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ACS Membership Moves

The Australian Computer Society has taken one of its most ill-conceived steps to date by restricting membership to those with professional qualifications in computing. Readers may remember my tirade against this plan some two years ago, when I pointed out that the ACS was in danger of alienating many computer professionals.

Computing, like mathematics, is a handmaiden to other sciences and professions. Programs to help solve problems in any field of endeavour are best written by a professional in that field, and this concept has been extended to less 'professional' areas, such as management, with the trend to so-called 'end user computing'.

Many computing professionals began their careers as engineers (civil, chemical, mechanical ...), doctors, accountants, scientists or managers, and have no formal computing qualifications. For all that, their experience of business and other professions, together with their knowledge of computing (gained either in courses or through experience), makes them just as capable — and often more so — than those with pure training in computer science.

Computing is being taken out of the hands of the professionals. Personal computing, end user computing, IBM's information centre concept — all are designed to reduce reliance on the 'high priesthood' and put computer power in the hands of the user. The ACS's step therefore moves against the current trend.

I could only support this move to upgrade the professionalism of the organisation if the ACS

were to encourage membership of unqualified but experienced professionals by examination. Those who entered computing after formal training in some other profession should not be penalised. In particular, the ACS's Professional Development Seminars, many of which cover basic topics such as systems analysis, should either count towards the membership requirements or should be dropped, since none of the members could possibly benefit, having already completed such courses.

In addition, if the ACS is to pursue this course it must undertake activities to support its members' professional standing. I would venture to suggest much of the DP consulting work in Australia is being carried out by accounting firms rather than DP consultants. As these firms have expanded into new areas - DP consulting, management consulting, publishing, seminars, market research and others — they have continued to defend their own ground. An Australian Society of Accountants ad could run as follows: 'To be a doctor you have to be a doctor; to be a lawyer you have to be a lawyer; to be an accountant you have to be an accountant; and to be a computer consultant, you have to be an accountant.'

Until it can claim to represent the majority of qualified computer professionals in Australia (qualified in whatever manner), and until it can claim to represent their interests as aggressively as the accounting bodies, the ACS is progressively going to lose members in a growing industry.

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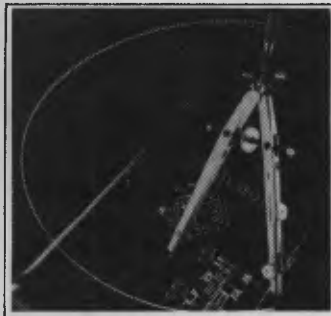
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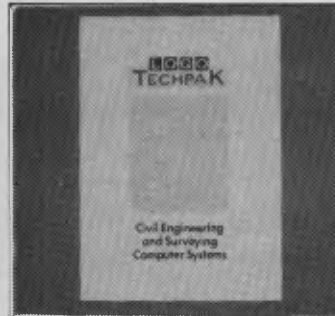
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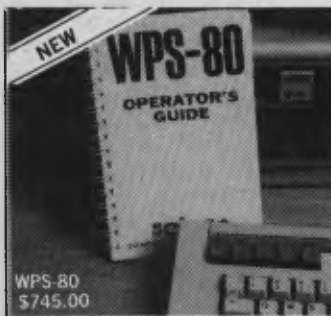
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FAKE APPLES MEET BAD END

Apple Computer Australia has been waging a campaign against vendors of Apple-compatible clones which violate Apple's copyright. Since the company's battle against the Wombat in 1984 and the subsequent amendments to Commonwealth copyright laws, the company has successfully settled 14 cases in the Federal Court in recent months. A further six cases are under way and Apple is investigating four more dealers in Sydney and Victoria.

IN RECENT raids in Sydney, Apple's lawyers confiscated machines containing copyright material from a number of computer dealers. The copyright laws apply to anything which "embodies copyright material", so while the hardware itself does not contravene copyright, the programs in ROM do. The company's campaign against fake Apples has met with a deal of success, and these recent raids are part of a long-term battle.

David Strong, Apple's managing director, said of the campaign, "Up to nine months' notice in writing has been given to each vendor and we have never pursued enormous damages payments. We simply demand cessation of the activity, recovery of our costs and forfeiture of profits related to sales of fakes." He added Apple's main objective was to protect its customers: "Purchasers of clones frequently find they are stuck with dubious copies of operating systems Apple upgraded three years ago."

Purchasers of clones can be affected in other ways. In one of the

recent raids by Apple's lawyers on a Sydney dealer, owners of clones taken to the shop for servicing found their machines confiscated along with the dealer's machines. Apple believes there is no doubt the law upholds it in these circumstances, but such action certainly places the individual purchaser in a difficult position.

Although Apple is sympathetic to people who find themselves caught in this situation, the experience can be fairly harrowing. Ewart Stronach was one of the small fry caught in Apple's battle against the clones, and his account of the imbroglio uncovers Apple's techniques in catching the dealers involved, as well as sounding a warning for others who possess a less than genuine Apple.

An Apple by Any Other Name ...

Settle back, dear reader and read on. But first, if you have an Apple clone, nip out the back and remove the ROMs.

My story started, unknown to me, with the visit to a certain and, may the proprietor forgive me, insignificant computer sales and repair outlet that lurks behind a florist shop in sunny downtown Botany. I use the term insignificant in relation to the size of the operation compared to the monolithic Apple Corporation.

Some weeks ago a tall dark stranger entered the little shop and enquired about some new hardware. "Will it run my Apple software?" he asked. "Of course," replied our proprietor. "May I try my disk in it?" asked the stranger. "Of course," replied our proprietor. By now you will have gathered our proprietor is the kind of man who will do anything for a friend and any potential customer is automatically a friend.

Our customer put his disk in the drive, punched reset and the drive burst into life. It whirred and searched and came back with the screen message DISK ERROR. Our puzzled proprietor made conciliatory noises but the stranger took his disk and left. What he left with was a complete copy of the ROMs — and without so much as a 'by your leave'.

Shortly after, I sent a TEC I computer to Botany for repairs, because our friend knows all about Apples and a TEC I bears an uncanny resemblance to an Apple. He repaired the machine which, incidentally, a large retail chain closely allied with Apple had failed to do, and called me to arrange its return. Later that same day he called again to say that the mystery stranger had reappeared bearing a piece of paper emanating from the Supreme Court of New South Wales. This innocent piece of paper allowed him to:

"Remove into the Plaintiff's Solicitors' custody all computers, silicon chips and other articles which reproduce or embody reproduc-

tion of the works or any of them which appear to the said employees of the Plaintiff's Solicitors to do so."

Armed with this all-powerful document he proceeded to remove any machine bearing a more than passing resemblance to an Apple, including a certain TEC I, partially disassembled, from the workshop bench.

This news of the sudden loss of a valuable piece of hardware sent shockwaves all the way down to my CPU. As an indication of my extreme anger, I reported the computer stolen to the local branch of Sydney's Finest. I then endeavoured to contact the confiscating solicitor. It was not until the next day I succeeded and words were exchanged. I asked why he had seen fit to take the TEC I, as it was not being offered for sale and was not even of the same brand as those which were being offered. He said he took it because he thought it had an Apple ROM in it. I asked if he had taken the proprietor's car, since I'm sure there was an Apple ROM in the glovebox. He failed to grasp the depth of my logic, but finally agreed to return the TEC I, minus the ROMs, on proof of ownership. I was callow enough to suggest he just send back the empty box for all the good that would be, but as the basic principal of debt collection is to take whatever is offered and chase the balance later, I agreed to collect the property.

I then rang David Strong, general manager of Apple in Sydney. Mr Strong, while not totally sympathetic to my cause, proved very reasonable to deal with. He suggested it was not Apple's intention to penalise individuals, and if I recovered the computer and brought it out to Ryde he would arrange fitting of an original Apple ROM set free of charge.

Meanwhile our erstwhile proprietor, suffering, no doubt, from a dreadful case of the 'I'm Going Bankrupt Blues', had settled out of court. The settlement was based on the recorded number of clones he had sold (not many, I might add), plus a moderate punitive settlement. It is possible he might have fought the case on a couple of points. The computers were imported before the well-known Apple-versus-Edge case and there was some doubt as to the actual ownership. Nevertheless, a repair shop big enough to live behind a florist shop in Botany is seldom big enough to bear the cost of extended litigation, funded by people big enough to put a four-colour brochure in your evening paper.

My final visit to the solicitor was warily amicable and I received the TEC I back complete with original ROMs. As I sat in the deep leather lounge on the 50th floor I gazed out over Sydney and wondered how many lost sales due to clones it would have cost to retain such watchdogs.

I have no doubt Apple was totally right in the seizure of anything being offered for sale, despite the fact the outdated IIC can by no stretch of the imagination be called a force in the current market. I and my solicitor agree the organisation exceeded its brief in confiscating personal property, legally imported from a country which is not party to the international copyright laws. The computer was legally imported and duty paid on entry to Australia.

Had Apple offered its computers at a reasonable price in the first place, there would have been considerably less temptation either to copy them or buy a copy. The people who bought such copies, particularly on overseas visits to countries not party to the copyright agreement, should run only the inherent risk of not being able to get service from Apple dealers, not the risk of having their computers seized and the consequent inconvenience and expense of recovery.

I further feel the very few who purchase such machines on a price-only basis would not in many cases have been able to afford a real Apple, and Apple Corporation, while it never got the original sale, still stood to gain software sales to an otherwise non-existent market.

Where should it all end, Dear Reader? Should we burn our TEC Is, our Wombats, our Redstones and our unbranded Apple lookalikes? I don't feel so. International copyright is a complex business and I feel traders who care to run the risk of building or importing a product (often as well or better built than the original, and at half the cost) deserve to succeed, but must bear the consequence if caught.

Apple has demonstrated the consequence. Despite the company's legal rights, the exercise is terrible PR. It will be a long time before I consider buying a Real Apple. □

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DR FINDS PARTNERS

Digital Research Inc's financial future is looking more secure with the recent announcement of two new corporate partners.

Northern Telecom and Motorola (US-based) have signed agreements to purchase minority equity interest in DRI. DRI's founder and chairman, Gary Kildall, said the agreements signalled a vote of confidence in the company, and the investment would provide support for the continued development of GEM and the Concurrent DOS family.

Kildall stressed the agreements provided for minority investment in DRI and were not steps towards acquisition. The agreement limits the two new investors to minority shareholding in the company, with neither company taking a seat on DRI's board.

"Approximately six months ago we decided to bring additional capital into the company, to ensure it had adequate reserves to continue its future software development efforts, and to aggressively market the excellent new product lines we have developed over the past 12 to 18 months," said Kildall. "We elected to work with some of our strategic OEM (Original Equipment Manufacturer) partners, and approached Northern Telecom and Motorola first because we had long-term strategic relationships with these two companies, and because they have been interested in DRI's newer technologies. We mutually selected a minority equity as the most productive and least interfering with DRI's ongoing development and business plans".

TAFE STUDENT WINS PRIZE

A Sydney Technical College student has earned \$5000 for himself and \$50,000 for his college's computer facilities by winning the Digital Equipment Corporation's prize for studies in computing.

Leopold List won the prize for his program 'RAPID — System' (Remote Access Product Information and Display System). Digit-

al's national competition was open to tertiary computing students and its emphasis was on the originality and commercial potential of the entries.

The college prize will be used to enhance existing Digital facilities at Sydney Technical College. Leopold has been a student at the college since 1983, enrolling originally in the introductory Data Processing Concepts course and subsequently progressing to the full-time Data Processing Certificate Course.

His winning entry is a system which allows the running of selected programs for demonstrations and/or tutorials, such as computer-aided-instruction, and the setting up of information screens and control of user access. Its benefits include instant access to information and advice about company products, a reduced need for direct contact with product representatives, on-screen and printed report layout generators and significant cost savings. □

CD ROM CONFERENCE

Microsoft Corporation has announced it will sponsor the first international conference on CD ROM (compact disk read only memory) technology. The conference, scheduled for March 3-6 this year, will be held in Seattle, Washington, and is expected to draw participants from all over the world, including Australia.

The conference will feature sessions and presentations from major companies, influential authorities and experts who are actively developing new products and technology in hardware, systems and applications software, and publishing industries.

It is expected participants will leave the conference with a working understanding of CD ROM technology. Chairman of Microsoft, Bill Gates, said the conference should serve as a catalyst for integrating CD ROM technology into personal computers.

Some of the topics to be covered are:

- An introduction to CD ROM: the basics.
- CD ROM software applications — how will the new technology

affect traditional computer applications?

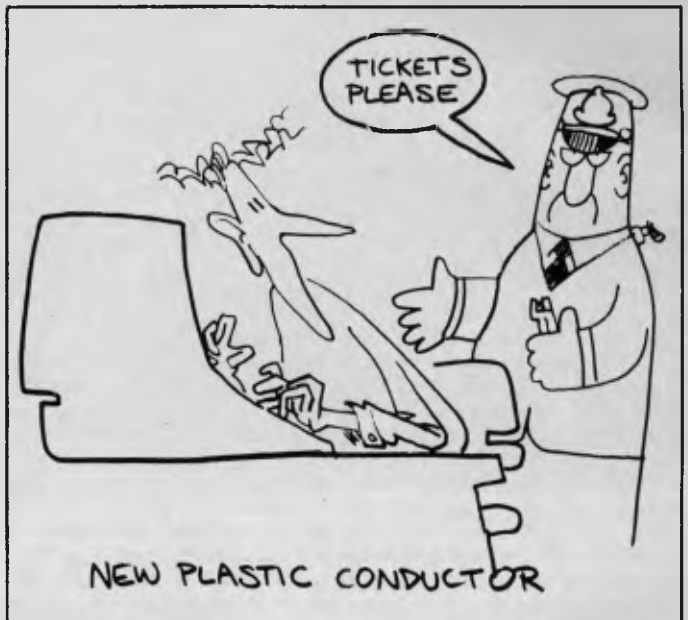
- Videodisks and CD ROM.
- CD PROM and CD ROM: a compatible WORM drive (sounds enticing!).
- The varieties of retrieval software.
- Distribution, security, encryption and licensing.
- From the printed word to digital ROM: a how-to session for publishers.

Anyone wishing to speak at the conference should submit a 250-word summary of their intended presentation to the organising committee via Burson-Marsteller in Australia (19th Floor, 1 York Street, Sydney 2000). Conference registrations can also be made through Burson-Marsteller by phoning (02) 27 3571. Cost is \$US799 until February 1. After that date you'll have to pay \$US899. □

Organic Solids and the Department of Physics at UC Santa Barbara.

Polyisothianaphthene, or PITN, is one of the earliest products from the new field of molecular engineering and represents a significant advance in the state of the art. Synthetic polymers, commonly called plastics, are made by linking a large number of identical chemical building blocks, called monomers, into long molecular chains (the first of these polymers was celluloid, created in 1868).

Others have been developed since then which have a number of useful characteristics, including light weight, pliability, moldability and electrical insulation. However, the idea of a plastic which could exhibit the electrical, optical and magnetic properties characteristic of a metal was considered a complete contradiction in terms, and it is only recently




NEW PLASTIC CONDUCTOR

A plastic that is both transparent and a good conductor of electricity is something many scientists had considered physically impossible. But now a new polymer with those characteristics has been designed, synthesised and characterised by researchers from the Institute for Polymers and

that such materials have been discovered.

What appears likely to be the first product made from a conducting polymer is a light-weight plastic battery. PITN, with its additional property of transparency (in fact, it is electrochromic, and will change from dark blue to transparent when its electrical state is changed), is a likely candidate for use in computer displays; while liquid crystal displays (LCDs) have a problem with



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NEW RSI STANDARD

The Standards Association of Australia is seeking comment on a proposed new standard providing recommendations for preventing the occurrence of repetition strain injuries in the occupational environment.

The proposal — DR 85356 Pre-

vention of Repetition Strain Injuries — was prepared at the request of the Human Factors Committee under the supervision of the Safety Standards Board, in order to provide the basic principles for assisting management and staff in preventing the occurrence of soft-tissue disorders.

The draft describes the hazards associated with the type of work performed and provides details for work organisation, training, planning and design of appropriate work systems. It is hoped the final standard will provide recommended methods of work organisation which will assist in the reduction of hazards and safeguard the physical well-being of workers.

Single copies of the draft can be obtained free of charge from SAA offices in all state capitals and Newcastle. Comment should be received by the Association by January 31. □



DU PONT AND PHILIPS CD VENTURE

The Du Pont company and N.V. Philips of the Netherlands are to form a joint venture which they claim will become the world's pre-eminent supplier of optical disks.

According to the two firms, the market for these disks is expected to exceed \$US4 billion by 1990. Du Pont and Philips will combine all their existing compact disk (CD) and high-density information storage disk operations to manufacture and supply disks for all CD markets.

"From its inception in early 1986, the new company will be the world's largest supplier of CD for pre-recorded music", Gerrit Jeelof, vice president of Philips, said. "It will also be the world's most diversified optical disk operation, supplying optical disks for every audio, video and data market."

In New York, Du Pont vice chairman Edgar S Woollard Jr said the undertaking would be the largest non-energy joint venture in Du Pont's history and underscores the company's intent to enlarge its participation in electronics.

According to Woollard the new company will have unmatched technological, manufacturing and marketing strengths. Initial assets of the enterprise will include the world's largest CD manufacturing facility in Hanover, West Germany; an operation at Blackburn, England; an existing high-density optical disk development facility near Wilmington, Delaware; a development facility at Eindhoven, the Netherlands; access to all optical disk research at both Du Pont and Philips; and sufficient infusion of capital for initial operations.

By 1990 the venture is expected to have capital investment of more than \$US500 million, a \$US60 million annual research and development program, and about 3500 employees at several

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MICROBEE GOES PUBLIC

Microbee Systems Limited, once known as Applied Technology, is going public with a float of over 7.5 million ordinary shares.

Owen Hill, founder of the company, will hold approximately 45.2 per cent of Microbee systems' shares, with Citicorp Capital Investors holding a 5.4 per cent equity after the float.

"The purpose of going public is to raise working capital for our expansion programme, which includes product development, research and the extension of Microbee Technology Centres throughout Australia and New Zealand," said Mr Hill. "We have high hopes for a data communications computer, which will offer the user input to services such as banking and shop-

ping from home, dealing in securities and access to a wide range of information."

Microbee Systems has been one of the success stories of Australian computer manufacturing. The Microbee kit computer was first introduced in 1982. Three months after its launch, the New South Wales state school system approved the Microbee for educational use, a decision which was followed in quick succession by approval for educational use in Western Australia, Queensland, Victoria and by the National Schools' Commission.

In 1983, Microbee opened a factory at Gosford, NSW, to put its colour Microbee on the market, and in November of that year the company started exporting to Sweden, a market which now accounts for 13 per cent of total sales.

More than 50,000 Microbee computers are now used worldwide, and the company is opening new premises at North Ryde to keep pace with growth in both its home and export markets. □

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AMERICAN GRAFFITI

BY HOWARD A. KARTEN

SOFTWARE KNOCKOFFS

When microcomputers were born and began to proliferate just a few years ago, it was something of a watershed for businesses and consumers: from that point forward, low-cost computing power was available to everyone. Another revolution seems on the verge of breaking out today: the software revolution, with low-cost (but fully featured) software available at under \$US100.

Database software is an excellent example. Database management is one of the functions most heavily in demand in business: the success of integrated packages such as Lotus 1-2-3, as well as less integrated packages such as dBase II, attests to that. Perhaps not so ironically, it is the very success of those packages that has created a demand for low-cost, knockoff software.

In the dress business, knockoffs are low-cost, lookalike copies of much more expensive dresses, such as designer originals. Unlike dresses, software can be copyrighted, of course, but only the specific processes — how the database software actually performs its task — are protected. The structure in which data is stored, and the commands used to manipulate data, cannot be protected.

Thus, most computer users — businesses as well as individuals — usually prefer to stick with the products they know and have learned, and which have become *de facto* standards within their companies. There is also a reluctance to switch to any new database software if it will mean having to convert existing databases to a new format.

New users sometimes expect software to be inexpensive compared to the cost of hardware, and

are taken aback at the high costs of the 'brand-name' products. Thus, 'workalike' database software fills a niche created by the success of the pioneer products!

In the United States several companies are now attempting to fill this need: Borland's Reflex sells for \$US99 (list), and at least two other vendors are selling database products for under \$100.

One of those is Practicorp International, of Newton Upper Falls (a Boston suburb), Massachusetts. The company's \$69 relational database package, Practibase (for IBM and compatibles) "is a dBase II knockoff," admits Mark Sprague, product manager for Practicorp. According to Sprague, Practibase's command structure exactly duplicates dBase II's, as does its storage structure.

Moreover, Practibase has menus, which can be bypassed, and according to Sprague, "the average novice can get into it in 10 to 15 minutes."

The concept certainly seems logical, perhaps even viable. But can it actually sell? Adam Osborne's second shot at fame and fortune in the computer industry, via low-cost 'paperback' software, "met with less-than-enthusiastic reviews," notes Sprague, with Osborne's file manager "heavily panned in the review press, despite the fact Osborne had the press's ear."

There are other issues as well. For example, a \$US70 price makes any database package unattractive to retailers, because of the low profit margin, and leaves little room for the user support which is so often necessary for success. To combat these problems, Practicorp is selling its database directly, and may eventually charge separately for support, although support is currently bundled, free of charge, with

Practibase.

Whether low-cost database software will ever spread in a significant way to non-IBM machines is a great unknown. Unlike word processing, database management is an almost quintessential business function — and non-IBM machines, such as Commodore or the Macintosh, have not made significant inroads into business. Thus, developers have little incentive — because of the small potential market — to develop low-cost software for those machines.

COMPUTER FORTUNES

Speaking of databases, every fall, *Forbes Magazine*, possibly the USA's most prestigious business magazine, publishes a database of the 400 richest Americans. Although this exercise may strike some as gauche, and/or typically American, it nevertheless attracts considerable interest — not the least for the number of computer-related personal fortunes which have been made.

This year we find William Hewlett, co-founder of HP, who usually seems to make the list, has a net worth estimated by *Forbes* to be around \$US780 million. (Although co-founder David Packard's name comes second in the company title, his personal fortune is estimated at \$US1500 million). Computerland founder William Millard's estimated net worth is around \$US480 million; Intel's Gordon Moore, who had a hand in the paternity of integrated circuits and so might be considered the starter of modern-day computing, is worth around \$US220 million. The real father of the computer industry, Wang Laboratories' CEO An Wang (he invented core memory as well as

founding Wang), has also been rewarded appropriately for his pioneering work: he's on the list at \$US715 million.

Does anyone remember Max Palevsky? He founded Sigma Systems 15 or 20 years ago, and later sold it to Xerox (which subsequently killed it) — he's worth \$US200 million. Howard Vollum of Tektronix is there at \$US190 million.

This year's setbacks in the computer industry caused a decline in the size of several computer-based fortunes: Apple CEO and original bankroller A.C. Markkula's net worth dropped precipitously (although he probably still has enough left to buy a Mac or two), as did Steve Jobs', late of Apple. Missing, after previously making the list, were Phillip Hwang of Televideo and Sri Tandon of diskmaker Tandon Corporation.

One of the odd things about the list is the absence of names from old-line computer makers. Although Digital's Ken Olsen is there (at \$US160 million, down from a previous high of \$US235 million), we didn't spy any Burroughs, Sperry's, Opels, Akers, Watsons or other famous names from American computer history.

COMMODORE'S LOSS

Commodore International Ltd, which earlier this year introduced the Amiga, posted a loss of \$US39.2 million in the first quarter of fiscal 1985-86. The loss follows a \$US124 million loss for the previous quarter, which caused company auditors to issue a "qualified opinion" about the company's financial health. Company officials attributed the losses to the costs of introducing the

Amiga and Commodore 128. For the fourth quarter of 1983-84 the company had a profit of \$US33 million; and for the first quarter of the previous year it made \$US28 million.

DISTRIBUTION CHANNELS IN FERMENT

Engineering, sales, marketing, planning, and other key departments of computer industry companies are no longer unique in having to cope with rapid change and new methods of doing business. Other departments have lately begun to feel some of the upheaval that has long bedeviled major business functions.

A significant change on the business scene is the recent opening in San Francisco of the

Microcomputer Inventory Exchange. Briefly, the Exchange will act as a broker between manufacturers caught with large amounts of inventory on their hands, and large institutional buyers who wish to make bulk hardware purchases; no software will be handled. MIX's commission will be 10 per cent of the value of every transaction. This move has already caused some alarm among retailers and dealers, concerned about issues such as price, service, guarantees, and inadvertently being forced to compete with themselves.

Another approaching change in traditional methods of doing business was highlighted recently at a forced auction held at Seequa Computer Corporation in Maryland. One of the items for auctioned was 240 copies of Wordstar 3.3, which Seequa had purchased under an OEM agreement. The successful bidder, Cy-

cle-Recycle Co of Waynesboro, Virginia, plans to sell the \$US350 (list) package for \$US119.

In question is whether Micropro (vendor of Wordstar) will provide telephone and written technical support to eventual single-copy end users. Although there is really no question the 240 copies are all legitimate, Micropro's sales contract with Seequa apparently puts the burden of end-user support on the latter. And reports out of Micropro on its policy are contradictory.

In short, it looks like once again, past industry history - what little of it there is - will not be much of a guide for the future.

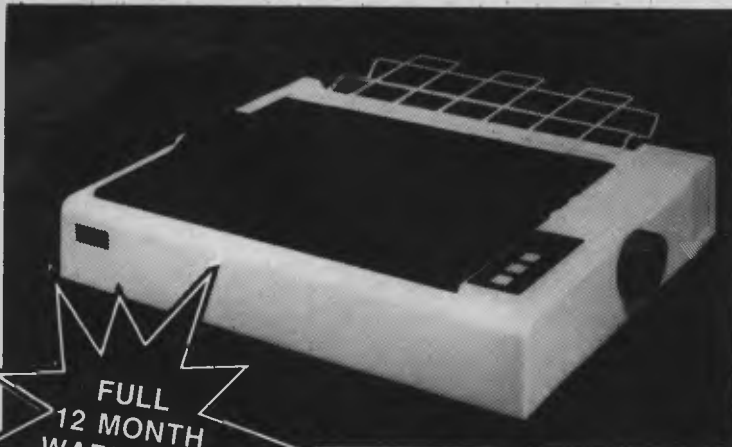
INTEL ANNOUNCES 32-BIT 80386 CHIP

Intel Corp, maker of the famed 8086 and 80286 chips which pow-

er IBM PCs and clones, recently announced the 32-bit 80386 microprocessor, intended to be the successor to the 80286. The new chip has an impressive speed - it will process a maximum of four million instructions per second (4 MIPS), and can directly address an astounding 4 billion bytes of memory. This makes it suitable for micros with virtual memory architecture, as well as upwardly compatible with the earlier members of the Intel 80X86 family.

The new chip, expected to become available in mid-1986, can also simultaneously run different operating systems. This makes it ideal for multi-processor or multi-programmed systems. Presumably, the chip will soon be available in limited quantities to buyers, which means commercial products employing it might be available as early as Christmas 1986. □

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The one modem now enables access to bulletin boards operating at 300 baud, Videotex services such as Telecom's Viatel at 1200/75 baud, as well as Packet Switching Networks including OTC's Midas and Telecom's Auspac at 1200 baud full duplex. In addition, the 2400 baud full duplex facility will enable high speed

point to point file transfer, and access to data bases that will soon be upgrading to the new V22bis facility. This single, sophisticated modem supports auto-dial, auto-answer and auto-disconnect.

Another NetComm first!

The NetComm SmartModem 1234 is out on its own, and offers the business user the potential for significant reductions in telephone charges. It can be driven by most communications software programs, and connection is directly to a standard telephone socket. Ordinary stuff for an extraordinary performance!

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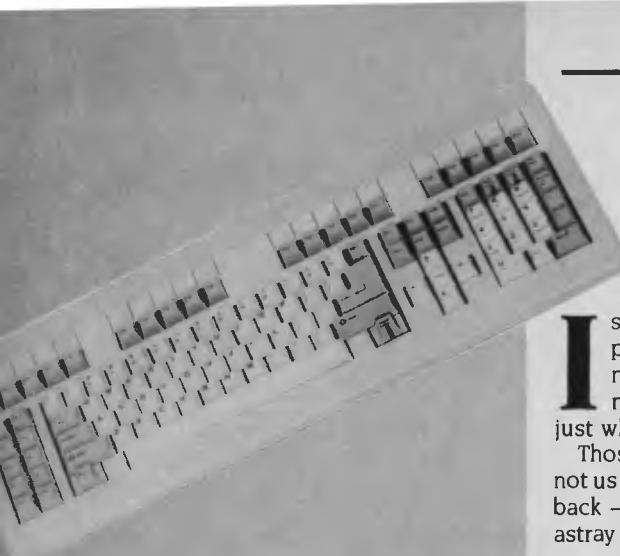




DUELLING ATs

What is the hottest machine on the desktop? These days the major contenders for that title are IBM and its clones, with the first serious attempt to put supermicro power in front of a single user: the Intel 80286-powered AT. Matt Whelan took to a brace of AT lookalikes with ruler, scales, quality gauge and stopwatch in hand to find out just how they tick — and which one ticks the fastest.

Duelling ATs



Is four times as fast worth twice the price? Is four times as fast even necessary? Is the power of a super-micro too much for one user, or is it just what we've all been waiting for?

Those questions are for you to answer, not us (we're biased power freaks from way back — we might lead you even further astray than a computer salesman). What we can tell you is where to put your money once you've decided that power is the way to go.

Yes, you can have a two to four times speed improvement over your bread-and-butter IBM PC with the latest desktop generation, the AT 'and friends'. You can also have many variations on the theme, from extra performance and features to lower cost.

The choice is wide — the high price of IBM incompatibility is a lesson that seems to have been learned well by the major manufacturers. Companies which sat and watched the IBM PC for years, hoping it would go away (or at least considering it irrelevant), now understand the micro game is played by IBM's rules.

The rash of AT clones came hot on the heels of the IBM release; nobody is wasting time being left behind in the marketplace this time. And we're seeing some benefits of the IBM leadership, because the opposition knows from experience it has to do it better to compete. The consumer wins.

WhAT's Around?

We started with quite a list of AT-compatible possibles for the comparison but, as usual, a few of the announced machines were 'not quite ready for review' (or, we imagine, sale).

One or two others we know *are* available were promised; we've been left to make our own assumptions on why they didn't arrive.

Several more AT competitors are due by the time you read this, but specifications and details were all that existed in Australia at the time of writing. We've listed for your information many of those we know are coming, but don't mistake that for a comment on their performance or quality.

We came up with five serious contenders and one 'ring-in' for the test. The ring-in was Triumph-Adler's latest machine, the P50. It came with two floppies, which put it at an immediate disadvantage against the hard-disk ATs; a bigger disadvantage was its 80186 processor — while it's significantly faster than the 8088 of the IBM PC, it

can't run with its own bigger brother, the 80286 fitted to the AT.

The GladiATors

Now let's look at the serious contenders:

IBM PC AT: The standard-setter and, as usual with big, safe IBM, not quite state-of-the-art. Any other company which sat down to design a machine such as the AT would have allowed for a higher-speed version of the 80286 processor (one was released before IBM launched the machine, another has appeared since) and a bigger hard disk (20 Mbytes really is paltry in these days of low-cost mass storage). The design of the AT is impressive, however: a fast and capable machine with enough power for several users, it retains PC compatibility to give itself instant software support and an easy path to dominance in the power market.

Compaq Deskpro 286: A company founded on IBM compatibility, and very successful because of its early recognition of the significance of the IBM PC, Compaq is usually the only name you'll see alongside IBM's on the cover of hardware-dependent software packages ("For IBM PC, Compaq, and close compatibles"), so close is its design. Naturally Compaq was very quick to take up the AT challenge; it was just as quick to turn its machine into the one IBM should have designed. The Deskpro 286 has a high-speed 80286 (but you can slow it down to IBM speed for full compatibility when needed) and a 30 Mbyte drive (still not enough, perhaps, but an improvement).

Texas Instruments Businesspro: TI has learned the hard way that doing it better doesn't necessarily guarantee success, so this time it has tried to do it the same *and* better at the same time. Its machine offers two variations on the built-in 'IBM AT mode' — a TI PC-compatible mode, with its excellent high-resolution graphics, and a turbo mode, in which it runs its processor flat out, without wait states.

NCR PC8: The 'cash register company' makes nice computers, and the PC8 is an impressive device. It isn't a straight compatible, either — like many of the big companies opposing IBM, NCR realises you have to do more to compete with 'the name'. The PC8 has keyboard enhancements and the latest, fastest version of the Intel processor fitted for its little piece of one-upmanship.

Kaypro 286i: After avoiding 16-bit machines and PC compatibility for long enough to endanger its health, Kaypro is

Duelling ATs

getting into the IBM swing of things very nicely now. The 286i is the closest of the machines reviewed to being a straight clone, relying on a software bundle and a low price for its edge over the others.

Against The StopwATch

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's where we started our comparison.

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 benchmarks. Benchmarks can be misleading, 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 pre-

vious 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 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.

- **DOIT2** — A test of transfer speed on the hard disk alone, this one moved around 700 Kbytes of files from one subdirectory to another (about 2 Mbytes of data separated the subdirectories).

We measured each machine several times on each test, and drew up a chart of the results. Then 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, the others were given points that amounted to their time expressed as a percentage of the winner's.

We had the NCR machine for a short time only, and missed two tests (DOIT and DOIT2) on it. We also missed DOIT2 on the Texas Instruments machine in turbo mode. For the sake of the final ratings we've left these two tests out of the overall point-score although the times are included in the results chart.

All the machines were set up as similarly as possible for the tests. Their hard disks were formatted (after we backed up the mess of files that came with two of the test machines) and loaded with exactly the same files, in the same order. We ran the tests in the same order on each as well. If the machines were identical, they should have produced identical results.

They didn't.

ATvanced Performance

One thing is certain — these machines really get going. They're faster than any personal computer we've benchmarked so far, by a long way.

For example, the standard IBM PC runs the BBBMARK test in 23.5 seconds; the AT does it in nine. The PC takes 14.6 seconds for the Sieve, while the AT rushes through it in 4.89 (and the fastest machines on our

tests ran it in 3.64!).

So which was the quickest of our ATs? The scoring system comes up with an overall performance winner, but three of the machines excelled on test.

The NCR, the Compaq and the TI each won their share of the performance tests, clearly outpacing the IBM and its slavishly similar clone, the Kaypro. The performances of the NCR and the Compaq were expected — both run the higher-speed 8 MHz 80286 — but the TI's figures, obtained from a 6 MHz chip, were a pleasant surprise.

Interestingly, the Compaq and the TI were also the slowest machines tested — both have two speeds, and in their slow modes they came in slightly behind the IBM and Kaypro.

Full details of each machine's performance on the tests can be seen in the charts, but it's worth a closer look at some of the results:

BBBMARK: This test separated the machines into two distinct groups, but was otherwise inconclusive — the times were too close. Any slight errors in our manual timing of the tests could have accounted for the differences — usually only a tenth of a second — between machines in each group.

The Compaq won this one at 6.9 seconds, ahead of the NCR at 7.0 and the TI, at 7.3. The second grouping came in at around 9.1 seconds, giving a fair indication of the difference between the two versions of the 80286.

We couldn't understand why the IBM was, initially, more than a second slower on this test; it turned out to be the BASIC interpreter. Anyone who has tried to run IBM's BASICA on a lookalike will know it usually fails — that's because it uses routines contained in the IBM ROMs. Going to ROM, which has a slower access time than RAM, may save on memory, but in a machine this fast it costs you time. Under IBM's BASICA the AT ran this test in a disappointing 10.2 seconds; it trimmed that to 9.1 when we used a copy of the Compaq BASICA.

Our ring-in, the Adler, ran through the loop in 12.2 seconds, respectably close to the AT and well ahead of a standard PC's 23.5.

CBSIEVE: The Sieve benchmark usually involves timing 10 iterations of a loop which finds prime numbers up to 8190. We ran it through 100 iterations and divided the results by 10, simply to reduce the

Duelling ATs

THE OTHER ATs

There will be at least six more AT lookalikes on the market by the time you read this — and that's not counting the badge-engineered clones which will swarm out of Taiwan into small distributorships and computer stores.

Most of these will be direct copies of the IBM, offering little difference except for the price.

Here are details on a few of the machines which were announced, but not shipped, before we went to press:

Osborne AT: Osborne Australia expected to land its Taiwanese-built AT in December. It's a straightforward clone, with a 6 MHz 80286, 512 Kbytes of memory (expandable to 3 Mbytes), a 1.2 Mbyte floppy and a 20 Mbyte hard disk. The specifications say it has a standard three-user LAN, compatible with PC-Net, Transnet and other high-level LANs, although we'll have to wait and see exactly what that means. It has eight expansion slots, serial and parallel interfaces and comes with MS-DOS as standard. The Osborne comes with six months' warranty and is expected to sell for less than \$7000. Contact: Osborne Australia, 93 York Street, Sydney 2000; (02) 290 1122.

VT-AT Master: Assembled in Australia by Sydney company Video Technology, this machine is made from components imported from the United States, Japan, Singapore and Taiwan. Its 6 MHz 80286 is upgradable to 8 MHz, and it carries a megabyte of memory on the motherboard. The 105-key keyboard has a separate cursor-control pad and the video cards supplied are aftermarket units from Amdek or Hercules. In other respects its specification is very close to that of the AT. Options include a 3 Mbyte multifunction card with two serial ports and one parallel port plus a games port, a 40 Mbyte hard disk and the 8 MHz processor. The operating system is MS-DOS 3.0, warranty is one year, and price for the base

model is expected to be \$6500. Contact: Video Technology, PO Box 181, Peterham 2049; (02) 569 3015.

PHD AT: The PHD (Perito Holdings Design) is another Sydney-built machine with some interesting variations. It runs a 6 MHz processor with zero wait states for its one megabyte of on-board memory. According to Perito, the PHD uses a sophisticated virtual machine emulation approach to resolve the 80286/8088/PC/XT compatibility problem. Instruction set incompatibilities between the 8088 and the real mode 80286 are eliminated by a powerful custom-designed processor circuit which monitors 80286 execution and traps any incompatible instructions (so they can be emulated virtually). EPROM code execution is protected — if a 'user mode' program (application or operating system) attempts to call or jump into the EPROM-resident BIOS, execution traps to a virtual machine routine which emulates the equivalent IBM PC/XT BIOS service. This 'virtual bios' approach makes it possible to provide a 100 per cent IBM-compatible BIOS without having to be concerned about possible copyright violations of IBM-proprietary object code. Prices are \$6400 for the floppy-only model and \$8400 with a hard disk. Contact: Perito Holdings, 2/170 Main Street, Blacktown 2148; (02) 622 2793.

ITT XTRA XP: The XP is sold as an IBM PC XT-compatible, yet is claimed to provide a significant speed improvement over the AT. An Intel 80286 processor combined with zero wait state main memory makes the XP by far the fastest fully IBM PC XT-compatible machine around. The XP has 512 Kbytes (expandable to 640 Kbytes) of on-board RAM and an additional one megabyte of zero wait state memory is available via an expansion board. Contact: STC Business Communication Systems, PO Box 488, North Sydney 2060; (02) 925 7272. □

Top and Centre: Compaq's high-performance, quality Deskpro 286. Above: The ring-in, Adler's P50, wasn't in the same performance league.

Duelling ATs

chance of timing errors.

Despite our precautions, the results of this one would appear to have come out a little skewed — the TI shouldn't have won, even with the help of its turbo mode, but we have it fractionally ahead of the Compaq instead of fractionally behind. Just to be sure, we ran the test several times — the TI refused to be beaten.

The Sieve was another close one for the leaders, with a meagre six-hundredths of a second separating them. The TI's 3.64 seconds beat Compaq's 3.69 and NCR's 3.70, while IBM and Kaypro (and, of course, the non-turbo TI and the slowed-down Compaq) were out of the race with figures of around 4.89 seconds.

The Adler machine ran this one in 7.19 seconds, well ahead of the standard IBM PC's 14.6 but not quite mixing it with the 80286-powered machines.

LOTUS: The Lotus 1-2-3 tests were blitzed by the Compaq, which won all three stages, but it again had the NCR and the TI snapping at its heels.

The first test — loading the more than 300 Kbyte file — highlighted one interesting aspect of these machines' architecture: disk transfer speed pays little heed to hot-rod processors. All the machines on this test posted similar times, even to the extent that the TI returned identical figures in turbo and non-turbo modes.

However the recalculation test and the file save, both of which require some 'thinking', were again zapped by the Compaq, the NCR, and the TI. They were grouped around six seconds for the recalculation, compared to 7.6 for the slouches, and around 14 seconds for the file save, giving them a whopping margin of nearly 10 seconds.

dBASE: This three-stage benchmark is where the NCR ran away and hid from the opposition, exhibiting an unbeatable combination of CPU performance and peripheral speed.

It was almost pegged by the Compaq on the compute-bound stage 1 — the difference was one second in 280, so as far as we're concerned they were equal on that one — but in the other two stages the Compaq dropped its bundle, fading into last place.

This failure would suggest the Compaq's hard disk access speed lets it down, although from the other tests we can see that isn't a problem in the shorter accesses of the day-to-day work situation.

Stage 1 of this test again highlighted big differences between the fast processors

Design of the machines tested was, not surprisingly, similar. All except the TI follow the same basic layout established by IBM with the PC and continued in the AT — a system box with expansion slots at rear left, a power supply on the right, and disk drives in the front right-hand corner.

and the IBM 'standard', with nearly 100 seconds separating the fastest and slowest machines. Stage 2 saw the NCR come in a staggering 201 seconds ahead of the worst performer, the Compaq in its slowed-down 6 MHz mode. The IBM, Kaypro and TI in non-turbo mode were very close, while the TI moved into a comfortable second place once the boost was turned up.

On stage 3 the NCR posted another blinder, coming in 84 seconds ahead of the turbo TI and more than 200 seconds ahead of the slowest runner.

DOIT: Transfer speed from the floppy disks was a big equaliser, with some real surprises in the results — the TI romped home in turbo mode, thrashing the Compaq with 46 seconds compared to 62.3. The big shock was IBM, which came second with 57 seconds. If you want a floppy-only machine (I can't believe anyone would buy an 'engine' as big as the 80286 to drive 'wheels' as small as a floppy, but they do) then the TI or the IBM are probably the two to choose from.

ThAT Design

Design of the machines tested was, not surprisingly, similar. All except the TI follow the same basic layout established by IBM with the PC and continued in the AT —

a system box with expansion slots at rear left, a power supply on the right, and disk drives in the front right-hand corner.

Variations on the AT include the central power-on and hard disk access lights and a key lock which secures the system unit case and locks out the keyboard. The case is bigger and squarer than the PC's. IBM also added a neat cover panel for the usually untidy-looking rear of the system unit; when you're paying this much for a PC, you shouldn't have to put up with a shabby rear showing across your desk to visitors. The cover is held in place by velcro fasteners.

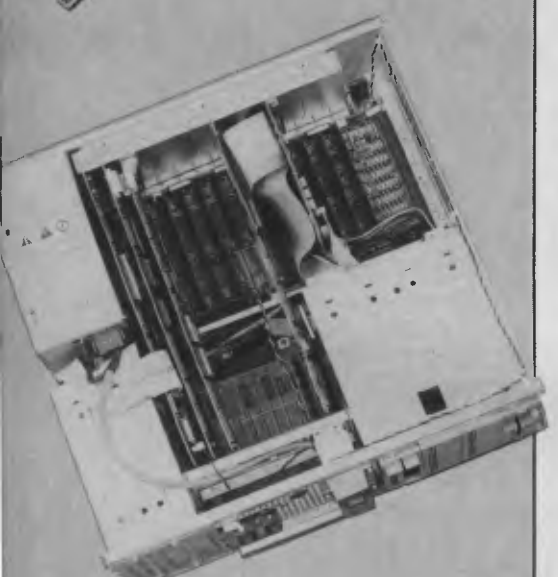
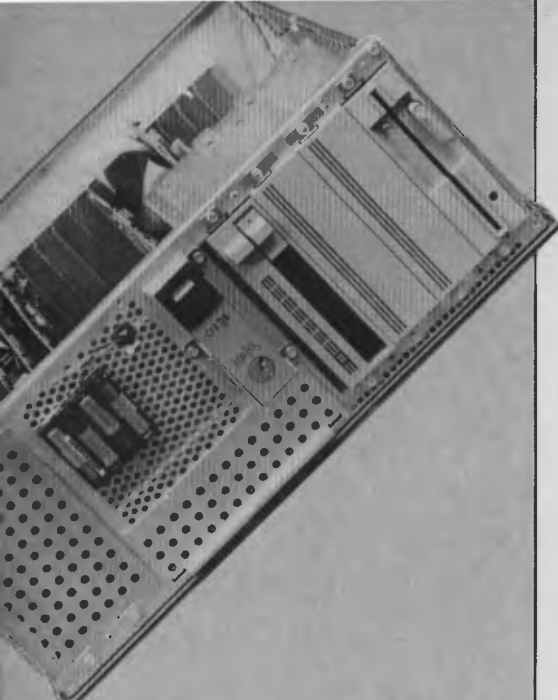
The IBM and the Kaypro are virtually identical in layout, while the others show slight variations. On the Compaq the floppy disk drive and the tape backup unit (standard on the enhanced model) sit closer to the centre of the front panel, with the hard disk in the right-hand corner. On the NCR, the keylock, volume control, power switch and lights sit behind a hinged door.

The TI is quite different, although it follows the same basic theme. First, it is obviously designed to sit upright beside your desk, rather than on it as a monitor support — a bolt-on stand is provided, 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 the other computers follow IBM in providing eight expansion slots, the TI provides 14. This external difference hints at some major internal variations — the TI is a cleverly designed machine, and can fit a whole lot more into the package than the others.

You don't even have to use the expansion slots when you want to 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 at the left. Optional full-height hard disks providing up to 72 Mbytes each would use the two left-hand slots, which still leaves room for three floppies and the optional cartridge tape backup unit. (Incidentally, the tape backup software provided with this unit is excellent, providing much easier operation and far more versatility than the software which comes with the Compaq or most other tape drives we've seen.)

Duelling ATs



The Texas Instruments Businesspro
— a design masterpiece.

The TI's packaging is clearly superior, and if you wanted one of these machines for multi-user operation this would be hard to ignore because of the extra expandability.

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

The keyboard is a work of art: beautifully sculpted, it has all the keys provided by IBM (and laid out the same way) plus an extra pad of dedicated cursor and control keys. It also has two extra function keys (for compatibility with the TI PC).

The remainder of the keyboard has a 'tiled' design — and if you lift any of the tiles (using the tool supplied, which sits in a slot of its own under the keyboard) you discover working key movements. Aha! You could move any of the keys to the position you wanted if you didn't like the standard layout. It's a brilliant concept, although the software to handle the necessary key redefinition doesn't yet exist. Oh, well ...

The IBM keyboard sets the standard the others have to follow, of course — and fortunately this time IBM has moved away from the ridiculous key layout of the PC to a more standard configuration. Unfortunately, however, IBM has again taken it upon itself to redefine the way the world will work by shifting the Escape key from the left top of the keyboard to the right-hand numeric/control keypad. Is it sheer arrogance, or are IBM's designers so distant from the real world they don't know any better?

Another addition to be thankful for is a row of three lights on the top right of the keyboard — indicators for Caps Lock, Num Lock, and Scroll Lock.

The NCR keyboard, like the TI, provides an extra pad of cursor and control keys so that the numeric pad can be used as such. It also provides a further 20 function keys (the first 10 are in the standard IBM location at the left of the keyboard) in a row along the top. Its indicator lights are in the keytops themselves — a more sensible approach.

The Compaq has a smaller keyboard than the others, although it manages to fit

a replica of the IBM layout without feeling at all cramped. It too has the indicator lights in the keytops. The keyboard plugs into the front of the system unit, not the rear — another sensible change from the IBM way of doing things.

The Kaypro has a duplicate of the IBM keyboard, but in a more ergonomically sensible case. It slopes down to a very thin edge at the front, with enough room to provide 'heel rests' for the typist's hands.

Height/slope adjustment on all the keyboards except the TI's is two-position — up or down. The TI uses another clever design to provide multi-position adjustment.

IBM's keyboard is probably the best to type on, with its positive feedback 'clack-clack' action, although Compaq's plastic keys have good action and simulate the IBM feedback with a subtle electronically produced keyclick.

IBM CompatIbIlity

One of the most significant questions for many users will be this: how compatible are the lookalikes with the AT, and how compatible is it with the PC?

Despite early criticisms of the AT's PC compatibility we found most things would run on it quite happily — and compatibility isn't really a big issue, because anyone whose package doesn't work on it has released (or will soon) AT versions of the product.

Our experimentation with various packages turned up two interesting observations: the AT's PC DOS 3.0 may be less PC-compatible than MSDOS 3.0; and Digital Research's Concurrent DOS 4.1 is probably one of the best compatibility tests you can find these days.

It may have been a one-off problem, but a version of Lotus 1-2-3 we tried would run under everything except PC DOS — we had to boot the AT under Compaq's MS DOS to run our Lotus tests.

More varied were the results of trying to run Concurrent DOS on these machines. We didn't get a chance to try it on the NCR, but had encouraging results on the IBM, the Kaypro and the Compaq. On all three it booted happily from a floppy, then worked problem-free through its automated hard disk installation.

Then came the crunch. Once we tried to re-boot it from the hard disk we had problems with the Kaypro and the Compaq; on the Kaypro it told us we had an 'Incompati-

Duelling ATs

ble ROM BIOS' and refused to run; on the Compaq it appeared to boot correctly, but once running couldn't find any files at all on the hard disk.

The TI's performance was less successful, but more entertaining. Trying to boot from a floppy, it would blank the screen after going through the load process and then seemed to crawl away and die. Once we happened to leave it running while we made the coffee and discovered that, after a few minutes of paralysis, it actually came up with the Concurrent sign-on. We selected the installation routine, after which it promptly died again. Strange.

DocumentAtion

IBM's documentation is good, without being spectacular. It can be hard to find the right information at times, and more technical information would be appreciated by some users, but generally the manuals are useful, meaningful and competent.

IBM provides two manuals in the bookshelf-sized slipcase binders that have become a standard — an Installation and Setup manual and a Guide to Operations (I prefer the NCR choice of 'Owner's Manual' as a name for this one). DOS, BASIC, and Technical Reference manuals are extras, which has always seemed a little rough to

me. IBM provides two separately bound copies of the simplified DOS 'User's Guide' to hand around the office, something the others haven't thought of.

TI has a matching set of manuals, though they contain less (IBM has made greater allowance than most for the newcomer, with detailed drawings of components showing switches, adjustments, installation methods and so on). NCR restricts itself to an Owner's Manual which is a lightweight — a nine-page Getting Started booklet and a flimsy five-chapter rundown on (not quite) everything you need to know.

Kaypro and Compaq ignore the slipcase standard, which is a shame — we're just starting to get used to orderly bookshelves where what you want is obvious. Kaypro has the heavyweight documentation, covering as it does all the bundled software as well as the operating system software. The machine comes with a full suite of Micropro software (Calcstar, Wordstar, Mailmerge, Infostar and Starburst) and a manual for each, plus books on DOS, BASIC and, believe it or not, an MS DOS Programmer's reference manual. Perhaps we were shortchanged on our review machine, but there wasn't one word on the hardware, or on getting started, setting up,

installing options, and so on. If that's the way they're shipped to customers, we expect first-time users to be having a particularly joyous time ...

The Kaypro manuals are all printed by the company, so at least they look like they belong (and are a consistent size for the bookshelf). However they're not as easy to use as the three-ring binders, nor are they easy to find information in, thanks to unimaginative layout and poor typography. (The manuals for Micropro's products are straight reprints, so they're okay, but the DOS manuals are awful).

Compaq has taken to an unusual landscape layout for its manuals, which makes them unwieldy on the desk and on the bookshelf. They're spiral-bound and stored in hard-backed plastic covers, so they're both sturdy and easy to flip through. Content is basically similar to the IBM manuals, although a little too much computer familiarity is expected of the user — what drawings there are are less detailed, and don't have the critical items arrowed (as in the case of the instructions on removing the cover — it tells you to remove 'the three screws', and shows a vague drawing of the rear of the case. Which three of the seven or eight fitted should we remove? Who knows...)

	BBEMARK	CBSIEVE	LOTUS 1-2-3			dBASE II BENCHMARK			DOIT	DOIT2
			Load	Recalc	Save	Stage 1	Stage 2	Stage 3		
NCR PC8	7.0	3.70	23.3	6.0	14.0	280	315	351	N/A	N/A
Compaq 8 MHz	6.9	3.69	22.5	5.5	13.8	281	434	476	62.3	38.8
TI Turbo	7.3	3.64	23.4	6.0	14.4	307	391	435	46.0	N/A
Kaypro 2861	9.1	4.89	23.5	7.7	23.5	379	403	452	77.3	37.5
IBM AT	9.1	4.89	23.8	7.7	23.3	378	408	458	57.0	38.3
TI Standard	9.2	5.02	23.4	7.6	23.8	384	410	525	61.7	51.5
Compaq 6 MHz	9.2	4.90	22.9	7.6	23.0	384	516	567	64.8	37.9
Adler P50	12.2	7.19								
IBM PC	23.5	14.60								

Figure 1. The performance figures tell the story: the NCR, Compaq and TI in 'turbo' mode were significantly faster than the IBM 'standard'. Each won its share of the performance contests, while all machines blitzed the figures recorded by a standard IBM PC used as a comparison point. The 80186-based Triumph-Adler P50, while twice as fast as a standard PC, couldn't mix it with the big boys.

Duelling ATs

Performance AT a Price

The enhanced AT is, as far as we're concerned, the base model for a machine of this sort of power (who wants that performance tied to a single floppy drive?). Before you do anything fancy to it (like adding a monitor), the 512 Kbyte hard disk AT will cost you \$11,256. By the time you get it 'on the road' you'll have to outlay around \$12,000. It's too much.

I don't have the time or space to justify my feelings with a string of component cost comparisons, but I'm convinced that's a what-the-market-will-bear price rather than a real indicator of the cost of manufacturing an AT.

TI's construction and component quality, and the expandability and versatility inherent in its clever design, would be more likely to part me from my money. TI's pricing is marginally higher than IBM's across the range, but they're close enough for it to make little difference.

The Compaq offers extra hard disk capacity and a tape drive for \$13,345, which

is starting to look more reasonable. You can also have a no-tape machine, including monitor and 30 Mbyte drive, for \$11,895.

NCR says its PC8 will sell for less than the equivalent IBM, but won't determine the final price until it's released in January.

Kaypro is the price leader of the group, offering an almost identical machine (though obviously not of quite the same construction quality) with a bonus bundle of software for just \$8265. You need a monitor on top of that, but it's still cheap.

Which AT For Me?

I hate comparison tests which are inconclusive, so this one won't be. But I also hate being forced to make a choice between machines which are as close as these.

The IBM itself has advantages — it's the 100 per cent compatible, the one you know all the software and add-ons will work on. And just because the others are faster doesn't mean it's slow — it isn't. It's a

top-class machine that is a little over-priced and a little under-engineered.

The Kaypro offers identical performance to the AT at two-thirds the price, and throws bundled software into the bargain. It's a hard one to walk past at the price.

The Compaq is well-engineered, feature-laden and fast — it could stand its ground against any of the machines tested and come out on top in several areas.

So too could the NCR, our overall performance winner — it stands out as a leader of the high-performance generation.

The TI gets our design award — it's a superior piece of engineering even before you consider its turbo mode and the bonus of TI PC-compatible high-resolution graphics.

Which would I buy? If I were spending the company's money (always the favoured approach) it would probably be the TI. If it were mine, perhaps the Kaypro. And if I were recommending one to a friend, it would be the IBM. It's still the only way I could be sure they wouldn't blame me if things went wrong ... □

What do all these magazines have in c



They all applaud Framework.

“In summary, Framework is an impressive product, and pleasing to use. It allows you to create, modify, organise and analyse information and to present it in a professional way. Its strengths lie in its text management, its ease of use, and the way it allows you to organise inter-related information.

AUSTRALIAN SOFTWARE GUIDE OCT 84.

Framework seems to have no particular bias to one work orientation or another; that is, it's not a spreadsheet with added-on features, nor is it a database with a spreadsheet tacked on. Overall, it seems to be fairly strong in both data management and word processing, and is a strong all-round performer.

YOUR COMPUTER DEC 84.

Framework is an excellent all-round product with few weaknesses. It offers true integration and tremendous versatility. If you are looking for a good, flexible, all-round package, then it is hard to go past this one.

TODAY'S COMPUTERS MAY 85.

Framework enables users to “think on the run,” to formulate disparate ideas and then arrange them logically. The program uses logical steps or “frames.” A frame can be a single word or number, a paragraph of text, a complex unit of information, or a completed spreadsheet. Framework is an excellent program.

AUSTRALIAN BUSINESS APRIL 3, 1985.

Duelling ATs

	BBBMARK	CBSIEVE	LOTUS 1-2-3			dBASE II BENCHMARK			TOTAL	AVERAGE
			Load	Recalc	Save	Stage 1	Stage 2	Stage 3		
NCR PC8	99	98	97	92	99	100	100	100	785	98.1
Compaq 8 MHz	100	99	100	100	100	100	73	74	746	93.2
TI Turbo	95	100	96	92	96	91	81	81	732	91.5
Kaypro 286i	76	74	96	71	59	74	78	78	606	75.7
IBM AT	76	74	95	71	59	74	77	77	603	75.4
TI Standard	75	73	96	72	58	73	77	67	591	73.9
Compaq 6 MHz	75	74	98	72	60	73	61	62	575	71.9

Figure 2. Overall ratings based on our performance tests gave NCR victory, even though the Compaq won most of the tests. The NCR's margin on the dBase benchmarks put it in front. Our rating system gave 100 points to the winner of each test, then rated the others against the winner's time to allocate points on a percentage basis.

common?



Framework offers windowing so that the integrated word processing, spreadsheet, graphics, database management and communications can be displayed on the screen simultaneously. There is a common command set for all applications and a frames editor for applications development.

AFR MAGAZINE SEPT 4, 1985.

Framework is now even better.

Framework II contains a larger, faster and more powerful spreadsheet.

It includes an advanced word processor with 80,000 word speller checker, visible page breaks and built-in mailmerge.

These two primary functions are supported by fully-integrated telecommunications, database, outlining and colour graphics.

In fact, all the features are tightly integrated with common syntax and keystrokes, eg. the spelling checker works on spreadsheets as simply as it does on text.

Framework II works on the IBM PC, XT, AT or close compatibles. It can take advantage of memory sizes greater than 640K.

So if you only buy one software package, make it Framework II.

For more information contact any leading computer dealer or the Master Distributor.

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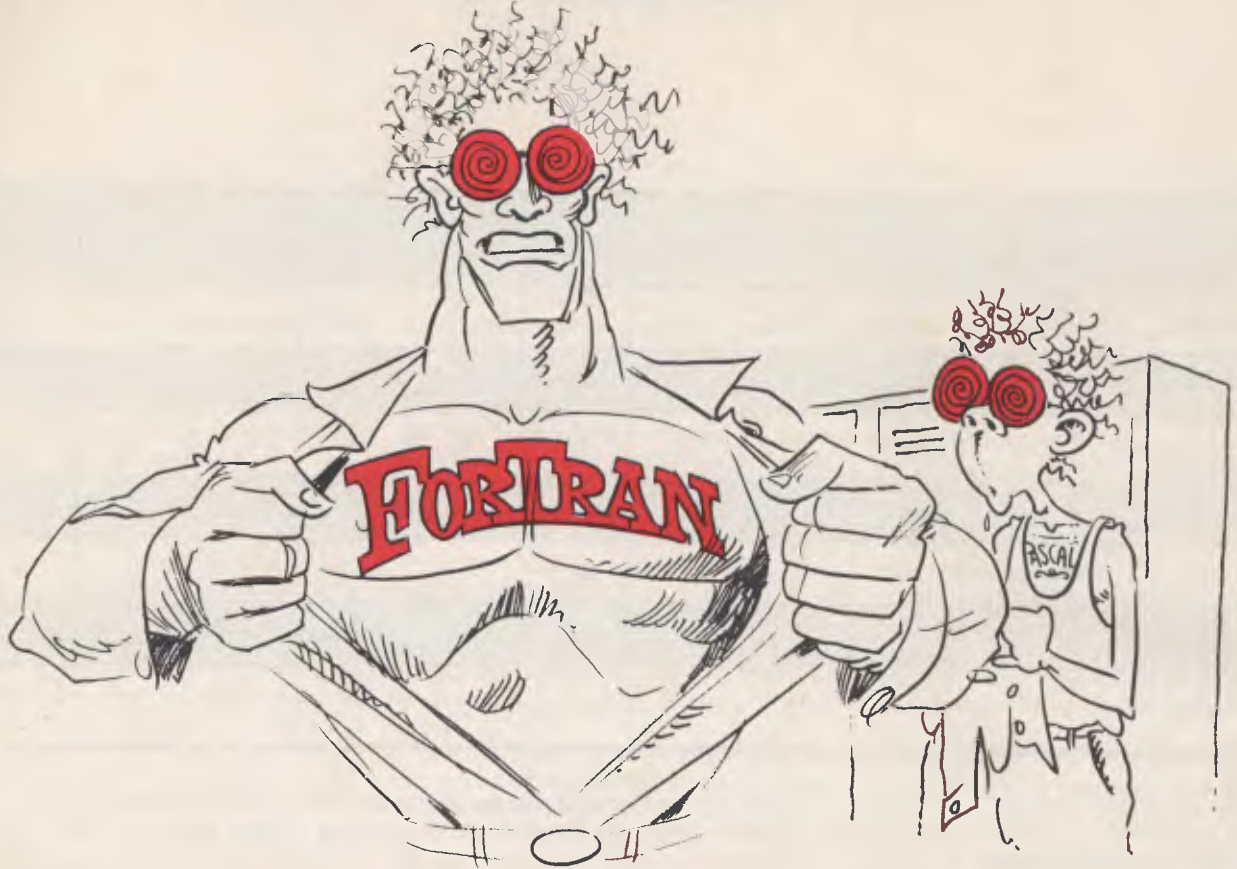
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REAL PROGRAMMERS VS PASCAL



REAL PROGRAMMERS DON'T USE PASCAL

Back in the the 'Golden Era' of computers it was easy to separate the real men from the quiche eaters: real men understood computer programming, quiche eaters didn't. Real computer programmers said things like "DO 10 I=1,10" and "ABEND" (they actually spoke in capital letters, you understand), while the rest of the world said things like "computers are too complicated for me" and "I can't relate to computers — they're so impersonal". As a previous work [1] points out, real men don't 'relate' to anything and aren't afraid of being impersonal.

But times have changed. Today we're faced with a world where little old ladies have access to computers through their microwave ovens, 12-year-old kids can blow real men out of the water playing Asteroids and Pacman, anyone can buy and even understand their very own personal computer, and the real programmer

This literary gem, in which an anonymous hacker attempts to sort the Real Programmers from the quiche-eaters, seemed too good to pass up when it appeared on our desks after circling the world's Unix network.

is in danger of becoming extinct and being replaced by high school students with TRASH-80s.

There is clearly a need to point out the differences between the typical high school Pacman player and a real program-

mer. If this difference is made clear, it will give these kids a role model, a father figure to aspire to. It will also help explain to the employers why it would be a mistake to replace the real programmers on their staff with 12-year-old pacman players (at considerable savings in salary).

Languages

The easiest way to spot the real programmer in the crowd is by the programming language he or she uses. Real programmers use FORTRAN, quiche eaters use Pascal. Nicklaus Wirth, the designer of Pascal, gave a talk once at which he was asked how his name was pronounced. He replied, "You can call me by name, 'Virt', or by value, 'Worth'", which goes to show Wirth was obviously a quiche eater. The only parameter-passing mechanism endorsed by real programmers is call-by-value-return, as implemented in the IBM/370 FORTRAN-G and similar compilers. Real

REAL PROGRAMMERS VS PASCAL

programmers don't need all these abstract concepts to get their job done; they're perfectly happy with a keypunch, a FORTRAN IV compiler and a beer.

The following is a summary of DOs for real programmers:

- Real programmers do list processing in FORTRAN.
- Real programmers do string manipulation in FORTRAN.
- Real programmers do accounting (if they do it at all) in FORTRAN.
- Real programmers do artificial intelligence programs in FORTRAN.
- If you can't do it in FORTRAN, do it in Assembly language. If you can't do it in Assembly, it isn't worth doing.

Structured Programming

The academics in computer science have fallen into a 'structured programming rut' over the past several years. They claim programs are more easily understood if the programmer uses some special language constructs and techniques. They don't all agree on exactly which constructs, of course, and the examples they use to show their particular point of view invariably fit on a single page of some obscure journal or another — clearly not enough of an example to convince anyone.

When I got out of school, I thought I was the best programmer in the world. I could write an unbeatable tic-tac-toe program, use five different computer languages and create 1000-line programs which really worked. Then I ventured out into the real world, where my first task was to read and understand a 200,000-line FORTRAN program, then speed it up by a factor of two. As any real programmer will tell you, all the structured coding in the world won't help you solve a problem like that — it actually takes talent.

Some quick observations on real programmers and structured programming:

- Real programmers aren't afraid to use GOTOs.
- Real programmers can write five-page-long DO loops without getting confused.
- Real programmers like arithmetic IF statements — they make the code more interesting.
- Real programmers write self-modifying code, especially if they can save 20 nanoseconds in the middle of a tight loop.
- Real programmers don't need comments — the code is obvious.

- Since FORTRAN doesn't have structured IF, REPEAT ... UNTIL, or CASE statements, real programmers don't have to worry about not using them. Besides, they can be simulated when necessary using assigned GOTOs.

Data structures have also received a lot of press lately. Abstract data types, structures, pointers, lists and strings have become popular in certain circles. Wirth (the abovementioned quiche eater) actually wrote an entire book [2] contesting you could write a program based on data structures, instead of the other way around. As all real programmers know, the only useful data structure is the array. Strings, lists, structures and sets are all special cases of arrays and can be treated that way just as easily, without messing up your programming language. The worst thing about fancy data types is you have to declare them, and real programming languages, as we all know, have implicit typing based on the first letter of the (six-character) variable name.

Operating Systems

What kind of operating system is used by a real programmer? CP/M? God forbid — CP/M, after all, is basically a toy operating system. Even little old ladies and primary school students can understand and use CP/M.

Of course, Unix is a lot more complicated: the typical Unix hacker can never remember what the PRINT command is called this week! But when it gets right down to it, Unix is a glorified video game. People don't do serious work on Unix systems — they send jokes around the world on UUCP-net and write adventure games and research papers.

No, your real programmer uses OS370. A good programmer can find and understand the description of the IJK3051 error he just got in his JCL manual, while a great programmer can write JCL without referring to the manual at all, and a truly outstanding programmer can find bugs buried in a 6 Mbyte core dump without using a hex calculator (I've actually seen this done).

OS is a truly remarkable operating system. It's possible to destroy days of work with a single misplaced space, so alertness in the programming staff is encouraged. The best way to approach the system is through a keypunch. Some people claim there is a time-sharing system which runs on OS370, but after careful study I've come to the conclusion they are mistaken.

Programming Tools

What kind of tools does a real programmer use? In theory, a real programmer could run his programs by keying them into the front panel of the computer. Back in the days when computers had front panels, this was actually done, occasionally. Your typical real programmer knew the entire bootstrap loader by memory in hex and toggled it in whenever it got destroyed by his program. (Back then, memory was memory — it didn't go away when the power went off. Today, memory either forgets things when you don't want it to, or remembers things long after they're better forgotten.) Legend has it that Seymore Cray, inventor of the Cray I supercomputer and most of Control Data's computers, actually toggled the first operating system for the CDC7600 in on the front panel from memory when it was first powered on.

Seymore, needless to say, is a real programmer.

One of my favourite real programmers was a systems programmer for Texas Instruments. One day he got a long-distance call from a user whose system had crashed in the middle of saving some important work. Jim was able to repair the damage over the phone, getting the user to toggle in disk I/O instructions at the front panel, repairing system tables in hex, reading register contents back over the phone. The moral of this story: while a real programmer usually includes a keypunch and lineprinter in his toolkit, he can get along with just a front panel and a telephone in emergencies.

In some companies, text editing no longer consists of 10 engineers standing in line to use an 029 keypunch. In fact, the building I work in doesn't contain a single keypunch. The real programmer in this situation has to do the work with a 'text editor' program. Most systems supply several text editors from which to select and the real programmer must be careful to pick one which reflects his personal style. Many people believe the best text editors in the world were written at Xerox Palo Alto Research Centre for use on the company's Alto and Dorado computers [3]. Unfortunately, no real programmer would ever use a computer whose operating system was called 'Smalltalk' and would certainly not talk to the computer with a mouse.

Some of the concepts behind these Xerox editors have been incorporated into editors running on more reasonably named operating systems: EMACS and VI being two. The problem with these editors

REAL PROGRAMMERS VS PASCAL

is real programmers regard the 'what you see is what you get' philosophy as being as dangerous with text editors as it is with women. No, the real programmer wants a 'you asked for it, you got it' text editor: complicated, cryptic, powerful, unforgiving, dangerous — TECO, to be precise.

It has been observed that a TECO command sequence more closely resembles transmission line noise than readable text [4]. One of the more entertaining games to play with TECO is to type your name in as a command line and try to guess what it does. Just about any possible typing error while talking with TECO will probably destroy your program or, worse, introduce subtle and mysterious bugs in a once working subroutine.

For this reason, real programmers are reluctant to actually edit a program which is close to working. They find it much easier just to patch the binary object code directly, using a wonderful program called Superzap (or its equivalent on non-IBM machines). This works so well that many working programs on IBM systems bear no relation to the original FORTRAN code. In many cases, the original source code is no longer available. When it comes time to fix a program like this, no manager would even think of sending anything less than a real programmer to do the job — no quiche-eating structured programmer would even know where to start. This is called 'job security'.

Some programming tools *not* used by real programmers:

- FORTRAN preprocessors like Mortran and Ratfor, the 'Cuisinarts' of programming (great for making quiche). See comments above on structured programming.
- Source-language debuggers — real programmers can read core dumps.
- Compilers with array bounds checking — they stifle creativity, destroy most of the interesting uses for EQUIVALENCE and make it impossible to modify the operating system code with negative subscripts. Worst of all, bounds checking is inefficient.
- Source code maintenance systems — the real programmer keeps his code locked in a card file, implying its owner can't leave his important programs unguarded [5].

The Real Programmer at Work

Where does the typical real programmer work? What kind of programs are worthy of



the efforts of so talented an individual? You can be sure no real programmer would be caught dead writing accounts-receivable programs in COBOL, or sorting mailing lists for *People* magazine. A real programmer wants tasks of earth-shattering importance (literally).

Real programmers:

- Work for Los Alamos National Laboratory, writing atomic bomb simulations to run on Cray I supercomputers.
- Work for the National Security Agency, decoding Russian transmissions.
- It was largely due to the efforts of thousands of real programmers working for NASA that our boys got to the moon and back before the Russkies.
- Work for Boeing, designing the operating systems for Cruise missiles.

Some of the most awesome real programmers work at the Jet Propulsion Laboratory in California. Many of them know the entire operating system of the Pioneer and Voyager spacecraft by heart. With a combination of large ground-based FORTRAN programs and small spacecraft-based assembly language programs, they're able to perform incredible feats of navigation and improvisation, such as hitting 10 km-wide windows on Saturn after six years in space, repairing or bypassing damaged sensor platforms, radios, and batteries. Allegedly, one real programmer managed to tuck a pattern-matching program into a few hundred bytes of unused memory in a Voyager spacecraft, which searched for, located and photographed a new moon of Jupiter.

The current plan for the Galileo spacecraft is to use a gravity-assist trajectory past Mars on the way to Jupiter. This trajectory passes within 80 +/- 3 km of the

surface of Mars. Nobody is going to trust a Pascal program (or a Pascal programmer) for navigation to these tolerances.

As you can tell, many of the world's real programmers work for the United States government, mainly in the Defense Department. This is as it should be. Recently, however, a black cloud has formed on the real-programmer horizon. It seems some highly placed quiche eaters at the Defense Department decided all defence programs should be written in some grand unified language called 'Ada'. For a while it seemed Ada was destined to defy all the precepts of real programming: it was a language with structure, data types, strong typing and semicolons. In short, Ada was a language designed to cripple the creativity of the typical real programmer. Fortunately, the language adopted by DoD has enough interesting features to make it approachable: it's incredibly complex, includes methods for messing with the operating system and rearranging memory, and Edgar Dijkstra doesn't like it [6]. (Dijkstra, as I'm sure you know, was the author of *GoTos Considered Harmful* — a landmark work in programming methodology, applauded by Pascal programmers and quiche eaters alike.) Besides, the determined real programmer can write FORTRAN programs in any language.

The real programmer might compromise his principles and work on something slightly more trivial than the destruction of life as we know it, providing there's enough money in it. There are several real programmers building video games at Atari, for example. (But not playing them; a real programmer knows how to beat the machine every time — no challenge in that.) Everyone working at Lucasfilm is a real programmer. (It would be crazy to turn down the money of 50 million *Star Trek* fans.) The proportion of real programmers in computer graphics is somewhat lower than the norm, mostly because nobody has found a use for computer graphics yet. On the other hand, all computer graphics is done in FORTRAN (so there is a fair number of people doing graphics in order to avoid having to write COBOL programs).

The Real Programmer at Play

Generally, the real programmer plays the same way he works — with computers. He's constantly amazed that his employer actually pays him to do what he would be doing for fun anyway (although he's careful not to express this opinion out loud). Occasionally, the real programmer does

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REAL PROGRAMMERS VS PASCAL



step out of the office for a breath of fresh air and a beer or two.

Some tips on recognising real programmers away from the computer room:

- At a party the real programmers are the ones in the corner talking about operating system security and how to get around it.
- At a football game the real programmer is the one comparing the plays against his simulations printed on 11 by 14 fan-fold paper.
- At the beach the real programmer is the one drawing flowcharts in the sand.
- At a funeral the real programmer is the one saying, "Poor George. And he almost had the sort routine working before the coronary.
- In a grocery store the real programmer is the one who insists on running the cans past the laser checkout himself, because he never could trust keypunch operators to get it right the first time.

The Real Programmer's Natural Habitat

What sort of environment does the real programmer function best in? This is an important question for the managers of real programmers. Considering the amount of money it costs to keep one on the staff, it's best to put him or her in an environment where he or she can get his or her work done.

The typical real programmer lives in front of a computer terminal. Surrounding this terminal are:

- Listings of all programs the real programmer has ever worked on, piled in roughly chronological order on every flat surface in the office.
- Some half-dozen partly filled cups of cold coffee. Occasionally, there will be cigarette butts floating in the coffee. In some cases, the cups will contain orange crush.
- Unless he or she is very good, there will

The real programmer might compromise his principles and work on something slightly more trivial than the destruction of life as we know it, providing there's enough money in it.

be copies of the OS JCL manual and the 'Principles of Operation' open at some particularly interesting pages.

- Taped to the wall is a lineprinter Snoopy calendar of the year 1969.
- Strewn about the floor are several wrappers for peanut butter-filled cheese bars (the type made pre-stale at the bakery so they can't get any worse while waiting in the vending machine).
- Hiding in the top left-hand drawer of the desk is a stash of double-stuffed Oreos for special occasions.
- Underneath the Oreos is a flowcharting template, left there by the previous occupant of the office. (Real programmers write programs, not documentation. Leave that to the maintenance people.)

The real programmer is capable of working 30, 40, even 50 hours at a stretch, under intense pressure. In fact, he prefers it that way. Bad response time doesn't bother the real programmer — it gives him a chance to catch a little sleep between compiles. If there isn't enough schedule pressure on the real programmer, he tends to make things more challenging by working on the small but interesting part of the problem for the first nine weeks, then finishing the

rest in the last week, in two or three 50-hour marathons. This not only impresses the hell out of his manager, who was despairing of ever getting the project done on time, but creates a convenient excuse for not doing the documentation.

Generally:

- No real programmer works 9 to 5 (unless it's the ones at night).
- Real programmers don't wear neckties.
- Real programmers don't wear high-heeled shoes.
- Real programmers arrive at work in time for lunch.
- Real programmers might or might not know their spouse's name. They do, however, know the entire ASCII (or EBCDIC) code table.
- Real programmers don't know how to cook. Grocery stores aren't open at three in the morning, so real programmers survive on Mars bars and coffee.

The Future

What of the future? Real programmers are very concerned because the latest generation of computer programmers is not being brought up with the same outlook on life as its elders: many of them have never seen a computer with a front panel; hardly anyone graduating from school these days can do hex arithmetic without a calculator; and college graduates are protected from the realities of programming by source-level debuggers, text editors which count parentheses and 'user-friendly' operating systems. Worst of all, some of these alleged 'computer scientists' manage to get degrees without ever learning FORTRAN! Are we destined to become an industry of Unix hackers and Pascal programmers?

From my experience, I can only report the future is bright for real programmers everywhere. Neither OS370 nor FORTRAN show any signs of dying out, despite the efforts of Pascal programmers around the world. Even more subtle tricks, such as adding structured coding constructs to

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FORTRAN have failed. Oh sure, some computer vendors have come out with FORTRAN 77 compilers, but every one of them has a way of converting itself back into a FORTRAN 66 compiler at the drop of an option card — to compile DO loops as God meant them to be.

Even Unix might not be as hard on real programmers as it once was. The latest release of Unix has the potential of an

operating system worthy of any real programmer: two different and subtly incompatible user interfaces, an arcane and complicated teletype driver and virtual memory. If you ignore the fact that it's 'structured', even 'C' programming can be appreciated by the real programmer: after all, there's no type checking, variable names are seven (ten? eight?) characters long and the added bonus of the pointer

data type is thrown in — like having the best parts of FORTRAN and assembly language in one place (not to mention some of the more creative uses for #DEFINE).

No, the future isn't all that bad. In the past few years the popular press has even commented on the bright new crop of computer nerds and hackers leaving places like Stanford and MIT for the real world. From all evidence, the spirit of real programming lives on in these young men and women. As long as there are ill-defined goals, bizarre bugs and unrealistic schedules, there will be real programmers willing to jump in and solve the problem, saving the documentation for later. Long live FORTRAN!

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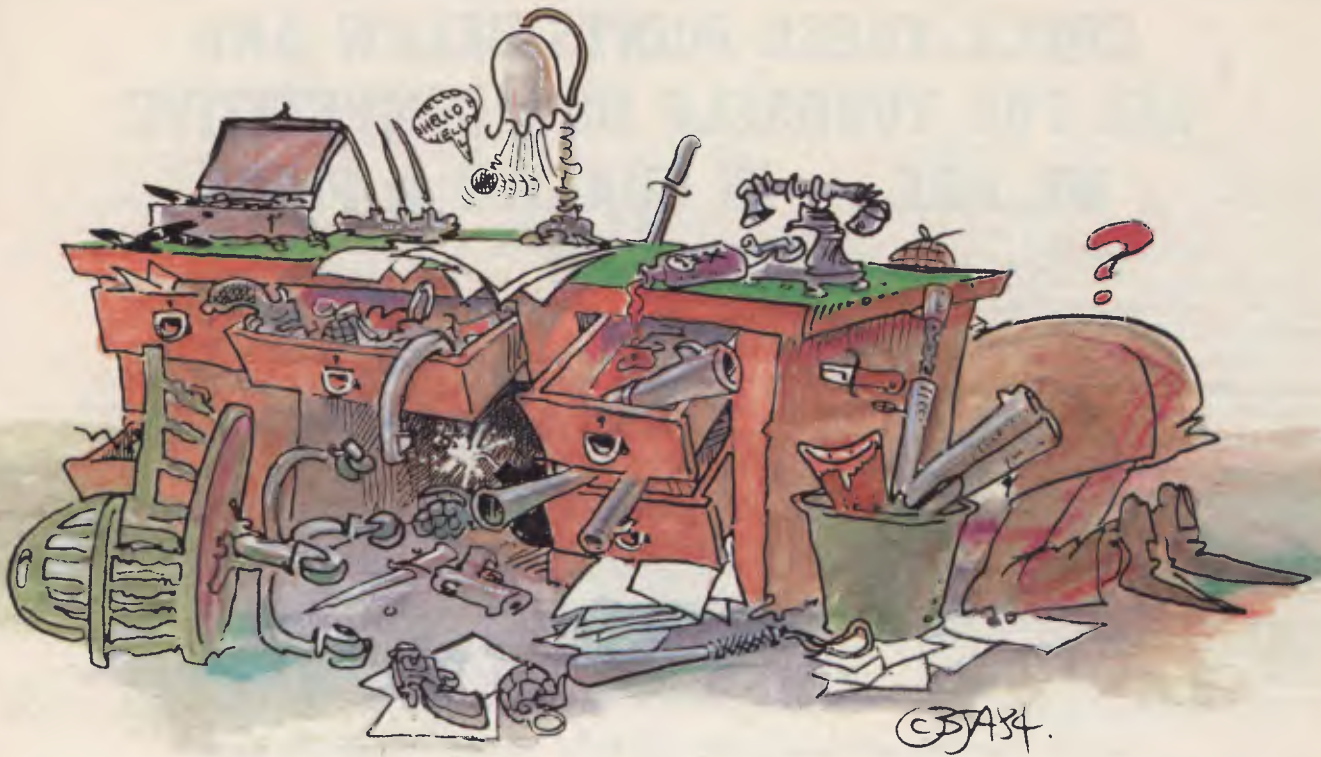
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The Great Database Found

When we set out eighteen months ago to find a suitable successor to dBase II as 'king of the databases' we didn't quite realise what a job we were in for. But The Great Database Search has proved an interesting and informative exercise for Matt Whelan, Rose Vines, Les Bell, and the other databasers enlisted along the tortuous quest for felicitous file-handling. Now the major contenders have been put through their paces it's time to see how the judges voted.

Okay, we've had enough. We started the Great Database Search expecting it to take six to 12 months, but it has consumed 18 and could go on forever if we let it.

We won't. We've seen enough to know there are several worthy successors to dBase II, and we're here to name them. Today. Now.

We may have missed some (often intentionally — we could see they wouldn't make the grade), and more are being released regularly, but right now, at this very

point in time, we are going to make a decision.

It will be a highly personal, subjective, we-like-this-so-that's-that decision. There are so many different uses for databases, so many different types of users, and so many different styles of packages that our answer can't be right for everybody. But it will be right for us.

What makes our opinion relevant? Apart from the usual reasons why reviewers, who see a wide range of packages in all sorts of situations, are experts in the field of making such a judgment, we also happen to be



Database Found

database junkies. Much, if not most, of the programming work we do is database-orientated. We know and love and hate dBase II enough to be called in to help people from home users to corporate DP departments. Les Bell and Matt Whelan are regularly contracted to run training seminars and hands-on courses in database use, programming, design and systems analysis.

We're looking for a replacement for old faithful, dBase II (still a great product, we say, within its limitations), not because it's something interesting to talk about in the magazine but because we want to use it.

Individual tastes being what they are, our varied database searchers will in some cases be using different products. There isn't one database package which, for us, stood so far above the rest as to be unassailable.

And The Winner Are ...

Yes, we have two winners, plus an honourable mention or two, although we're not going to say every package we reviewed is worthy of victory under this-or-that condition.

The judges were decisive in their support of a final short-short-list of two packages, but found it impossible to decide between them.

So ... drum roll, wait for it, here's the big moment ... the winner are: Dataflex and Knowledgeman. Yes, the first two contenders reviewed, the ones we said would be front runners, the ones we liked so much — we still haven't seen anything we'd prefer. What's more, virtually all our criticisms of these packages have been washed away by successive new version releases since we originally carried out the tests.

There are database packages which do some things better, there are others which do some things more easily, and there are still more which claim to be far greater than either (though none of them has been submitted for test, don't ask us why), but as overall packages these are the ones we want to use.

We'll still use dBase II for many of our simpler jobs, and we'll still use dBase III for jobs its memo field capabilities happen to suit, but for our complex multi-file applications Dataflex and Knowledgeman will be our tools of choice.

It is their inbuilt and elegant ability to handle multiple related files which really puts them ahead. In other respects they are similar to much of their competition, although they have all the power where

many competitors have only parts of it. Once it gets to related files, however, our two walk away.

And how do the individual judges stand in this decision? Matt Whelan is hooked on Dataflex (for one thing, he's the multi-user user), Rose Vines won't look past Knowledgeman (especially the new Kman/II), and Les Bell, typically, will pick up whichever of the packages happens to be close at hand, spend three minutes recalling the particular language, and knock the job over in an afternoon. Then he'll tell us how it should have been done in a real language, and go back to play with his C and PL/I.

The Aussie Effort

Some mention must be made of Meta4, the locally written package which is quite different in concept to the others and which, according to guest Database Searcher Jeff Richards, is a work of art.

Perhaps it would have won if the judges were newcomers to computing rather than database junkies; its fresh approach and new concepts — combined with a low \$195 price tag — certainly earn it an honourable mention.

Another pair of unusual products is Superfile and The Accounting Solution (TAS), both reviewed in this issue. Superfile is a powerful free-form database which virtually installs itself as part of the operating system, and can be called from several high-level languages. TAS is a low-cost system with a lot of power. Look for more on these as you work your way through the magazine.

But first, here's a reminder on the packages reviewed so far:

Product: Q-Pro 4

Distributor: Mitsui Computer Systems, (02) 451 7711

Issue reviewed: Scheduled for February 1986

We had intended to run Q-Pro in this issue, but although the review was completed in time the author's illness prevented him from filing the story.

He assures us it wasn't Q-Pro which made him sick, and promises a full-scale rundown soon (but not Real Soon Now). The package was entered into the judging for our search Grand Final even though the review isn't in this issue.

Q-Pro is an impressive, powerful database package which has been available overseas for some years, yet has only recently been picked up by an Australian

distributor. That's good news for local users, because they don't have the usual new-package problem of lack of support. Q-Pro's release was accompanied by the release of a vast range of useful utilities and add-ons, all of which combine to turn it into a powerful development tool.

It's similar in concept and approach to one of our favourites, Dataflex, in that it is screen-program-based, and doesn't have an interactive command mode. Like Dataflex, it has various 'auto-pilot' program generators for the newcomers, and it has a rich and comprehensive programming language.

Q-Pro can be hard to get into, but rewarding once you're there. It's well worth looking at, so watch for the upcoming review.

Product: Dataflex Version 2.0

Distributor: Australian Microcomputer Solutions, (052) 21 1300

Price: \$1000 for 8-bit, single-user version
Issue reviewed: September 1984
Dataflex was one of the first products reviewed in the Great Database Search, way back in September 1984. It is a system primarily designed for the serious software developer, with some additional features which enable less expert users to handle moderately complex tasks with ease.

Unlike dBase, which has been the yardstick for measuring the performance of other databases in our quest, Dataflex has no interactive mode. This means you have to write a program to get anything from the system, and in Dataflex, programs have to be compiled.

This may appear daunting to the uninitiated. However, Dataflex supplies a variety of tools which make the process less painful than might be expected, and do much of the early dirty work themselves. These tools include pre-written macros (a macro is a series of commands which can be called by one simple command), which handle data entry and reporting, and automatic file-definition and program-creating routines.

Dataflex provides one of the easiest solutions for getting complex, multi-file database applications up and running. It also has multi-user capabilities, and will run under a variety of eight- and 16-bit single-user, multi-user and networking operating systems. In summary, an elegant and powerful system.

Database Found



Product: Knowledgeman
Distributor: Database Network,
(03) 523 9399
Price: \$847 (single user)
Issue reviewed: September 1984

Knowledgeman is a dBase-style database system, with few limitations and a lot of power. It has an interactive mode for creating and accessing data files directly, and a programming language for developing customised applications. It also has an integrated spreadsheet, which can use the database programming language for cell definition.

Most limitations on the system are imposed by the hardware or system software used, rather than by Knowledgeman itself. For example, the number of tables (data files) open at once, program length, indexes per table, working variables and command line length are all limited only by your hardware. The limits which do exist are pretty generous, too: 65,535 records per table, 255 fields per record, 65,535 characters per record or field, and a maximum index key length of 65,535 characters.

Knowledgeman has built-in commands for producing multi-file reports and listings. (For the technically minded, Knowledgeman is designed to be consistent with the relational notions of functional dependency and third and fourth normal form.) Relational commands include LIST, STAT and CONVERT.

Other features include: an extensive security system, providing password ac-

cess from file to field level and automatic encryption of data; automatic generation of statistical information on your data; extended numeric functions, including square roots, natural logarithms, arcsine and sine, random number generation, and polynomial roots; arrays; and a heap of 'environment variables' which let you define how Knowledgeman performs various tasks.

The major problems with the original version were the documentation, the absence of a multi-user version, and the long learning curve for newcomers to databases. Knowledgeman/2 (reviewed elsewhere in this issue) addresses all these issues. It is available for the Vax-II and systems running under PC-DOS, MS-DOS, Unix, CP/M, Novell Netware, PC-Net and various windowing environments; the single-user version costs \$899. Eight integratable modules are also available, including a word processor, report writer, communications program, natural language interface and C interface. Knowledgeman and Knowledgeman/2 are available from Database Network, on (03) 523 9399.

If you've been impressed by dBase III, you'll be bowled over by Knowledgeman!

Product: Optimum
Distributor: Software Suppliers,
(02) 888 1955
Price: \$1450
Issue reviewed: November 1984
Optimum has the feel of a system designed *by* programmers *for* programmers.

What this means is it is decidedly unfriendly (with an especially user-hostile manual), and it's powerful.

Optimum consists of seven subsystems: a DEFINE File utility, the Terminal Control Language, the Micro-English Inquiry/Reporting Language, Select-Ed Sentence/Report Editor, the Form Processing System, the Item Editor and file utilities.

DEFINE not only lets you define a file structure, but also produces a 'compiled' data form, which handles data entry and modification. Together with Micro-English and Select-Ed — which provide reporting and data selection facilities — DEFINE lets the inexperienced user create simple databases and reports.

The real power of Optimum is in the Form Processing System and the Item Editor, which make it possible to produce reports in almost any format and to manipulate data at basic levels. The programming language used in these subsystems is semi-automated, prompting the user through editing sessions. However, this is not the place for a novice user to end up — the complexity and power is likely to stymie them completely, and the manuals will provide no release.

If you're a system developer, Optimum will prove a strong tool. It is one of the few systems around which provides variable-length records, it can be used on a wide range of machines (including multi-user systems) and it has powerful data manipulation and cross-referencing features. If you're a mere mortal, look elsewhere for a database.

Product: dBase III
Distributor: Arcom Pacific, (07) 52 9522
Price: \$795
Issue reviewed: January 1985

The Great Database Search began with the desire to find a rival for dBase II, the first really powerful database for microcomputers. The development of dBase III gave Ashton-Tate the chance to respond to the criticism and praise of dBase II users and produce a system with fewer limitations and greater ease of use.

dBase III certainly overcomes many of the limits of dBase II: the number of files open concurrently has been increased from two to ten, the number of working variables from 64 to 255 and the number of fields from 32 to 128. A series of new functions and commands provide more flexibility and power, and give dBase true relational capabilities at last (using the SET

RELATION TO ... command). Two new field types have also been introduced; the DATE fields store dates in a special format which allow them to be converted from numeric to character formats, and the MEMO fields allow free text entry. MEMO fields take up 10 bytes in each record: the actual text is entered in a related MEMO file, and space will only be allocated in this file if a record has data entered in the MEMO field.

Other improvements over dBase II include a much faster SORTing routine, a multi-column label generator, an improved REPORT FORM command and the introduction of PROCEDURE files, which can incorporate 32 command files with support for parameter passing and local and global variables.

On the whole, the manuals are well written, although a few more examples of commands in action wouldn't go astray. However, most holes in the manuals are filled by the ASSIST command and the extensive HELP facility. The ASSIST command invokes the dBase Assistant, a menu-driven system which prompts users through writing commands. The HELP command provides information on all the dBase commands and functions; any time you make a mistake, dBase asks "Do you want help?", and places you in the appropriate HELP screen if you reply "yes".

dBase III doesn't have the power of Dataflex or Knowledgeman, nor the same multi-file features. However, it does combine ample power for the average user with a well-designed, easy-to-use interface.

Product: Condor III

Distributor: Database Network,

(03) 523 9399

Price: \$699

Issue reviewed: May 1985

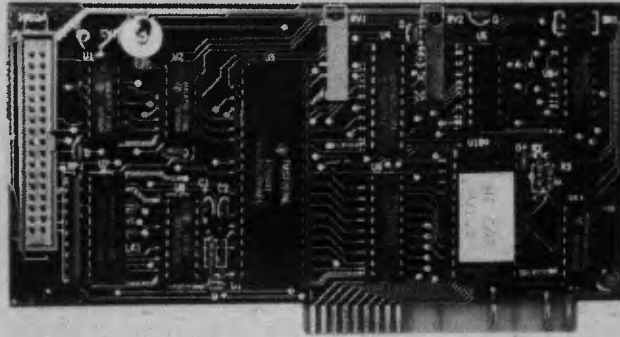
Condor is a moderately easy to use, moderately powerful database. It follows the general design of dBase, with an interactive command line mode and a procedure file mode.

Data file creation is accomplished by drawing a data entry screen on your display, and then answering questions about field types and permissible values. Information can be added to a file by using the ENTER, APPEND and COMBINE commands, or the READ command for importing data from files created by other systems or word processors. Data can be viewed or manipulated using the UPDATE, LIST, PRINT, DISPLAY, DELETE, SELECT, SORT and INDEX commands.

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Database Found



In addition, there is a series of powerful commands which makes the system especially suited to accounting applications. These commands are PROJECT, JOIN, COMPARE and POST. POST is particularly useful: it allows you to update a master file from a transaction file, automatically maintaining an audit trail of all changes.

Condor lets you produce simple reports using the PRINT and TITLE commands. For more complex reports, the REPORT subsystem provides one of the most powerful report writers available. It is also the most complex feature of Condor, and is not easy to use. But it is worth the effort.

Condor's command procedure facility is a real disappointment. It is merely a slightly extended SUBMIT or BATCH file facility, with little flexibility or power. Because of this, it is difficult to use Condor for developing complex multi-file, automated systems. Another hole in the system is the lack of character or numeric manipulation functions.

On the plus side, Condor's documentation is a treat, with plenty of help for newcomers to databases. A good system for people with modest needs, the latest release of the program (version 2.11.03) supports networking, has a menu-driven interface and increased power.

Product: Meta4

Distributor: System Solutions

Price: \$195 (CP/M); \$395 (MS-DOS);

\$1200 (multi-user)

Issue reviewed: July 1985

An Australian-developed, fourth-generation database, Meta4 is an exciting package which uses a unique conceptual approach to database development. Databases are represented as buildings, with rooms, doorways and objects in the rooms, and file creation is a matter of constructing new rooms and doorways between the

rooms. This approach makes the development of multi-file systems a simple and logical process.

Meta4 is entirely non-procedural; everything is done by defining database structures and relationships between items in those structures. It is a network database, rather than a relational database, with inter-relationships needing to be specified by the system designer. The building construction approach forces modular design of the system, and makes modifications and extensions to existing systems very easy to implement.

The manual provides detailed instructions for developing a complete system. The reference section is small because there are few commands to learn — Meta4 maintains a consistent user interface throughout, so the same group of commands is used for most tasks. Simple database systems are easy to develop, while complex systems require a lot of thought and time to produce. But what constitutes 'complex' in Meta4 is frequently beyond the scope of what is possible in other products.

The program runs under CP/M-80, MS-DOS and Unix, as well as a few multi-user systems. Despite the low price tag, Meta4 compares favourably with many of the more expensive packages on the market.

Product: R:base 4000

Distributor: Microsoft, (02) 452 5088

Price: \$630 for R:base; \$300 for CLOUT;

\$205 for the extended report generator

Issue reviewed: October 1985

R:base is a powerful database manager with strong relational capabilities. It is driven by a data dictionary which keeps detailed information on the database and file structures, and it uses an inquiry language based on IBM's structured query language (SQL).

Relational commands include INTERSECT, UNION, SUBTRACT, PROJECT, JOIN and APPEND. The richness of these commands makes it easy to develop moderately complex applications, despite the absence of a strong set of programming commands. The construction of complex command lines is made easier by the Prompt mode and the Help system, equivalent to dBase III's ASSIST and HELP commands.

The R:base report writer is a little restric-

tive, but does allow headers, footers, sub-totalling and averages. A more extensive report writer is available as an option. On the plus side, R:base has inbuilt password protection, so designers can declare records and files read or write protected for specific users.

Another option for the system is CLOUT, a natural-language interface based on a dictionary of commonly used words. This interface allows users flexibility in querying the system, and includes interactive development of the dictionary, so database querying can be customised to suit a particular user.

Since our review, R:base 5000 has been released, a system which gives the designer more power.

Product: The Sensible Solution

Distributor: Compsoft, (07) 839 0066

Price: \$950 (single-user);

\$1450 (multi-user)

Issue reviewed: November 1985

The Sensible Solution is another package designed primarily for system developers. It has some automated features which enable the development of simple single-file data entry and modification programs, but most of its power can only be accessed by doing some hefty programming.

There is no command line interface in Sensible: all programs must be compiled before they can be run. Files are created using a screen painting method similar to Dataflex and Condor, and the system revolves around a data dictionary. The use of a data dictionary makes it easy to establish complex relationships between files, but keeping track of these relationships is not a job for the beginner.

Simple programs can be developed using the Program Generator. It is then possible to modify these using the Source Code Editor. This Editor eliminates syntax errors by using a prompted system of command development; this also means programs cannot be written using external word processors, and the Sensible way doesn't always feel like the sane way.

There's a lot of power in Sensible, but it's not easy to get at. The documentation gives no overall understanding of the program and the beginner's section has no index. For programmers, the extensive debugging facilities are a boon, but a bit more power in the Sensible language itself (it has limited control structures) would be of more use than the syntax-free programming facility. □

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**WHY PRINTER
WHEN YOU
CAN LASER?**



Who needs a \$6000 stand-in for a \$5000 daisywheel that has already been replaced by a \$2000 letter-quality dot matrix printer? That's the attitude some people have toward laser printers, yet the Australian market has rushed to embrace the new technology. Matt Whelan recently went searching for a laser printer for the YC office — here's what he found on his way.



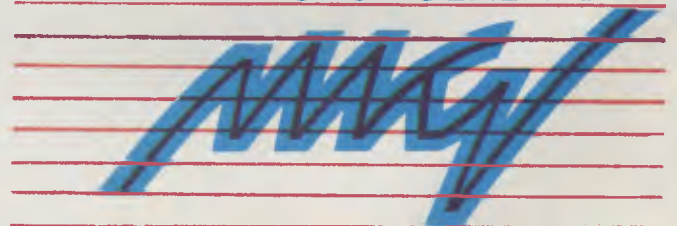
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Instant printing, high quality, no noise, and great graphics — there's a lot to recommend the laser printer, despite its relatively high price tag.

The Australian market certainly seems to think so, as it has outstripped all the laser manufacturers' sales forecasts in a rush to convert to the new technology.

Noise — or the lack of it, in the case of the laser — may be a major factor in this stampede. Fast printing is a big problem in most offices, as you have to devote a separate room to the noisy printer or invest in an expensive, cumbersome and bulky soundproofing hood (which only does half the job anyway). The laser printer can sit on a desktop, consuming less than a quarter of the space of a conventional machine, and spit out its cleaner, higher quality pages at a much faster rate ... silently.

The \$6400 Question

The question potential laser buyers are asking is this: "is it worth the money when I can get a respectably fast, quality dot matrix printer for one-third the price?"

The answer, as usual, depends on what you need to do. We are firmly committed to the bigger-is-better philosophy of computing, because we know just how much nicer it is to use an over-specified machine than an under-specified one. However there are realities in this world (we try to avoid all of them), such as being able to cost-justify business purchases; if you print four memos a week you can quite happily survive with a \$300 Epson lookalike.

If, on the other hand, you need high-speed, high-quality output — perhaps for more than one PC in some cases — then it's well worth looking at the laser printers already available. We've done just that, and discovered a whole lot of benefits — plus a few problems.

Problems? Yes, two in particular. The first is a perennial worry in computerdom: the best-supported machine is not necessarily the best machine. Early in the life of the laser printer, Hewlett-Packard's Laserjet has more in-built support from software authors than any of the others, yet most of its competitors provide significantly more features for the price. Which way do you go? It's a tough decision whichever way you look at it. The next problem is the high cost of owning a laser printer: not only are they expensive to buy, they are also relatively expensive to run. See our panel on running costs for more details.

We found five laser printers we could

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it.*

test, although there are one or two others on the market. If you read last issue's *Next Month* column you'll have noticed we weren't too sure the laser tests were even going to happen — most of the distributors had, at that stage, already failed to deliver their promised machines several times.

Logo Computer Centre, a Hewlett-Packard dealer, saved us from total disaster by lending us a machine early in the piece. We bought it when the review period was up, and at that stage still hadn't seen any of the others.

They eventually arrived, virtually within hours of each other: a Canon LBP8 (complete with a Canon AS-300 computer to drive it), a Ricoh LP4080 from Mitsui (which bravely loaned us a prototype), an Apple Laserwriter (with a Mac, of course), and an Impact Laser 800-II. What did we miss out on? A QMS machine, because the distributor didn't seem to think a review was worth the trouble, and DEC's LN03, which is basically a badge-engineered Ricoh. Canon and Impact both sell cheaper models, with fewer features, but we didn't get a chance to look at those. That seemed to be about the market for low-cost (relative to the big guns of laser printing, at least) desk-top lasers. More will undoubtedly arrive in between writing and publishing this story, and we'll hear about some we didn't know existed. That's usual-

ly the manufacturer's fault for not bothering to tell anyone ...

The fact that all the printers reviewed, except for the Ricoh, are based on Canon's laser 'engine' (oh how we hate that expression — what it basically means is they're virtually identical mechanically) means there's not a lot to talk about in comparing appearance, speed or basic function. The big differences are in the on-board 'smarts' — how each machine drives the laser to provide extra effects and features. Here's a machine-by-machine rundown on the features, and the 'smarts', of the lasers we tested:

Hewlett-Packard Laserjet

First in, best dressed ... HP may not have had the first working model at the computer shows, but it was the first to have the machine available in quantity. And, because it was shipping machines, the software developers took note. Several software packages we've had in for review in recent months have included support for the Laserjet — support for many of the others is restricted to their ability to emulate common printers such as the Epson and the Diablo.

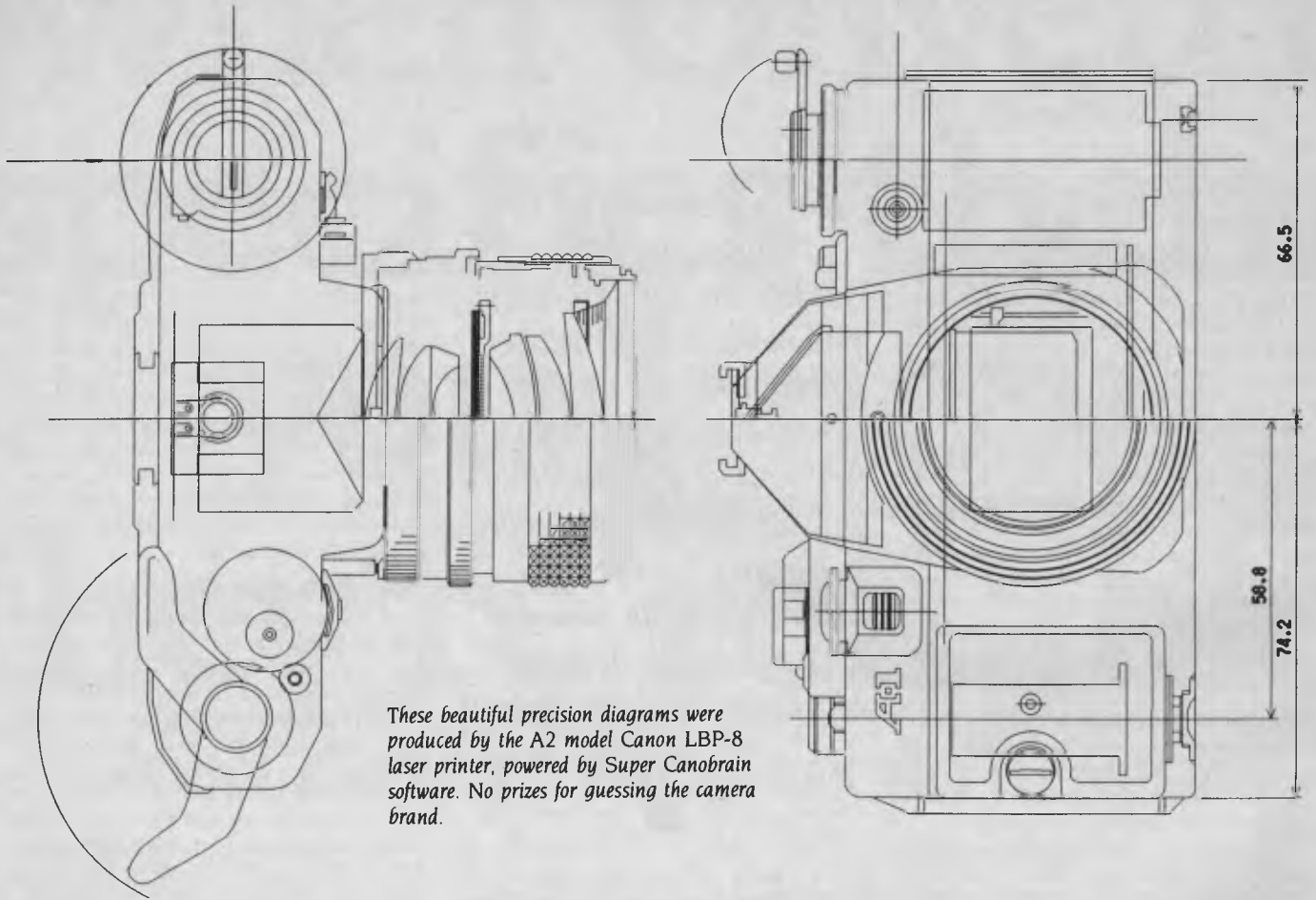
The HP, like all the laser printers tested, is a neatly packaged unit. At 48 cm wide, 42 cm deep, and 29 cm high it is unobtrusive on a desk-side table or cabinet. But at 32 kg it's deceptively 'solid', as we found when we lugged it and the other lasers up and down the stairs to our office several times.

Installing the machine isn't simple, as it involves removing shipping clips, fitting the electrophotographic (EP) cartridge, installing a 'fusing roller cleaning pad', and the paper trays (the easy bit). However the procedure is well detailed in the manual and proceeded smoothly and quickly.

Configuration of the serial port is easy — because you aren't able to change much. The baud rate can be altered from the default of 9600, but you're stuck with a data format of eight data bits, one stop bit, and no parity. Hopefully your computer has more flexibility if you don't happen to match that set-up. The port can be relatively easily altered from RS232 to RS422

A test print button allows immediate verification of the unit's operation, and a self-test button on the operator control panel invokes the internal diagnostic and follows up with a full-page character print-out. Apart from the test button, the panel contains on-line, continue, form feed and manual feed switches. A two-character alphanumeric read-out alerts you to the

Laser Faire



These beautiful precision diagrams were produced by the A2 model Canon LBP-8 laser printer, powered by Super Canobrain software. No prizes for guessing the camera brand.

unit's readiness or any problems. The control panel is primitive compared to those of most of the opposition.

The first thing you notice about the HP is how simple it is to get it up and running, printing out simple text virtually within minutes of unpacking it. The second thing you notice is how hard it appears to drive once you want anything more fancy — the HP control sequences are a far cry from the simple escape sequences we're used to in printers.

Hewlett-Packard has developed a 'Printer Command Language' which is standardised across its range — fine if you're using HP computers, but a little tedious otherwise. The real piece of insanity (of which you get seven lines' warning in the manual) is the fact the sequences freely intermix the lower-case letter L (l), the number one (1), upper case letter O (O), and zero (0) — combinations which can easily be mistaken in most typefaces. That little piece of ingenuity will cause users real problems, not to mention the fact it makes it much harder to understand exactly what the control codes you set up six months ago really do ...

The next problem with the command language is the fact that most commands are long — too long, for example, to be

installed in the user print control areas of good old Wordstar 3.3. A few short commands can be used, like shift-in and shift-out codes for moving between primary and secondary fonts — but selecting the fonts initially will have to be done outside the program. This isn't a problem for many of the newer IBM PC word processors, which can have longer codes installed if they don't already have a Laserjet driver.

Individual commands in the HP language aren't excessively long — they average around five characters — but the problem is you usually have to string several of them together to achieve the desired effect. For example, to change to one of the fonts in the (optional) font cartridge, you don't just ask for 'font number 7' — you have to select it by its characteristics. Therefore you might have to issue commands for symbol set, font type, pitch, height, style, stroke weight, and spacing in one go. Here's an example command you might use to select landscape printing mode, Roman-8 symbol set, fixed spacing, 10 cpi, 12 point, upright Courier medium:

```
ESC&I0ESC(8UESC(s0p10h12v0s0b3T
```

Each of these commands has an order of precedence, so you can't just issue one

individual command to change fonts in many cases — you have to specify enough of the characteristics to override the precedences of the previously selected font.

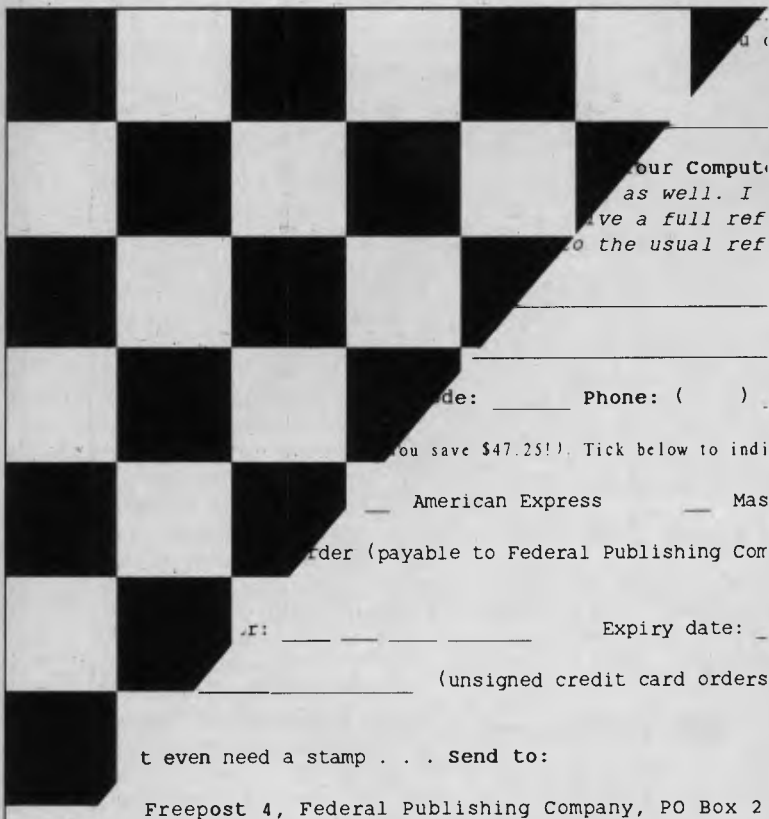
If you specify a set of characteristics which doesn't exactly match one of the on-line fonts, the closest available match will be selected — again based on the precedence of the various components of the selection command.

It looks frightening at first, but we soon got used to it — our Laserjet could be made to do anything we wanted with a little thinking. However, it is a command set designed to be driven by software, not by a user on a day-to-day basis, whereas some of the opposition provide an easy method to build complex print control commands into their text.

A real limitation of the Laserjet is the fact it isn't 'intelligence-based' — its features are pretty well fixed to what's bolted onto the circuit board. Fonts aren't variable as they are in many of the competitors — you can't shade, slant, bolden or enlarge fonts. You can only change the print-out by selecting another on-line font, which means shelling out around \$360 a time for font cartridges if you don't like the default Courier font installed on-board.

A plus here, however, is the fact the

Laser Faire



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Anyone for chess? The squares were produced by a standard HP Laserjet, and on the other side of the board we have a sample of copy printed by our Impact printer (the Laserjet in upgraded disguise.)

Hewlett-Packard's fonts are particularly well designed. Output from the Times Roman proportional (it's in font cartridge B, justifiably one of the most popular), for example, looks like it came from a typesetting machine. It's amazing how various makers' versions of what should be the same font can look so different.

The Laserjet has a host of other commands, most of which you would expect from any high-quality printer but some specific to the laser's individual requirements.

There are commands to turn underlining on and off, set landscape or portrait printing mode (landscape is only available with landscape fonts, not the 'normal' fonts), set page length, margins, text length, line spacing, vertical motion index, cursor positioning, perforation skip, paper input control (from the paper tray or manual feed), reset the printer to standard, and print raster graphics.

You can also instruct the HP to print the current page multiple times, a far better solution than having your PC send the data over and over again.

Impact Laser 800

Impact sells four models starting from \$6300 (already a full-featured unit) and

ranging through \$6900 (extra fonts and goodies), \$9900 (a special for barcode applications) to \$11,600 for the do-everything graphics machine designed for CAD/CAM use.

We tested the Model II, even though we never received a Model II — we cheated, and took Impact up on its \$995 conversion option for our Laserjet. The changeover turns it into an Impact machine with all features, including control panel and badgework (which explains the absence of the Laserjet in our photographs — it didn't exist any more by the time we took them).

The Impact features list is probably the best we've seen for the price, and it's delightfully easy to use. It seems to be the only machine around whose software allows for end users rather than the kind-heartedness of software package developers.

First it has the widest range of emulations: Laserjet, Qume, Diablo and Epson. Then it has its own command set, all in straight ASCII — so you can just plonk printer control commands in the middle of your text and see an immediate result. Most importantly, it will always accept its own commands *as well as* the commands of the currently selected emulation. Sensible. You can be using a word processor confi-

TOMORROW'S OFFICE

SPECIAL EDITION

Desktop publishing: it's here 1
A case of less is more 2
The medium is the message 3
Now publishing is a snap 5
and more

PUBLISHING TAKES A GIANT STEP FROM THE PRINT SHOP TO THE DESKTOP

The computer revolution has reached the publishing industry — right down to the "publishing" that is done everyday in your office and mine.

You're not in the publishing business? Think again. In your normal business day, you probably write a couple of letters, a memo or two, prepare a presentation, and write a report. The production of written communication is publishing.

Newsletters definitely fall into the publishing category. So do many of the other documents that businesses produce — annual reports, price lists, brochures, manuals, and proposals.

For years, we've had few tools to help us publish office communications. The typewriter was a big improvement over quill and ink. That was followed by the electric typewriter and, just about 10 years ago, by word processing. Now we're entering the age of desktop publishing, using microcomputers to write, design, and print documents that look typeset without ever leaving your office.

This special issue of Tomorrow's Office takes a quick look at publishing yesterday and today — its beginning and its future.

YESTERDAY...

By the 16th century, the press had — as one historian has noted — "lost the sheen of novelty without acquiring the lustre of respectability." A scholar named Aldus Manutius changed that. Issuing important works in Greek and Latin, Aldus tried to promote and preserve the spirit of the classics. Unknown to him, he had started a revolution in publishing.

IN

a culture like Ours, long accustomed to splitting and dividing all things as a means of control, it is sometimes a bit of a shock to be reminded that, in operational and practical fact, the medium is the message.

Marshall McLuhan



Aldus Manutius 1480-1515

Watch out typesetters! The Apple Laserwriter does a fantastic imitation.

gured to drive a Diablo and still embed extra commands in your text without worrying about what mode you're in.

It comes with six fonts built-in (four on the Model I), and enough memory to load them in varied styles into 15 available font areas. Any font can be used in landscape mode as well as portrait mode, and the fonts can be altered as they are transferred to the working font areas. They can be made bold, italic, shaded, reverse, double height or double width. Six fonts varied that many ways adds up to an enormous range of standard fonts to choose from.

The control panel on the Impact is a dream. It has a programming mode which lets you set most of the operating parameters, fonts and so on in a menu-driven mode with full prompting on a 16-character LCD display. Options selected can then be saved to non-volatile RAM to leave your preferred defaults there for power-on.

Fonts can be user-downloaded, areas of the print page can be treated as 'graphics cells' to allow the use of logos and so on, there are line and box-drawing commands, and a forms overlay capability is provided.

This means basic forms data which will remain unchanged over many pages can be loaded into the machine once, and will

then be automatically superimposed over every page printed.

The print control commands are easy for the user to understand and use. A lead-in character (user-selectable — usually an obscure keyboard character like the vertical bar or tilde) is sent to the printer followed by a mnemonic command, a parameter, and a terminating character. For example, the Hewlett-Packard command above which selected 12-point Courier Medium at 10 cpi in landscape printing mode could be done like this on the Impact:

ML. CP10. CFI.

ML means Mode Landscape; CP10 stands for Character Pitch 10; CFI says Change Font to 1 (the one currently stored in font area 1).

That sort of command structure is easy for the average user to incorporate into text for special commands, while the word processor can handle the normal bolding, underlining and so on by issuing commands to suit the current emulation. It's the sort of sensible approach printer manufacturers have always seemed to be able to avoid.

Before I sound like I'm getting too carried away, it's time to own up to some problems with the Impact. It doesn't implement all commands in several of its emulations, although those left out are unlikely to be used often, if at all. And some of the typefaces are awful compared to their counterparts on the HP — the Times Roman in particular is an ugly face

The Impact features list is probably the best we've seen for the price, and it's delightfully easy to use. It seems to be the only machine around whose software allows for end users rather than the kind-heartedness of software package developers.

on the Impact, where it was an elegant, attractive design as sold by HP. The Impact accepts font cartridges, but not HP ones ... a shame.

I'm not too worried. The Impact people are keen, responsive and competent, and it won't be long before they iron out the small problems. And they're right here, in Australia, so we don't have to yell too loud to attract their attention.

Canon LBP-8

Canon sells two models, the 'basic' A1 (still significantly more powerful than the Hewlett-Packard) and the more-memory-

more-graphics A2. We looked at the A2, but the only real differences are its 1.125 Mbytes of memory, vector print graphic mode, and full paint memory mode.

Setting up the Canon is virtually identical to setting up the Laserjet (after all, they're all the same 'box of bits') except for the Canon's more detailed instructions. In fact, the Canon manual is far more detailed in most areas, providing a lot more technical information about the unit as well as covering all recommended actions with very specific drawings. However, it can be terse once it gets to the software technicalities — they're the style of 'explanations' which will usually require a lot of thought followed by a lot of experimentation.

The Canon's control panel is more comprehensive, allowing various parameters to be programmed on the spot rather than by software alone. A nice touch is the data indicator light, which shows you the printer is receiving information — because you can't hear these machines printing, usually the only clue that a transfer has been successful is the sound of the paper-feed mechanism.

The LBP-8 has four built-in fonts and, sensibly, they're variations on the same type: you get regular, bold, italic, and footnote (condensed) versions of the Courier typeface. Other fonts can be added with cartridges which seem to be interchangeable with HP units.

It has two print command modes — Diablo and International Organisation for Standardisation (ISO). ISO command support is common, according to Canon, but in the PC world we think you'll get more joy out of the Diablo emulation. The problem with that is all the useful commands for a laser printer — selecting and changing fonts, graphics, forms overlay data and so on — are in the ISO set. Don't worry — you can switch back and forth in software, but again it's not an everyday end-user job.

The Canon has a number of features not found on the HP: it can use up to 15 fonts per page, can make characters double height and double width, and can accept user-downloaded character sets. It has more complex graphics capabilities in basic form, and the A2 model's Vector mode adds commands for shapes, patterns, rounded corners, poly line, circle, arc, polygon, ellipse, paint, and a whole lot more.

Rather than take up too much space talking about the Canon, I'll leave a little

Continued on page 106 ...

THE COST OF LIFE IN THE LASER LANE

The cost of running a laser printer shouldn't be ignored if you're thinking of buying one — it will probably add up to more than the price of the machine itself over its working life.

One of the first things I thought of when I started contemplating the purchase of a laser printer was the unreliability of photocopiers — how often have you seen the technician in the office fixing these marvels of modern office technology. The printing mechanism in the laser printer is basically the same as that used in a photocopier.

The Canon-based lasers solve the old photocopier reliability and quality deterioration problems by putting most of the important bits in a replaceable cartridge — the EP cartridge. This contains the photosensitive drum, toner hopper,

developing cylinder and drum cleaner in one unit.

EP cartridges last for 3000 copies before they need to be replaced — and at a cost of around \$170 each, that adds up to nearly six cents a printed page before you consider any other servicing or purchase costs. Maintenance contracts on these units range from \$400 to more than \$1000 a year, and major repairs need to be considered a possibility at some stage. If, as it has been suggested, the likely service life of these units is 100,000 pages, the purchase price on a basic model represents a further cost of five cents a page.

All up, each page out of your laser printer is likely to cost you 15 cents or more. You want a 100-page program listing, or 10 copies of a 10-page report? That'll be \$15 please ... □



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EXPLORING THE MANDELBROT SET

Like many other readers, I've been fascinated with the incredible pictures recently published in connection with research into fractals. A good example is the August 1985 issue of *Scientific American*, which has a colour picture of what looks like a computer-enhanced photograph of a quasar on the front cover. It's anything but: the picture is pure mathematics — a small detail near the boundary of a unique set of complex numbers known as the Mandelbrot set, named after a researcher at the IBM Thomas J. Watson Research Centre in New York called (surprise, surprise) Benoit Mandelbrot.

Despite their relative complexity, I have the feeling fractals are likely to offer the same kind of fascination as Conway's life 'game', which was also popularised by *Scientific American*. My guess is we're going to see many more articles on this subject before interest wanes.

This article divides into two parts, the first providing the background to the mathematics of the Mandelbrot set, the second for those folk who really don't care

Take a deep breath, pour a stiff scotch and hang onto your hats as Phil Grouse takes a close look at one of the most complex sets in mathematics.



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THE MANDELBROT SET

for the maths but simply want to create those same fascinating pictures on their colour monitors. Once you've toyed with these programs you'll probably return to examine the mathematical foundations. You'll have plenty of time; creating a file for a picture can take up to 30 hours or more if you're pushing for resolution.

Mathematical Principles

The Mandelbrot set consists of an infinite number of connected points in a complex plane which meet a certain criterion. Before explaining that criterion, I should mention you need a basic understanding of complex numbers to follow the logic of the program algorithms. If you're already familiar with complex numbers you can skip over the following section.

The Basics of Complex Numbers

The world of 'normal' computing is made up of real numbers: integers, such as 1, 2 and 100, or non-integers, such as 3.141592. The real numbers all lie on a single line which stretches from minus infinity to plus infinity. A point on that line corresponds to a particular real number.

A complex number has two components: real and imaginary. As such, it's represented as a point on a two dimensional plane. The real part corresponds to the value of the point projected to the horizontal axis and the imaginary part to the projected point on the vertical axis. This plane is sometimes referred to as the 'complex' or 'Argand' plane.

That doesn't sound too 'complex', does it? Here we use the term complex in its technical sense — it doesn't mean complicated, but it does mean just a wee bit peculiar. That's because we're not just treating each complex number as a simple pair of values (like two-dimensional vectors). Rather, if the real and imaginary parts of the complex number 'z' are 'a' and 'b' respectively, we say 'z' is the same as 'a + bi' where 'i' is the square root of minus one.

Hang in there if you're lost. We all know minus one doesn't have a square root, which is why it's imaginary. But (and you'll love this) if it did exist, it would have the unique property of a square of minus one. In other words, the fundamental property of 'i' is $i^2 = -1$. With that outrageous assumption, a whole new field of mathematics unfolds, which includes the Mandelbrot set.

To illustrate how you can perform algebra with complex numbers, consider the operation of squaring 'z'. Remember we de-

finied 'z' as 'a + bi'. Its square must therefore be the new complex number 'a² — b² + 2abi'. The second term is the result of squaring 'bi'.

When working with complex numbers in a computer it's simply a matter of holding both the real and imaginary parts in separate locations. You're clearly not going to store 'i' anywhere; it's all in the mind.

Rules

The complex numbers which constitute the Mandelbrot set must all satisfy a simple rule. To see if the complex number 'c' is in the Mandelbrot set, first set a second complex number 'z' to zero (0+0i), then carry out the following step repeatedly or until the size of 'z' exceeds two:

$$\text{LET } z = z^2 + c$$

If the size of 'z' never exceeds two, no matter how many times you repeat the assignment, 'c' is in the Mandelbrot set. By 'size', we mean the distance from the origin to the complex number. In other words, the square of the size of 'z' is 'a² + b²'.

Now that's one heck of a test. If it locks up in an infinite loop, the point is in the set. That's a lot of computer time, and in practice you limit the number of iterations to (say) 500. In the *Scientific American* article referred to above, a limit of 1000 was used, and real number crunchers had to be accessed. You should only consider using 1000 if your machine has an 8087 co-processor and/or a fast 80186 or similar.

Now we've defined the rules for the Mandelbrot set it's possible to write a program to test a range of points in a selected area to see if they belong. It turns out they nearly all lie in a rectangle with a lower left corner at $-2 - 1.25i$ and an upper right corner at $0.5 + 1.25i$. If you plot the points of the set in black on a white background you wind up with something which looks like a cancerous kidney!

But it's the points which are right on the edge of the Mandelbrot set which are of real interest. Mathematicians describe the boundary of the Mandelbrot set as being a 'fractal'. Fractal geometry is the study of forms which have fractional dimensions.

In practice, some points 'pop out' of the iteration loop very quickly, while others take ages before they finally give up. We would like to give a unique colour to each point which 'pops out early', the colour being defined by how long it took to pop out. The smaller the area examined, the more fascinating the plotted results. The program description in the following section explains how you can do this on your computer.

The Logic of the Mandelzoom Programs

Below are two programs: the first does the number crunching and generates a (massive) file, and the second allows you to present that file as a coloured picture. The colour boundaries may be modified any number of times for more pleasing effects without having to regenerate the file each time. Generating the picture file can take anything from a few hours to days, depending on the resolution you're seeking, the power of your computer and your patience. You might consider letting it run as a background job under a multi-processing operating system, such as Concurrent DOS, if you have access to one.

Before providing specific programs (in BASIC), supply the logic in 'pseudo-English' form using flowblock notation. The logic given in Figures 1a and 1b is for a program to generate a 'picture file'. We'll discuss possible formats for this file a little later. Meanwhile, you can use this specification as a springboard if you're inclined towards languages other than BASIC. When I have the time (and the money) I'll do it in 8086 assembler and take advantage of the fast floating point operations of the 8087 numeric co-processor. I chose BASIC for the first pass, since PL/I-86 doesn't have double-precision floating point and its fixed decimal arithmetic isn't too good for number crunching. Microsoft's GW-BASIC supports double-precision, as does the BASIC compiler. The penalty for programming in BASIC is loss of speed.

The program is called Mandelzoom because it allows you to zoom in on tiny boxes in the complex plane. The idea is to pick a box which straddles the edge of the Mandelbrot set. There are zillions of great spots, but we'll offer a few suggestions for you to try.

The value of LIMIT can be as high as 1000 if you have the computer time, but I find 512 gives reasonable results. If your computer is an IBM PC or similar, WIDTH and DEPTH should be 320 and 200 respectively (to correspond to the resolution of your colour screen measured in pixels). The box referred to in Figure 1a is located on the edge of the Mandelbrot set. The corner coordinates ACORNER and BCORNER are the real and imaginary parts of the lower left-hand corner of the box, while SIDE is the length of the edge of the box. We supply a few sets of values for you to start with. Note if you inadvertently pick a box right inside the Mandelbrot set the program will take a very long time to run, since each of the 320 by 200 points will require the full

THE MANDELBROT SET

iteration of the testing loop.

Although the program works with ordinary precision variables, problems emerge when examining very small boxes. You really should use double-precision where possible, except for the variables LIMIT and COUNT.

Figure 2 is a pseudo-English definition for a simple program which displays the picture file in two parts. The first part loads the file into an array and the second is a loop which displays the array according to chosen colour ranges. For example, you might decide to have points in the Mandelbrot set as black (COUNT has reached LIMIT), green for COUNT in the range 0 to 100, blue for 101 to 200, and so on. Different

pictures result from different range choices.

When turning this into a real program you come up against a small snag: the sheer size of the required array. If you choose a 320 by 200 display, the array P will need to hold 64,000 numbers—hardly a proposition for BASIC, which places a limit of 64 Kbytes on its data segment. Even if you squeezed each value into one byte you'd still be over the limit, since the data space is also required for the other variables.

Here is one solution: if you keep just the four most significant bits (a 'nibble') of COUNT it will still be possible to resolve 16 separate levels. The trick is to assign two

'nibbles' to each picture element in the array P, which will require only 32 Kbytes of storage. Although it may take a little 'unwrapping' during display, the program is at least feasible. Furthermore, you can cut the size of the picture file down to roughly the same size by doing the transformation in the Mandelzoom program. You will then be able to store about 10 picture files on a single disk. In practice, this means instead of writing each value of COUNT to the file you output the integer part of $(COUNT-1) * 16 / LIMIT$, which will always lie between 0 and 15 inclusive.

The program in Listing 1 is for Microsoft BASIC on the IBM PC. When compiled and linked, it generates a complete picture file in about six hours (more if there are many points in the Mandelbrot set). It uses a limit of 512, but outputs only four bits per pixel as described above. I've excluded any graphics statements from this program to suit the particular version of my compiler (V5.35). If your compiler supports graphics you can draw the picture while the file is being created. If you don't have a compiler be prepared for some very long runs. Note the hash (#) symbol appended to a variable means it's double-precision. When a percentage sign (%) is appended, the variable is a two-byte integer.

You may like to consider creating the file in two steps instead of using the single process described, as you do lose information when trimming off the least significant bits of COUNT before sending it to the file. Since the real computation time is in calculating each value of COUNT for each pixel, you can send the whole value to a file, then 'massage' that file into the form created by the program in Listing 1. You could then select suitable ranges to repre-

MandelZoom

```

+-----+
| Open a new (named) output file to receive the picture.
| Set LIMIT to the maximum number of iterations through the loop.
| Set WID to the number of pixels across the required picture.
| Set DEPTH to the height of the picture (in pixels).
| Accept the "box" corner coordinates ACORNER and BCORNER.
| Accept the length of the side of the "box" as SIDE.
| Compute GAP = SIDE/WID.
| Call Generate.
+-----+
  
```

Figure 1a. The main program sets the initial conditions for a picture file 'run'. It uses the Generate procedure shown in Figure 1b. See text for further description.

Generate

```

+-----+
| FOR M = 0 TO DEPTH-1
+-----+
|   FOR N = 0 TO WID-1
+-----+
|     AC = N * GAP + ACORNER
|     BC = M * GAP + BCORNER
|     Set the following variables all to zero:
|       AZ, BZ, I, J, K and COUNT.
|     WHILE (COUNT < LIMIT) AND (I+J <= 4)
+-----+
|       AZ = AC + I - J
|       BZ = BC + 2 * K
|       Add 1 to COUNT
|       I = AZ * AZ
|       J = BZ * BZ
|       K = AZ * BZ
+-----+
|     Output the value of COUNT to the file
+-----+
  
```

Figure 1b. This is the number-crunching loop which generates the picture file. It will contain DEPTH*WID values.

AREA	ACORNER	BCORNER	SIDE
1	-1.26	0.01	0.02
2	0.26	0.01	0.01
3	-0.88	0.24	0.025
4	-2.00	-1.25	2.50
5	-0.885	0.24	0.027

Figure 3. Some corners and sides defining boxes with interesting contents.

THE MANDELBROT SET

sent the 16 possible values rather than simply trimming off least significant bits.

Running Mandelzoom

Figure 3 shows some corners and sides defining boxes with interesting contents. You can zoom in for closer details by making the side smaller and choosing your new corner position within the previous box.

Area 4 should give you almost the complete Mandelbrot set, and can act as a suitable starting point for zooming in on other areas. Area 5 is close to the picture which forms the front cover of the August 1985 issue of *Scientific American*.

In a following article I will provide a program listing for displaying picture files on the colour monitor of your IBM PC. Meanwhile, if you get impatient, write one for yourself following the logic of Figure 2. I'll also have more great pictures to show you. □

DisplayPicture

```

+-----+
| Set up an array P with WID rows and DEPTH columns
| Open the picture file for input
| FOR M = 1 TO DEPTH
+-----+
|   FOR N = 1 TO WID
|   +-----+
|   | Read next number into P(N,M)
|   +-----+
+-----+
| WHILE you want to display a new picture
+-----+
|   Set the colour values and ranges for this next display.
|   Clear the screen
|   FOR M = 1 TO DEPTH
|   +-----+
|   |   FOR N = 1 TO WID
|   |   +-----+
|   |   | Determine the COLOUR corresponding to value of P(N,M)
|   |   | Plot point at row N, column M with colour COLOUR
|   |   +-----+
|   +-----+
|   Wait for a keystroke
+-----+

```

Figure 2. Logic for a program to display the picture file without the need to reload the file for each new picture.

```

100 'Mandelzoom program Oct Scientific American 1985 430 NEXT
110 ' 440 RETURN
120 INPUT 'Name of new Mandelbrot file';N$ 450 '
130 OPEN N$ AS #1 LEN=2 460 '
140 FIELD #1,2 AS A$ 470 'Plant1: Procedure
150 LIMIT%=511 480 'Output nybble r% - 1st of 4
160 WID%=320 490 '
170 DEPTH%=200 500 G%=R%
180 INPUT 'Corner';ACORNER#,BCORNER# 510 PASS%=2
190 INPUT 'Side';SIDE# 520 RETURN
200 GAP#=SIDE#/WID% 530 '
210 GOSUB 240: 'Generate 540 '
220 END :REM End of main program 550 'Plant2 and Plant3: Procedure
230 ' 560 'Output r% 2nd pass of 4
240 'Generate: Procedure 570 '
250 'Generate the required file 580 G%=16*G%+R%
260 ' 590 PASS%=PASS%+1
270 FOR M%=1 TO DEPTH% 600 RETURN
280 PRINT M%; 610 '
290 PASS%=1 620 '
300 FOR N%=1 TO WID% 630 'Plant4: Procedure
310 AC#=N%*GAP#+ACORNER# 640 'Output r% and write to file n$
320 BC#=M%*GAP#+BCORNER# 650 '
330 AZ#=0: BZ#=0 660 IF G%>=2048 THEN G%=G%-4096
340 I#=0: J#=0: K#=0: COUNT%=0 670 G%=16*G%+R%
350 WHILE COUNT%<LIMIT% AND (I#+J#<=4) 680 PASS%=1
360 AZ#=AC#+I#-J#: BZ#=BC#+2*K# 690 LSET A$=MKIS(G%)
370 COUNT%=COUNT%+1 700 REM a$ is a 2 byte record representing 4 values
380 I#=-AZ#*AZ#: J#=-BZ#*BZ#: K#=-AZ#*BZ# 710 PUT #1
390 WEND 720 RETURN
400 R%=INT((COUNT%-1)*16/LIMIT%) 730 '
410 ON PASS% GOSUB 470,550,550,630 740 '
420 NEXT 750 'End of Listing

```

Listing 1. Basic program to generate a Mandelbrot picture file.

OVERKILL AND UNDERDEVELOPMENT

The early purchasers of the Model-T Ford were faced with a phenomenon familiar to most computer users: next year's model would not only cost less than today's, it would also have superior performance. In those days the infant motor industry was rapidly climbing the learning curve. Innovation was the order of the day, both in the technology of automotive design and the art of cost-efficient manufacture.

Today the car industry is mature — the learning curve has flattened. The fundamentals of car handling and performance were worked out years ago, and the few new performance developments stem from the incremental refinement of older techniques. With the decline of 'performance innovation' present automobile manufacture has become totally cost-driven. The prime objective is to build a competitively priced car, to find new ways of efficiently assembling and screwing together the necessary components. When we talk of high-tech cars we're really talking of high-tech manufacture. A 10 per cent saving can turn last year's 'also ran' into this year's leader.

Many observers have noted the parallels between the infant computer and auto industries. Computers are certainly experiencing an equivalent performance/cost reduction heyday; yesterday's mainframe power now sits inside many desktop PCs. But if history is any guide, this happy state of affairs will not continue indefinitely. Just as there are fundamental physics which limit a car's performance, there are bound to be limits beyond which computers can't go. Some of these limits are now in sight, although we still have quite a distance to travel before we reach them. The greatest single obstacle is the speed of light.

If you're familiar with high school physics you'll realise light travels fast: approximately 297,600 km per second. Light speed is also regarded as the maximum velocity — nothing in this universe can travel faster. (Some theorists suggest there is an alternative universe where nothing travels slower than the speed of light, which doesn't help us because, according to the laws of physics, the two can never meet.)

Nano nano

The speed of light becomes important

Ever thought about how far computer technology could go? We're still climbing the learning curve but, according to Ian Allen, we're not ready to give up the search for speed yet.

when we consider electrons (the basic messengers of any computer) travel at or near light speed. While the speed is fast, the distance they have to travel is short; present computers operate in the nanosecond range (a nanosecond is the unit of time you get when you divide one second by 1,000,000,000 — 10^{-9} of a second). In that amount of time electrons travelling at the speed of light traverse about one foot. A typical 16-bit computer has a clock speed of 4 MHz; in other words, it performs one very basic function every 250 nanoseconds.

Let's pretend you're a microprocessor which has just completed an execution. You need your next instruction, so you send a signal. This travels down one of your pins, then along a circuit board (which also happens to be an antenna which can pick up noise), then up the pins of a memory chip, which contains your program. The memory chip then has to respond to the signal, read its own contents and send a signal containing your next command back along the same routes. Obviously, this communication exercise slows down the whole process; not only does it involve time delays while the memory chip looks up the information you've requested (typically 100 to 150 nanoseconds), but it also involves centimetres of travel (and therefore time), plus the risk of exposure to unwanted interference.

Present micros can cope with these delays; after all, they're still operating relatively slowly. The next step is to reach for the world of the picosecond — 10^{-12} of a second. We know this is achievable be-

cause some military computers are already operating in this range, but at this speed electrons travel about one thousandth of a foot per clock cycle. Obviously the compactness of the circuitry becomes highly critical as the pursuit of speed becomes the pursuit of distance.

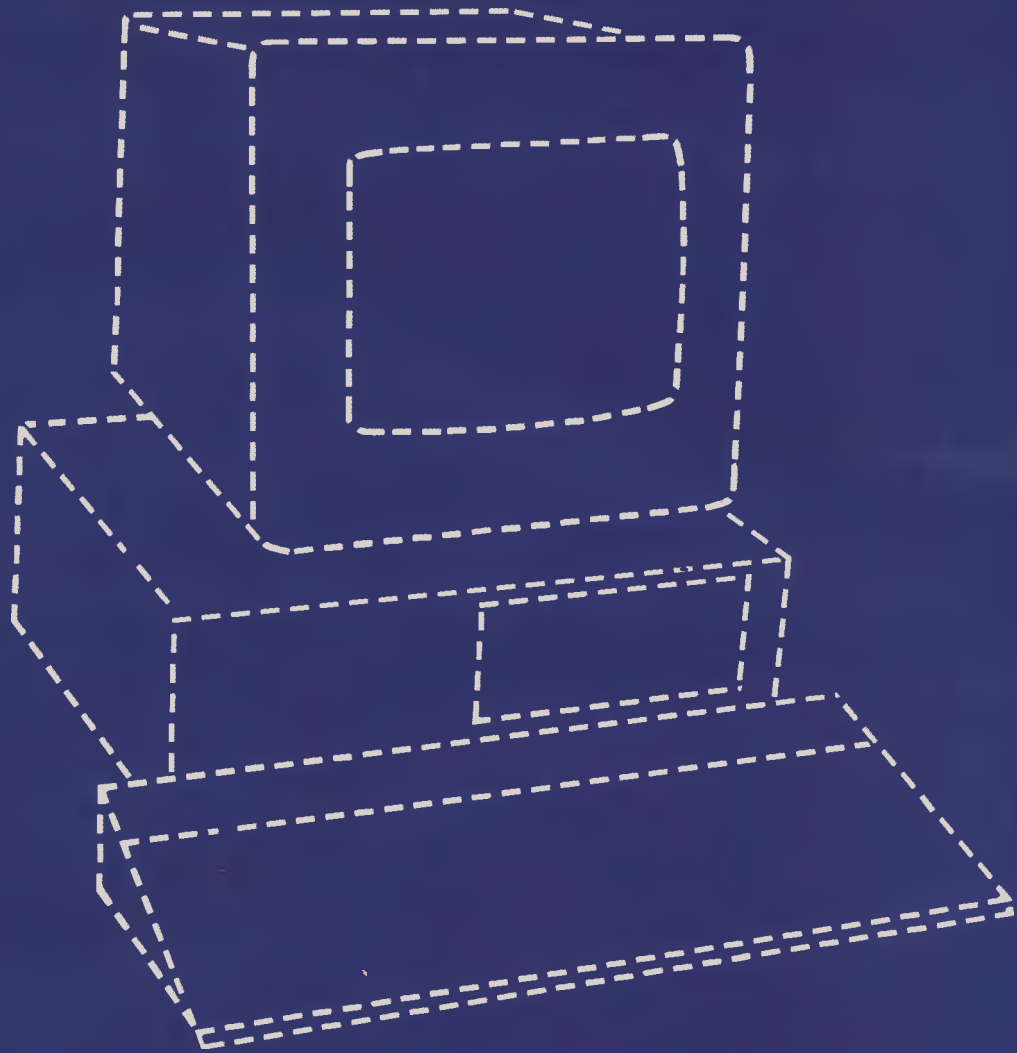
The military is pushing into the femtosecond range. This is mind-bogglingly fast — we're talking about incredibly small units of time. To get an idea of scale let's use an analogy: the age of the universe is commonly thought to be around 10 billion years. A femtosecond is to one second what two minutes is to the age of the universe! In a femtosecond light traverses only one millionth of a foot. To make computers which can function at this speed the distance electrons must travel becomes supremely important.

This is where the limit comes in. As we approach electron distances, which are measured in terms of atomic diameters, we reach the end of the line. We can go this far and no further, since there's a limit to the ultimate speed of a computer.

It's worth remembering the human race is notorious for its distaste of limits. When sailing boats could go no faster we created steamships. Planes took speed way beyond the limits of cars. Perhaps we'll find a way to circumvent the physical boundaries just described — parallel processing is an obvious approach. Perhaps electro-chemical models will be the way to go: after all, the human brain operates that way and it's still far more versatile than even the smartest computers.

Meanwhile, the here and now is still in the nanosecond world, and profit is the driving force behind our technology. Research is already divided into two areas: cost-driven and product-driven. Cost-driven research is similar to car manufacture: the object is to build more of the same, but at a lower price. In the case of memory chips, we sit on a temporary plateau. Dynamic RAM is the standard and performance improvements are incremental; a minor efficiency improvement in manufacture can be decisive in the competitive market. It's the sort of thing the Japanese do well, and it's no surprise they now dominate this market.

The Americans are more interested in product-driven research and it's easy to see why. If you compete in the cost-driven



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world and invent a new process which is just 10 per cent more efficient, you're king for six months (until the opposition catches up on the learning curve). Invent a new product which embodies some advance never seen before, such as non-volatile memory, and you're king indefinitely (or for as long as the patents hold up).

American Stranglehold

This attitude to research explains the American stranglehold on the logic chip market. It also defines the current priorities in research. If you can identify a need not met at present, but in which there is a sizable potential market, you're cooking with gas.

If we look at memory devices there is obviously a need for some form of non-volatile RAM. Present approaches use CMOS technology, which requires a battery backup. This does the job but has limits: the read/write times are much slower than with dynamic RAM. Certain applications, as in motor cars, can't depend upon the battery always being present. What if it goes flat? It would be far better if we had a RAM which held its memory even if all power were disconnected, but was equally as fast as dynamic RAM in read/write time. Such a development would depend on a new technological (and patentable) approach. It doesn't matter if the opposition licenses the technology; the dollar revenue is enormous.

High-rise Chips

Another area to look at is chip density. Despite the billions of dollars already spent on making ever more compact chips, the design effort has always been two-dimensional. If chip density is measured in bits per square inch we're really talking real estate; value is measured in bits per picoacre. Commercial office space is valued in square metres per location, so we tend to build multi-storey office blocks in expensive areas. Why not use the same approach in chip architecture? The big problem has been the physical properties of silicon — it doesn't lend itself to high-rise. But why stick to silicon when other electronic materials may have different properties — potassium nitrate (KNO₃) already looks promising as an alternative, and its electronic properties suggest it's suitable for high-rise architecture.

In this case your microprocessor would be situated on a three-dimensional chip; it would only be a matter of 'ducking up-stairs' to get the next instruction. No more journeys through fields of radio interfer-

We're still very firmly in the innovative age of computer technology. By the time we reach the plateau, we'll probably find we have become just as attached to our slow old computers as we now are to our cars. Supersonic jets may be faster, but try taking one of them to the supermarket!

ence and obstacles like dry soldered joints. The net result would be not just a boost in speed, but also in reliability and accuracy.

When we talk about new electronic materials we can challenge all previous conceptions. Aluminium was king in the aviation world until carbon-fibre composites came along. New materials can really alter performance possibilities. Let's think about computer memory. We have already reached the stage where there is no physical limit (other than space) to the amount of RAM you can plug into a computer. The trouble is you have to be able to access it all, otherwise it's not much use.

The Nitty Bitty

The first consideration is your processor. An 8-bit computer is more or less limited to 64 Kbytes of addresses. You can increase this by going to 16-bit or 32-bit machines, but you can never get away from the fact that memory is made up of bits and bits take up space. Each bit requires one on/off circuit to store its contents. It doesn't matter if you're using 8-bit or 16-bit words, you still need to put the bits somewhere! Given that we're looking for ways to compress our circuitry, the space taken up by RAM becomes important, but new materials mean we may be able to

challenge existing rules.

When you first learnt about binary notation you were probably told humans have 10 fingers so they count in base 10, and computers count in base two because they have an on and an off state — a zero or a one. This is all very simple, but what if we developed a new material which had three states: on, off and maybe? A computer using such a material could count in trinary. The memory increase would be dramatic: eight binary bits can store any of 256 different numbers; eight trinary bits could store up to 656!

Such a material would give us a huge leap in our ability to compress circuitry and increase speed. But why should we settle for base three? Why not base four or base 10? The limit will be determined by our understanding of materials. It's been suggested base three is the mathematical optimum, but the history of science tells us such rigid pronouncements are made to be proved wrong.

Another area of development is optical data processing. Many observers have inferred this is related to processing speed; it is and it isn't. Electrons already travel near enough to light speed as it is, and using light instead isn't going to produce any great speed increases. The real benefit is in the retrieval of the information to be processed. If you have very large data files you need to be able to access them quickly. Magnetic storage is slow because it depends on a flux field and the resolution of that signal. Read/write speed is therefore limited, especially since it depends on the magnetic head being in physical contact with the surface of the storage medium. If we increase the flux by making the disk or tape pass faster, we start encountering problems such as friction, heat and premature wear on the read/write head.

Optical storage sheds these restrictions. No physical contact is necessary and light can resolve densely packed data at very high speeds. Optical storage technology will make high-speed random file searching a reality and will undoubtedly introduce a whole new dimension of tasks for computers to perform.

Knowledge-based computing will just be the beginning — we're still very firmly in the innovative age of computer technology. By the time we reach the plateau of the learning curve, we'll probably be just as attached to our slow old computers as we now are to our cars. Supersonic jets may be faster, but try taking one of them to the supermarket! □

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PACKARD**

Writers' Wishlist



THE COMPUTER WRITERS'

◆ ◆ ◆ ◆ 1985 WISHLIST ◆ ◆ ◆ ◆

EVAN MCHUGH
Editor, 'Australian Computing'

*Two roads diverged in a wood, and
I - I took the one less travelled by,
And that has made all the
difference.*
Robert Frost

For me, it was a toss-up between two very different machines: the Apple Macintosh or the Compaq 286 portable.

To my mind both these machines represent excellent technology and both are portable, which is an important factor if you like to be able to work whenever the urge strikes you and wherever you might be. But before I reveal my choice, there are a few other knick-knacks scrawled on my 1985 shopping list.

In a year of bogging advances in your average office print quality, a year in which one and all surged toward greater computer storage capacity, a year when every man/woman and his/her sharebroker discussed Christensen protocols over breakfast ... I wished myself a laser printer, a hard disk and a modem. Just which laser printer and which hard disk would depend on which of the above machines I chose, but I know exactly which modem I would have snaffled — the Netcomm Smartmodem 1234.

Released at the end of last year, the Smartmodem can run at 300, 1200/75, 1200/1200 and 2400 bits per second. Add

*Had money been no
object, what kinds of
computers would your
favourite gurus have
wished for in 1985? Our
old friend Evan waxed
poetical, Whelan was
predictable, the Grouse he
was unbudgable, Mr
Powell quite irrepressible,
Helen yearned for a nice,
safe cage, and Rose and
Robertson were agreeable,
which bodes well for the
NEC APC III.*

to this Smartmodem capability and you have one of the most flexible Australian-made communications devices on the market.

Anyway, back to the engine required to

run all these desirable bells and whistles. The Macintosh is the obvious choice if you have a specific, perhaps graphics-related, task in mind. Some of the software becoming available for the Mac is revolutionising jobs in many areas.

But my choice is the Compaq portable. With an 80286 processor, a 20 Mbyte hard disk and 640 Kbytes of RAM, this is an all-rounder with real muscle. It's blindingly fast for a dedicated machine and has enough memory for my needs, in a unit that packs up quickly and goes with me on my travels.

Sure, elegant engineering is a nice thing, but, as I'm sure Matt Whelan has tried to convince you before, nothing beats raw power. Frost can have the less travelled road, me for the fast lane.

PHIL GROUSE

Owner of Ron. Writer and programmer extraordinaire.

O to be a millionaire. Or even to have the bucks to put a decent set of wheels on Ron, my PC compatible. When I bought him way back (when?), I thought his 10 Mbyte hard disk and 512 Kbytes were the cowboy's pants. Today that's all ho-hum. The price of 20 Mbyte hard disks is scarcely above that of the 10 Mbyte units, and RAM has tumbled in price. So it really wouldn't take an arm and a leg to give old Ron a shot in the arm. Here's what I'd really like to do to him.

Writers' Wishlist

For starters, we'd do a RAM cram — as much as his system will allow. I think that means an extra 128 Kbytes, but surely someone out there has a RAM disk card with a decent megabyte on it, which doesn't map into (and therefore collide with) the 8088's main memory. Maybe Intel's Above Board is the answer. That would be neat; especially if the RAM was battery backed in case of power failures. That's another thing — an uninterruptable power supply would be really great. Our local mains have a tendency to hiccup.

Then we'd add a second hard disk — 30 Mbytes wouldn't be unreasonable, but we would have to have a streaming cartridge tape backup system as well. And I'd make good use of an 8087 numeric co-processor chip — to speed up the calculation of Mandelbrot files, of course.

While we're spending, how about a decent colour graphics card with software support. The IBM EGA card would probably fit the bill; my RGB monitor is already a high-resolution job, and it would be nice to be able to display sharp multicolour graphics. Ron might object to the EGA; I understand you need a new ROM chip when installing it in the IBM PC. Ron's ROMs will almost certainly not buy the swap. On the other hand, I keep hearing stories of a ROM-swap board which can carry an alternative set of ROMs for an alternative BIOS ...

I'd still like to be able to access Viatel, using the new card and, say, the Netcomm In-Modem — yahooooo, there we'd be, with colour graphics and all.

Finally, I could use one of the new Hewlett-Packard laser printers, or one of the newer printers sporting LED technology — quiet, fast and great resolution.

But Ron would remain at the heart of it all.

THE dVINE Ms

ROSE

Editor of dLetter, and ruthless News and New Products editor for 'Your Computer'

When I started thinking about this piece I had no idea which computer I'd have bought myself if finances had permitted any purchase.

I knew it wasn't an IBM PC. While IBM has certainly provided the industry with a standard, it has ensured that standard represents mediocrity. Admittedly, there are some clones around doing a flash job: the Olivetti and Toshiba 1500 might have tempted me to loosen the purse strings,

had there been anything in the purse.

I also knew it wasn't a Macintosh. There are lots of great things about the Macintosh and some of the software now being produced for it, such as Pagemaker, is really impressive. But I can't bear its sloth, and having been brought up on CP/M and its derivatives, I'd rather be able to avoid the interference of a tizzy 'user-friendly' interface!

Some of the most impressive machines appearing on the scene this year have been portables or laptops. Somehow, I don't seem to fall for these numbers, despite their charms — probably because the screens and keyboards are really not up to the standards available on desktop machines.

In the end, the one machine which really appealed was NEC's APC III. Not only has NEC had the gumption (foolhardiness?) to resist IBM compatibility, but it has consistently produced machines which emphasise quality. The original APC was a gem, and the APC III continues this tradition of excellence.

As I don't have to worry about the cost of this machine for the purposes of this exercise, I should mention the little extras I'd want bundled in the package. First, a hard disk — I don't think I could stand the pace of working on a floppy-only system after using hard disks for so long, and most of the software I'm interested in works much better with an excessive amount of memory available, both RAM- and disk-wise.

Second, I'd grab a Software Library Expander: an addition which lets you run PC-DOS programs such as dBase III and Flight Simulator. With this board snugly in its slot, I'd hardly be losing out by not opting for straight IBM PC compatibility.

Finally, since you're shouting, I couldn't go past the complete library of Knowledge-man II software. I was impressed with the Knowledge-man database when I first reviewed it and the new version is a definite improvement. Together with the Kman integrated word processor, report generator, C language interface (and so on) I think I could chug away quite happily. Until, of course, the next gee-whiz hardware and software hits the market and I start to hanker for the latest and greatest.

No wonder I've never got around to buying a machine for myself ...

MATT WHELAN

Zooooooooooooommmmm.

Everyone has guessed already, right? You

all know what power-crazy Whelan would buy any time you put some money in his hands: YAC (yet another Compupro). Why not? I'm always spending Federal Publishing's money buying bigger and faster Compupro equipment, and I'm PC-less after selling the seven-user, 40 Mbyte Compupro System 816B which has graced my study for the past year (a typical home computer, wouldn't you say?). Another Viasyn (not the medicine, but the new name Bill Godbout picked out of a hat for Compupro) is the obvious choice, especially with the lower prices currently on offer for the new-look hotrod 80286 box.

This time maybe not. I must admit it's tempting. I almost rang the bank manager today to tell him just how important an 8 MHz 80286/Z80H combo with a megabyte of RAM, 40 Mbyte Winch, cartridge tape drive and all the frills was to the efficient running of the Whelan household. Just think how many recipes we could store, and how quickly we could call up instructions on making the morning toast.

But then I wonder whether I really should persist with IBM incompatibility these days when there are (finally) some reasonable machines with a foot in Big Blue's camp. Why, I could even do it on the cheap with one of the deals being offered on the Olivetti M24. Hmmm, maybe not that either — can I really live without the performance of an 80286?

Perhaps it should be an AT clone (but not the real thing — I refuse to support the arrogance that produces anti-standard interface connectors and redefines the world's keyboards wrongly, regularly). Such a machine, with a real hard disk (20 Mbytes is a joke on such a device) would have its advantages. The major one is the ability to partition the disk for different operating systems.

I can satisfy my curiosity by delving into Xenix without giving up my old favourite — Concurrent CP/M — and have PC-DOS on hand any time I want it. It sounds better than waiting for Compupro to polish up its PC Video Board and introduce some real compatibility, because even then I'll have to choose between that and Unix, rather than trying both together.

Yes, maybe that's the answer. Perhaps the Texas Instruments Businesspro, with its clever layout, extra expandability, high-speed operation and the optional 72 Mbyte disk? Or the Compaq, fast and full-featured? Or a cheapie, like the Kaypro or the President? That wouldn't hurt as much as a price equal to the Compupro.

Writers' Wishlist

Okay, that's it. It's decided. I'll take the Compupro. No, make that the TI; no ... wait a minute, you're paying — I'll take both!

GARETH POWELL

Computer Editor, 'Sydney Morning Herald'

What would I have bought in 1985? What would I have wished for in a Christmas computer, with Father Christmas looking benevolent and money no object?

Speed for a start.

I love my Macintosh with a pure passion, but it is slow and I suffer from the disease called Macfidgets while waiting for programs to load. I want a machine that is at least ten times faster.

But I've got used to 32-bit technology, so it must use a Motorola 68000 as its central processing unit or, even better, a 68020, which is faster yet allows parallel processing.

And I don't want my computer's central processing unit to be doing anything but working the main body of the computer; the keyboard can have a separate chip. So can video. So can sound. I want the CPU to remain pure, unsullied and fast — very fast. I am, let's face it, a speed addict. I am to computers what Toad of Toad Hall was to motor cars.

And I want colour.

I have had it on my Macintosh — but at exorbitant expense. I have it when I use my Toshiba 1100 on a colour monitor. I have it when I use my Apricot F1 in the same way. And my Apple IIe. Not to mention my Apple IIc and my Commodore SX64. (Is this man computer mad? Is there any argument?) But PC colour is not as fine as the Macintosh black and white. Very little is. What I want is a neat combination of them both — colour plus Macintosh high resolution.

And I must have good sound — not the tinny pipsqueaks that come out of most computers' loudspeakers. Not the metallic voices of the robotic androids that greet me at computer fairs grinding out trite and meretricious phrases of insincere welcome. I want sound as grand as a Welsh chapel choir singing Cwm Rhondda on a good Sunday. I want sound that will make the angels weep with envy. I want to be able to recreate Lily Pons singing the Marseillaise in the Daughter of the Regiment at the Metropolitan in New York at the outbreak of the war. I want, if not to be the Mozart of the computer keyboard, to at

least have the facilities to become the Salieri.

I want sound as good as a Fairlight Synthesiser.

And I must have vision.

What use a computer without great vision?

I must be able to inject a video signal and have the computer digitise all the images as they occur. And it must be in colour. And I must be able to manipulate that colour and those images with great ease.

How else can I become the second Steven Spielberg?

Oliver St John Gogarty once wrote, "There is no such thing as a large Irish whiskey." The man was right. And there is no such thing as too much accessible memory — especially if you are working with video images.

Oliver St John Gogarty once wrote, "There is no such thing as a large Irish whiskey." The man was right. And there is no such thing as too much accessible memory — especially if you are working with video images.

So I want an excess, a plethora, an abundance of user-accessible memory. Say seven megabytes for starters and we'll discuss the rest later.

And the machine must be able to run IBM PC programs straight out of the box because that is where much of the action is. At the same time it should run Macintosh programs with small modifications to allow for colour, which will give me a library of programs as big as all outdoors.

And it should be elegant. It should complement the decor of my study — a cross between late Victorian tat and new Japanese high-tech gross-out — but, at the same time not make too much of itself. I hate pushy computers.

And yes, it should have a mouse (which I normally hate but is useful for graphics).

It is very important the keyboard be de-

tachable and programmable, so I can convert it to the Dvorak system, which I love, instead of the qwerty system invented by the evil Scholes for the typewriters, which I loath.

That is the computer I wanted last Christmas.

To dream an impossible dream, you hum?

Chance would be a fine thing, you mutter?

Wrong. The machine exists. It is called the Commodore Amiga and it will be on sale in Australia in the early months of this year. I made Christmas come early last year by having an Amiga flown in from San Francisco in November. And yes, it is everything I'd wished for. It is also remarkably cheap — as in under \$5,000 for the configuration I have described.

CLIVE ROBERTSON

Channel Seven (Sydney)

I don't want you to think I have oodles of money. If I did, I would be writing about the computer I now *have*. I am really worse off than you are.

But, just *supposing* I had the money, which computer would I buy? I had to stop and think about this one. I am writing this small article on my faithful old Kaypro II (modified), so I can't actually claim I need another computer — we must be talking about something I would simply like to have. So, let's pretend you are Santa (I know that will all be over by the time you read this, but for the sake of the article, and so I won't feel like I'm talking to myself ...).

I think my choice would have to be the NEC APC III. I had one of these for a while, but I fell into a trap (more on that later). NEC has reluctantly decided to make its lovely machine *.B.* compatible. I don't like that big company at all, but if all the sheep around the world *must* be led, and other sheep feel they *must* make things *.B.* workable, then any classy machine that lacks the software will only ever be second best.

The NEC is what the *.B.* should have been. It is a real joy to work with, if you can call it work, and if you can find anyone technical at NEC to help you. When you work with NEC products you realise a little of the pioneering spirit of Australia — sometimes you feel very much alone.

So, it's a NEC, with *.B.* compatible card, the *biggest* hard disk they make, and all the software ever made to run on it.

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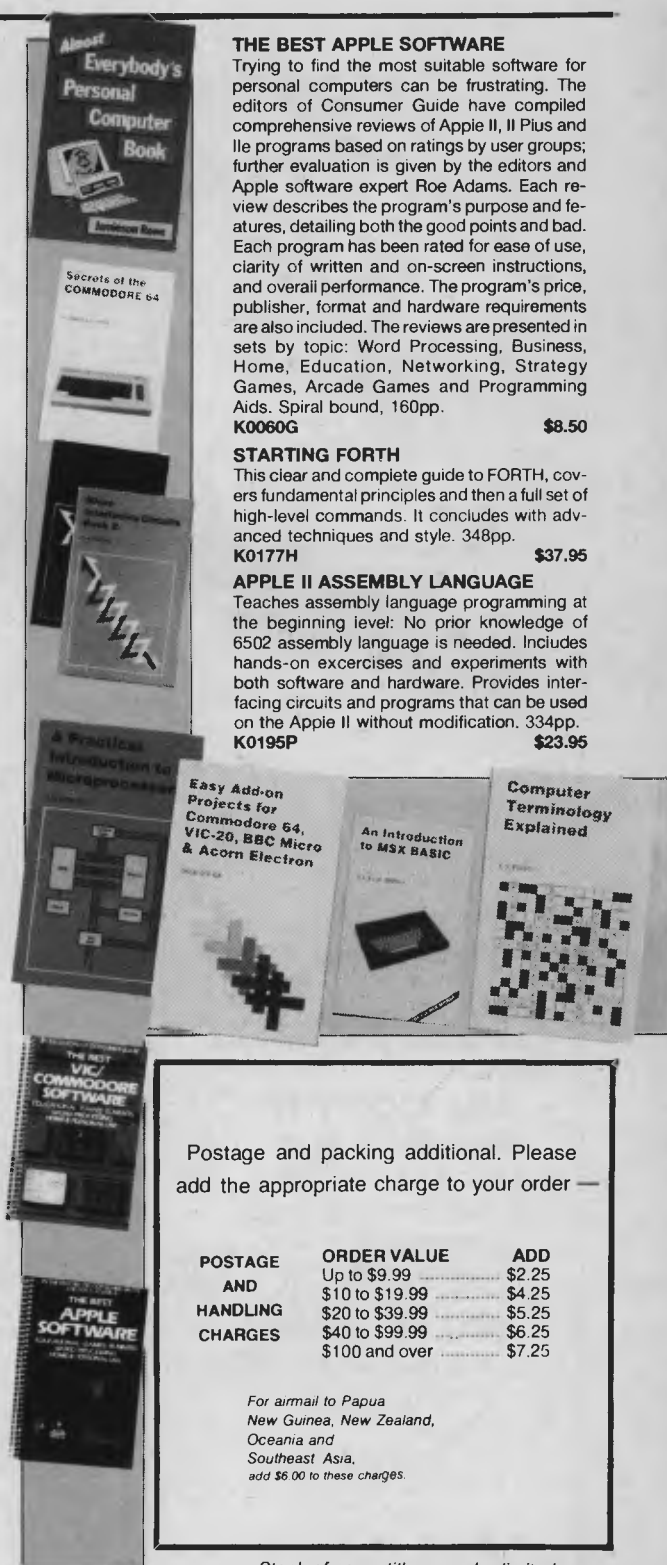
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Writers' Wishlist

(You thought being Santa was dead easy, didn't you?) You see, therein lies the trap: I got caught before, when the cost of the machine slowly went down in comparison with the (even then) software available. Software is fun. Making software work is the challenge — the machine is no problem.

So, dear Santa (or whoever you are), I'll be 'in' all this year. I know I left it too late for Christmas '85, but who believes in an overweight man in a red outfit who has a blood pressure problem? What sort of fantasy is that? However, cough up with the NEC and the software, and I'll be willing to believe in you.

I don't fancy having to rearrange the furniture in order to squeeze a more substantial machine into my ten-foot-wide house; or having to buy an ergonomic grotesquerie to rest it on.

HELEN MEREDITH

Computer Editor, 'The Australian'

My fourteen-year-old friend Harvey told me the Pantek was the computer of his dreams. Oh to be so certain of it all!

Exploring the world of computing is for Harvey like being a happy oyster lover holidaying at the seaside. He roams among the oyster-encrusted rocks, feasting as he fancies — some word processing here, a new adventure game there, a little bulletin board fun, and so on.

Not driven by any dollar imperative or work-a-day deadline, Harvey opens the shells of his computing dreams as he fancies.

My days are spent tapping the power of the mainframe, word processing, editing, taking advantage of sophisticated software to get the pages done on time, and being a conscientious and very boring computer user.

And I admit to being pampered in computing terms. What do I need that I don't already have access to?

I am forced to ask the question anyone should ask — what is it I want the technology to do for me apart from what it already does?

I'm not a freelance journalist running a private business from home. Home is where I go to relax, have fun, eat, make music, and rest my square eyes from the day's work at a terminal.

I have a portable computer and acoustic coupler to take on my travels, and a modem to link my tiny electric attic to the world. This satisfies what simple computing needs I have outside work.

I don't fancy having to rearrange the furniture in order to squeeze a more substantial machine into my ten-foot-wide house; or having to buy an ergonomic grotesquerie to rest it on.

I love the Mac, but even this computing delight needs some space.

What I fancy is a simple — and undoubtedly expensive — device that rests unobtrusively on a corner of my desk, taking up no more room than my little NEC PC 8401B. A kind of miniature Hal — a Halette, if you like — that will save me from unfortunate lapses of memory, help me with some of the more tedious tasks of running an inner city home, and provide me with a little light entertainment of the Zork variety when I fancy it, or allow me to tap into some of the more esoteric databases (no questions please).

I wouldn't mind if Halette's presence was quite pervasive, since monitoring and securing would be largely what she would be about.

When the local hoods put their cotton-pickin' fingers on our door windows, she could alert a security service. When the cat next door mistakes our one and only flower bed for its personal toilet, I'd like to be informed. If the refrigerator door is left open or the iron on, I would like Halette to flash some kind of warning across her screen.

I wouldn't mind if she made tutt-tutting noises when my house mates or I stayed too long under the shower, threatening to empty the hot water tank.

The possibilities are endless.

Am I describing an intelligent house? Probably. They do exist. NEC showed me what was possible in Tokyo last year. But the gear is still a bit too bulky for my taste.

Halette is probably the computer of my dreams, and given carte blanche I would have rushed out and bought her last year, if only she'd been born on time.

Ah, well ... next year perhaps. □

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Reviews

Dick Smith's Cheap Compatible 68

The Multitech MPF-PC is an attractive proposition, both for its excellent price and the extensive support available from Dick Smith Electronics. Foodies like us will also appreciate the chip sockets and built-in muffin fan.

Mind Over Minors 70

"What?!" I can hear you exclaim. Our reaction was the same when this package arrived in the YC offices: "Yech, what is this? 1984 revisited? Wotta concept — it's gross," and so on. We're still not particularly enamoured of the idea that a computer could effectively analyse and advise on parent/children relationships. See what you think.

The Microprofessor — An Education in Itself 76

Put a professor in your pocket, and in your bag, and behind your ear and in your glove box and ... this computer comes in many pieces. Piecing it together is part of the learning process for which it was designed, and you can go on adding a thermal printer here, a switching power supply there, some ROM-ware in between — but there comes a point where you'd be better off having bought an IBM PC.

Dedicated to WP — The New Sony 83

What distinguishes a dedicated word processing machine from the highly versatile, hard-working, speedy, willing, almost-intelligent machines we usually talk about in 'Your Computer'? Rose Vines had her prejudices removed (didn't hurt at all) and now advises people to be honest about their needs before ruling out a machine like the Sony Model 10.

The Tower of Babel 89

Operating system barrier? What barrier? The recent crop of transfer utilities has made it possible to transfer a wide variety of disk formats for use on the IBM PC. There are some advantages in flying the bright-Blue standard.



DICK SMITH'S CHEAP COMPATIBLE

ALTHOUGH not big on power, the MPF-PC System 1 offers reasonable functionality and expandability. The review unit was supplied with just 128 Kbytes of RAM and a single Teac floppy disk drive. It has four expansion slots, but only one is free.

Of more interest is the internal layout of the system; for some unfathomable reason the cards are mounted horizontally. The Toshiba PC does the same trick, but with the aim of lowering the overall height of the system unit, which would otherwise be determined by the the standard card height. The MPF-PC manages to trim about an inch (2.5 cm) off the height — hardly worth the loss of expandability. You see, the MPF-PC has no system board. Like the Datamax Mitac, all the system logic is on IBM-compatible expansion cards, so one slot is lost to the CPU card, another to a

The circus continues and still they send in the clones. Taiwan's Multitech Industrial Corporation has released yet another IBM PC compatible, which Frank Lee has consented to review because it really does have something worth talking about.



multi-function card and a third to the colour graphics adaptor board.

Although there are no spare memory chip sockets on the CPU card, it's possible to increase the memory to 512 Kbytes without using up the final slot by substituting 256 Kbit chips for the 18 standard 64 Kbit chips. Expansion to a second disk drive is simply a matter of popping out a removable panel and physically installing the new drive; all the connections are already there.

The CPU card has a single rear connector for the keyboard, while the multi-function card includes a floppy disk drive controller as well as a single parallel port, a nine-pin serial port and a games port. The manual supplies details for constructing a suitable adaptor cable for converting the nine-pin serial connection to standard 25-pin

MULTITECH

RS232C form. The multi-function card also provides a battery-backed calendar clock.

The third card is a display adaptor, either monochrome or colour (the review unit had a colour board).

Despite its small size (40 cm by 38 cm by 12 cm), there's plenty of room inside the system unit, and it keeps its cool with a quiet muffin fan.

Loosening up

The keyboard layout sticks reasonably closely to the IBM 'standard', although there's one extra unmarked and undocumented key. Sadly, there are no keys with illuminated LED indicators. The keyboard itself is lighter than average, and the keys feel uncomfortably loose — even wobbly. I wish manufacturers would realise the quality of the keyboard has a major impact on potential buyers — first impressions really count.

Early compatibles often included an external reset switch, which was seen as a preferable alternative to powering down and back up again when the system became unresponsive to the usual keyboard three-key reset. It added only a few cents to the overall cost, but saved considerable time and operational wear. Alas, it seems to have fallen from fashion, and the MPF-PC sadly lacks this feature.

Two paperback manuals are provided with the system: a Taiwanese reprint of the Microsoft MS-DOS User's Guide and Multitech's own Users' Guide. This latter document is comprehensive and well written, with only a trace of a Taiwanese accent to betray its origins.

I couldn't fault the compatibility of the MPF-PC — it ran the Microsoft Flight Simulator perfectly, as well as the less demanding Lotus 1-2-3, Wordstar 3.3 and Sidekick. Our prime number benchmark test compiled, linked and executed in the same time as it does on the IBM PC.

The MPF-PC is marketed in Australia by Dick Smith Electronics in three versions. System 1 is the review unit just described (The price includes a three-month warranty period.)

System 2 brings the memory up to 256 Kbytes and adds a second disk drive. The warranty is extended to six months, and includes free on-site service in most major cities. System 2 also includes Micropro's Easy word processor.

Two paperback manuals are provided with the system: a Taiwanese reprint of the Microsoft MS-DOS Users' Guide manual and Multitech's own Users' Guide. This latter document is comprehensive and well-written, with only a trace of a Taiwanese accent to betray its origins.

System 3 substitutes a 10 Mbyte hard disk for the second floppy disk drive and brings the total memory up to 512 Kbytes. Instead of Easy, System 3 includes Soft-friend's Aura integrated package, as well as free installation; the remaining spare slot is consumed by the hard disk controller. Incidentally, if you're wondering why it has 10 Mbytes instead of 20 Mbytes, it's due to the size of the power supply. At 65 watts, there's not much hoot left over for a 20 Mbyte unit, so resist the temptation to 'do it yourself' unless you really know what you're doing.

The MPF-PC should be attractive, both for its excellent price and extensive support arrangements. Dick Smith Electronics has no plans to provide a monochrome card as an alternative to the colour graphics card, which is a pity — a simple word processing application could benefit from the additional resolution offered by the monochrome adaptor, plus the lower cost of the adaptor and display. Nevertheless, a knowledgeable user could quite easily tackle the changeover. □

RATINGS:	POOR	GOOD	V. GOOD	EXCELLENT
DOCUMENTATION	██████████			
EASE OF USE	██████████			
DESIGN	██████████			
RELIABILITY	██████████			
VALUE FOR MONEY	██████████			

Unit:	Multitech MPF-PC
Distributor	Dick Smith Electronics, 396 Lane Cove Road, North Ryde 2113; (02) 888 3200.
Worst points:	Keyboard quality, little room for expansion.
Best points:	High compatibility, low price.
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System 3: 512 Kbytes, one floppy, one 10 Mbyte hard disk	\$3395
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MIND OVER MINORS



MIND OVER MINORS

"SOFTWARE THAT HELPS you manage and motivate young people," runs the headline on the front cover of *Mind over Minors*.

The format of this package is similar to that of *Mind Prober*, which I reviewed a few months back. It is published as a paperback book with two diskettes in an envelope bound behind the back cover.

Just below the cover picture of a nine-year-old lad with an expression like he's just about to drop a live lizard into your

Yet another thoughtful product from the experts in expert systems — Human Edge's Mind over Minors is reviewed by Frank Lee.

tinny are some pretty grandiose claims. "The advancements of Artificial Intelligence provide parents and teachers with a plan of action based on your personality and the personality of the child in question." Correct use of the program is said to increase children's academic performance, indicate appropriate disciplinary measures, improve communication, and generally help you handle children more effectively.

Human Edge is on to a good thing and

MIND OVER MINORS

the company is set to wring the last drops out of it. I've explained the theory of it before, but just in case you tuned in late, here's roughly how Human Edge systems operate.

The idea is to generate advisory reports describing the characters of assessed individuals, or appropriate interactions between pairs of assessed individuals. 'Assessment' is a matter of generating a binary vector for each person. Each element of the vector relates to an adjective, and is a 'true' or 'false' entry (hence the vector is binary). Human Edge systems use vectors with around 50 or 60 elements each to define an individual's characteristics. The user is asked to create these vectors by responding to a sequence of questions in an 'agree or disagree' form.

In the case of Mind Over Minors, a vector is set up for the teacher or parent, and another for the child in question. The system then rubs one vector against the other to generate a 'profile', using a broad range of accepted psychological principles. The profile is used to create an English language report from a large database of suitable paragraphs. The paragraphs themselves contain various 'macro entries', which allow individual names to be planted in the final printed reports, along with appropriate pronouns ('his' or 'her', 'she' or 'he' and so on).

Of course, the user is protected from the inner workings of the system; there is no mention of vectors, and the program is entirely menu-driven and suitable for folk with little more than the experience of being responsible for a child, and having access to a microcomputer system.

Mind Prober dealt with assessing single individuals based on the entered vector. It was more of a party game than a serious psychological tool, although it was presented with some degree of seriousness. Human Edge's 'Sales Edge' program produced reports designed to direct salespeople in their approach to dealing with prospective clients. That program used the two-vector approach, and is more similar to Mind Over Minors.

The 'expertise' in all Human Edge products is their method for generating 'profiles'. It's easy to say 'rub the two vectors together', but the actual process is highly complex. According to the introduction, the software was created as a collaborative exercise involving professional workers in a broad range of disciplines. Knowledge engineers composed large databases of information in the fields of education and

As a parent, I found much of the advice to be trite but certainly worth repeating. On the other hand, there were also sections which I wish I had read many years ago. Still, we all survived without computer-aided parenthood.



psychology. The data was then re-expressed as related sets of logic rules after extensive revision and review. The final expression in software earned the endorsement of the United States' National Educational Association.

There are two versions of Mind Over Minors: one for parents, and another for teachers. The parent's edition was provided for review — it covers children from five to 18 years. The teacher's edition covers from primary to high school levels.

A few words about the book are in order before we take a look at the program itself. Actually it's a book within a book. Its title is *Managing Children*, and there are seven chapters ranging from 'Traps in Managing Children' to 'Building Parent-Child Relationships'. Each chapter concludes by re-

ferring to the value of using the software to obtain information specific to the reader's particular problems. The five authors appear to be very well qualified, although I am in no position to comment on the validity or otherwise of the psychological and educational theories at the basis of the work. The volume is certainly very readable and nicely illustrated. As a parent, I found much of the advice to be trite but certainly worth repeating. On the other hand, there were also sections I wish I had read many years ago. Still, we all survived without computer-aided parenthood. In fact, I reckon my kids are terrific.

The book is replete with statistical tables showing young people's preferences in a broad range of areas. It is also backed up by copious references, many of which have appeared during the last three years.

A further 20 or so pages are devoted to the software itself, which is available in a variety of formats to suit various home computers, including the Apple II, the Commodore 64 and of course the IBM PC. Instructions for all three are supplied. In particular, the IBM PC version tells you how to install PC-DOS on the disk in precise detail. That the program is aimed at computer illiterates is evidenced by the use of an AUTOEXEC.BAT file, rather than the simple instruction to start the program with the command MOM.

In spite of the initial attention to detail, it was a bit disconcerting to discover the system looking for a disk in drive B when the reporting option was selected. Clearly the second disk (labelled 'Output Disk') was required. Why was no instruction given either in the book or from the program itself? The term 'Output Disk' is also something of a misnomer since nothing is written to that disk during program execution; it is actually the collection of wise sayings garnered for the report according to the computed profile. Individual vectors are stored on the original program disk, and may be modified as required from time to time. Indeed the recommended practice is to review both parent and child characteristics at regular intervals, especially during difficult periods.

The program is clearly written in compiled BASIC. It switches to a 40-column screen, and operates entirely in black and white. There is no option to use colours if a suitable monitor is available. Not that I mind, but it would have been a simple enhancement. More particularly there is a variety of cosmetic flaws in the program.

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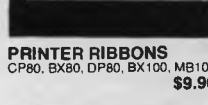
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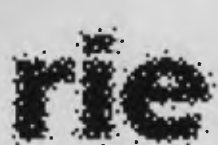
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THE MICROPROFESSOR



— An Education in Itself

YOU CAN TELL immediately from the list of options that Multitech's new Microprofessor is more like a set of building blocks than a computer. That's by design; it's intended as a serious training tool, to lead the student gradually into the mysteries of programming the 8088, as well as being an introduction to the architecture of the IBM PC (without going to the expense of buying a PC or compatible).

Overview

The MPF-1/88 is a single-card 8088 machine with a keyboard and a small two-line LCD display screen (see photograph). It is powered by an external AC/DC adaptor or an optional internal switching power supply. It contains a powerful ROM monitor reminiscent of those used in the early days of the Z80 (such as Xitan's Zapple), and there is room for an additional two ROMs and an extra 8525 DRAM chip. The keyboard has the usual qwerty layout, plus an Alt key and two function keys (F1 and F2). There is an expansion bus connector, a 16-pin Centronics printer port connector and sockets for an external audio cassette drive; a small speaker can be programmed for different tones. There are no facilities for disks of any kind. The clock speed is the

Phil Grouse reviews the new Microprofessor 8088-based single-board educational computer system and finds it provides a learning curve worth following.

same as used in the IBM PC, namely 4.77 MHz.

Cards compatible with the IBM PC may be added to the system using a separate interface expansion module, although this also requires adding the switching power supply to the basic system.

The system is backed by extensive documentation, and all the ROM monitor code is available for inspection. For its stated educational purposes the system is well conceived and designed.

A Closer Look

The review unit was supplied with 4 Kbytes of RAM using two 8525 DRAMs, leaving

one empty socket for an additional DRAM. A jumper lets you substitute 8 Kbyte chips, allowing a maximum of 24 Kbytes of main memory on board.

There are also three ROM sockets. One is occupied by a 27128 EPROM containing the standard monitor system, and those remaining can accommodate ROMs for applications such as a two-pass assembler or a Forth interpreter, up to a maximum of 48 Kbytes.

The LCD provides for two lines of 20 characters each, while the system monitor supports a 24-line logical display. The commands Alt-A and Alt-Z allow scrolling up and down through the logical display.

Two LEDs are provided: a green LED indicates when data is being transferred through the cassette port, and the red LED is illuminated when the CPU executes a HLT instruction or when the system is in the HOLD state.

Two methods are available for system expansion. One is by means of the 64-pin card-edge connector, which may be connected to the expansion interface module. There is also room on the main system board for soldering in a standard 62-pin H connector, though there may be some difficulty in mounting an actual IBM PC-type

expansion card.

The expansion interface module is designed to support a maximum of three IBM PC expansion cards. It is powered from the main unit via the two extra lines in the 64-way cable which links it to the edge connector. The expansion unit and either a monochrome or colour graphics display card plus the 'VIP' ROM allow the use of a normal monitor rather than the limited liquid crystal display.

Documentation

Three paperback manuals are provided with the basic system: a user's manual, a reference manual and the ROM monitor source code listing; the tutorial manual is an optional extra. All are well written and provide a wealth of detail. Most of us have by now become immune to the occasional lapses of Taiwanese documentation into twisted English: there is the odd 'has' for 'have' and confusion between singular and plural forms, but it's better than most. The Taiwanese also have this strange habit of using questions as section headings; for example, "What is the PRT-I/88 printer board used for?", rather than "Printer Board Functions". You get used to it.

The user's manual provides a short introduction to the hardware, then demonstrates the use of the monitor's line assembler to generate a simple program which sums the integers from 1 to 100. The monitor, it turns out, is quite a powerful beastie, but the single-pass assembler cannot handle symbolic labels or decimal constants. It needs hexadecimal notation for all references to values and locations; however, this is a fine starting point for an educational machine. The optional two-pass assembler gives a taste for 'real' assemblers.

The sample program (see Figure 1) also illustrates the use of interrupts to invoke special monitor functions. The INT 10 instruction displays the hexadecimal contents of the AX register. The INT 7 returns control to the system monitor. The line-assembler is invoked with the command A 0080:0, and the entered program is executed with the command G0.

The monitor's W and R commands are used to write and read tape-recorded data and programs. The program in Figure 1 could be saved to tape as the file 'SAMPLE' with the command

```
W 0080:0 0080:E /SAMPLE/
and read back with the command
R /SAMPLE/
```

Chapter 5 of the user manual provides a comprehensive list of all the monitor's commands. It shows how up to three

breakpoints may be set with the G (GO) command, how to use the assembler (A command) and the disassembler (L command). C (cancel) removes any previously set breakpoints. The X command displays register contents and allows individual register contents to be modified.

The hexadecimal contents of any location or block of locations can be examined or set with the M command (a combination of the Zapple D and S commands). Other commands include I (insert data), D (delete data), F (Find a string), and T (Transfer a block of data).

Among the miscellaneous commands is P (pause), which allows adjustment of the speed with which characters are sent to the LCD screen. The N command inputs a byte from a nominated hardware port and displays it in hexadecimal on the screen; the O command sends one or more bytes to a nominated port. Table 1 lists the standard port assignments. The Z command switches the console output between the LCD screen and an attached display monitor (if the VIP ROM is installed).

The monitor also provides a list of useful subroutines which may be accessed through the INT (interrupt) instruction. These are listed in chapter 7 of the user's manual, but there is nothing like the range of facilities available from the IBM PC's ROM BIOS. There are input/output calls for the various devices, including the keyboard, LCD screen and printer. These routines can also drive certain cards plugged into the interface extension; they include the asynchronous communications card and display cards.

Appendices to the user's manual are primarily hardware oriented, but also provide memory maps, error message explanations and an instruction set summary for the 8088/8086.

The reference manual is a very detailed exposition of the MPF-I/88's internal workings. Chapter 1 describes the monitor's interrupt service routines in detail; chapter 2 explains what happens at cold boot and warm boot times; chapter 3 is devoted to input/output programming concepts. An overview description of the system hardware is supplied in Chapter 4 and is backed by full schematics in Appendix B. Chapter 5 deals with device drivers, and provides the source listing of a sample driver for the LCD screen plus a detailed commentary. A similar exercise is performed for the keyboard. Appendix A is an introduction to Intel's 8088 Assembly Language, while Appendix C is a voluminous reprint of Hitachi's date (*sic*) sheet of the two-line

LCD screen.

The monitor program source listing is just that; it's well commented and runs to about 300 pages.

Finally, the tutorial takes the student through a no-hassles introduction to the 8088 and assembler programming and debugging. It also tells you how to install the expansion bus, and an optional thermal printer and EPROM burner.

The Interface Expansion Module

To make use of external IBM-type cards and certain other options it is necessary to give the system a power boost from the optional switching power supply. This small black box fits snugly into the main unit and may be installed in a couple of minutes or less. It has a switch and normal three-pronged socket for an external power cord. With this installed, the expansion module is connected, using the supplied flat cable, to the system board edge connector, and the required cards installed.

The serial interface card lets you make a null-modem connection to a PC for downloading/uploading software using the communications software (UD.COM) supplied on diskette. The corresponding facility for the I/88 requires the EPB-I/88 EPROM burner (see below). The serial card may also be used to drive an external terminal under the monitor's EXPAND command.

Two other cards came with the system: a monochrome adaptor and a colour graphics card. The monitor's Z command checks to see which of these cards is installed, then transfers all console output to the appropriate port. You can't install both cards at the same time.

All this is great stuff, but not much use if you can't run any disk-based software. I really doubt the educational utility of these expensive extension cards. I can agree with the value of the base system, but once you start to add expensive goodies you may as well go the whole hog and buy a PC compatible, or even the Real Thing.

Other Goodies

I'd exclude the thermal printer and EPROM burner from these last caveats. They are good value for money and are excellent teaching adjuncts.

The EPB-I/88 EPROM burner is a small card — roughly 10 by 15 cm — which connects via a short, flat 40-conductor cable to a connector on the expansion interface module. It can't be used apart from the interface module, which brings the total cost for this facility to just over \$440 (since ▶

MICROPROFESSOR

it also needs the switching power supply).

The EPB carries a ROM which supports upload/download communications with a remote IBM PC through the serial card, plus read, write and verify functions for the actual EPROM burner. EPROMs supported include the 2716, 2732, 2732A and 2764. There are also 6 Kbytes of additional RAM and a 24-line parallel port.

The thermal printer is a real cutie. It too is on a 10 by 15 cm board, uses a tiny roll of paper only 6 cm wide for a 20-character line and is powered by an external 9-volt DC supply. The printer itself is 7 cm wide, 1.4 cm high and 3.3 cm deep, and weighs in at a massive 45 grams. Print speed is approximately 48 lines per minute.

While you wouldn't be generating your monthly operating statements on this unit, it can provide hard copy of assembler programs or disassemblies. My only reservation is that you can get a 'real' dot matrix printer for just over half the price.

To send 'screen' information to the printer you use the now familiar control-P key sequence to toggle the feature in and out. There is also a driver in the ROM monitor for sending the contents of the AL register to the printer as an ASCII byte.

Figure 2 is a sample memory dump using the monitor's M command, shown as printed in actual size.

In Summary

This is an excellent approach to hands-on instruction for the 8088, especially through the well documented and designed ROM-based monitor. In its minimal configuration the Microprofessor could well form the basis of learning laboratory training carrels, though there is a need for locally written instructional programs and exercises if the machine is to be included in a formal course structure. I have indicated my doubts on the value-for-money aspect of the interface expansion module, though it is a requirement if you wish to use either the printer or the upload/download facility.

A reasonable educational system would require the switching power supply, the interface module, the serial card and the EPROM burner, which brings the total retail cost to just over \$1000. This would be increased if you added the various ROMware options or chose to increase the total RAM capacity. However, to put things into perspective, this would be only a fraction of the total cost of mounting an educational program based on the Microprofessor, so it is well worth consideration by educational bodies. □

RATINGS:	POOR	GOOD	V. GOOD	EXCELLENT
DOCUMENTATION	██████████			
EASE OF USE	██████████			
DESIGN	██████████			
RELIABILITY	██████████			
VALUE FOR MONEY	██████████			

Distributor:	Emona Computers, 1st Floor 720 George Street, Sydney 2000.
Recommended Prices:	MPF-1/88 single-board computer — \$445.05; tutorial documentation — \$29; video interface ROM — \$42.55; two-pass assembler ROM \$71.30; 8088 Fig-Forth ROM — \$71.30; interface expansion module — \$96.60; switching power supply — \$132.25; EPROM programmer board — \$213.90; mini-printer — \$142.60; upload/download software for IBM PC — \$22; AC adaptor \$13.80. IBM-compatible expansion cards asynchronous communications — \$142.60; colour graphics — \$235.48; monochrome display card — \$182.12; TTL-level monochrome monitor — \$198.

```

0080:0000 MOV AX,0
0080:0003 MOV CX,64
0080:0006 ADD AX,CX
0080:0008 LOOP 0006
0080:000A INT 10
0080:000C INT 7
    
```

Figure 1. Sample program to sum the digits from 1 to 100. All values are in hexadecimal. The locations are prompted by the single-pass assembler.

```

>M0:0 23
0000:
0000 00 07 00 FC
0004 82 2B 00 FC
0008 72 11 00 FC
000C 0F 07 00 FC
0010 00 07 00 FC
0014 00 07 00 FC
0018 15 03 00 FC
001C 00 07 00 FC
0020 DB 04 00 FC
    
```

Figure 2. Actual size printout from the micro printer, obtained by using the control-P toggle and the monitor's M command.

Device	Hardware Port
LCD screen (Command)	IA2H (read) IA0H (write)
LCD screen (Data)	IA3H (read) IA1H (write)
Printer data output	IE0H
Printer strobe output	Bit 7 of port 180H
Printer BUSY input	Bit 6 of port 1C0H
Keyboard array output	Bits 3 through 0 of port 180H and bits 7 through 0 of port 160H
Keyboard array input	Bits 4 through 0 of port 1C0H.
Control key input	Bit 5 of port 1C0H
Tape output	Bit 6 of port 180H
Tape input	Bit 7 of port 1C0H

Table 1. Device port assignments.

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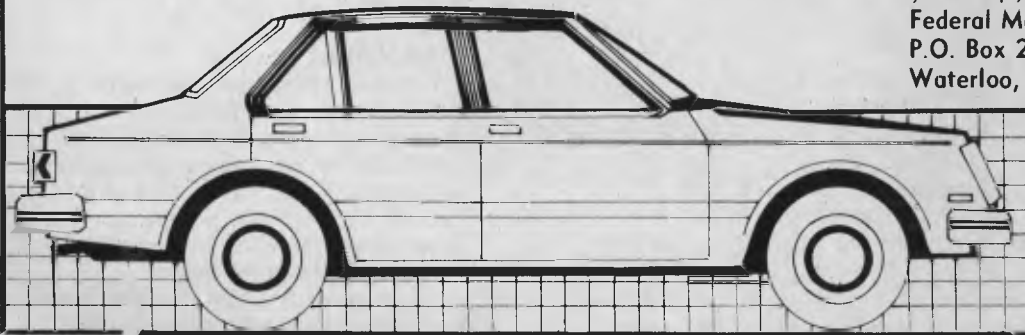
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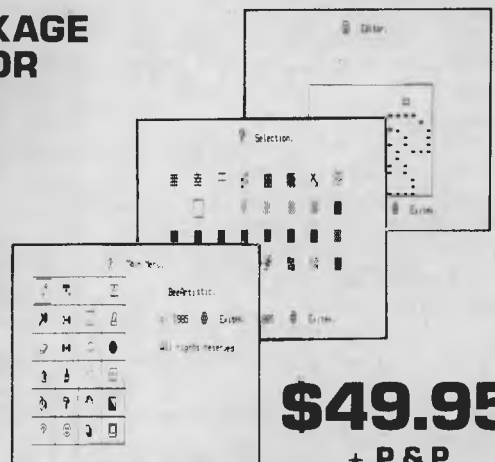
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since first meeting a typewriter to be keystroke efficient). Moving around the text is done by pressing the GO TO key, the appropriate area-defining key (WORD, LINE and so on) and EXECUTE. This system should be simple to learn for someone new to word

My one concern about the command sequences was the need to press keys all over the keyboard; most of the command and area-defining keys are placed near one another, but all commands require the EXECUTE key and some need numeric keys. A numeric keypad placed with the command keys would make life much easier.

Apart from the mechanical basics of entering text, the Sony approaches the concept of word processing in a slightly different way from most word processing programs. When the system is loaded, you're presented with an 'initial blank page'. This is an area of 158 characters by 200 lines, with the screen providing an 80-character by 21-line window on the page. It's possible to place text anywhere on this page, and later save it as a document; so the page exists whether you have typed any text on it or not. This contrasts with programs such as Wordstar, where nothing exists — empty space or text — until you type it. It gives you the feeling of working at a typewriter, which for many will be a comforting approach.

Features

A rundown of the main features of the Sony shows the usual complement, plus a range of extras:

- Global search and replace.
- Multiple format lines to adjust margins and tabs throughout a document.
- Automatic reformatting of text.
- A format menu for determining character pitch, justifying, line spacing, word-wrap, headers and trailers.
- Multi-column printing.
- A trace mode, for displaying all the formatting commands embedded in the text.
- On-screen underlining and boldface.
- A help facility.
- A maths function for performing calculator functions, and for inserting and performing maths operations within the text.
- A divided screen, so you can look at and edit two documents (or two parts of the same document) at one time.
- A background mode which lets you queue documents for printing or refor-

The printer is a 20 character-per-second daisywheel model, which destroyed the peace and quiet of my home late one night; living with laser printers and suitably hooded dot matrix machines, I'd forgotten about the daisywheel din.

matting, so you can print and edit at the same time.

Other extras include a steno function, which lets you store frequently used words or phrases and retrieve them with a couple of keystrokes. These phrases are stored in a system document called \$STENO. I could store the following:

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in the \$STENO document, assign it to the 'Y' key, then produce it in a document whenever I pressed 'Y', followed by the STENO SPACE key. Simple and flexible.

Another system document, \$INIT, stores the default system values. By changing the values in this document, you can customise the system, adjusting the defaults for printer format, line and document format, maths function and system configuration.

The software I reviewed was the basic version. You can also get mailmerge facilities, which allow you to sort data and print directly from the keyboard to the printer, as well as standard mailmerge functions, a spelling checker and communications software.

The Verdict

The system I tested, with two double-sided disk drives (and 256 Kbytes of RAM), word processing software and printer, sells for \$6247.60. The single-drive version costs a little over \$4860. This is a lot of money; you'd have trouble selling any CP/M machine for this price, but obviously Sony is offering something special.

If you want to use a computer almost exclusively for word processing, the Sony should be considered. It's a machine made with care and attention to detail, and rarely have I seen any computer which makes the learning process so easy (even the CP/M software supplied has a menu-driven interface to make life bearable for novices). Hardware, software and documentation all contribute to an overall impression of style, dependability and friendliness. It's up to you to decide whether the extra features outweigh the pricetag. □

PRODUCT DETAILS


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Models HR 39 & HR 134

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Technical Data - HR 39 & HR 134	
CRT Size:	12" Diagonal (29cm)
Phosphor:	HR 39 (Green); HR 134 (Amber)
Sync-H. Scan Frequency:	18.432kHz
V. Scan Frequency:	50/60Hz
Signal Input:	Video - TTL Level Positive Sync. H - TTL Level Positive Sync. V - TTL Level Negative
Video Response:	20MHz
Display Size (H x V):	203mm x 135mm
Display Time (H x V):	44Ms x 18.99msec
Resolution:	Centre 1,000 lines Corner 800 lines
Display Formats:	9 x 14 matrix, 2000 characters in 80 x 25 format
Input Terminals:	9 pin "D" type connector
Dimensions:	10.5"(H) x 15"(W) x 12"(D) 257(H) x 367(W) x 294(D)mm
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Business

Rocking 'Round the World with IMC and the Laptops 100

While the business world waits ... for return phone calls, couriers carrying urgently required documents, correspondence from overseas offices, the clacking of that confirmation coming through the telex machine ... the rock music industry has gone up-tempo high-tech. Have you been missing the beat?

THE GREAT DATABASE ROUND-UP

Here it is, the last batch of Great Database contenders — well, almost. We still owe you a full review of Qpro 4, which you'll see next month ... and, of course, developers haven't been twiddling their thumbs while waiting for the results of our search. We've recently heard about enough new databases (and one or two are already on our desks) to start afresh. Kman and Dataflex are going to be hard to beat.

The Accounting Solution 109

Known as TAS, this package offers a data dictionary, programming language and program compiler in one. It's well presented, and cheaper than the other contenders, but Frank found the language a little too foreign.

Superfile — an Unconventional Database 115

And now for something completely different. Superfile creates a 'super operating system' with full database facilities and interfaces to conventional languages ... with a length of rayon brain thrown in.

Knowledgeman/2 — What's New? 119

This new release of one of our favourite databases deals with almost all the criticisms Rose originally levelled at the earlier version, as well as continuing development of the product.

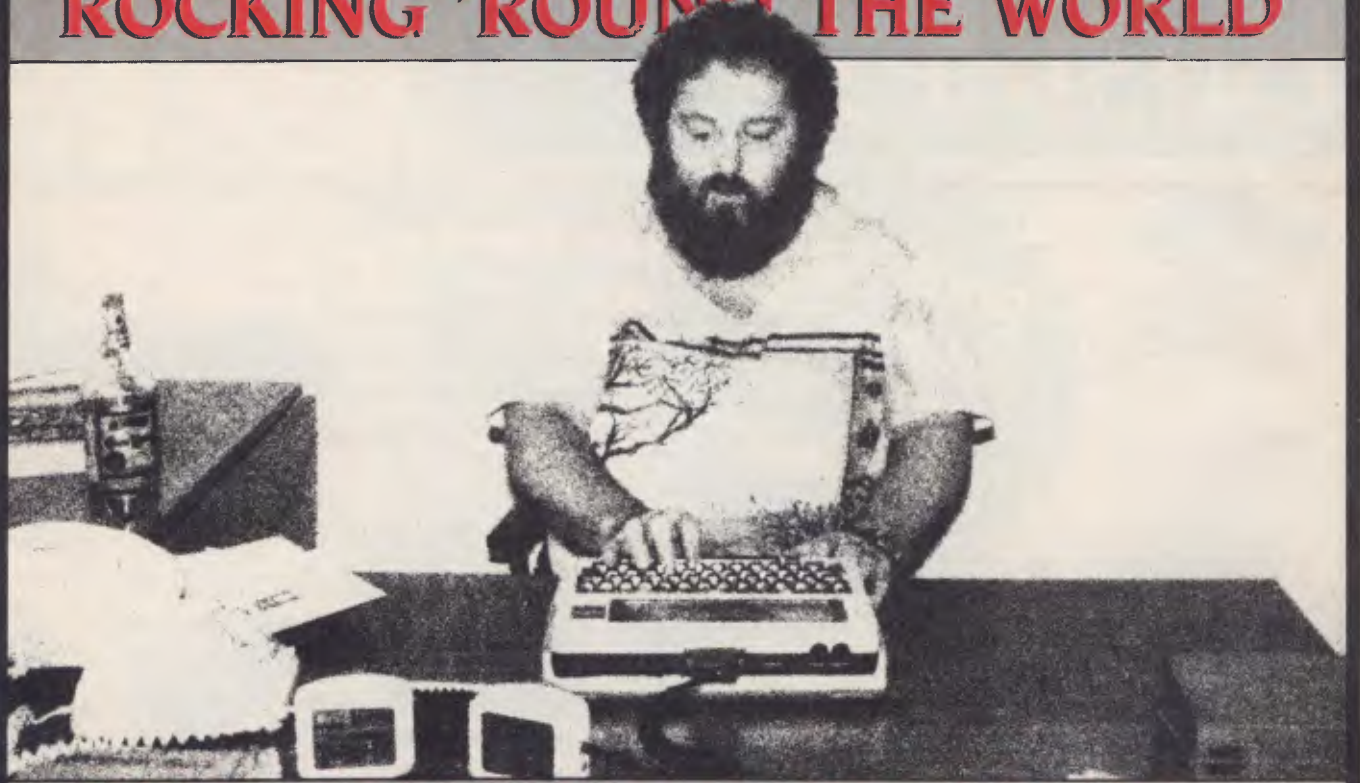
CAD Helps Plan Building Sites 121

Getting back to the AT. Norman finds its ATtributes are ATtractive to people in the scientific, professional and engineering fields. One town planning and architectural firm has been quick to use it with the kind of software that helps it tell where a building would best be placed AT.

ROCKING ROUND THE WORLD

BY PHIL TRIPP

ROCKING 'ROUND THE WORLD



WITH IMC AND THE LAPTOPS

While the business world is treating computer communications with caution, rock musicians worldwide are competing to see who can transmit data under the most impossible conditions, and music-affiliated industries have for some time been conducting their business via a dedicated communications service.

AN EXCITING RACE is being run by international touring rock bands — one that shows business users of computers just how versatile and dynamic a computer network with electronic mail facilities can be. The members of these bands, along with their managers, road crews and record

companies, are part of a closed user group comprising 3000 subscribers worldwide, most of them being in fairly constant transit.

The race is on to see who can send electronic mail from the most exotic locations, using the most high-tech equipment.

Armed with battery-operated, laptop portable computers and acoustic couplers, rock 'n rollers have broadcast their proud messages of accomplishment from locations as diverse as Botswana and Siberia. Data has been transmitted from phones in band limos, planes and boats, and the current frontrunner is Stevie Wonder's lighting engineer, who successfully sent his message from a hovercraft crossing the English Channel.

It may just sound like a lot of fun — rock stars graduating from video games to a new form of diversion in computers — but this global computer Gumball Rally is only an amusing sideline to the serious use of computers to link a far-flung industry.

The participants in this music-business computer network are pioneering the use of electronic mail and networking worldwide, while also relieving some of the

ROCKING ROUND THE WORLD

pressure and boredom of being on the road. The system they belong to is called International Management Communications (IMC), which was established a few years ago in the United States by Donald Singleton, an executive with Westinghouse who helped develop the commercial application of electronic mail systems.

Singleton had several associates in the music industry, who were usually hard to contact because of heavy touring schedules. He saw the potential for a closed user group, linking the touring side of the business to the worldwide interests which record, promote and work from offices in centres like Los Angeles and London.

Contacts Worldwide

IMC now has mainframe computers in London, New York, Los Angeles, Tokyo and Sydney. Over 200 Australian users are online, using the network to maintain contact with overseas markets. In Australia, the network is accessed via OTC's Minerva system; in England and Europe connection is through Telecom Gold; in the United States it's through the ITT Dialcom network; and in Japan users can dial IMC directly through the everyday phone system. IMC can also be reached from virtually anywhere in the world with a local phone call and then through the interdependent links established between international phone systems.

Using the system is easy: by linking a portable computer through an acoustic coupler or modem to a phone, making a call to the main computer and signing on through a high-security system of passwords, the user can communicate with international contacts or a home office. Whether in a hotel, at a pay phone, at the airport, backstage at a concert or in someone's office, the user can access his or her mailbox for incoming letters, type instant replies and generate other letters which are zapped across the globe in seconds.

In addition to the electronic mail facility, access to over 1.5 million telex users is possible, with the ability both to send and receive messages directly through the IMC system.

As with most other user groups, IMC also offers bulletin board facilities, games and a comprehensive online news service dedicated to the music industry. The bulletin boards are controlled by a number of

*Performers, managers,
road crews, sound and
lighting companies,
transport companies, travel
agents catering specifically
for the music industry,
concert promoters,
suppliers of T-shirts,
programs and other
concert memorabilia,
record companies, music
publishers, recording
studios, video-clip makers
and music producers are
all regulars on the IMC
network.*

sub-groups. In the United States there are Vidiots, operated and used by the professional video community; Geeks, which caters to professional sound engineers in studios and on the road; and Nerds for general silliness. There's also a General bulletin board, on which members may advertise goods for sale, services, new products, special deals and so on.

The electronic publishing service maintains charts from the United States, England and Australia, showing the positions of albums and singles. It also produces two 'newsletters' — one covering international music news and one outlining Australian events, issues and movements in the industry.

Some speciality publications are online, supplying extracts and providing the means for system users to get the hard-copy versions, or submit their press releases electronically.

Performance, a US magazine, provides a listing of available artists and venues, for promoters to use in buying 'dates'. *Pollstar* magazine publishes similar information,

as well as supplying the box office figures from recent concerts, so talent buyers can gauge the success of artists in different geographical areas. Other magazines in the areas of studio and live sound, and even consumer pop magazines, are using the IMC system to send information online and to receive stories from their journalists around the world.

Manufacturers of musical instruments, sound and lighting gear, and other companies with an interest in the music industry are starting to create their own bulletin boards and news services on the IMC system. Fairlight Instruments, based in Sydney, manufactures the \$35,000 Computer Musical Instrument and other high-tech products. The company maintains an online FINEWS system providing information on new products; listings of dealers and service centres worldwide; new ideas on how to apply Fairlight equipment; a bulletin board for users to exchange tips, techniques or general info; and a user hotline which answers questions about Fairlight products, tries to give users solutions to equipment-related problems, or refer them to their nearest point of repair or technical assistance.

Not Just for Musos

The main users of the IMC system are those people in the industry who travel extensively or need to maintain constant contact with far-flung interests. Performers, managers, road crews, sound and lighting companies, transport companies, travel agents catering specifically for the music industry, concert promoters, suppliers of T-shirts, programs and other concert memorabilia, record companies, music publishers, recording studios, video-clip makers and music producers are all regulars on the IMC network.

The main attraction of the system is that it saves both time and money when communicating over long distances. For Australian users, it is cheaper and faster to use electronic mail for maintaining international contacts than telephone and telex, and the problems of time differences are solved because communications sent on the system are ready for pickup by the receiver at any time, no matter where in the world they are.

Take the example of a band like AC/DC, which together with its management com-

ROCKING ROUND THE WORLD



The Tandy Model 100's compact size, ease of use, built-in communications software and a wide network of service and spare parts outlets make it a favourite with IMC communicators.

pany has 16 IDs on the system; when the band is touring, its home office in Sydney can receive daily reports and communique, eliminating the need for keeping and sending piles of paperwork. The manager may be in Japan securing a record release, and then go off to the United States to check on upcoming tour dates; not only can he be in touch with both the office and the band without ever talking to them, but he can also receive and send contracts, perhaps making modifications, scrutinise reports from both office and road managers, and send telexes through the system to people who aren't members of IMC.

The band members of AC/DC can stay in touch with their families or business interests, without worrying about the postal system or hanging on the phone for long periods. The road crew can contact friends on other tours, reorganise trucking or air freight arrangements for transporting gear between dates, or combat touring boredom by reading the online news or playing games.

As with most other user groups, IMC also offers bulletin board facilities, games and a comprehensive online news service dedicated to the music industry.

Other bands, such as Midnight Oil, INXS, Joe Walsh from the United States and many others use the system while touring here and overseas. An English touring company, the Footsbarn Theatre, has been in Australia since February 1985 and will finish its national tour in March this year. Company manager John Kilby uses an Epson PX-8 with 128 Kbyte mem-

ory and a disk drive for keeping up with the home base, as well as handling the books and making hotel and airline reservations.

People who work with bands about to tour, like Dire Straits, come over to book dates and amass information on the local amenities. They may also plot the intended movements of their semis and cargo planes, enabling them to schedule touring commitments more efficiently and reduce their front and rear-end costs.

Record companies and music publishers are just starting to tap into the potential of the IMC system. Virgin Records has over 50 IDs worldwide, and many other major companies, like CBS and WEA Records, are using the system — as an adjunct to telephone, telex and facsimile machines — to keep in touch with their overseas offices.

Two Australian independent labels, Mushroom and Wheatley Records, have been members of the system since its inception. Mushroom's Michael Gudinski and Gary Ashley are constant users, often

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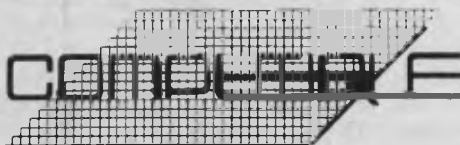
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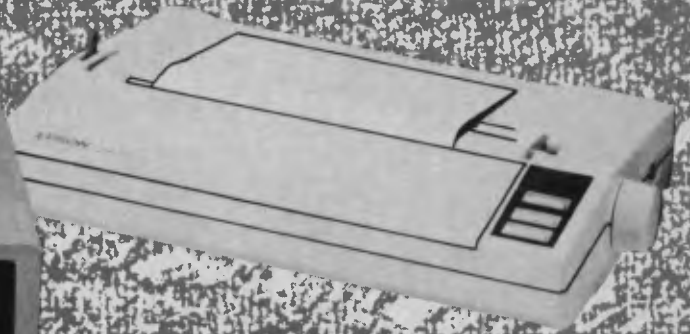
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"Since the music business is so mobile, the ability to access other people in the industry, locally and worldwide, has proved to be quite an attraction. And with OTC's interconnection of the worldwide telex system with the electronic mail network, few companies and individuals can afford not to be online."

checking in several times a day to keep the flow of information zipping back and forth from music publishers and record companies handling their artists overseas.

Like most of the users on the system, Gudinski and Ashley use the Tandy Models 100 and 200. These portable Tandy units are popular for their ease of use and reliability, and for providing access to a worldwide network of stores offering service and spare parts. Built-in communications software simplifies operation and a compact design makes the Tandys easy to carry around.

Growing with the Technology

According to Dave Mulholland, system manager of Australian Management Communications, the local operator of IMC, "The people we deal with in the music and now the film industry have never used a computer. To them, computers are a new technology, though they may use complex digital recording machines or electronic instruments. Small laptop computers are ideal for them to start on and the 32 or 64 Kbyte memory seems adequate for their needs.

"But," he adds, "they often upgrade to other machines or have their equipment modified as their knowledge and proficiency increase. Once they become more con-

versant with the electronic mail facilities, they can take advantage of a wider range of functions, such as an online text editor with a 12,000-word spelling checker, the ability to chat, via their keyboards, with other users who are accessing the system at the same time, and even setting up global conferences with other users at designated times."

Mulholland's company, Jands Concert Productions, is Australia's main supplier of sound and lighting systems, and staging and crews for local and overseas artists. He first became aware of the IMC system a couple of years ago, when US road crews began using their portables when on tour in Australia. Seeing the potential for the Australian industry, Jands established the Oz connection through OTC, and patronage has grown phenomenally in the past year.

As Mulholland explains, "The cost of doing business with overseas parties is enormous, and most people in the industry have to rely on phones and mail, or telex if they can afford to pay an extra \$150 a month just to have it in their office. Since the music business is so mobile, the ability to access other people in the industry, locally and worldwide, has proved to be quite an attraction. And with OTC's interconnection of the worldwide telex system with the electronic mail network, few companies and individuals can afford not to be online."

The hardware needed to access IMC can cost as little as \$1000. A company's existing office computer might simply need the addition of communications software and a modem or acoustic coupler. Information transfer is at either 300 or 1200 baud, with access costs set at 32 cents a minute; the initial IMC joining fee of \$175 covers training. Compared to hotel telex and telephone rates, or even ordinary telex transmission of written material, the costs are a bargain.

Aside from the economic incentives, the applications are fun — and the music business is based on fun even though it's a complex and highly competitive business. In what other industry would you find a worldwide competition to come up with the most bizarre tale of accessing a computer network? Rest assured, when the first space shuttle flight takes on passengers there'll be a roadie on board to take the technology to its final thrust. □

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room for the sample printouts — they give a fair indication of its extraordinary capabilities. A Canon AS-300 computer (a cleverly designed piece of hardware) with 'Super Canobrain' software produced the samples - it won't be as easy to produce such results without that combination, but it is possible. (Super Canobrain [makes me think of the inside of a dog's head ...] is a Macintosh-like mouse-driven graphic window environment. It makes Apple's effort look even more elegant and user-friendly than we always knew it was.)

Apple Laserwriter

Again we'll let the pictures tell the story, because there's not a lot you can say about the Laserwriter — it has an on-off switch, lights to tell you it's working, and a baud rate switch.

There is no control panel, and we were given no information on driving it — it's a software-controlled 'black box' (white, actually, but you know what we mean ...) which is told how to behave by the attached Mac, and does what it's told.

It's choc-full of on-board smarts, including more than a megabyte of memory, and is totally graphics based. Each machine even has its own name (set by a program from the host computer) so it can be called up on an Apple-Talk network by a computer looking for a printer.

Its self-test on startup includes printing out a graphics page with the identifying name in big letters, so you never have to work too hard to find out which printer is where on the network.

This machine is a must if you really want to do some of the great things the Macintosh (or, preferably, the Lisa) is capable of.

I Go To Ricoh

Mitsui should have its Ricoh LP4080 on the market by the time you read this, but we were only able to spend a relatively short time with a prototype model.

It had minor bugs which we promised to ignore — they won't be there on the production version — and came with no manuals, so our test was a what-you-see-is-all-you-get affair. Nevertheless, we were impressed.

It's the only machine we looked at which isn't Canon-based (see, I didn't call it an engine!) and for that reason is the only one with significant physical differences. It's taller and squarer, heavier (37 kg), and, thankfully, a lot smarter in the layout of its paper path. The printed pages come out of

As soon as Impact tidies up some of the areas where we have minor complaints (and gets hold of some fonts which look as good as the HP ones) we'll be totally enraptured. We don't think we'll have to wait too long, either — it seems so far to be a particularly competent and responsive organisation.

this machine face down, which means page one ends up on top — where it's supposed to be. Hallelujah! No more colating ...

It also has provision for two font cartridges, and its paper feed tray can take 250 sheets, a whole lot more practical than the 80 or so the others manage. Its resolution is the same as the Canon-based machines, at 300 by 300 dots per inch, as is its rated speed, eight pages a minute.

Software control is by the Diablo command set, it carries four resident fonts, can take downloaded fonts and can handle forms generation.

Unlike the Canon-based machines it has separate belt/drum and toner inserts. The toner needs replacing every 3000 copies but the belt unit lasts for 15,000. According to Mitsui, it has six times the overall service life of the Canon-based printers.

On the minus side, it's more imposing than the others and will take up more desk space and it's particularly noisy compared to the Canon-based units. It's still quiet enough to sit in the normal office, but it will be more noticeable. In overall style, sound and feel it betrays its photocopier heritage more than the Canon design.

The Laser The Better

This isn't a comparison test, so we're not out to declare a winner — but it wouldn't be fair to end this rundown on laser printers without offering some comparative comments.

First, the Laserjet: we bought one, so it can't be all bad (though the assistance and service we received from Logo Computer Centre counted a lot in that decision). We picked the Hewlett-Packard because we wanted a machine for straightforward word processing work, we wanted quality and reliability, and we wanted a machine the software makers were already supporting. At \$5900 all-up it was a worthwhile choice — now it appears HP is releasing a cheaper unit, with more features, so that will be one to really watch out for.

However, we're very happy with our Impact update to the Laserjet — it makes it a much more useful and versatile machine for an all-up cost of \$6900. As soon as Impact tidies up some of the areas where we have minor complaints (and gets hold of some fonts which look as good as the HP ones) we'll be totally enraptured. We don't think we'll have to wait too long, either — it seems so far to be a particularly competent and responsive organisation.

Canon's A1 offers an impressive range of features for its \$5700 — it's probably the best value on the market at the moment. You would want to be using graphics heavily to step up to the \$8500 A2 model, as that's where its extra features lie — but, as you can see from the sample printouts, it does produce some attractive graphic work.

We can't offer too many comments about the Ricoh, as we only carried out limited testing on a prototype. It has some distinct advantages, a few drawbacks, and a competitive price tag of \$6440. It's well worth a closer look at the production version, which will be available by the time you read this.

Apple's Laserwriter, at just on \$10,000, shouldn't be snapped up as a replacement for the office daisywheel — it's a high-quality graphics machine and would be wasted in lesser applications. Its reproduction of Macintosh graphics is spectacular, and combined with packages like Page-maker it could cost some typesetting shops a lot of business.

I'd be happy with any of these machines. I wouldn't dare suggest one is better, because that decision comes down to the simple question of which particular set of features suits you. Just grab the one that takes your fancy, and you'll be sure of two things: 1) it will do a great job for you, and 2) you'll wish it had 'just one or two' of the features available in some other machine

□

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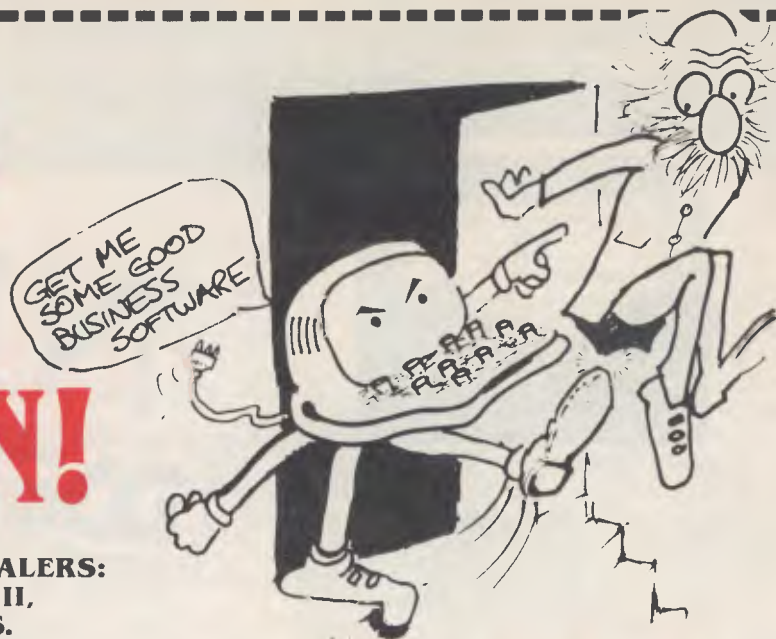
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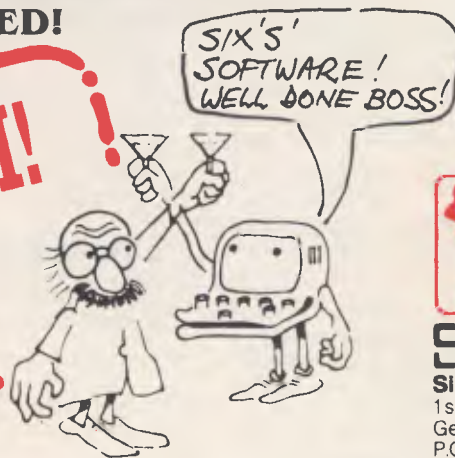
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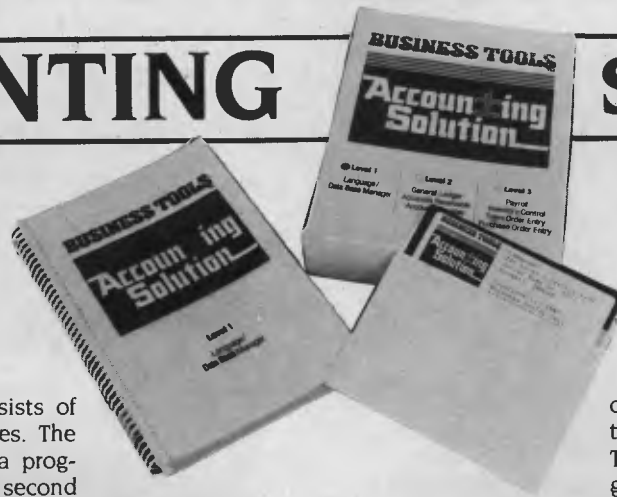
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Level 1



THE ACCOUNTING Solution consists of three separate 'levels' or packages. The first of these, reviewed here, is a programmable database system. The second adds three integrated applications: accounts receivable, accounts payable and general ledger. The third level adds inventory control, sales order entry, purchase order entry and payroll. Source code is provided for all these applications, and none of the disks is copy-protected (a courageous and enlightened decision for which the authors are to be congratulated). Let me quote from the manual:

"...you may make as many copies as you need. However, you may not give copies to anyone else for their use. The only way to encourage other software companies to reduce their prices to reasonable levels is to reduce the unauthorised distribution of their programs. This is going to require everyone working together, but in the end we will all benefit by having more choices at far more reasonable prices."

Level 1 is the database system itself, complete with a compilable extensive language system. It's supplied in a variety of disk formats (the review copy was configured for the IBM PC in DOS 2.0 format), and arrives in a nicely presented box as a single floppy disk with an overview booklet and a system manual. The overview summarises all three levels.

Creating and updating a database can be approached either directly through the system's menu-directed mechanisms, or by using a specially written program in the TAS language.

For the number conscious, here are the system limitations in brief: up to 1296 sets of data files can be on-line at any time and up to 16 data files can be open at any one time. Each data file may have up to 16 related sort key files, which are automati-

This Great Database contender combines a data dictionary, programming language and program compiler in a compact, well-presented package. How does a cheapie like TAS compare with the likes of dBase III and Dataflex? Frank Lee opens up its dictionary and gets a little fussed over the language ...

cally updated at each transaction. Logical record sizes range from one to 10,254 characters, and up to 17 million records can be held in any one file. Business Tools claims the access method permits location of a required record in less than one second.

The following files are supplied with Level 1:

- TAS.EXE: the primary system under which everything else runs. When invoked, TAS displays the opening menu shown in Figure 1. The only thing you need apart from this is a text editor for creating source code files for the compiler. In my case, I use Wordstar 3.3 in non-document mode.
- TINSTALL.EXE: the installation program for TAS which permits the changing

of run-time control codes and the adaptation of various terminals and printers. The version supplied was already configured for an IBM PC with either colour or monochrome display. TINSTALL actually makes permanent changes to TAS.EXE, so you should keep a copy of the original version (naturally).

- TCOMP.EXE: the compiler. It translates source files with a file type of .SRC into executable programs with the .RUN file type extension. The language is outlined briefly later in this review.
- TASFILE.K and TASFILE.M: locator files for all other TAS files. An entry is created for each new file entered into the data dictionary. Both these files must be on the default drive, while the data files may be on any other drive. TASFILE.K is the key file, which keeps track of the number of records in each file and maintains the B-tree information for each key in a record. TASFILE.M is the master file, and defines the record structure for each file and its location.
- TFILENT.RUN: the program which maintains the TASFILES.
- TASDICT.K and TASDICT.M: the data dictionary. The specification or layout for each file created with TAS is entered into the data dictionary with the program TDICTMGR.RUN.
- TDICTMGR.RUN: the data dictionary maintenance program.

Surprisingly, these files collectively occupy just 93 Kbytes, which leaves quite a bit of space for application programs and files—even on floppy disk-based systems.

Documentation

The system manual is a spiral-bound 13 cm by 20 cm booklet of 130 pages. It's well written, divided into three sections plus appendices.

The first section deals with installation procedures and may be skipped if you're running on an IBM PC, unless you wish to

THE ACCOUNTING SOLUTION

```

Business Tools, Inc.
The Accounting Solution (tm)
Language/Data Base Manager Ver 1.03 07/01/85
Copyright (c) 1985 All Rights Reserved
Current company code:

0) Display control codes
1) Execute a TAS program
2) Maintain Data Dictionary
3) Initialize a data file
4) Rekey a data file
5) Enter data into a file
6) Set internal company code
7) Exit to operating system

# Enter the number of your choice
    
```

Figure 1. The TAS system opening menu.

change the default colours for normal and enhanced text.

Section 2 is a detailed tutorial showing how to create a new database and how to access and modify data using programs written in the TAS language. It explains the data dictionary and related programs and utilities in depth.

The third section is a reference manual explaining each of the main-menu choices and the elements of the TAS language.

There is also a listing of error messages and their possible causes. The appendices supply system and language limitations and a short summary of the language, and the source code for TDICTMGR is provided in full, complete with explanatory comments.

In TAS, files are linked to a data dictionary rather than to specific screens (as in dBase), which makes it possible to use part or all of any data file in any other program. The TFILENT program must be run (from the main menu) to associate other files with an existing schema.

Setting up a new Database Specification

Selecting option 2 from the main menu

Figure 2. Data dictionary maintenance menu.

```

Business Tools, Inc.   The Accounting Solution (tm)
-----
                        Data Dictionary Manager

Schema: ***** Action:      (Enter ? for help information)

Name      Type  Size  Csze  Dec  Ovlly  Offset  Key  Up  Array#
-----
    
```

(Maintain Data Dictionary) produces the screen shown in Figure 2.

The screen lets you define a complete record layout as a named 'schema', which can be used to define the structure of more than one file if required.

The system prompts the user for the characteristics of each field in the record schema. Field names may have up to 15 characters. It's recommended practice to use unique field names so subsequent reference to the schema name by programs isn't required. It's also a good idea to keep schema names short so each field name can be prefixed by the schema name for uniqueness.

Field types can be alphanumeric, numeric or date format. The size refers to the displayed size in characters. 'Csze' is the internal size — the same as for alpha fields and roughly half for numeric and date fields. Numeric fields are stored in BCD format (one digit per nibble plus a nibble for the sign), while dates are always four bytes long.

If a field type is numeric you can specify the number of decimal characters in the 'Dec' column. The maximum is eight, and must be at least two characters less than the total field size.

If you want the 'Ovlly' field to overlay one or more other fields, set it to 'Y' and specify

the offset within the record. An example might be a field named ADDRESS, which encompasses separate fields for each line in an address.

The 'Key' field is set to 'Y' if it's to be used as a search key. Up to 16 keys may be designated for any file and they're automatically maintained when a new record is saved or an existing record is changed. Records can also be accessed by record number.

If the 'Up' field is set to 'Y' all entries will be saved in upper case.

Any field can have multiple array elements. To create an array you enter the number of elements in the 'Array#' field (ranging from one to 255).

Option 3 of the main menu is required before data can be entered into a new file. Option 2 has simply established a schema, not a data file. The TFILENT program defines the file(s) to associate with the schema. Option 3 initialises the named data file by creating both the appropriate key and master file records. It effectively removes all records from a file without actually deleting the file from the data dictionary.

Option 4 restores the key files for a nominated data file, should they become corrupted.

Option 5 allows direct access for entry of data in a particular file without having to write a program to do it.

The TAS Language

This free-format language stipulates only that there be not more than one command per line of text and that commands aren't split across lines. Comment lines start with a semi-colon (;). Individual commands can be labelled for control transfer using a method common to many languages: prefixing the line with an identifier, terminated with a colon. dBase users may shudder at this, since GOTO is a classic source of programming difficulties, but its restricted use can be very valuable. Figure 3 is a sample program which displays selected records in a specific file. ▶

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```

;nafprt
;file display program
define(Name,a,8)
open(naf,,BadFile)
pon(a)

Another:
clrscr
pmsg("Specify upper limit for names..")
enter(Name)
find(b,nafname)

start:
if NAFNAME <= (Name) do
{
pmsg(nafname,naftele,nafdate)
}
find(n,naf,LoopEnd)
goto start
BadFile:
pmsg("Problem with opening this file.")
LoopEnd:
pmsg("Another? ",5,23)
enter(Name,YN)
upcase(Name)
nafname = ("")
if Name = ("Y") goto Another
finished:
run()

```

Figure 3. Program to access and display parts of the database NAF.

Figure 3. A sample program which displays selected records in a specific file.

Since the name of the source file is NAFPRT.SRC, we give the DOS command TCOMP NAFPRT to compile the program. All source files have the .SRC file type and in this case the two-pass compiler generates an object program NAFPRT.RUN.

Although containing structured elements (if, then, else and while), the language is a bit fussy. It has similarities to 'C', but nearly all the commands are calls to high-level database operations. I've explained the program briefly below.

The first two lines are descriptive comments and are discarded from the object program, while the third line (the define command) establishes a new (temporary) alphanumeric field in the data dictionary with the name 'Name' and a length of eight. This field is used later in the program as an upper limit for selecting name records for display. The next command opens an existing data file 'naf' with the specification of a label 'BadFile' to which control is transferred in the event of an opening failure. The 'pon(a)' command

sets the default device for printing messages and the 'a' tells the system to ask at run time. Possible responses are 'S' (screen), 'P' (printer) and 'D' (disk file).

This program has a number of labels, which is a pity because it leads to unstructured code and hard-to-read programs. Unfortunately, the current language restrictions tend to limit the usefulness of the 'WHILE' command, which would have been great here.

The label 'Another' marks the point of re-entry for another scan of the database, 'clrscr' clears the screen and 'pmsg' displays the message 'Specify upper ...' on the

device selected when the 'pon' command was executed (presumably the screen). The 'enter' command accepts a keyed-in value for the field 'Name', then the 'find' command 'rewinds' the file containing the 'nafname' field to the beginning (hence the 'b').

The next seven lines form a primitive 'while' loop. The first find command has already established the contents of the first record. The NAFNAME field (name component of the record) is compared with the entered value in 'Name'. If the comparison test is true, three fields of the record are displayed on the same line. The loop ends with a find command, which reads in the next (hence 'n') record. This looks like a permanent loop, but the loop exits to the label 'LoopEnd', when the find command hits the end of the data file.

The 'BadFile' code was explained in connection with the 'open' command. This is followed by the loop-terminating code at 'LoopEnd', where the user is asked if another pass of the file is required. This time the 'enter' command is qualified to ensure the reply is a 'Y' or 'N' response. The supplied field (still 'Name' to save setting up another temporary field) is converted to upper case, then a test is done to check for an affirmative response. Finally (at the label 'finished'), the 'run()' command returns control to the main menu. The RUN command can also specify another program which is then 'chained'; for example, RUN(MENU) would chain to the program MENU.RUN.

Although there are many more commands available in the language than are shown in the sample program, I'd like to see more flexibility in the syntax. For example, there doesn't appear to be any facility for constructing compound conditional expressions for either the IF or WHILE commands. Nevertheless, you can still create powerful programs, as the published listing of TDICTMGR.SRC clearly demonstrates. □

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SUPERFILE — An Unconventional Database

What better way to round off the Great Database Search than with a system which does everything differently. Superfile creates a 'super operating system', with full database facilities and interfaces to conventional languages. It also has an artificial intelligence connection. Our resident artificial intelligence, Les Bell, examines the Superfile approach.

ONE OF THE MAJOR drawbacks of conventional database management systems is the fact they require some design in advance and cannot easily be changed once a database has been set up. A classic example (in Australia) is setting up a database with a telephone number field to follow a template like:

(999) 999-9999

and then discovering you have to enter a number for someone who is still on a manual exchange somewhere back of Bourke — of course, it just won't go.

Other databases require flexible data structures. While it is possible, using relational techniques, to set up a database structure which anticipates most of your requirements, this is tedious, difficult and kills whatever database is lying underneath the layer of support code.

This is why Superfile is so interesting and so attractive to inexperienced computer users. They can see no reason why they should have to restrict themselves to particular data formats — after all, the salesman said using a computer would make their mailing list much more flexible, and isn't the computer supposed to do all the work? It's only experienced users who restrict themselves to thinking in terms of fixed-length fields.

Superfile is a completely free-format database. Everything, but everything, goes into one file. It doesn't matter what kind of record you're entering: an inventory record, a customer account master record, a transaction — Superfile stores them all in the same file.

While Superfile does have the concept of a record, and of forms for data entry and reporting, that's about all it has in common with other databases.

Like many mainframe database management systems, Superfile acts as an extension of the operating system, and provides data manipulation services to any language or application which is capable

of making the required calls — either an interrupt or call to a DBMS entry point. Superfile's authors took the view — and an eminently sensible one it is — that most database manipulation languages were no easier to learn, and were usually less powerful, than conventional languages. The only thing they have that conventional languages do not is some way to access the database.

For existing programmers, then, Superfile does not require you to learn a new language. For non-programmers, if you do want to program Superfile you can learn a language which is more generally useful, such as BASIC, C or whatever, and for which more comprehensive tutorials are available than just the manual that comes with the DBMS.

Superforms and Supertab

Superfile does not actually require any programming to use it. A number of programs are supplied, written in one of the host languages (who cares which one?), which provide the basic operations of adding, editing, finding, displaying and deleting records in the database.

At the lowest level, the LOOK program provides the ability to maintain the database. To run it, the user must first load the database management system itself into memory. We tested Superfile on the IBM PC and simply placed the DBM command which does this into our autoexec.bat file. Because the database manager takes up quite a bit of memory (over 64 Kbytes), however, you may not want it permanently in memory.

LOOK provides facilities roughly similar to the dBase II command language, with the exception of full-screen forms handling and reporting. Obviously, it's not programmable.

Since each record in the database is free-format, there has to be some way of identifying the fields which make up any

particular record. This is done with tags, which are effectively field names. Tags are reusable; in other words, a record can have the same field defined multiple times.

To examine a raw database, you first load the database manager itself and then use the LOOK program to browse through the database. When I say browse, I don't mean in the super-interactive dBase II/III BROWSE command sense.

LOOK allows the user to enter queries in the form of 'models' which specify a search pattern. For example the model:

NAME=Phil

will search the database for records which have a value of 'Phil' in a NAME field. I say 'a' NAME field, because Superfile allows you to have more than one occurrence of any field. Placing both first names and surnames in a NAME field, for example, will allow retrieval by either.

In fact, Superfile does not regard a file as consisting of fixed-length records, like most other database managers. Instead, it uses 'tags' which are in some respects like variables in a programming language. You can have up to 65,000 different tags in a file, each of which may or may not have a value in a particular record.

Superfile is supplied with a set of standard tags, such as COMPANY, ADDRESS, COUNTY, IDENT, CREDIT, AMOUNT, PCODE, REMARKS and others. A record can have as many or as few lines of remarks as required.

Models provide powerful searching capabilities. For example, you can use not only the '=' symbol, but also '>' and '<' to check credit authorisations or other numerical amounts. Wildcard searching is possible, using a technique familiar to most users: an asterisk replaces any sequence of characters. A particularly powerful feature is the use of Soundex codes; for example, a model like:

NAME@Smith

will find all names which sound like Smith.

Finally, models can be combined by using the caret (^) symbol.

While using LOOK you can insert records by typing + before entering them, and delete records by typing — before them. This method of deletion is somewhat clumsy, but would not be used often.

The preferred way of accessing a Superfile database is the FORMS utility. This is a menu-driven utility which provides a full-screen display of database records (the form is created by the separate CFORM program). Searching is performed by entering known data and then pressing control-Z (↑Z) to terminate entry and cause FORMS to locate the first matching record. Pressing return will move through the database to the next matching record.

Other FORMS options allow you to add records, delete and undelete records, edit records and tidy the database. Tidying, a process which presumably involves the packing and reindexing of the database, seemed to be painfully slow when we tried it, so it's a process one wouldn't do too often.

CFORMS allows form creation by screen painting. One can simply roll around the screen, inserting prompts and other information, and delimiting fields with right and left square brackets (] and [). Once the form has been designed, the next stage in the process is to associate screen fields with tags and provide some input editing controls, or other options, on the field.

Other options allow fields to be calculated based on the values in other fields, date conversions, validation against short lists of values, numeric display with an appropriate number of decimal digits, write-protection of fields, default values and many other sophisticated features.

Superfile forms, while not fully programmable like those in dBase and similar products, are nonetheless capable of extremely sophisticated operations. In particular, complex validation and editing is much simpler and faster in Superfile.

Reports

Superfile uses another program called Superstab to produce reports. This is similar in operation to Superforms; there are two

programs called CTAB and TAB to create and run reports respectively. A SORT program is also supplied to sort the database before producing reports.

Reports are laid out in very much the same way as forms, except they are made from up to five components: the main header, page header, report lines, subtotals and totals. Each of these is defined in the CTAB program, using full-screen editing.

While it is true that dBase-style systems can produce arbitrarily complex reports by using programs, most users will find Superstab satisfies the vast majority of their requirements. Of course, if they do require complex reports, Superfile has a way of meeting their needs that is even more powerful — access to the Superfile database from other programming languages.

Program Interface

Superfile is not a standalone package like most PC database products. Instead, it consists of a database manager program which loads and stays resident along with

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the operating system and, in effect, extends the operating system to provide database facilities. Superforms and Supertab are simply programs which take advantage of this extended 'operating system'.

Programmers can also use the Superfile database to handle files for them. In other words, forget about writing sorts and index routines, high-speed searches and the like — let Superfile do it for you.

The simplest way to use Superfile in this way is from interpreted Microsoft BASIC, as supplied on the IBM PC and like machines. Southdata Software, the developer of Superfile, provides a machine-code interface to BASIC, together with some tutorial and reference material. This is useful for extending Superfile's basic functionality (which you should realise by now is not that basic) to provide complex reporting, data acquisition and similar functions.

Other languages are supported, including compiled BASIC, C, Level II COBOL and others.

While the mechanics of calling Superfile are simple, designing complete systems will require some skill and programming experience.

Under a multi-user operating system such as Unix, Superfile provides record locking, allowing several users to share a database. In addition, Superfile provides some security facilities; for example, the tags are stored in the database file in special records, but only the super-user can access these, to minimise the risk of accidental corruption. Security is to be further upgraded in future releases.

Expert System

Southdata Software has an interest in expert systems. Rather than write its own expert system shell, however, it has chosen to purchase the rights to another product and interface it to Superfile. The product, ACLS, is actually a version of Expert-Ease, the package developed by Professor Donald Michie and his team at Edinburgh University.

ACLS is interfaced to Superfile through a program called PACLS (Pre-ACLS), which extracts the appropriate information from the database and converts it into a form suitable for ACLS. ACLS itself constructs rules based upon the data fed to it, and produces these in a form of 'structured English' which is close to Pascal (in fact, it could very nearly be directly included in a Pascal program).

In a very convincing demonstration,

ACLS examines a database of symptoms, facts and prognoses about cancer patients, and then produces a rule relating the symptoms and facts to the likely prognoses. A running display shows the current complexity of the rule, the number of cases it does not cover, and the number of records examined so far. This display is absolutely riveting, as the program gradually extends its rule, then simplifies it as it is able to exclude certain factors. Watching this I was very aware of the dangers of assuming that the computer is really thinking.

In Use

Superfile takes a little getting used to, particularly if you expect it to be like other database systems on the market, which it quite definitely is not. However, with a little experience, everything runs quite smoothly.

For example, we evaluated the PC-DOS version of the program, and it took us a little while to adjust our system to include ANSI.SYS in the CONFIG.SYS file and to put the DBM command in AUTOEXEC.BAT file. (This is one of the dangers of reviewing software — at first you are reluctant to alter the operation of your system to accommodate a package which will only be on the system for a short time. Eventually you have to do it properly.)

Some of the programs which make up Superfile require quite complex command lines to load, with various flags specified on the command line, as typically seen on Unix systems. We soon twigged that putting these commands in batch files would simplify operation.

Superfile is not as accommodating as systems such as dBase III in allowing the user to enter arbitrary commands at the keyboard. Setting up databases must necessarily involve some trial and error, but with Superfile you soon realise a little thought and planning will repay handsomely (it does with dBase as well, but it's not so obvious). A little paper and pencil figuring before starting work is not necessarily a bad thing.

Early versions of the system seemed somewhat buggy, but the release tested seems to have overcome those problems and matured considerably. The documentation is more professional, and while not brilliantly structured is at least indexed and relatively easy to find one's way around in.

Overall, I was very impressed with Superfile. It is a new direction in database system design, with the kind of thoroughgoing approach one has come to expect from the best of UK software. This is characterised by a design which favours important design features over those which simply look good in the adverts, and a commensurate lack of hyperbole in those ads. In other words, it's quality software.

Superfile can do many things which 'conventional' databases cannot. For bibliographic applications, for example, it would have to be a leading contender, and for research databases and those subject to statistical analysis, it is particularly powerful in conjunction with ACLS.

Versions of Superfile are available for CP/M-80, CP/M-86, MS-DOS and Unix operating systems. □

PRODUCT DETAILS

Product name:	Superfile Database Management System			
Made by:	Southdata Software			
Hardware required:	Almost any PC or Unix system			
Options:	ACLS expert system rule generator			
Review copy from:	Sunshine State Scientific Systems, PO Box 4, Darling Heights 4350; (076) 35 3362			
Price:	8-bit single	8-bit multi	16-bit single	16-bit multi
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KNOWLEDGEMAN/2 — WHAT'S NEW?

BY ROSE VINES

When *The Great Database Search* began many months ago, Knowledgeman was one of the original packages given a thorough going over. I was impressed with that early version of the program and recognised it as a real dBase II beater.

Since then, dBase has gone from being II to III, and Knowledgeman has become Knowledgeman/2. The differences between the two versions of Knowledgeman are not quite as dramatic as those between dBase II and III; this is probably because there wasn't *all* that much room for improvement on the original program. However, Knowledgeman/2 answers almost all the criticisms I levelled at the earlier version, as well as continuing the development of the product.

Criticisms Answered

The two things which worried me most about Knowledgeman were the high degree of competency required to use the program, and the inadequate and patronising documentation. The program presents a pretty familiar environment to dBase users, with an interactive command-line mode for instant data gratification, and a procedure facility for producing extensive information systems which run automatically. They both require about the same level of expertise and perseverance to learn, however, because Knowledgeman has far more capabilities, it takes a lot longer to understand its potential.

Knowledgeman/2 gives the user the choice of three methods of interaction: the command-line prompt, the procedure facility and a new menu-driven interface. The menu system once again displays the excellence in programming which characterises the Knowledgeman software in general. It has a chain of menus which provides both a visual path of the choices a user has made, and a written example of the actual command generated by those choices. Generated commands can be saved at any time for future use.

Another aid for the novice (and many advanced users) is the inbuilt help screens. The help facility is context sensitive, so if you've chosen a menu item which produces the command PLUCK, pressing the HELP key will produce information on that command.

There are over 400 pages of online help, which gives you an idea of the size of the program itself.

There is one other method of interacting with Knowledgeman/2 — KChat. KChat is a 'natural language interface', which lets you define your own vocabulary for use with the program. This program is available separately, as are a variety of other Knowledgeman modules.

The other shortcoming of Knowledgeman — the documentation — has also been addressed. Two manuals are supplied with Knowledgeman/2, a user's guide and a reference manual. The user's guide describes both the menu and command interfaces in detail, and takes the user through the development of an example system. It is a vast improvement on its predecessor. The reference manual is not much different from the original, with commands divided into functional groups. I'd still like to see an alphabetical listing of the commands, but on the whole I'd rate the documentation as very good indeed.

My other main complaint about the original version was the lack of shorthand means of retrieving information on *all* the fields in a table. For example, to get a complete listing of a table with seven fields, I would have to type a command such as:

```
LIST product, prodno,  
shortname, quantoh, orderquant,  
company, compno
```

With the new version, all I have to type is LIST. When you realise Knowledgeman can have 255 fields per record, you see what a relief this feature is!

Other Goodies

The new Knowledgeman arrived with a list of 47 enhancements over the earlier version; some are fairly esoteric, others represent major changes.

The inbuilt spreadsheet has been rewritten to provide more facilities, easier interchange of data between it and other spreadsheets, and a dramatic improvement in its use of memory (each cell requires approximately 40 per cent less space than in the previous version).

There are additional string functions, a new field type (INTEGER), date processing and full command-line editing

capabilities. The new KLIB utility lets you create and maintain libraries of procedure files, with automatic scrambling of an entire system to protect it from prying eyes. The already impressive security facilities have been extended, and an easy installation program has been included.

When I originally reviewed Knowledgeman, two integratable modules were available — KPaint and KGraph. Since then six other components have been released: KText, a word processor; KChat, the natural-language interface; KReport, a report generator; KComm, a communications package; KMouse, a mouse controller; and K-C, a C language interface, which allows you to combine the extensive data management facilities of Knowledgeman with the speed and power of the C language.

I haven't had a chance to use all these programs; some are perhaps not as extensive as could be wished, but they integrate beautifully, providing a complete system which is hard to beat. I'd rather have the Knowledgeman suite than any other integrated package I've seen.

Conclusion

My only other criticism of the original Knowledgeman was the lack of a multi-user version. In my original review, I was bold enough to say "multi-using would make this an almost ideal system". Well, you guessed it, Knowledgeman/2 is available in multi-user versions, for both local area networks and multi-user machines.

Do I stick by my initial assessment? You bet. Of course, there are some little niggles — the sort of thing you notice as you become really familiar with a program. For most people the main drawback will be the heavy-duty hardware needed to run the thing: the program itself requires 320 Kbytes of RAM, and if you try to run it on anything less than a hard disk you'll grow old before your time. The package sells for \$899 (single-user version), with runtime licenses costing \$253. The other modules start at \$218 for KPaint and KMouse and escalate to \$1698 for K-C.

If I had that sort of money (*and* if I had a computer of my own!), I'd certainly buy Knowledgeman/2. □

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THERE IS a growing school of thought that the Personal Computer Advanced Technology (PC AT) family of machines is less suited to everyday office tasks than to applications where these computers can be used as powerful workstations for much more substantial jobs than writing letters or balancing the books. The 'Advanced Technology' name comes from the fact that the machine's Intel 80286 processor is infinitely more complex than the 8086 or 8088 of the regular PC or XT and their lookalikes, and can handle many more instructions at much faster speeds, thus giving it greater capabilities.

Much of the advantage, however, has not yet been realised by available commer-

Is the PC AT too powerful just for use in office environments? Norman Kemp found it much in demand in professional, scientific and engineering fields, and focussed on one application in an architectural office.

cial software. This applies particularly in offices, which are mainly using adapted versions of popular packages written initially within the constraints of the IBM PC (circa 1981 in the US and 1983 in Australia).

When you add to the office AT a hard disk with moderately high-speed capacity, its performance increases greatly — but it becomes a bit like using a four-wheel drive to go down to the shops for some cigarettes: a waste of power. Although still short of software to fulfil all its promise, the AT would seem to be best regarded as the utility machine of the technical, engineering, drafting, scientific and manufacturing worlds, capable of seeing these ►



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fields through to the 1990s. A network of ATs throughout offices for electronic automation is feasible, but would be unnecessarily expensive when most of the computers would be working for only a few hours a week.

When IBM launched the PC AT, it was billed as a computer for corporate offices, with networking as one of its prime functions. The pivotal idea was a host mainframe with an AT in the centre as a file server, sharing data stored on hard disks among lesser computers. Although the AT didn't have the necessary network operating system available to achieve this on release, some interested groups grasped at the potential of bringing workstation processing into other areas where the existing equipment was much more expensive or limited in scope.

In 1986 the IBM PC AT — and its many clones and near-compatibles — looks like becoming a standard machine for this workstation type of operation, with a performance slightly lower than that of the smallest minicomputers but with the capacity to be expanded economically into multi-user and multi-purpose applications which the PC and XT standalones cannot achieve.

What a CAD

One of the first users of the AT in Australia to combine it with a computer-aided-design (CAD) applications package is the Sydney town planning and architectural firm Wellings, Smith and Byrnes. In November 1985 the firm took delivery of an AT with 512 Kbytes of memory, a 20 Mbyte hard disk, a 1.2 Mbyte diskette, an 80287 co-processor, an Autocad software system, a 33 cm Verticom screen and a Calcomp 1043 plotter on instalment, valued at just over \$50,000. Additional proprietary software purchases have included IBM's word processor, Displaywrite III, Lotus 1-2-3 for site analysis applications and Ashton-Tate's dBase III.

The AT is the basis of a system which will be extended with more IBM computers in future years. The company's installation and implementation strategies are being developed and co-ordinated by David Emerson, a professional architect who has been with the firm for three years.

"It has been a leap forward from our existing computer setup," said Emerson, "which consisted of an Otrona Attache portable with CP/M 2.2, Wordstar, Calcstar and dBase II, an accounts computer purch-

ased from Data Concepts of Coff's Harbour about four years ago, and a Remington NBI 3000 word processing system. More powerful systems were available to choose from, and the next step could have been a Unix-based supermicro, but the leasing costs on CAD software alone were in the region of \$37,000.

"Because technology moves so quickly these days, it seemed better to decide on cheaper equipment which still provided an industry standard. The system we are installing should give us at least 90 per cent of what we could have had from the more expensive ones. It is expandable to networking as our needs grow, and can almost

The system can automatically calculate the dimensions of buildings and the residual land, and identify and mark for future reference areas such as zoned land, flood plains, tidal levels and prevailing winds.

certainly be linked to outside databases for access to professional information when they are in operation."

Wellings, Smith and Byrne is a medium-sized practice established in 1972, now employing 20 architects, town planners and clerical support staff. About two-thirds of the firm's work is on town planning projects, with the remainder in architectural design and documentation, and it handles about 30 new jobs a month. The major package, which will be used in drafting procedures involving drawing to scale and delineating site features, is Autocad. This American graphics package is widely used around the world in a variety of productivity tool applications, particularly in factory management, as well as in planning engineering and construction projects of all types.

"On many projects we may have to draw a site plan up to 100 times at various scales and with differing information," Emerson said. "Manual drawing of difficult sites is complex, and requires skilful drafting,

CAD FOR BUILDING SITES

which may take a great deal of time when we can least afford it.

"Autocad will be used primarily in the preliminary stages of a job rather than to provide full working drawings," he added. "It may show a whole subdivision with road systems; or a building in different locations around a boundary or street lines; the positions of parking lots and open spaces on a site; and possibly interior features such as the layout of a food market. There can be a lot of shuffling around and a number of attempts may have to be made before a layout of a construction job can be printed out for council or client consideration and approval. Autocad simplifies this greatly."

Because the system can store standard layouts on the hard disk, architects will be able to call them up, position them and print them out. This eliminates some manual steps, and enables last-minute changes to be made to drawings.

Last-minute Changes

Emerson said that with the graphics screen, the AT can superimpose standard layouts over a site plan, and save them with a graphics tablet to get the most suitable fit. "Because the system can store the standard layouts on the hard disk, the architect will be able to call them up, position them and print them out. This not only eliminates some manual steps, but also enables changes to be made to drawings right up to deadlines for submissions."

One of the larger projects for which the system will be used is in the planning of stores for the Food Plus chain. Emerson said computer layouts will show the buildings in their correct positions, and the interiors will be fully drawn in to show features of each store, complete with aisles,

displays and cash register counters. Another job will involve the study of a 100-room motel construction and its location in the surrounding road system.

"We also do a lot of residential work, and like to get the simpler drawings done as early as possible," said Emerson. "On the town planning side land subdivisions are not as complex as devising buildings. An outstanding feature of the computer is its capacity to zoom in on a location or site plan to give a larger and more detailed version of the building or the site."

In other operations, the system can automatically calculate the dimensions of buildings and residual land, and identify and mark for future reference areas such as zoned land, flood plains, tide levels and prevailing winds. "This information can be vital when preparing plans for councils, developers and government departments," according to Emerson.

The spreadsheet package Lotus 1-2-3 will provide the firm with analyses of sites, balancing of floor space ratios, site and population densities, and financial information. Later a modem and communications package will be incorporated so the practice can access external proprietary databases. The main databases of use to the professional town planner or architect are still in the early stages of development, but one of the most convenient could be that of the Lands Office at the Registrar-General's Department, which staff now have to visit three or four times a week for information. The NSW Metropolitan Water, Sewerage and Drainage Board is also building a database which may be open to external access, and an architectural database is being provided by the NSW Institute of Architects.

During the first weeks of installation half a dozen staff at Wellings, Smith and Byrnes will be trained in the basic uses of the system's professional capabilities, and about three or four will become regular users on a time-rationed basis. If the demand for time grows beyond the present capacity, a second AT will be purchased.

Training will also be extended to the word processing section, where operators will learn to use Displaywrite III so they can subsequently move into an all-IBM environment. "Our primary aim in installing the system has been to increase productivity within the firm by creating standard elements, reducing the amount of repetitive work and saving time," Emerson said. □



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Instruction Set

Computing for Bird Watchers 126

What computer is that? What is its habitat? What is its anatomy? Where does it fit into the data processing chain? How is it of use to you? Les answers these and other questions in a new series of articles designed to ease computer novices into the wonderful world of micros.

Make No Mistake 132

Nobody likes to be wrong — especially at their own great expense. Here, Les describes the pits most commonly fallen into by beginner computer buyers.

C For Smarties 136

This month Les Bell continues to string you along, with a new array of characters, numerous declarations, and a warning against trusting computers to do their sums correctly — all variables on a theme, C?

Structured Programming — Part 9 139

Phil gets himself into a State while creating a flowblock to execute one of the special-purpose modules — and other similar adventures. He claims it's all written "in simple English", but a working knowledge of the last eight articles in the series is prerequisite to diving into this episode of Grouse's Structured Travels.

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COMPUTING FOR BIRD WATCHERS



MANY YEARS ago, when I was involved with electronics, I was impressed by an article in *Wireless World* magazine, which attempted a non-mathematical (at least, as far as possible) explanation of that highly mathematical technique, the Fourier Transform. To make an otherwise incomprehensible topic palatable to a lay audience, the article was entitled 'Fourier Analysis for Bird Watchers', which explains my earlier series, 'BASIC for Birdwatchers'.

This new tutorial series follows in the same vein. Four years ago, when we started *Your Computer* (Good Lord, is it really that long?), we were particularly conscious of the needs of the beginner in what was at that time mostly a hobby activity. Over the years we (like our audience) have become more technical, but we still want to make *Your Computer* accessible to the newcomer, so we're going to start at the beginning again.

This series is intended to meet the needs of a wide range of readers. We hope existing readers will still find the odd titbit which will make it worth perusing, while corporate executives grappling with 1-2-3 will discover the underlying theory explaining why disks are formatted, why the screen is only 80 columns wide, and so on. Likewise, the small business user will find advice on how to select a computer for accounting purposes, as well as how to decide what tasks are suitable for computerisation. Business and computing students will find relief from course material and textbooks, which assume the world still runs on IBM Model 29 card punches. (It's possible to explain how computers work without talking in terms of mainframes.) And finally, the home user will be able to delve beyond how to plug in the 'Space Invaders' cartridge.

Perhaps the best place to start is with a definition of personal computing. A computer is a digital device which accepts input data, processes it and outputs results.

Les Bell sets out to bring our novice readers up to speed with an 'all you ever wanted to know about personal computing, but were too afraid to ask' series ...

■

By digital, we mean the computer counts instead of using a variable voltage to represent values. The idea of input-process-output is central to how we think about computers.

'Computing' describes the process of using a computer for some purpose. 'Personal' simply means the computer doesn't require an army of programmers and operators to get something done — anybody can use it.

We're edging closer to a better definition. In fact, it's pretty well pointless to attempt to define a computer — by the end of this series you'll have some definitions of your own. Perhaps the best definition of a personal computer I've been able to come up with depends on the user's ability to say "It's mine, it's mine, and you can't play with it." If the computer is small and inexpensive enough to be placed at the disposal of one person to use, or not use, as he or she sees fit, it's a personal computer. Otherwise it's simply a computer.

What is a Personal Computer?

Personal computers are fundamentally similar to any other kind of computer. They differ primarily in scale, in the way they are used and in the specific features they have.

Microcomputers and supermicrocomputers are a little bit larger than most personal computers but smaller than minicomputers, and are still of interest to many YC readers. They can often be shared by many users at one time, performing either personal computing tasks or running corporate information system tasks, such as accounting or inventory management.

Minicomputers are larger again and perform in very much the same way, while mainframe computers (often inappropriate for personal tasks) are traditionally large, stored in air-conditioned rooms and attended by white-coated operators, and are generally so expensive they have to be kept operating full-time.

Even though you may only have a personal computer on your desk or at home, it's important to know something about the larger machines, because in the near future personal computers will be used to communicate with mini and mainframe computers, to process information transferred from the bigger machines.

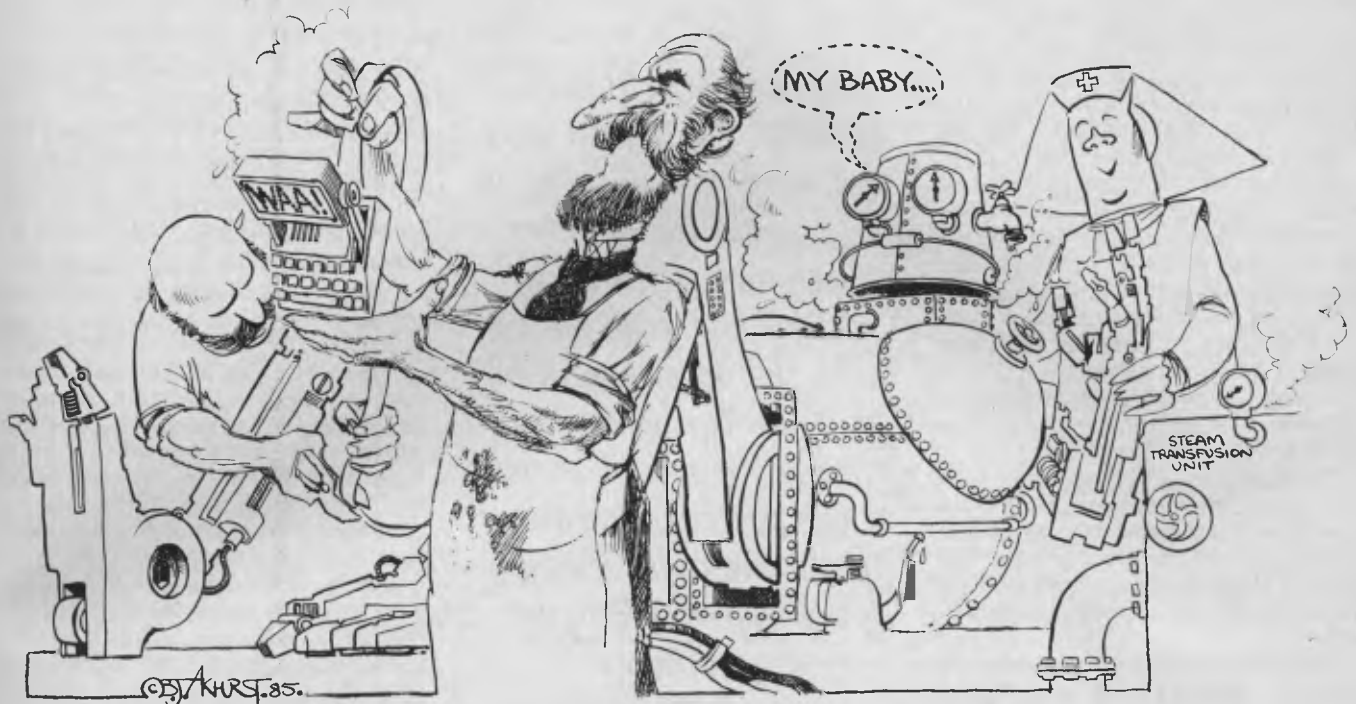
Don't Know Much About History?

The history of computing is actually quite long. It originally started with the quest for mechanical devices to assist with the addition and multiplication of large numbers — the abacus, for example, is a simple form of computer.

However, the real story of the computer starts in 1642, with a simple adding machine built by Blaise Pascal to help his father add columns of figures. Based on poker-machine-style wheels with pin gearing, the machine could not multiply or divide, but could add and subtract.

In 1673 the German philosopher/mathematician Gottfried Wilhelm Leibniz devised the Leibniz wheel, which could also multiply and divide. Machines based on this principle were built from the later part of the 19th century right until the end of World War II.

BIRD WATCHERS



BIRTH OF THE FIRST COMPUTER.....

The real birth of the computer occurred in the 19th century, with an eccentric English mathematician called Charles Babbage. Babbage was approached by the British Admiralty to produce navigation tables — a tedious, time-consuming and error-prone operation. According to one story, Babbage was discussing the difficulties with the astronomer Herschel. Babbage said "I wish to God these calculations had been executed by steam", and Herschel confirmed it was quite possible.

With admiralty funding, Babbage started work in 1823 on his Difference Engine, a device which would produce tables of logarithms, sines and cosines, using 20-digit registers, and deliver printed output.

Unfortunately, Babbage's ideas were far in advance of the engineering of the day, and the Difference Engine was never completed. Frustrated by the lack of progress, Babbage worked continually on new ideas, and in 1833 he decided to scrap the current machine and proceed with a new and even grander design, the Analytical Engine.

The concepts behind the Analytical Engine were amazingly close to those of the modern computer. The Engine was to be programmable and capable of proceeding without human intervention until it arrived at an answer. Babbage split the machine into two units: the store, where both instructions and data would be fed into the machine on punched cards, and the mill,

where arithmetic and logic operations would be performed under control of the stored instructions.

The punched card idea was taken from the automated weaving loom invented in 1805 by Joseph Marie Jacquard. The Analytical Engine was intended to store 1000 words of 50 digits each, but once again Babbage outstripped the technology of his day and never saw the machine built.

However, the ideas embodied in the Analytical Engine have echoed down through the years, and we're still reminded of them by the modern programming language, Ada. Babbage's patron was Lady Augusta Ada Lovelace (the daughter of Lord Byron), who was said to have written the world's first computer program. Current evidence, however, suggests it was actually written by Babbage and published under Lady Lovelace's name in order to lend credibility to the Analytical Engine before an increasingly sceptical admiralty, which eventually withdrew funding.

Bits of the Analytical Engine can still be seen in the Science Museum in London. While it was never completed, a Swedish printer called Pehr Georg Scheutz did build a machine based on Babbage's Difference Engine in 1854, and I believe in the 1950's IBM built a replica of what the Analytical Engine should have looked like

Babbage himself was a fascinating character, famed for his hatred of the barrel-

organ grinders who frequented London's streets in those days. He blamed the noise they made for the loss of a quarter of his working power and fired vitriolic anti-organ-grinder missives to newspapers and members of Parliament.

Babbage was devoid of any poetic spirit. For example, on reading Tennyson's 'Vision of Sin', which contains the couplet:

*"Every moment dies a man,
Every moment one is born."*

he pointed out in a letter to the poet that if this were true the population of the earth would remain constant, and suggested the following revision:

*"Every moment dies a man,
And one and one-sixteenth is born."*

While the Analytical Engine bore the seeds of the development of the modern computer, more of the underlying theory still had to be discovered. In particular, the mathematical foundations of logic were yet to be explored.

In 1848, the mathematician George Boole published 'The Mathematical Analysis of Logic', which was followed in 1854 by 'An Investigation of the Laws of Thought'. These treatises established what is now known as symbolic logic or Boolean Algebra, and paved the way for modern computers to use the binary system rather than decimal numbers.

1890 marked the beginning of two companies which played a major role in computer development: Burroughs and IBM. William Burroughs invented the Adding and Listing Machine, a popular office calculator, while Herman Hollerith designed a tabulator machine for the 1890 United States Census. Hollerith went on to form the Tabulating Machine Company in 1896, which amalgamated with a scale and time clock company to form the Computer-Tabulating-Recording Company in 1911. In 1924, under Thomas Watson, this company became the International Business Machines Corporation.

The digital computer as we know it today was brought into existence by the stimulus of World War II. Ironically, it was a similar problem to the one which sparked Babbage off: the calculation of firing tables for trajectory calculations required by artillery.


These firing tables were initially produced by hand, but a human performing one multiplication every 10 seconds would require 12 hours to prepare a single trajectory, and a complete table comprised between 2000 and 4000 trajectories. The differential analyser, a type of mechanical analogue computer, could calculate a trajectory in 10 or 20 minutes and a complete table in 30 days.

Electromechanical calculators were being developed at the time, but they were even slower than the differential analyser. For example, the Bell Model III, developed at Bell Laboratories in 1944, used 9000 relays, covered 1000 square feet and weighed around 10 tons. It could multiply two seven-digit numbers in one second, and would have taken 40 minutes to calculate a trajectory.

The Harvard Mark I Automatic Sequence Controlled Calculator was developed jointly by International Business Machines and Harvard University under Howard Aiken. Measuring 15.5 metres long and 2.5 metres high, it contained 800,000 parts. Its architecture comprised 60 constant registers, 72 storage registers for addition, a central multiplication and division unit and the ability to calculate elementary transcendental functions, such as sine and cosine. It could multiply two 23-digit decimal numbers in three seconds and divide in twelve seconds. The speed was limited primarily by the time required for mechanical parts to move from one position to another.

This problem was solved by building a machine with electrical computing, con-

Meanwhile, across the Atlantic, the British were also working feverishly on digital computer technology. An early victory had been scored with the development by Alan Turing of the Colossus, a special-purpose computer designed to crack the codes used by the German Enigma machine.



trol and memory elements. The electronic valve or vacuum tube was able to respond to electrical signals hundreds of times faster than a relay. John Atanasoff of Iowa State College had already proposed this alternative in the summer of 1941.

Top-Secret

But it was John Mauchly and J. Presper Eckert, at the University of Pennsylvania's Moore School of Electrical Engineering, who built the ENIAC (Electronic Numerical Integrator and Computer). Dedicated on February 15th, 1946, ENIAC was too late for the war effort. However, one of its first tasks was to run some calculations prepared by Dr John von Neumann for the top-secret atomic bomb project at Los Alamos. A problem which would require eight hours on an electromechanical machine took only one minute on ENIAC.

Von Neumann, a brilliant Hungarian mathematician, produced an even more advanced machine, the Electronic Discrete Variable Computer, EDVAC. This machine introduced two major concepts, which have been incorporated into almost every machine since.

EDVAC was the first computer to use the binary system of notation, which is simpler and more reliable than the decimal storage used in earlier machines. EDVAC was also the first machine to have its program stored along with the data inside the machine's memory (previous machines

had stored the program externally on punched cards, tape or plugboards). With programs stored in exactly the same way as data, one program could manipulate another — a brilliantly simple, yet powerful concept, now known as the von Neumann architecture.

Meanwhile, across the Atlantic, the British were also working feverishly on digital computer technology. An early victory had been scored with the development by Alan Turing of the Colossus, a special-purpose computer designed to crack the codes used by the German Enigma machine. This device, which was to remain secret for many years after the war, played a major role in the Allied victory. Built in 1943, the 1,500-tube Colossus was the world's first electronic digital computer.

In fact, it was eventually a British company, Ferranti, which delivered the world's first commercial computer, the Mark I, installed at the Royal Society Computing Machine Laboratory in 1951.

American Lead

During the '50s the American companies, most notably IBM, took the lead. In the late '50s the transistor, invented at Bell Laboratories in 1947, made the second generation of computers possible. Much more reliable and less power-hungry than valves, transistors made smaller, cheaper and more powerful computers possible.

In 1959, Jack Kilby at Texas Instruments and Robert Noyce at Fairchild Semiconductor both independently invented the integrated circuit, a way of building complete circuits in one chip. Their work had in fact been foreshadowed by Geoffrey Dummer of the Royal Radar Establishment, who said in 1952, "With the advent of the transistor and the work in semiconductors generally, it now seems possible to envisage electronic equipment in a solid block with no connecting wires. The block may consist of layers of insulating, conducting, rectifying and amplifying materials, the electrical functions being connected directly by cutting out areas of the various layers."

The integrated circuit was subsequently adopted for use in the third generation of computers in the mid to late '60s.

From Miniskirts to Minicomputers

The '60s also saw the development of smaller computers: the so-called 'minicomputers'. Pioneered by Digital Equipment Corporation, minis were small and cheap enough to be dedicated to one person, or

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Tim Hartnell, prolific computer author, and one of the best-known Australians in the personal computer field, is head of Interface Publications. He says that for years he has been appalled that many software prices seem to be inordinately high, with little apparent justification.



"The amount of work involved in bringing many computer products to market - hardware, books or software - can be immense," Tim admits, "but that does not seem to justify software prices which are - in many cases - totally out of proportion with the investment in development time and expertise in the product."

Although Tim lives in Melbourne, he travels overseas to the UK and USA - where Interface has offices - two or three times a year. On the last trip, he decided to approach software developers directly, and bring back software to Australia which was not only extremely good, but which Interface could offer at realistic prices. "The more software we can sell in Australia and New Zealand, the easier it will be to convince developers overseas to place their products with us. We'll simply keep the quality up, and prices down, hopefully grow into an even more major force in the field. Realistically-priced software is here to stay. The era of the absurdly high prices is over."

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BIRD WATCHERS

to one application (process control or data acquisition). DEC's PDP-8, which was introduced in 1965, for example, was the first mass-produced computer and the first computer to sell for under \$20,000.

The next major leap occurred in 1971. Noyce had left Fairchild with Gordon Moore to set up a new company, Intel, to manufacture memory chips for the computer industry. Intel was approached in 1969 by a Japanese calculator manufacturer called Busicom, which wanted a set of chips designed for assembly into a range of calculators. Intel's applications research manager, Marcian Hoff, realised the chip set was basically a small digital computer and encouraged Busicom to make the chips more general.

In June 1971, Intel released the 4004 4-bit microprocessor chip set, comprising processor, Read-Only Memory (ROM), Random Access Memory (RAM) and other components. This was the first microprocessor, although other companies were working on similar devices.

Meanwhile, Intel was approached by Data Terminals Corporation (now better known as Datapoint) to produce a similar chip set for an intelligent terminal design. Intel designed the chip, but changed the design from the DTC specs, and when it was rejected put it on the market as the 8008 (the first 8-bit microprocessor). This chip carried around 2,900 elements and could execute 50,000 instructions per second.

The direction was now clear. Intel produced a second generation of microprocessors, the 4040 and 8080, which were upwardly compatible with the earlier chips, a strategy the company has continued to pursue today. Even when 8080 designer Masatoshi Shima left Intel to design the Z-80 for Zilog, he maintained compatibility.

These microprocessors were now powerful enough to be considered real computers. In 1974, *Radio-Electronics* magazine published a design for a do-it-yourself computer, the Mark 8. When *Popular Electro-*

nics' January 1975 issue described the Altair 8800, a minicomputer-like box based on the 8080, the response was astounding. Ed Roberts, president of MITS and designer of the Altair, sold 400 machines in the first few weeks — as many as he'd expected to sell altogether!

The microcomputer revolution was now well underway. When Tandy introduced its TRS-80, the first pre-assembled personal computer in 1977, the revolution became available to all, even those who couldn't use a soldering iron. Later that year, Apple introduced the Apple II, and the result is well-known to all.

IBM finally entered the personal computer market in 1981, changing many of the rules of the game in the process. The personal computer business is now mature, comparatively stable and, some would say, deadly dull.

In next month's article, we'll look at how computers — all computers — work, and probe the mysteries of hardware and software. □

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MAKE NO MISTAKE

IN ALL THE YEARS I've been involved with personal computers, I don't think I've seen anybody buy the perfect computer for their needs first time. However, some people have just made it hard on themselves, and have repeated some errors.

'Why Did I Want This?'

Some people actually go out and buy a computer without any clear idea of why they want one. This is probably the major reason for unhappiness with home computers, and it's a bit of a hobbyhorse of mine. On the other hand, if you have no particular need for a computer, you can hardly be disappointed if it won't do something.

The fact that every man and his dog, from electronics stores to department and furniture stores, is selling home computers is no reason for every man and his dog to buy one. You have to have a better reason than that.

In the early days of personal computing, when you had to buy a computer in bits and build it yourself, we could be pretty sure that anyone who had a personal computer had a need for it — otherwise they would hardly have bothered with the pain and expense of getting it going. In 1975, the major reason for getting involved was a burning curiosity about computers, that only owning a computer could satisfy.

In about 1977, the market changed perceptibly; some companies realised there was only a limited number of computer jocks in the world, but that there was a huge untapped potential in the vast majority of people who had never even considered owning a computer. The advertising agencies were called in, and suddenly personal computers were being portrayed as:

- fun for the family
- educational
- great for keeping household accounts
- an ideal way to learn about the future
- an even better status symbol than a video recorder

and all the other symbols and images that advertising people know are the key to our souls and our cheque books. That's not to say personal computers aren't all the

Over the years, Les Bell has seen a number of newcomers to computing buy their first computer. He's seen many of the mistakes they made and, believe it or not, he's occasionally been mistaken himself. Here he writes about the common errors — you can avoid them.

things described above; just that all these things may not be important to you. If you think they are — boy, have I got a bargain for you in a nice line of harbour bridges!

In short, commercial interests want to sell you a computer, to go with your massage shower head, electric toothbrush, quadraphonic hi-fi and other material objects. If you collect these kinds of things, be my guest.

If, on the other hand, you want to think about what you are doing and whether it is of use to you, here is some advice.

Home computer users are motivated by a number of things. The people who get the most benefit out of a home computer, in general, are those who are fascinated by the things, and who are intelligent enough and motivated enough to find out how they work, how to make them do things in general and how to make them do the specific things they want. In short, they are highly motivated to read books, attend computer club meetings or evening classes and learn to program, and they will spend quite a lot of money on software packages and peripherals, knowing they will reap the benefits in some specific way.

These people are hackers, otherwise

known as computer jocks. To them, the computer is the ultimate pinball game, a game with no end in which sometimes the computer has the advantage while the hacker tries to figure something out and at other times he or she is the master as they show friends how they taught it to play 'Daisy, Daisy' over a radio.

The next satisfied group is those who bought a computer as an adjunct to some other form of activity. For example, a surprisingly large number of journalists has bought Osborne I's to assist them with writing articles and books (though it's surprising how few of the computer press have computers!). Many people have written programs to keep score for neighbourhood tennis competitions, club secretaries use computers to assist them with correspondence, amateur dramatists use them for script-writing, record collectors catalogue their collections, and so on.

For these people, the computer is ancillary to their main interest, and is viewed as a tool to help get the job done. Nonetheless, such people cannot help but become fascinated with the specific problems of their application. For example, the record collector will become something of an expert on database management systems. In such cases, people sometimes become part-time programmers and consultants, earning supplementary income from what started as a sideline.

In most cases, the computer involved has been moderately expensive with adequate mass storage (usually in the form of disks) to ensure success. For example, while many people routinely handle personal correspondence with a Commodore 64 and Easy-Script, a working journalist would require two disk drives and a more powerful word processing package — and, of course, could more easily justify the expense.

It would generally be true to say there is not much you can do with an under-\$400 computer, and under \$200 it is certainly true. The reason is that to get the price down so low, manufacturers progressively strip out first mass storage capacity, then internal RAM storage, and finally, the abil-

ity to have any kind of expansion at all. At least with some low-cost (cheap, to be honest) computers, you can expand by adding disk drives, more memory and so on, but with the cheapest of all, you're stuck. You may just get a glimmer of the potential a real computer possesses, but that's all.

The next group of home computer users is that which buys a computer for the kids. Here, too, it's important to have some purpose in mind. Are you buying a home computer for the kids because:

- a) They have a serious and genuine interest in computers and are at the age where either a career in computers or a career involving computers is under consideration.
- b) The Joneses down the street have bought one.
- c) It's hell round the house during the holidays and at least the games will keep them amused.
- d) 'Computers are becoming more and more important, aren't they?'
- e) Educational programs are available, which teach all about arithmetic, maths, history, grammar, you name it.
- f) The little buggers will make your life a misery until you do.

Let's look at each of these reasons in turn. Reason a) is obviously worthwhile. If little Jane or little Johnny is shining in the sciences and looks a dead cert to be a scientist or engineer, a computer will be the best investment you will ever make as a parent. Be prepared for a shock to the wallet, though. Little J will need at least a Commodore 64 — more likely an Apple II with disk drives — to satisfy his or her curiosity about computer graphics. You're looking at an investment of \$1000 to \$2000 or more. (Of course, if little J is going to be a management type, he or she will want an IBM PC — but can probably advise on a suitable lease arrangement.)

If b) is your motive, my advice is simple. Make sure your kids get on well with the Joneses so they can all use the Joneses' computer. If that doesn't work, you may have to buy one; since pride will not let you get a cheaper model, go for exactly the same one (it's probably come down in price since they bought theirs, anyway). But make sure you buy the latest and greatest software; that way you're ahead of the Joneses. Don't be surprised if, after a month or so, it goes back into its box and on top of the wardrobe.

Peace and quiet during school holidays

is worth almost any price. In case c), go for a low-cost model with plenty of fun educational software. Commodore leads the field here, but Tandy's Colour Computer, Atari, Sinclair and others are worth considering. Relegation to the wardrobe is also on the cards here, especially if your youngster routinely gets 20 per cent in mathematics exams.

Computers are cropping up in everyday life (case d)), but generally cleverly disguised as microwave oven timers or automated bank tellers. The idea (and it's working) is that computers should have to adjust to people's way of doing things, not the reverse. Little Jane is, what, 13 now? If you cram all there is to know about computers into her head now, half of it will be out of date before she leaves school.

The idea that we all have to learn to use computers today or we'll be second-class citizens tomorrow is the product of woolly thinking and woolly writing on the part of the popular press. All the evidence goes against it — so if you're worried by d) forget it.

Educational programs are available for computers, that's true. Only very few are truly worthwhile, and little Johnny could probably work through the whole lot in surprisingly few hours. A genuinely useful educational computer or terminal, together with software, is more sophisticated — and expensive — than most other applications, with good reason. The solution in e) is to leave it to the schools where the specialised knowledge is.

Case f) is solved by analysing it to be either a) or c) and buying the appropriate model. If the kids want it, you work out why, and then try to reconcile that with your budget.

Disk Capacity

Here's a hidden gotcha for the business buyer. Generally, if you're buying a business computer for a standard application, such as general accounting, the salesperson will know how many accounts fit on the system and will advise accordingly.

However, if you are setting out to do your own thing, perhaps with the aid of a database manager like dBase II, it's easy to overestimate just what can be done with small disk drives. For example, let's assume you're a journalist with an Apple II and a Softcard, and you want to use dBase II to maintain a database of your public relations contacts. You sit down and work out just what information you want to

store, just like it says in the manual. So far so good. Then you create the database — no worries so far — and then start entering data from your address book.

You have 500 names and addresses to go in. Surprise, surprise when you get a disk full error at just over 360 entries. How can this be, you ask yourself? The disk capacity is 128,000 bytes — that's characters — and I haven't typed anything like 128,000 keystrokes.

Let's backtrack to your file structure, which looks like this:

Fieldname	Length
Surname	20 characters
First names	20 characters
Phone number	15 characters
Company	30 characters
Position there	20 characters
Suite Number	15 characters
Street address	30 characters
Town	30 characters
State	10 characters
Postcode	10 characters
Country	20 characters
Industry Code	4 characters
Last contact date	8 characters
Comment	50 characters

The length of each field is just enough to store the longest value you expect to encounter. However, whether you actually use all that space or not, dBase allocates it, and fills it with spaces. Therefore, whenever you add a record to the database, it takes up 282 bytes, plus one for dBase's delete flag. That's 283 bytes per record, plus 520 bytes for the dBase file structure header. The number of records you can store is therefore $(128,000 - 520) / 283$ or 450, isn't it?

Well, yes, but what about the index files you're using; so you can locate people quickly you're indexing on surname, company and industry code. Those files take up a surprising amount of space, too. Each index file has a 512-byte header, and then each record is the same length as the key field plus four bytes, taking up yet more space — and that's why you're down to just 360 entries in your file. Better start looking for a new computer, Ralph.

Peripheral Vision

Quite a common error people make when buying a computer is to forget to figure in the costs of peripherals and other add-ons they will need. Even the simplest personal computer requires some form of display

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MAKE NO MISTAKE

and mass storage, generally a domestic television set and a cassette tape recorder.

If your display is to be an ordinary television, you may need to purchase a special RF modulator which converts the video output of the computer into a TV signal — this is not terribly expensive. Alternatively, your television may have a direct video input specifically designed for computers and video recorders.

Cassette recorders for computers are a tricky proposition. In general, cheap recorders won't work satisfactorily, particularly on those computers which load at high speed, since they require a really good frequency response. On the other hand, there's no point in going for a really expensive model, since most of its features will be wasted.

In the bad old days when I had a cassette-based machine (I really did, Virginia), I found the best cassette recorder to be the model Tandy recommended for its machines: the CTR-80A, I think it was. That model is probably no longer available, and there's no guarantee its replacement is as good, but its price is an indication of what you should expect to pay for a suitable recorder — \$60 or thereabouts. Forget to figure that into your computer budget and you'll have to miss a few nights at the pictures.

Don't imagine for a second you're going to be able to do anything really serious without a disk drive. All commercial applications revolve around disk files — customer files, order files, invoice files — and the computer needs to have fast access to these files. That's impossible with cassette tapes and not that easy with disks, if the truth be told.

In point of fact, it would be possible to set up quite a comprehensive accounting system using a computer with three cassette drives, but nobody's ever bothered. I used to have a system with three cassette interfaces and while I once set up some fairly sophisticated software to use two drives, I rapidly lost interest. You would, too.

So, don't be fooled: cassettes are okay if all you want to do is write or play games programs, but as soon as you start talking data files, you'd better start talking disk drives.

Supermarket Software

I mentioned above the care with which you should choose your computer, but the same applies to software. With good soft-

ware costing hundreds of dollars, you want to be sure you're getting the right package.

For example, suppose you have a huge record collection to catalogue, and you've bought a personal computer for this task. You have a disk drive (or two) and capacity is not a problem, so now it's just a matter of setting up some software.

Well, the computer comes with BASIC as standard, and in the ad it said you could just write your own programs, right? Right, my friend — *you* write the programs, not the computer. While you're trying to get this first (fairly ambitious) program off the ground, you're not going to have time to listen to your records, and since your spare cash is going to go on books on BASIC programming, you can't afford to buy any more anyway — thus you arrive at an alternative solution to the problem.

Never mind, the ad said the computer uses standard BASIC and you can run any of thousands of published programs, right? Right — but try finding a record-cataloguing program among them, or any other useful programs, for that matter. You'll find dozens of Wumpus and Battleship games, even a few Star Treks, but nothing like what you want.

The answer? What you need is a database management system or a list manager; something like pfs:File, Cardbox or a number of other programs. Here most of the work is done for you; all you have to do is design a screen form, say how you'd like the file sorted and that's it. Well, almost ...

Make sure you don't wind up buying a program that's too complex for your requirements or too simple to do what you want. In short, be prepared to shop around for quite some time, compare notes with other users and ask questions of sales staff in computer stores.

In summary, there are a few things you should bear in mind when buying your first computer:

- 1) You'll have to spend more than you expect, even when you take this into consideration.
- 2) The computer itself is only the start; you will have to spend as much again on software, disk drives, other add-ons and bits and pieces.
- 3) Don't count on using the family television with the computer; this works if the computer is getting occasional use, but if your computer purchase is a successful one, no-one will be able to watch television (which may achieve a secondary objective for you!).

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C FOR SMARTIES

C FOR SMARTIES

Part 3

We know you're dying to get back to the C-my side of things. This month, Les Bell sizes up C variables. Proceed with caution.

OUR TOPIC this month is the declaration and allocation of types of C variables. The basic data types supported by C are char, integer and float (we'll ignore pointers for the moment); all other types are simply modifications of these. For example, 'long' is simply a long integer which is twice as long as the standard, while 'double', like a long float, is a double-precision floating point variable.

Notes

The sizes and value ranges of most types are implementation- and machine-dependent. The values given in Table 1 are those most prevalent for compilers on 16-bit machines.

These types are generally determined by the hardware of the target machine. The types shown in the table are those found in most compilers for microprocessors, where 16-bit integers are natural for the machine architecture. However, you

should be aware that minicomputer implementations won't always be completely compatible. For example, unsigned longs are not supported on the PDP-11.

In a sense, character types are actually integers. Generally, a character variable is one byte — just big enough to contain an ASCII character. Normal characters are non-negative, but values such as -1 can be used as end-of-file indicators and the like.

For this reason, unsigned char values are not a good idea. The problem is file input routines will detect end-of-file then return -1, but when this is stored in an unsigned char variable it will magically turn into 255. A test for end-of-file will therefore fail, since 255 does not equal -1. Avoid unsigned chars if you want your programs to be portable.

What's the difference between ordinary signed integers and unsigned ones? C does integer arithmetic in two's complement form, which means in a 16-bit integer

one bit is used to indicate the sign, leaving 15 bits to indicate the value. With 15 bits you can indicate a value of just over 32,000. Because of the way two's complement arithmetic works, the actual range is -32768 to +32767 (for an explanation of two's complement arithmetic, see the box).

If you don't need to store negative numbers, you can use the 16th bit as part of the value, allowing a range of 0 to 65535.

Notice a single-character variable can only store a single character. In order to store a string or sequence of characters, you must use an array of character variables. (Arrays come later in the series — you'll just have to believe me for the time being, but you might already have realised the declaration of name [NAMELEN] in last month's sample program is an array.) BASIC programmers will probably find C's string handling crude at first.

The floating point facilities also vary from machine to machine. Most 8-bit machines have no floating point hardware and therefore perform floating point in software, with formats varying from compiler to compiler. Some compilers, like BDS C, do not support floating point as part of the C language. In the 16-bit world, the 8087 numeric data coprocessor uses the IEEE (Institution of Electrical and Electronics Engineers) floating point format, and most compilers are compatible with this. Most provide both hardware and software floating point support.

Declarations

A declaration simply consists of the type specifier, followed by a list of variables to be declared. See Table 2 for examples.

The declaration causes the compiler to place the variable name into its symbol table so it will later know what type it is.

Type	Storage Required	Minimum Value	Maximum Value
char	8 bits, one byte	-128	127
unsigned char (1)	8 bits, one byte	0	255
integer	16 bits, one word	-32768	32767
unsigned integer	16 bits, one word	0	65535
short	16 bits, one word	-32768	32767
unsigned short	16 bits, one word	0	65535
long	32 bits, two words	-2147483648	2147483647
unsigned long	32 bits, two words	0	4294967296
pointer	implementation dependent		
float (2)	32 bits, two words		
double	64 bits, four words		
long float	64 bits, four words		

Table 1. C types as used in CP/M and DOS compilers. (1) A rare type, this is only seen on some 8-bit CP/M compilers. Can cause portability problems. (2) The floating-point sizes are also machine-dependent. The sizes given here correspond to the IEEE floating point format, used by the 8087 chip and most software fp libraries.

Table 2.	int i;	/* Declare i to be an integer */
	int j, k, l;	/* Declare j, k and l to be integers */
	unsigned int u;	/* u is an unsigned int */
	long blah;	/* Declare blah long integer */
	float f, g;	/* f and g are floats */
	double d, e;	/* d and e are doubles */
	char a, b, c;	/* a, b and c are chars */

Along with the name, the symbol table stores the type of the variable (which implies its size) and also the scope of the variable — that is, the parts of the program in which the variable is known. We'll talk more about the scope rules later. The declaration also causes the compiler to reserve storage space for the variable — to give it a home, so to speak.

Declarations in C can do other things, such as specify the storage class of a variable. More on that later.

Constants

Integer constants are written simply as a string of digits, while float constants may also have a decimal point and optional exponent.

Char constants are handled rather differently. If a single character is to be used it's enclosed in single quotation marks, while a string of characters is written: `'n` double quotes (literally a "quoted string").

These are all the types required to satisfy virtually all computing needs. Let's go ahead and use them in some sample programs; try Listing 1 first.

This is a very simple program which multiplies two numbers together and prints the original data as well as the result. We declare a, b and c to be of type integer, assign a and b values from constants, multiply them and place the result in c. This is then printed using a formatted print function.

Run this program and 'C' the results. Now edit it, so a is assigned the value 151 and b the value 273, and run it again. What

happens, and why?

We can fix this in a couple of ways. The first is to make a, b and c long integers, so they can hold a greater range of values; modify the program again, changing the declaration so a, b and c are longs, and run it. Is the result okay?

For the greatest range of values, use floating point variables; once again, change the declarations so a, b and c are declared float, run the program and note the results. Reasonable? Why is this so?

If you refer back to the printf format string definitions, you'll find particular format strings apply to particular data types. The appropriate formats for floats are %e, %f and %g. Try these and see if there's any improvement.

Take five minutes now to experiment with the field width and precision settings on the printf statement. Try print format strings of %4.2f, %06.2f and %4.2e, and compare the results.

Now look at Listing 2.

Before you run the program, what do you think will be printed for b? Run the program and see if you were right.

There are a couple of changes which can be made to this program, which illustrate some interesting points about C. First

change the print format strings from %c to %d and see what the program prints. Why does it do this?

A further change you can make is to try the string field formatting function on string c. Change the %s format string to %-40s and see what the program prints.

Finally, look at Listing 3, but don't run it now. It includes a statement we haven't covered yet: the for loop. BASIC programmers will be familiar with the concept — it simply adds 3.10, 10,000 times.

What do you expect the program to print?

It takes several seconds to run, so don't be surprised if it says nothing for some time.

The for loop is a flow-control statement. Don't worry about exactly how it works — the next C-programming article will cover that. For now, all you need to know is it adds 3.10 to a float variable f 10,000 times, then prints the result.

If you're like most of the population, and trust computers to do their sums correctly, you'll expect the result of running this program to be as follows:

After 10,000 additions, f = 31000.

For the record, the 'Introducing C' interpreter is a little more accurate than the compiler. It produces a result of 30997.308594, but it's still 2.69 in error!

This shows there are inevitable rounding errors associated with the use of floating point arithmetic, which can accumulate alarmingly. C should be considered with caution for certain financial systems.

Next month, we look at C's rich set of flow-control statements. □

Listing 1.

```
/* Exercise 4 - C types - investigate char types */
#define MAXSTR 40

int a,b;
char c[MAXSTR];

main()
{
    a = 'A';
    b = a + 1;

    printf("Please enter a string: ");
    gets(c,MAXSTR);

    printf("a = %c, b = %c\n",a,b);
    printf("c = %s",c);
}
```

Listing 2.

```
/* Exercise 3 - C types - multiply two numbers and print the result */
int a,b,c;

main()
{
    a = 3;
    b = 7;
    c = a * b;

    printf("a = %d, b = %d, a * b = %d\n",a,b,c);
}
```

Listing 3.

```
/* Exercise 5 - comparison of float and fixed arithmetic */
int i;
float f;

main()
{
    f = 0;
    for (i = 0; i < 10000; i++)
        f = f + 3.10;
    printf("After 10,000 additions, f = %f",f);
}
```

TWO'S COMPLEMENT ARITHMETIC

Like many computer languages, C performs integer arithmetic in two's complement notation. What does this mean? Let's backtrack a little and start by counting positive integers in binary. We'll assume we're working with a kind of mythical 'half-char' type; that is, we're storing our binary numbers in a 4-bit word. We can count from zero up as shown in the following table:

```

7 = 0111
6 = 0110
5 = 0101
4 = 0100
3 = 0011
2 = 0010
1 = 0001
0 = 0000

```

And so on. Notice counting up is done using the rules of binary arithmetic: zero plus zero equals zero, one plus zero equals one, and one plus one equals zero carry one.

I stopped at seven in this example, for a very simple reason: we want to be able to represent negative numbers, and obviously we'll have to use one bit to represent the sign of the number — in this case the most significant bit, which hasn't been used yet. If I were to add one to seven, the carry bit would ripple right along the length of the word and finally set the most significant bit — but if this is the sign bit the result would not be eight but some negative number.

Given that the most significant bit represents the sign of the number, how can we represent the value of the number? One way would simply be to represent the magnitude exactly as for the positive integers, so we would have:

```

1 = 0001
-1 = 1001
2 = 0010
-2 = 1010

```

While this can be done in theory, it complicates arithmetic unnecessarily. It would be particularly convenient if we could arrange the existing simple rules of binary arithmetic to continue to work for negative numbers (a little checking will show they do not work for the scheme above).

We could start by simply insisting that adding 1 to whatever representation we choose for -1, it should result in 0. So we have:

```

-1 = ???
+1 = 0001

```

```

0 = 0000

```

A little thought and experiment will show the only binary number which meets these requirements is 1111. Adding one to this number we repeatedly get a result of zero carry one, until finally the carry overflows at the left-hand end of the result, and we're left with zero.

If -1 is represented as 1111, we can use the same logic to show -2 is 1110, and so on. So we wind up with a table like this:

```

0 = 0000
-1 = 1111
-2 = 1110

```

```

-3 = 1101
-4 = 1100
-5 = 1011
-6 = 1010
-7 = 1001
-8 = 1000

```

This scheme is attractive in that an existing adder circuit can do arithmetic on negative numbers, but it does have its drawbacks. For example, with our 4-bit integers, what's the sum of five and four?

To find the two's complement representation of any negative number, use the following procedure:

1. Discard the sign and convert the number into binary.
2. Take the complement of the number; that is, convert all ones into zeros and zeros into ones.
3. Add one to the result.

For example, to calculate the two's complement of six (minus six):

Step 1. 6 = 0110

Step 2. Invert = 1001

Step 3. Add one -6 = 1010

Notice arithmetic works just fine. For example, what's 4 - 6? Convert six to its two's complement and add it to four.

```

4 = 0100
+ -6 = 1010

```

```

1110 = -2

```

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STRUCTURED PROGRAMMING

Part 9

IN LAST month's article I described a very common data processing problem, the sequential file update, and introduced a new approach to its solution.

Here's a brief summary. There are two input files: an old master file (named OMASTER) and a variations file (VARNS). Both files have one record per line and each line contains two items: an alphanumeric key, followed by a data string (enclosed in quotes). The variations file records are also prefixed with a 'transaction type': 'A' for an addition, 'C' for a change and 'D' for a deletion. The structure of these records has been tailored so reading them in BASIC is easy. In practice some form of record structuring would be used, but here we're more concerned with the development of the general program logic.

The aim of the program is to create a new master file, NMASTER, following the instructions of the VARNS file. We must also allow for possible illegal variation records, issuing appropriate error messages. Both the OMASTER and VARNS file records are kept in strict ascending key sequence. A sample OMASTER file might contain the following records:

```
100 "A. Smith"
110 "K. Jones"
120 "F. Nurke"
```

The keys are the numbers 100 to 120. A sample VARNS file might contain:

```
"A" 90 "G. Browne"
"C" 110 "L. Jones"
"D" 120 "anything"
```

which would mean (1) add the record 90 "G. Browne" at the start of the new master file, (2) change record 110 to 110 "L. Jones" and (3) delete the record with key 120. After execution, the new master file should contain

```
90 "G. Browne"
100 "A. Smith"
110 "L. Jones"
```

Phil keeps his New Year's resolution and delves further into the state-switching approach to file handling; 1986 gets off to a good start when we discover one way of reducing the number of state handling modules is to execute them, and we bite the bullet on dealing with the particularly horrific UPDATE5 module.

We also explained that each of the input files is in one of three states: empty, full or finished. Accordingly, there are nine possible combinations to which we assign 'algorithm states', as shown in Figure 1.

We offered the flowblock of Figure 2 as the mainline program which controls the

Algorithm State	Input File States	
	Old Master	Detail
1	Empty	Empty
2	Empty	Full
3	Empty	Finished
4	Full	Empty
5	Full	Full
6	Full	Finished
7	Finished	Empty
8	Finished	Full
9	Finished	Finished

Figure 1. Update algorithm state table.

selection of the various 'case stubs' UPDATE1, UPDATE2 and so on. These 'stubs' perform the separate actions of the update algorithm. For a change, we're

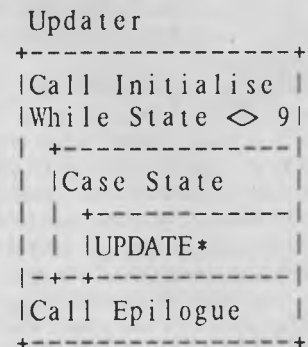


Figure 2. The main program flowblock.

drawing our flowblocks as they might be printed, using a simple daisywheel printer (without the box-drawing character set).

In simple English, this flowblock represents a loop which executes one of the special-purpose modules until the final State (9) is attained. By initialising State to 1, we force execution of the module UPDATE1, which will need to read one of the two input files (which one is a matter of choice). Having done so, the associated input buffer will be affected, so UPDATE1 will need to change the state to reflect the new conditions. That will cause execution of the next appropriate state handler, and so on. Our real design problem is now broken down into eight sub-problems, each of them relatively simple in nature.

Initialise

But before attending to these case stubs, let's take care of the module named Initialise; it's shown in Figure 3. The first line invokes a module which sets up the error messages. We can defer the design of that module until later when we better understand the errors. (Note we now prefer to use the more generic 'Call' in preference to BASIC's GOSUB.) The latest version of Speedit (now called 'Stylus') does the conversion for us.

Initialise is slightly complicated because of the way BASIC reacts to an end-of-file condition. Normally, EOF(n) is true after an attempt to read file #n has read the very last record; it is also true if the file which has just been opened contained no records. As a result we have to set the state depending on whether or not either input file was empty. There are four logical possibilities: neither file was empty, OMASTER was empty, VARNS was empty, or both were empty. I leave it to you to verify from Figure 1 that the value of State has been set correctly. All you have to do is trace the logic for each case.

As mentioned above, UPDATE1 must read one or other of the two input files. Which one doesn't matter since one is sufficient to change the state of the algorithm. We have chosen to read OMASTER (file #1). Following the read operation we must check to see if the last record was read, since this affects the state. Figure 4 shows a first attempt at UPDATE1. The read operation will be successful (that is, not read beyond the file end) since State 1 can only be reached if the last record has not been read in yet. That is certainly true if Initialise set State to 1, and we will ensure it remains true for the other modules. The first line sets the key for the master record in mk and the data in mdata\$.

We can make UPDATE1 a bit more general by using the fact that modules UPDATE2 and UPDATE3 should also take the same action: that is, read the OMASTER file. The only difference is that the value of State will be different. Figure 5 does the trick for all three modules (hence

```

Initialise
+-----+
|Call SetErrorMessages |
|print "Opening the files." |
|print |
|open "OMASTER" for input as #1 |
|If EOF(1) |
| +-----+ |
| | State = 7 | State = 1 |
| +-----+ |
|open "VARNS" for input as #2 |
|If EOF(2) |
| +-----+ |
| | State = State+2 |
| +-----+ |
|open "NMASTER" for output as #3 |
+-----+
    
```

Figure 3. The Initialise module opens all the files.

the stacked names) by adding 3 to the State value in each case. Check each against Figure 1 to prove for yourself that this is correct.

Module UPDATE4 corresponds to what must be done if there is a record in the OMASTER buffer (that is, 'full') but the VARNS buffer is 'empty'; clearly we must read the next record from the VARNS file. The same is true for State 7. Note also that this is the only point where the VARNS file is read, so it's a good place to check that the variation type t\$ is valid. If it isn't, the module issues an error message and leaves the state unchanged (to force another read using the same module). The consolidated logic of Figure 6 serves for both UPDATE4 and UPDATE7; check this is so before proceeding. Note the module also sets up a new variable, type, which can be used later as a 'case switch' in the range 1, 2 or 3 instead of the letters 'A', 'C' or 'D'.

It's a Horror

Let's conveniently slip over module UPDATE5 for the moment; it's a horror since it now has to deal with the situation when there are two records to be compared and used. UPDATE6 is much easier, as you can see from Figure 7. It corresponds to the situation when there is a record sitting in the OMASTER buffer, but the VARNS file is 'exhausted' (in other words, the last VARNS record has been read and dealt with).

UPDATE8 is just a little more complex

(see Figure 8). Since it is entered with State 8, this means the OMASTER file is exhausted (and therefore fully dealt with), but that there is a VARNS record awaiting processing. Logically that record must be an addition, otherwise we have a reportable error condition. You now see why we test the variation 'type' t\$ to see if an addition has been requested. If it has, the variation data vdata\$ is written out to file NMASTER; if not, error message 2 is displayed, which complains there is a variation other than an addition after the old master file has been exhausted. We'll set up those messages shortly using module SetErrorMessages.

The final act of UPDATE8 is to adjust the value of State depending on whether or not the record in the VARNS buffer was the last. If it was, then EOF(2) will be true, so State is set to 9 to reflect the fact that both input files are now 'finished'; otherwise the State becomes 7, which corresponds to a finished OMASTER file, and an empty (but not exhausted) VARNS file.

Error Messages

We yet have to deal with UPDATE5 and its progeny, but let's first dispose of the two remaining modules dealing with error messages: SetErrorMessages and ErrorMessage.

There are five possible error messages which might be generated, and Module SetErrorMessages simply initialises the array Ermsg\$ to the appropriate values. We already know what Ermsg\$(2) will be; Fi-

```

UPDATE1
+-----+
|input #1,mk,mdata$|
|State = 4 |
+-----+
    
```

Figure 4. A first try at designing UPDATE1.

```

UPDATE4
UPDATE7
+-----+
|input #2,t$,vk,vdata$ |
|If t$="A" or t$="C" or t$="D" |
| +-----+ |
| |State=State+1 |ernum=1 |
| |type=instr("ACD",t$) |Call ErrorMessage |
+-----+
    
```

Figure 6. The consolidated logic for States 4 and 7 reads the next VARNS record and corrects the State.

```

UPDATE1
UPDATE2
UPDATE3
+-----+
|input #1,mk,mdata$|
|State = State+3 |
+-----+
    
```

Figure 5. Consolidated logic for UPDATE1, UPDATE2 and UPDATE3.

STRUCTURED PROGRAMMING

Figure 9 shows the initialisation process.

The module ErrorMsg simply displays an error message using the value of `ernum` as an index, and also displays the current variation record and old master record contents.

Now For It

Now it's time to bite the bullet and develop UPDATE5.

The UPDATE5 module is responsible for the real heart of the update operation, where there are OMASTER and VARNS records to be dealt with.

There are two possible starting points to

As a final step, you should invent some sample test files and check the logic manually against this test data. If you have a copy of Stylus, you could do the same exercise using the computer.

this exercise: we either begin by comparing the two keys `mk` and `vk`, or we do a test on the variation type `t$`; I have chosen the former. You may like to examine a solution commencing with the second approach to see if you come up with a better answer.

The start of our solution is shown in Figure 11. There are three principle components, depending on the relative values of the two keys. Let's look firstly at the case when the master key `mk` is less than the variation key `vk`. Here we should simply dump the master record to NMASTER because it can't be affected by the variation request; this is done by the `print #3` statement. But then the value of `State` must be

```
UPDATE6
+-----+
|print #3,mk;",";mdata$|
|If EOF(1)|
| +-----+|
| |State=9|State=3|
+-----+
```

Figure 7. UPDATE7 outputs the current OMASTER record to the NMASTER file.

```
Equ2
+-----+
|print#3,vk;",";vdata$|
|Call Equ3|
+-----+
```

Figure 13. Change operation when keys are equal. The VARNS record is dumped to NMASTER. We use the shared logic of Equ3 (deletion) since it differs only in that the VARNS record is ignored.

```
Equ3
+-----+
|If EOF(1)|
| +-----+|
| |State=7|State=1|
| +-----+|
|If EOF(2)|
| +-----+|
| |State=State+2|
+-----+
```

Figure 14. Deletion operation when keys are equal. In effect, both records 'consume' each other. Check for yourself that the `State` values are correctly set.

```
UPDATE8
+-----+
|If t$="A"|
| +-----+|
| |print #3,vk;",";vdata$|ernum=2|
| | |Call ErrorMsg|
| +-----+|
|If EOF(2)|
| +-----+|
| |State=9|State=7|
+-----+
```

Figure 8. UPDATE8 deals with the final stages of the update operation after the old master file is exhausted.

```
SetErrorMessages
+-----+
| For i=1 to 5|
| +-----+|
| | read Ermsg$(i)|
| +-----+|
| data "Invalid variation type"|
| data "Master file finished, but variation is not an A"|
| data "Cannot add duplicate key"|
| data "Cannot change non-existent record"|
| data "Cannot delete non-existent record"|
+-----+
```

Figure 9. This module initialises the array `Ermsg$`, which contains the error messages used by `ErrorMsg`.

```
ErrorMsg
+-----+
|print Ermsg$(ernum)|
|print " VARN: ";vk,vdata$,t$|
|print " OLD MASTER: ";mk,mdata$|
+-----+
```

Figure 10. `ErrorMsg` displays an error message according to the value of `ernum`.

adjusted, and the new State depends on whether the master record happened to be last. If it was, EOF(1) will be true, in which case setting State to 8 reflects the new set of buffer conditions (see Figure 1). Similarly, we set State to 2 if the OMASTER record was not the last.

If mk was not less than vk, we next test for equality. Here we chicken out and leave it to three new modules Equ1, Equ2 and Equ3, which deal (respectively) with attempted additions, changes and dele-

tions. We do a similar thing in the case where mk is greater than vk by invoking Greater1, Greater2 and Greater3. Note we have included the setting of State in the latter case because that logic is common to all three types. Why? Because when mk is greater than vk we *must* deal only with the variation record. The master record will not be used — hence State is adjusted according to whether or not the VARNs record was the last in the file.

The flowblocks for the modules Equ*

and Greater* are offered without further comment in Figures 12 through 17; they are quite straightforward as they deal with well-defined conditions.

The final module, Epilogue, is shown in Figure 18; it simply displays a listing of the new master file NMASTER.

As a final step, you should invent some sample test files and check the logic manually against this test data. If you have a copy of Stylus, you could do the same exercise using the computer. □

```

Update5
+-----+
| If mk<vk
| +-----+
| | print #3,mk;","";mdata$
| | If EOF(1)
| | +-----+
| | | State=8|State=2
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| +-----+
+-----+

```

Figure 11. UPDATE5 handles the situation when there is a record available from both files.

```

Epilogue
+-----+
| print
| print "Listing of New Master file"
| print
| print "Key          Data"
| print "====          ====="
| close #1 : close #2 : close #3
| open "nmaster" for input as #1
| input #1,k,linedata$
| print k,linedata$
+-----+
| While not EOF(1)
| +-----+
| | input #1,k,linedata$
| | print k,linedata$
| +-----+
| print: print
| close #1
+-----+

```

Figure 18. Epilogue displays the updated file NMASTER.

```

Equ1
+-----+
| Rem Cannot add because keys equal
| Ernum=3 : Call ErrorMsg
+-----+
| If EOF(2)
| +-----+
| | State=6 | State=4
+-----+

```

Figure 12. An attempted addition when the keys are equal.

<pre> Greater2 +-----+ ernum = 4 Call ErrorMsg +-----+ </pre>	<pre> Greater3 +-----+ ernum = 5 Call ErrorMsg +-----+ </pre>
---	---

Figure 16. Attempted change when the keys are unequal.

Figure 17. Attempted deletion when the keys are unequal.

```

Greater1
+-----+
| print #3,vk;","";vdata$
+-----+

```

Figure 15. Attempted addition when the VARNs record is greater than the OMASTER record; the VARNs data is sent to NMASTER. Note that State is set for this and the next three modules from within UPDATE5.

Pocket Programs

Sega

HORSE RACE

This program makes full use of the Sega's excellent graphics-capabilities, with each race offering punters the opportunity to select track and weather conditions, which in turn affect the performance of each horse.

Up to five punters can place bets, and a check is kept on their wins and losses.

Full instructions are included in the program listing.

SI Molloy,
Mittagong, NSW

```

10 REM *** HORSE RACE ***
12 REM by Steve Molloy
14 REM for the SEGA SC-3000
16 REM March 1985
18 K=1:EN=0:BT=100:CT=100:DT=100:ET=100:
FT=100:L=20
20 GOTO 236
22 CLS:RP=1:BB=0:GG=0:RR=0:GK=0:BM=0:X=0
:Y=0:Z=0:M=0:N=0:BZ=0:CZ=0:QZ=0:EZ=0:FZ=
0
24 GOTO 112
26 CLS:SCREEN2,2:CLS
28 GOTO 86
30 CURSOR 40,60:PRINT "Do you require inst
ructions?":CURSOR 80,80:PRINT "Press Y or
N."
32 A#=INKEY#
34 IFA#="" THEN 32
36 IFA#="Y" THEN BEEP:GOTO 402
38 IFA#="N" THEN BEEP:CLS:GOTO 262
40 IFA#<>"Y" OR A#<>"n" THEN 32
42 REM punters
44 SCREEN1,1:CLS:COLOR 1,11
46 CURSOR 4,2:PRINT "How many punters are
prepared?":CURSOR 4,4:PRINT "to risk their
money today?":CURSOR 13,6:PRINT "(1 to 5)"
48 CURSOR 15,9:INPUT PU#
50 IF ASC(PU#)<49 OR ASC(PU#)>53 THEN 48
52 P=VAL(PU#):NA=12
54 FOR PS=1 TO P
56 CURSOR 4,NA:PRINT "Punter":PS:" Your n
ame*":CURSOR 23,NA:INPUT N#:GOSUB 480
58 NA=NA+2:NEXT PS
60 GOTO 40
62 REM the horse
64 MAG 3
66 PATTERNS#0,"000000000000000001"
68 PATTERNS#1,"03FF3F3F29500000"
70 PATTERNS#2,"0000000000000080"
72 PATTERNS#3,"BEFF3E0000000000"
74 RETURN
76 PATTERNS#0,"000000000000000000"
78 PATTERNS#1,"017FBF3F29500000"
80 PATTERNS#2,"000000000000006000"
82 PATTERNS#3,"DEFF7E3000005000"
84 RETURN
86 REM the course
88 SCREEN2,2:COLOR 1,15,(0,0)-(255,191),1
4:COLOR 1,1,(0,0)-(255,5),14:COLOR 1,3,(0,
186)-(255,191),14
90 LINE(40,0)-(40,191),1:LINE(41,0)-(41,
191),6
92 MAG 3:PATTERNS#4,"0010387CFE101038"
94 SPRITE 7,(60,5),4,2
96 SPRITE 8,(120,5),4,2
98 SPRITE 9,(180,5),4,2
100 SPRITE 10,(60,168),4,2
102 SPRITE 11,(120,168),4,2
104 SPRITE 12,(180,168),4,2
106 CURSOR 210,30:PRINT "Race":EN:CURSOR 21

```

Sega

```

5,50:PRINT"Tr: ";T$:CURSOR215,60:PRINT"Sk
: ";C$:CURSOR210,85:PRINT"L: ";LE$
100 LINE<LI,L>-<LI,171>,1:LINE<LI+1,L>-<
LI+1,171>,6:LINE<LI-1,L>-<LI-1,171>,6
110 GOTO130
112 REM length
114 SCREEN1,1:CLS:COLOR1,3
116 PRINT:PRINT:PRINT"    How long would y
ou like the":PRINT:PRINT"    race to be?"
118 PRINT:PRINT:PRINT"    You may select a
ny length":PRINT:PRINT"    between 1400 an
d 2000 metres"
120 CURSOR0,14:INPUTLE$
122 IFLE$<"1400"THEN120
124 IFLE$>"2000"THEN120
126 LI#LEFT$(LE$,3)
128 LI=VAL<LI#>:GOTO282
130 REM position
132 GOSUB62
134 SPRITE0,<2,25>,0,1
136 SPRITE1,<2,77>,0,6
138 SPRITE2,<2,77>,0,12
140 SPRITE3,<2,103>,0,12
142 SPRITE4,<2,129>,0,4
144 FORPH=1TO99:NEXT
146 REM start
148 BLINE<40,0>-<40,191>:BLINE<41,0>-<41
.191>
150 Q=LI-34
152 J=INT<RND<1>*13>+1
154 ONJGOTO156,156,156,160,160,160,164,1
64,164,168,168,172,172
156 GOSUB66:X1=X:GOSUB188
158 GOSUB76:X1=X+2:GOSUB188:X=X+E:GOTO17
6
160 GOSUB66:Y1=Y:GOSUB192
162 GOSUB76:Y1=Y+2:GOSUB192:Y=Y+F:GOTO17
6
164 GOSUB66:Z1=Z:GOSUB840
166 GOSUB76:Z1=Z+2:GOSUB196:Z=Z+G:GOTO17
6
168 GOSUB66:M1=M:GOSUB200
170 GOSUB76:M1=M+2:GOSUB200:M=M+H:GOTO17
6
172 GOSUB66:N1=N:GOSUB204
174 GOSUB76:N1=N+2:GOSUB204:N=N+I
176 IFX>QORY>QORZ>QORM>QORN>QTHENGOSUB20
8
178 IFRP=3THEN362
180 ONKGOTO182,184
182 SOUND3,140,0:SOUND4,3,15:K=2:GOTO152
184 SOUND3,160,0:SOUND4,3,15:K=1:GOTO152
186 REM sprite boce
188 SPRITE0,<X1,25>,0,1
190 SPRITE0,<X1+3,25>,0,1:RETURN
192 SPRITE1,<Y1,51>,0,10
194 SPRITE1,<Y1+3,51>,0,10:RETURN
196 SPRITE2,<Z1,77>,0,6
198 SPRITE2,<Z1+3,77>,0,6:RETURN
200 SPRITE3,<M1,103>,0,12
202 SPRITE3,<M1+3,103>,0,12:RETURN
204 SPRITE4,<N1,129>,0,4
206 SPRITE4,<N1+3,129>,0,4:RETURN
208 REM plaes
210 SOUND0:ONRP GOTO212,224
212 IFX>QTHENBB=1:X=Q:E=0:GOTO222
214 IFY>QTHENGG=1:Y=Q:F=0:GOTO222
216 IFZ>QTHENRR=1:Z=Q:G=0:GOTO222
218 IFM>QTHENNGK=1:M=Q:H=0:GOTO222
220 IFN>QTHENNM=1:N=Q:I=0
222 RP=2:RETURN
224 IFX>QTHENBB=2:GOTO234
226 IFY>QTHENGG=2:GOTO234

```

POCKET PROGRAMS

Sega

```

2228 IFM>QTHENRR=2:GOTO234
2230 IFM>QTHENGRK=2:GOTO234
2232 IFN>QTHENBM=2
2234 RP=3:RETURN
2236 REM instrp
2238 SCREEN2,2:CLS:COLOR1,4,,4:CLS:COLOR1
,11,<L,0>-<245,191>,4:COLOR1,12,<31,22>-
<235,15>,4:COLOR1,12,<31,75>-<235,68>,4
2240 PRINTCHR#<17>:CURSOR60,44:PRINT"HORS
E RACE"
2242 GOSUB474
2244 CURSOR09,25,95:COLOR6:PRINT"The sport o
f k199="
2246 PRINTCHR#<16>:CURSOR23,115:COLOR13:P
RINT"<CR>":CURSOR45,140:PRINT"Town and Country
Sports"
2248 SOUND0:FORU=12TO0STEP-2:FORSS=100TO
0STEP-50:SOUND1,50,U:SOUND2,.50+100,U:N
EXTSSO:NEXTU:SOUND0
2250 GOSUB254
2252 CLS:GOTO30
2254 FORA=1TO150:NEXT:COLOR1:CURSOR45,182
:PRINT"Press any key to continue..."
2256 A#=#INKEY#
2258 IFA#=""THEN256
2260 BEEP:RETURN
2262 REM field
2264 COLOR1,15,<L,10>-<235,181>,14
2266 CURSOR40,30:PRINT"The field for toda
y's events:"
2268 CURSOR75,60:GOSUB352
2270 CURSOR75,90:GOSUB354
2272 CURSOR75,100:GOSUB356
2274 CURSOR75,120:GOSUB358
2276 CURSOR75,140:GOSUB360
2278 GOSUB254
2280 CLS:GOTO42
2282 REM conditions
2284 CLS:COLOR15,4:CURSOR3,4:PRINT"Are tr
ack conditions set or dry?"
2286 CURSOR5,6:PRINT"Is the sky fine or o
ld?"
2288 CURSOR9,9:PRINT"Select # from:"
2290 CURSOR10,12:PRINT"<1> Wet/Cloody"
2292 CURSOR10,14:PRINT"<2> Dry/Cloody"
2294 CURSOR10,16:PRINT"<3> Dry/Fine"
2296 CURSOR9,19:INPUT"Key in 1,2 or 3:":T
D#
2298 IFTC#="1"THENE=6.5:F=6:G=6:H=8:I=8.5
:T#="W":C#="0":BM#="0":BB#="4":GG#="5":RR#="3":
GK#="20":BM#="6":GOTO306
300 IFTC#="2"THENE=6.5:F=7.5:G=7:H=8.5:I
=8.5:T#="D":C#="0":BM#="0":BB#="5":GG#="2":RR#="
4":GK#="22":BM#="8":GOTO306
302 IFTC#="3"THENE=7:F=7.5:G=7.5:H=9:I=9
:T#="D":C#="0":RR#="9":GR#="4":RR#="2":G
K#="14":BM#="7":GOTO306
304 IFRSC<TC#><49ORRSC<TC#>>51THEN296
306 REM odds
308 EN=EN+1:CLS:SCREEN2,1
310 SCREEN2,2:COLOR1,14,,14:COLOR1,15,<L
,5>-<235,186>,6
312 CURSOR40,5:PRINT"The odds for race "
:EN:" are:"
314 CURSOR45,L:GOSUB352:CURSOR175,L:PRIN
TBB#:"/1"
316 CURSOR45,30:GOSUB354:CURSOR175,30:PR
INTGG#:"/1"
318 CURSOR45,40:GOSUB356:CURSOR175,40:PR
INTRR#:"/1"
320 CURSOR45,50:GOSUB358:CURSOR175,50:PR
INTGK#:"/1"

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```

322 CURSOR45,60:GOSUB360:CURSOR175,60:PR
INTBM#:"/1"
324 CURSOR70,80:PRINT"Horse      Win/Place
Amount":LINE(110,80)-(110,180),6:LIN
E(190,80)-(190,180),6:LINE(0,76)-(255,76
),1
326 P=VAL(PU#)
328 CU=98
330 FORM=1TOP
332 CURSOR7,CU
334 IFW=1THENPRINTN1#
336 IFW=2THENPRINTN2#
338 IFW=3THENPRINTN3#
340 IFW=4THENPRINTN4#
342 IFW=5THENPRINTN5#
344 GOTO424
346 CU=CU+15
348 NEXTW
350 CLS:GOTO26
352 COLOR1:PRINT"Black Beauty":RETURN
354 COLOR10,:PRINT"Golden Girl":RETURN
356 COLOR6:PRINT"Red Rose":RETURN
358 COLOR12:PRINT"Green Knight":RETURN
360 COLOR4:PRINT"Blue Max":RETURN
362 REM result#
364 FORRT=1TO200:NEXT:CLS:COLOR1,15,(20,
10)-(235,181),14:GOSUB474
366 CURSOR30,30:PRINT"And the winner is:
":CURSOR150,30
368 IFBB=1THENGOSUB352
370 IFGG=1THENGOSUB354
372 IFRR=1THENGOSUB356
374 IFGK=1THENGOSUB358
376 IFBM=1THENGOSUB360
378 CURSOR50,60:PRINT"Second:":CURSOR150
,60: SOUND0
380 IFBB=2THENGOSUB352
382 IFGG=2THENGOSUB354
384 IFRR=2THENGOSUB356
386 IFGK=2THENGOSUB358
388 IFBM=2THENGOSUB360
390 GOSUB512
392 CURSORL,140:PRINT"Would you like ano
ther race?":BA#=INKEY#
394 IFBA#=""THEN392
396 IFBA#="Y"THENBEEP:GOTO22
398 IFBA#="N"THENBEEP:GOTO602
400 IFBA#<>"Y"ORBA#<>"N"THEN392
402 REM instructions
404 CLS:CURSORL,30:PRINT"HORSE RACE is a
program designed to":CURSORL,40:PRINT
"allow you to gamble to your heart's"
406 CURSORL,50:PRINT"content...without r
isking a cent":CURSORL,70:PRINT"Up to f
ive punters may bet on each":CURSORL,80:
PRINT"race."
408 CURSORL,100:PRINT"You may run as man
y races as you wish.":CURSORL,110:PRINT"
For each race, you will be able to":CURS
ORL,120:PRINT"determine the race length
and track":CURSORL,130:PRINT"and weather
conditions."
410 GOSUB254:CLS:CURSORL,30:PRINT"At the
end of each race punters":CURSORL,40:PR
INT"will be advised of wins/losses."
412 CURSORL,60:PRINT"Bets are limited to
between #10 and":CURSORL,70:PRINT"#99.
Each punter begins the day":CURSORL,80:P
RINT"with $100 in the kitty.":CURSORL,10
0:PRINT"How long that lasts is up to the
m:"
414 CURSORL,120:PRINT"Bets may be made t
o WIN or to PLACE.":CURSORL,130:PRINT"Ho

```

POCKET PROGRAMS

Sega

```

wever, PLACE winnings will only be":CURS
ORL,140:PRINT"Paid on the 1st and 2nd ho
rses."
416 GOSUB254:CLS:CURSORL,30:PRINT"Before
each race you will be able":CURSORL,40:
PRINT"to enter your bets.":CURSORL,60:PR
INT"To do this you simply type where":CU
RSORL,70:PRINT"indicated the initials of
the horse"
418 CURSORL,80:PRINT"You wish to bet on,
e.g., BB for":CURSORL,90:PRINT"Black Be
auty. Then whether you are":CURSORL,100:
PRINT"betting to Win or Place: W or P.":
CURSORL,110:PRINT"Then the amount you wi
sh to bet."
420 CURSORL,130:PRINT"Good luck!!":GOSUB
254
422 CLS:GOTO262
424 REM bets
426 CH=75:GOSUB462:CH=83:GOSUB462:GOTO43
2
428 CH=145:GOSUB462:GOTO4 2
430 CH=210:GOSUB462:LB#=H ":CH=218:GOSUB
462:RB#=HA#:GOTO452
432 IFW=1THENBH#=HA#:GOTO 18
434 IFW=2THENCH#=HA#:GOTO428
436 IFW=3THENDH#=HA#:GOTO428
438 IFW=4THENEH#=HA#:GOTO428
440 IFW=5THENFH#=HA#:GOTO428
442 IFW=1THENBW#=HA#:GOTO430
444 IFW=2THENCW#=HA#:GOTO430
446 IFW=3THENDW#=HA#:GOTO430
448 IFW=4THENEW#=HA#:GOTO430
450 IFW=5THENFW#=HA#:GOTO430
452 IFW=1THENBR#=LB#+RB#:GOTO492
454 IFW=2THENDR#=LB#+RB#:GOTO492
456 IFW=3THENDR#=LB#+RB#:GOTO492
458 IFW=4THENERA#=LB#+RB#:GOTO492
460 IFW=5THENFA#=LB#+RB#:GOTO492
462 REM bet rout
464 CURSORCH,CU+2:PRINT"_"
466 CURSORCH,CU:HA#=INKEY#
468 IFHA#="" THEN466
470 IFLEN(HA#)>1THEN466
472 PRINHA#:BEEP:RETURN
474 FORSO=200TO1200STEP50
476 SOUND1,SO,12:SOUND2,SO+100,10:SOUND3
,SO+200,8
478 NEXTSO:RETURN
480 IFPS=1THENN1#=#N#
482 IFPS=2THENN2#=#N#
484 IFPS=3THENN3#=#N#
486 IFPS=4THENN4#=#N#
488 IFPS=5THENN5#=#N#
490 RETURN
492 CURSOR10,182:PRINT"Press CR to enter
bet, INS/DEL to re-do"
494 HG#=INKEY#
496 IFHG#="" THEN494
498 IFASC(HG#)=13THENBEEP:GOTO508
500 IFASC(HG#)=8THENBEEP:GOTO504
502 GOTO494
504 CURSOR75,CU:PRINTCHR#(8):CURSOR83,CU
:PRINTCHR#(8):CURSOR145,CU:PRINTCHR#(8):
CURSOR210,CU:PRINTCHR#(8):CURSOR218,CU:P
RINTCHR#(8)
506 GOTO332
508 FORSP=10TO240STEP6:CURSORSP,182:PRIN
TCHR#(8):NEXTSP
510 GOTO346
512 REM wins/losses
514 CURSOR5,90

```

POCKET PROGRAMS

Sega

```

516  IFBB=1 THEN WI$="B":WA$=BB$
518  IFBB=2 THEN WE$="B":WB$=BB$
520  IFGG=1 THEN WI$="G":WA$=GG$
522  IFGG=2 THEN WE$="G":WB$=GG$
524  IFRR=1 THEN WI$="R":WA$=RR$
526  IFRR=2 THEN WE$="R":WB$=RR$
528  IFGK=1 THEN WI$="K":WA$=GK$
530  IFGK=2 THEN WE$="K":WB$=GK$
532  IFBM=1 THEN WI$="M":WA$=BM$
534  IFBM=2 THEN WE$="M":WB$=BM$
536  HW$=", your horse":YH$=" You have
won $":WD$=" Well done ":EX$=" Exoe
lent ":NB$=" Nice bet ":CS$=" Placed.
"
538  IFBH$=WI$ THEN PRINT WD$:N1$:HW$=" won!
":BA=VAL(BA$)*VAL(WA$):IFBW$="P" THEN BA=I
NT<<BA/5>*3)
540  IFBH$=WI$ THEN PRINT:PRINT YH$:BA:BZ=1
542  IFCH$=WI$ THEN PRINT EX$:N2$:HW$=" won!
":CA=VAL(CA$)*VAL(WA$):IFCW$="P" THEN CA=I
NT<<CA/5>*3)
544  IFCH$=WI$ THEN PRINT:PRINT YH$:CA:CZ=1
546  IFDH$=WI$ THEN PRINT NB$:N3$:HW$=" won!
":DA=VAL(DA$)*VAL(WA$):IFDW$="P" THEN DA=I
NT<<DA/5>*3)
548  IFDH$=WI$ THEN PRINT:PRINT YH$:DA:DZ=1
550  IFEH$=WI$ THEN PRINT EX$:N4$:HW$=" won!
":EA=VAL(EA$)*VAL(WA$):IFEW$="P" THEN EA=I
NT<<EA/5>*3)
552  IFEH$=WI$ THEN PRINT:PRINT YH$:EA:EZ=1
554  IFFH$=WI$ THEN PRINT WD$:N5$:HW$=" won!
":FA=VAL(FA$)*VAL(WA$):IFFW$="P" THEN FA=I
NT<<FA/5>*3)
556  IFFH$=WI$ THEN PRINT:PRINT YH$:FA:FZ=1
558  PRINT:IFBH$=WE$ AND BW$="P" THEN PRINT EX
$:N1$:HW$:CS$:BA=INT<<VAL(BA$)*VAL(WB$)>
/2.3):PRINT:PRINT YH$:BA:BZ=1
560  IFCH$=WE$ AND CW$="P" THEN PRINT NB$:N2$:
HW$:CS$:CA=INT<<VAL(CA$)*VAL(WB$)>/2.3):
PRINT:PRINT YH$:CA:CZ=1
562  IFDH$=WE$ AND DW$="P" THEN PRINT WD$:N3$:
HW$:CS$:DA=INT<<VAL(DA$)*VAL(WB$)>/2.3):
PRINT:PRINT YH$:DA:DZ=1
564  IFEH$=WE$ AND EW$="P" THEN PRINT WD$:N4$:
HW$:CS$:EA=INT<<VAL(EA$)*VAL(WB$)>/2.3):
PRINT:PRINT YH$:EA:EZ=1
566  IFFH$=WE$ AND FW$="P" THEN PRINT NB$:N5$:
HW$:CS$:FA=INT<<VAL(FA$)*VAL(WB$)>/2.3):
PRINT:PRINT YH$:FA:FZ=1
568  GOSUB 254
570  IFBZ=1 THEN BT=BT+BA:GOTO 574
572  BT=BT-VAL(BA$)
574  IFCZ=1 THEN CT=CT+CA:GOTO 578
576  CT=CT-VAL(CA$)
578  IFDZ=1 THEN DT=DT+DA:GOTO 582
580  DT=DT-VAL(DA$)
582  IFEZ=1 THEN ET=ET+EA:GOTO 586
584  ET=ET-VAL(EA$)
586  IFFZ=1 THEN FT=FT+FA:GOTO 590
588  FT=FT-VAL(FA$)
590  CLS:CURSOR 10,L:KT$=", your kitty now
":PRINT N1$:KT$:BT:IFP=1 THEN G0
0
592  CURSOR 10,40:PRINT N2$:KT$:CT:IFP=2 THE
N G000
594  CURSOR 10,60:PRINT N3$:KT$:DT:IFP=3 THE
N G000
594  CURSOR 10,60:PRINT N3$:KT$:DT:IFP=3 THE

```


POCKET PROGRAMS

Sega

```
N2760
596 CURSOR 10,80:PRINTN4$:KT$:ET:IFP=4THE
N600
598 CURSOR 10,100:PRINTN5$:KT$:FT
600 RETURN
602 CLS:CURSORL,40:PRINT"Hope you enjoye
d HORSE RACE."
604 CURSORL,60:PRINT"Come back and try y
our luck again!"
606 FORF=1TO199:NEXT:CLS:END
```

Amstrad

BYTE RIDER

You must guide your byte-cycle around the grid for as long as possible, without crossing over the lengthening trail of byte-fallout. A joystick is used to control the byte-cycle, which is capable of 90-degree turns.

Bruce Daniel
Mudgee, NSW

```
100 INK 0,24:INK 1,11:INK 2,0:INK 3,26: BORDER 1
110 hs=0:inv%=CHR$(24)
112 SYMBOL AFTER 254
113 SYMBOL 255,255,129,129,129,129,129,129,255
120 MODE 1
130 WINDOW 0,2,39,5,24
140 WINDOW 1,1,40,1,3
150 PAPER 2,3:CLS 2
160 PAPER 1,0:CLS 1
165 PAPER 0,2:CLS 0
170 CLS 1:LOCATE 1,14,1:PEN 1,3:PRINT 1,"BYTE RIDER !":PEN 1,2
180 LOCATE 1,1,2:PRINT 1,inv%:"Score ":inv%:USING "####":sc:LOCATE 1,20,2:F
RINT 1,inv%:"High Score ":inv%:USING "####":hs:
190 PEN 1:LOCATE 1,1
200 9d%=STRING$(228,255)
210 FOR lp=1 TO 3:PRINT 9d%,9s%:NEXT lp:PRINT LEFT$(9d%,76)
230 LOCATE 1,1
240 LOCATE 1,7,3:PRINT 1,"Press <FIRE> to Begin Play."
250 nc=3:cl%=CHR$(207):cx=16:cy=334:sc=0:jk=8
260 WHILE (JOY(0) AND 16)<>16 AND (JOY(0) AND 32)<>32:WEND
270 FOR lp=2000 TO 500 STEP -50
280 SOUND 2,1R,2,15
290 NEXT lp
300 ENV 1,127,75,1
310 SOUND 2,500,-1024,12,1
320 CLS 1
330 LOCATE 1,20,3:PRINT 1,inv%:"High Score ":inv%:USING "####":hs:
340 LOCATE 1,1,1:PEN 1,2:PRINT 1,"BYTE RIDER ! by Bruce Daniel 1985.":PEN 1
1
350 LOCATE 1,1,3:PRINT 1,inv%:"Score ":inv%:
360 WHILE TEST(cx,cy)<>3:LOCATE 1,8,3:PRINT 1,USING "####":sc+1:PLOT cx,cy,3
TAG:PRINT cl%:TAGOFF:sc=sc+1
370 jy=JOY(0):IF jy<>1 AND jy<>2 AND jy<>4 AND jy<>8 THEN jy=jk ELSE jk=jy
380 IF jy=1 THEN cy=cy+16 ELSE IF jy=2 THEN cy=cy-16 ELSE IF jy=4 THEN cx=cx-16
ELSE IF jy=8 THEN cx=cx+16
390 WEND
400
410 IF sc>hs THEN hs=sc
420 SOUND 128+2,4000
430 ENV 2,6,-1,3
440 SOUND 2,1110,110,0,2,0,7
450 SOUND 5,0,110,0,2,0,7
460 INK 3,15,3 INK 2,11,12 INK 1,12,11:INK 0,3,15
470 BORDER 5,24
480 FOR td=1 TO 1800:NEXT td
490 INK 0,24:INK 1,11:INK 2,0:INK 3,26: BORDER 1
500 GOTO 150
```

VZ200

MORSE TUTOR (again)

In the June '85 issue of *Your Computer* we published a Morse Tutor program written by Basil Heath for the TRS-80 MC10. It was wrongly listed as being intended for the VZ200. As a result, Basil received several letters and phone calls from VZ200 users who pointed out first that the print had been reduced so much it was difficult to read, and second that the program didn't work (for obvious reasons).

Basil has very kindly collaborated with a friend who owns a VZ200 in rewriting his program for that machine. Here we've listed both versions (with the right machine headings, this time). Our apologies to the many people we mislead by this mistake.

```

1 REM MORSE TUTOR PROGRAM:CLS
2 PRINT"AUTO-RUN";PRINT"YES(1)";PRINT"NO(2)";
4 CLEAR 500
5 DATA 63,62,60,56,48,32,33,35,39,47,6,17,21,9,2,20,11,16,4,30
6 DATA 13,18,7,5,15,22,27,10,8,3,12,24,14,25,29,19
7 INPUTR:DIMB$(36)
8 FORI=1TO36:READJ:LETB$(I)=CHR$(J)
9 NEXTI:CLS
10 INPUT"SPEED(WPM)(MAX 10)?";SPEED
11 LET SPEED=5.0/SPEED
12 INPUT"DELAY(0-15)?";DELAY:DELAY=DELAY*50
13 INPUT"NO--CHARACTERS(MAX 200)";N
14 INPUT"LETTERS(1)NUMBERS(2)OR BOTH(3)?";L
15 DIM T$(N)
16 CLS:PRINTTAB(5)"MORSE TUTOR PROGRAM";FORI=1TON
17 LETT$(I)=CHR$(RND(10*-1*(L<>1)+26*-1*(L<>2))+10*-1*(L=1))
18 NEXTI:FORI=1TON
19 LETX=ASC(B$(ASC(T$(I))))
20 GOSUB65
23 IF I=INT(I/5)*5THEN29
25 IF I=NTHEN32
27 NEXTI
29 FOR Z=1 TO INT(200*SPEED+(DELAY*5)):NEXTZ
30 GOTO25
32 FORI=1TON
34 IF ASC(T$(I))>10 THEN39
37 PRINTCHR$(ASC(T$(I))+47);
38 GOTO40
39 PRINTCHR$(ASC(T$(I))+54);
40 IF I=INT(I/25)*25THEN46
41 IF I=INT(I/5)*5THEN44
42 IF I=NTHEN49
43 NEXTI
44 PRINT" "
45 GOTO42
46 PRINT
47 GOTO42
49 IF R<>2THEN90:PRINT:PRINT:PRINT
50 PRINT"PRESS KEY(1)(ENTER) TO RE-TRY"
51 PRINT"PRESS KEY(2)(ENTER) TO EXIT"
52 INPUTP:IFP<2THEN16
53 DATA 80,82,79,71,82,65,77,32,66,89,58,45,32,66,46,72,69,65
54 DATA 84,72,32,86,75,52,65,66,72
55 CLS:PRINT:PRINT
57 FORI=1TO27
59 READA
61 PRINT CHR$(A);
63 NEXTI:END
65 LETY=X/2:LETX=INT(Y)
67 Q=(2*SPEED*(1+(Y-X)*4))
70 SOUND25,Q
75 IFX=1THEN80
77 FORZ=1TOINT(40*SPEED):NEXTZ
78 GOTO65
80 FORZ=1TOINT(120*SPEED+(DELAY*3)):NEXTZ
85 RETURN
90 PRINT:PRINT:PRINT"PRESS-'BREAK'-TO EXIT";
95 FORI=1TO10000:NEXTI:GOTO16
    
```

TRS-80 MC10

```

1 CLS
2 PRINT"AUTO-RUN";PRINT"YES(1)";PRINT"NO-(2)";
4 CLEAR 500
5 DATA 63,62,60,56,48,32,33,35,39,47,6,17,21,9,2,20,11,16,4,30,13,18,7,5,15,22,2
7,10,8,3,12,24,14,25,29,19
6 INPUT R
7 DIM B$(36)
    
```

TRS-80 MC10

```

8 FOR I=1 TO 36:READ J:LET B$(I)=CHR$(J)
9 NEXT I:CLS
10 INPUT"SPEED(WPM)(MAX 15)?":SPEED
11 LET SPEED=7.5/SPEED
12 INPUT"DELAY(0 15)?":DELAY:DELAY=DELAY*50
13 INPUT"NO. OF CHARACTERS(MAX 200)":N
14 INPUT"LETTERS(1)NUMBERS(2)OR BOTH(3)?":L
15 DIM T$(N)
16 CLS:PRINT TAB(5)"MORSE TUTOR PROGRAM":FOR I=1 TO N
17 LET T$(I)=CHR$(RND(10*-1*(L<>1)+26*-1*(L<>2))+10*-1*(L=1)):NEXT I
18 FOR I=1 TO N
19 LET X=ASC(B$(ASC(T$(I))))
20 GOSUB 65
23 IF I=INT(I/5)*5 THEN 29
25 IF I=N THEN 32
27 NEXT I
29 FOR Z=1 TO INT(200*SPEED+(DELAY*5)):NEXT Z
30 GOTO 25
32 FOR I=1 TO N
34 IF ASC(T$(I))=10 THEN 39
37 PRINT CHR$(ASC(T$(I))+47);
38 GOTO 40
39 PRINT CHR$(ASC(T$(I))+54);
40 IF I=INT(I/25)*25 THEN 46
41 IF I=INT(I/5)*5 THEN 44
42 IF I=N THEN 49
43 NEXT I
44 PRINT " ";
45 GOTO 42
46 PRINT
47 GOTO 42
49 IF R=2 THEN 90
50 PRINT:PRINT:PRINT
51 PRINT"PRESS KEY(1)(ENTER)TO RE-TRY":PRINT "PRESS KEY(2)(ENTER)TO EXIT"
52 INPUT P:IF P=2 THEN 16
53 DATA 80,82,79,71,82,65,77,32,66,89,58,45,32,66,46,72,69,65,84,72,32,86,75,52,
65,66,72
54 CLS:PRINT:PRINT
57 FOR I=1 TO 27
59 READ A
61 PRINT CHR$(A);
63 NEXT I:END
65 LET Y=X/2:LET X=INT(Y)
67 Q=(2*SPEED*(I-(Y-X)*4))
70 SOUND 200,Q
75 IF X=1 THEN 80
77 FOR Z=1 TO INT(40*SPEED):NEXT Z
78 GOTO 65
80 FOR Z=1 TO INT(120*SPEED+(DELAY*3)):NEXT Z
85 RETURN
90 PRINT:PRINT:PRINT"PRESS 'BREAK'-TO EXIT"
95 FOR I=1 TO 10000:NEXT I:GOTO 16
    
```

Microbee

DRAWER

Drawer lets you draw high-res pictures on the screen and save them on disk as graphics files. A default extension of .GRF is given to these files (for example, 'picture.grf' may be a file on the directory).

The main menu gives the options:

```

00090 ON ERROR GOTO 999
00100 CLS:PRINT TAB(26)"### DRAWER ###":PRINTTAB(26)"#####"
00105 CURS 28,6:PRINT">>MENU<<"
00110 CURS 26,8:PRINT"1) DRAW":PRINTTAB(26)"2) LOAD FILE":PRINTTAB(26)"3) KILL FILE":PRINT TAB(26)"4) DIRECTORY":PRINTTAB(26)"5) END"
00120 A1$=KEY$:IF A1$="" THEN 120
00130 LET A2=VAL(A1$):LET B=INT(A2)
00140 ON B GOTO 200,400,600,800,850
00150 GOTO 120
00200 CLS:PRINT " To create your drawing use the keys""\TAB(35)"Q W E""TAB(35)"A D""TAB(35)"Z X C"
00210 PRINT"Each key is used to direct the pointer (pencil), '1' is used to turn pointer on & '2' off."
    
```

Microbee

- 1) draw a picture
- 2) load a graphics file
- 3) kill a file
- 4) display the directory or
- 5) end the program

The program will give instructions if you select option 1. The keys O, W, E, A, D, Z, X, C are used to guide the pointer around the screen. Typing '2' turns the pointer off, allowing you to move around the screen without drawing lines, as well as letting you erase old lines. The DRAW mode also allows you to save the picture and continue. The number of PCGs used is shown in the top left corner — this must not exceed 128.

Ken Rowe
Dernancourt, SA

```

00220 PRINT" To save your drawing on a file press 'O'. To
return to the menu press 'M'."
00222 PRINT"The number shown in the top left corner can NOT exceed 128"
"Press space bar to start...":
00230 A2%=KEY$: IF A2%<>" " THEN 230
00240 CLS:HIRES:LET X=240:Y=122:V=0
00245 CURS1:PRINT" DRAW MODE"
00248 FOR I=0 TO 481 STEP 480:FOR J=0 TO 238 STEP 8:SET I,J:NEXT J:NEXT I
00250 SET X,Y
00255 IF V=1 THEN RESET X,Y
00260 LET Z=PEEK(258): IF Z=1 THEN LET X=X-1 ELSE IF Z=4 THEN LET X=X+1 ELSE IF
Z=23 THEN LET Y=Y+1 ELSE IF Z=24 THEN LET Y=Y-1
00270 IF Z=17 THEN LET X=X-1:Y=Y+1 ELSE IF Z=5 THEN LET X=X+1:Y=Y+1 ELSE IF Z=26
THEN LET X=X-1:Y=Y-1 ELSE IF Z=3 THEN LET X=X+1:Y=Y-1
00272 IF X>480 THEN LET X=480 ELSE IF X<1 THEN LET X=1
00273 IF Y>238 THEN LET Y=238 ELSE IF Y<1 THEN LET Y=1
00275 IF Z=33 THEN LET V=0 ELSE IF Z=34 THEN LET V=1
00277 IF Z=13 THEN 100
00280 IF Z=32 THEN 310
00290 IF USED<128 THEN CURS1:PRINT USED
00295 IF USED=128 THEN CURS1:PRINT"STOP !!!":OUT 2.59:OUT 2.65
00300 GOTO 250
00310 CURS1:PRINT" :CURS1:INPUT"NAME ?":N1%
:
00320 IF LEN(N1%)>8 THEN 310
00322 CURS1:PRINT"FILE SAVED AS "":N1%:".GRF"
00325 LET N1%=N1%+".GRF"
00330 CLOSE 6: OPEN "A",6,N1%
00340 GRSAVE 6
00350 CLOSE 6
00360 GOTO 245
00400 CLS: CLOSE 6
00410 INPUT "WHAT FILENAME ?":N2%: N2%=N2%+".GRF"
00420 OPEN "I",6,N2%
00440 GRLOAD 6
00470 CLOSE 6
00480 CURS1:LETX=256:Y=128:V=1:GOTO 245
00600 CLS:DIR:PRINT"INPUT"FILE TO KILL ?":N3%: LET N3%=N3%+".GRF"
00610 KILL N3%
00620 GOTO 100
00800 CLS:DIR
00805 PRINT"PRESS SPACE BAR TO RETURN TO MENU"
00810 IF KEY%<>" " THEN 810 ELSE 100
00850 CLS:PRINT"END":END
00999 PRINT""
01000 IF ERRORC=16 THEN CLS:CURS18:INVERSE:PRINT"YOU EXCEEDED 128":PLAYO,15:NORM
AL:GOTO 90
01010 IF ERRORC=45 THEN CLS:CURS19:INVERSE:PRINT"FILE NOT FOUND ERROR":NORM
AL:PLAYO,15:GOTO 90
01020 PRINT"ERROR ":ERRORC:" IN LINE ":ERRORL: END

```



Microbee

If you're one of those unfortunate people who don't have EDASM, or if you wish to incorporate a machine code subroutine in a BASIC subroutine — type in this program. It has been coded in the most space-saving way, in order to allow room for your machine code programs.

Please enter the listing without any spaces except in the print statements, or use GX to remove them.

This utility is excellent for use on the small assembly programs published in *Your Computer*. Just enter their hex code, then save to tape.

You are required to give a starting address for your program; this will be the execute address. The memory location will be displayed in the top left corner of your screen. If a mistake is made you can backspace over it or any previous location. The space bar will display the next location. When you have finished, pressing the ESC key will save the machine code program to tape in ASCII, in data statements. Use IN#2 to load the program.

Conversion

Remove Poke from line 1 only. The usr statement on 14 is equivalent to 14 VARIABLES = INKEYS: IF VARIABLES = "" THEN 14 equals print. Insert AND K\$="" on line 21. Change the OUT statement to your own output method. Insert 22 REM, which displays the current memory location. Replace the (A4 8) on line 10 with FOR LOOP = 1 TO 4: PRINT CHR(8);: NEXT LOOP. And, of course, KEY is equivalent to INKEYS or GET.

Ian Gorr
Belconnen, ACT

```

00001POKE257,2: DIMZ(3): CLS: PRINT" Bspace-Edit, Space-Forward, Esc-End"\\ "START ADD
";
00002GOSUB21: IFK=80R27THEN2
00003PRINTCHR(K);: IFK=58: K=K-48ELSELETK=K-55
00004Z(I)=K: I=I+1: IFI=4THEN2
00005S=Z(0)*4096+Z(1)*256+Z(2)*16+Z(3): T=S
00006CLS: PRINT: GOSUB22: UNDERLINE: FORK=0T015: PRINT"0";: IFK=10: PRINTCHR(K+48); ELSE
PRINTCHR(K+55);
00007PRINT" ";: NEXTK: NORMAL
00008FORK=0T04*Z(3): IFK=0: PRINT" ";: NEXTKELSENEXTK
00009GOSUB21
00010IFK=27THEN14ELSEIFK=32: K=PEEK(S): A=K/16: GOSUB23: PRINTCHR(I);: A=K-A*16: GOSUB
23: PRINTCHR(I)" ";: S=S+1: GOSUB22: GOTO9ELSEIFK=8ANDK<T: PRINT(A4 8);: S=S-1: GOSUB
22: GOTO9ELSEIFK=8THEN9
00011PRINTCHR(K);: GOSUB24: A=K
00012GOSUB21: IFK=80RK=27ORK=32THENPRINTCHR(8);: GOTO9ELSEPRINTCHR(K)" ";: GOSUB24
00013POKEA, A*16+K: S=S+1: GOSUB22: GOTO9
00014PRINT" Tape RECORD - Any key": K=USR(32774): PLAY0,10
00015L=10000: OUT#20N: PRINTL"FORA="T"TO"S-1": READB: POKEA, B: NEXTA: I=USR("T"): CHR(1
3)CHR(10)L+5"DATA";
00016FORK=TTOS-1
00017PRINTPEEK(K)" ";: C=C+1: IFC=160RK=S-1THEN19
00018L=L+10: PRINTCHR(127)CHR(13)CHR(10)L"DATA";: C=0
00019NEXTK
00020PRINTCHR(127)CHR(26): OUT#20FF: PLAY23: END
00021K=ASC(KEY): IF(K=48ORK=57)AND(K=65ORK=70)ANDK<8ANDK<27ANDK<32THEN21ELSERET
URN
00022M1=65536: F=S: FORK=1T04: M=INT(M1/16): A=F/M: GOSUB23: POKE61439+K, I: F=F-M*A: M1
=FLT(M): NEXTK: FORL=61444T061503: POKEL, 32: NEXTL: RETURN
00023IFA=10: I=A+48: RETURNELSELETI=A+55: RETURN
00024IFK=58: K=K+48: RETURNELSELETK=K-55: RETURN

```

Microbee

SIMPLE ACCOUNTING CORRECTED

In our August issue we published a program called Simple Accounting, written by Graham Upshall for the Microbee. Russell Cook found some errors in Graham's programming and submitted the following amendments.

```
1.line no.92 ERROR USED FOR FILE LEFT NO ERROR CHECKING
2.line no.94 NONEXISTENT USED FOR NEXT FILE RIGHT
3.line no.96 NONEXISTENT USED TO REPRINT NEXT FILE DATA
4.line no.702 ERROR WRONG VARIABLE SHOULD BE X NOT I
5.line no.804 ERROR TO CLEAR SCREEN GOSUB 72:GOTO 60
NEEDED NOT
GOTO90
```

```
00090 GOSUB 72:X=X+1
00092 X=X-1:IF X<1:X=J:REM <DIR
00094 IF D=46:X=X+1:IFX>J:X=1:REM > dir
00096 GOTO 58
00100 DATA"Electricity"
```

```
00700 NORMAL:OUT£3:PRINTIA63 42J:PRINTIA63 42J:PRINTD5#
00702 FORX=1TOJ:PRINTEO(X):NEXT X:GOTO 720
00704 REM * LOAD DATA *
```

```
00800 PRINT,P2#"K to Clear this FILE ,"R3#,:NORMAL
00802 GOSUB24:IFD<>75THEN14ELSEFORV=0TOF
00804 A1(X,V)=0:B1(X,V)=0:C1(X,V)=0:NEXTV:D1(X)=0:GOSUB72:GOTO 60:GOTO90
00806 REM * SET UP *
```

Microbee

SMAKER

Smaker is a 'sprite generator' written in BASIC. It allows you to create a line drawing of something and, by writing down the data, recreate it in your games and so on. It is better than the usual method in that it uses about one-seventh of the memory usually required and is more liquid; that is, you can easily move, scale or rotate the sprite.

To apply the program, first invent a name for your sprite; for example, Maurice.

```
00100 REM SMAKER 25/04/85 RICHARD LARKIN.
00110 ON ERROR GOTO 750 : POKE 162,00 : POKE 163,129 : POKE 257,2
00120 DIM X0(200),Y0(200),K0(1)
00130 P=0 : M=0 : X0(0)=255 : Y0(0)=255 : S0#="" : S1#="FBMELSC"
: S2=9 : CLS : PRINT "SPRITE MAKER-by Richard Larkin.";"Please enter title of s
prite." : I6#="KEY"
00140 ZONE15 : INPUT T1# : T1#=T1#(:1,16) : PRINT "Would you like the origin,";"
1) Bottom Corner;"2) Middle;"of the grafix screen ?"
00150 O1#=KEY : IF O1#="1" OR O1#="2" THEN 160 ELSE 150
00160 O0=0 : IF O1#="2" THEN LET O0=128
00170 GOSUB 650
```

Microbee

Run the program. Enter the name. Now decide what Maurice looks like and whether you wish to use a co-ordinate system or move a dot about the screen. Some instructions are supplied from within the program.

In KEY entry mode the prompt asks you to enter the co-ordinates of the next point. You may type numbers between 0 and 253 or -128 and 126, depending on location of origin. First type the X co-ordinate followed by either RET or /, then the Y co-ordinate followed by RET or /. The new point will be entered at the present location in the file, and a new line drawn on the screen.

In DOT entry a point is moved about the screen using the keys I, ?, ' and +, which form a diamond on the right side of the keyboard. Selecting the number keys 1-9 will alter the step size taken by the dot. Type P to enter a point when you have arrived at the intended location.

I starts a new line

C changes between DOT and KEY modes

E ends the file at the location of the pointer

B and F take you backwards and forwards through the file

S redraws the sprite with any corrections you have made

M gives you the menu for extra commands

The six extra commands execute movements along the X and Y axes, scale changes of the X and Y axes, rotate sprites, and print data. These are easy to work out, so explanations are not required.

When using the rotate command, the program will ask you how many degrees you wish to turn by, then return you to your input mode to choose the point about which to rotate. Rotating cause scale changes, since the little points on the screen are really rectangles, so a scale correction may be necessary afterwards.

The subroutine allows you to use your data in your own programs, or you might prefer the one I used in the actual program. It's up to you!

Richard Larkin
Dee Why, NSW

```

00180 CURS 0 : PRINT "(SPRITE MAKER):"T1$M for menu"B back one point"F for
ward a point"E end sprite"L line end"S sprite update"C change dot/key in
put"
00190 CURS 1,11 : PRINT S0$ : CURS 1,11 : IF X0(P)=255 THEN PRINT "END OF SPRITE
"$S0$ ELSE IF X0(P)=254 THEN PRINT "END OF LINE"$S0$ ELSE PRINT "X-VAL="X0(P)-00"
"$Y-VAL="Y0(P)-00" "
00200 PRINT "POINTER"P" "$"BUFFER MAX"M" "$"PCG USED"USED" " : IF I6$="DOT" TH
EN 750
00210 K0$(0)=" " : K0$(1)=" " : CURS 1,9 : PRINT "ENTER POINT XXX/ YYY"(A2
0 32+(A9 8$ : FOR X=0 TO 1 : K2$=""
00220 K1$=KEY : IF K1$="" THEN 220
00230 A=ASC(K1$) : IF NOT(A=8 OR A=127) THEN 240 ELSE IF LEN(K2$)0 THEN LET K2$
=K2$(;1,LEN(K2$)-1) : PRINT CHR(127) : GOTO 220 ELSE 220
00240 IF LEN(K2$)=0 THEN IF K1$("&"+ AND K1$("&- THEN PRINT " " : K2$="" "
00250 IF SEARCH(S1$,K1$)()0 THEN NEXT+X 350
00260 IF K1$="/ OR ASC(K1$)=13 THEN LET K0$(X)=K2$ : GOTO 290
00270 IF (K1$("&0 OR K1$("&9) AND K1$("&+ THEN 280 ELSE LET K2$=K2$+K1$ : IF LE
N(K2$)=5 THEN LET K2$=K2$(;1,4) ELSE PRINT K1$ :
00280 GOTO 220
00290 CURS 16,10 : PRINT"/" : NEXT X : X1=VAL(K0$(0))+00 : Y1=VAL(K0$(1))+00 :
IF X1)253 OR X1(<0 OR Y1)255 OR Y1(<0 THEN PLAY 24 : GOTO 210
00300 IF R0=1 THEN RETURN ELSE LET X0(P)=X1 : Y0(P)=Y1
00310 P=P+1 : IF P)M THEN LET M=P : X0(M)=255 : Y0(M)=255
00320 IF P=200 THEN PRINT "$FILE FULL"$S0$ : PLAY 24 : J=USR(32774) : P=199
00330 IF X0(P-2)(<)254 AND X0(P-1)(<)254 AND P(<)1 THEN PLOT INT(X0(P-2))+255,INT(Y
0(P-2)) TO INT(X0(P-1))+255,INT(Y0(P-1))
00340 GOTO 190
00350 IF K1$="B THEN IF P)0 THEN LET P=P-1
00360 IF K1$="F THEN IF P)M THEN LET P=P+1
00370 IF K1$="E THEN LET X0(P)=255 : Y0(P)=255 : M=P
00380 IF K1$="L THEN LET X0(P)=254 : Y0(P)=255 : GOTO 310
00390 IF K1$="S THEN 170
00400 IF K1$("&C THEN 410 ELSE IF I6$="DOT" : I6$="KEY" : GOTO 170 ELSE LET I6$
="DOT" : GOTO 170
00410 IF K1$("&M THEN 190
00420 GOSUB 650
00430 CURS 0 : A=0 : J=0 : PRINT "1) LEFT/RIGHT"2) UP/DOWN"3) X LARGE/SMALL"
4) Y LARGE/SMALL"5) ROTATE"6) PRINT VALUES"7) RETURN TO SPRITE"WHICH D
O YOU WISH ? "
00440 B=ASC(KEY)-48 : IF B(1 OR B)7 THEN 440 ELSE IF B=7 THEN HIRES : GOTO 180
00450 ON B GOSUB 470,500,530,560,590,620
00460 GOTO 420
00470 INPUT "HOW FAR RIGHT?" I0
00480 FOR X=0 TO M-1 : IF X0(X)(<)254 THEN LET X0(X)=X0(X)+I0

```

Microbee

```

00490 NEXT X : GOSUB 710 : IF A=1 THEN 480 ELSE RETURN
00500 INPUT "HOW FAR UP?" I0
00510 FOR X=0 TO M-1 : IF X0(X) <> 254 THEN LET Y0(X)=Y0(X)+I0
00520 NEXT X : GOSUB 710 : IF A=1 THEN 510 ELSE RETURN
00530 INPUT "X-SCALE FACTOR ?" I0
00540 FOR X=0 TO M-1 : IF X0(X) <> 254 THEN LET X0(X)=(X0(X)-00)*I0+00
00550 NEXT X : GOSUB 710 : IF A=1 : I0=-1/I0 : GOTO 540 ELSE RETURN
00560 INPUT "Y-SCALE FACTOR ?" I0
00570 FOR X=0 TO M-1 : IF X0(X) <> 254 THEN LET Y0(X)=(Y0(X)-00)*I0+00
00580 NEXT X : GOSUB 710 : IF A=1 : I0=-1/I0 : GOTO 570 ELSE RETURN
00590 INPUT "DEGREES CLOCKWISE" I0 : R0=1 : S1$="" : IF I6$="DOT" THEN GOSUB 760
ELSE GOSUB 190
00600 R0=0 : S1$="FBMELSC" : A0=-I0*.01745329 : S7=SIN(A0) : C7=COS(A0) : FOR X=
0 TO M-1 : IF X0(X) <> 254 : T0=X0(X)-X1 : X0(X)=C7*T0-S7*(Y0(X)-Y1)+X1 : Y0(X)=C7
*(Y0(X)-Y1)+S7*T0+Y1
00610 NEXT X : GOSUB 710 : IF A=1 THEN 600 ELSE RETURN
00620 A=0 : B=0 : FOR X=0 TO M-1 : IF B<>0 AND A=0 : I=USR(32774)
00630 IF A=0 THEN CLS : CURS 5 : UNDERLINE : PRINT "X-VALUE   Y-VALUE" : NORMAL
: B=1 : A=14
00640 IF X0(X)=254 THEN PRINT , "254 END OF LINE" : A=A+1 ELSE PRINT ++18 INT(X0
(X)+.5)++18 INT(Y0(X)+.5)++
00650 A=A-1 : NEXT X : PRINT , "255 END OF DATA" ANY KEY TO CONTINUE" : I=US
R(32774) : RETURN
00660 HIRES : C=0
00670 A=INT(X0(C)) : B=INT(Y0(C)) : IF A=255 OR A=254 THEN RETURN
00680 C=C+1 : X=INT(X0(C)) : IF X=255 THEN RETURN ELSE IF X=254 THEN LET C=C+1 :
GOTO 670
00690 Y=INT(Y0(C)) : PLOT A+255,B TO X+255,Y
00700 A=X : B=Y : GOTO 680
00710 A=0 : FOR X=0 TO M-1 : IF X0(X) (0 OR X0(X))255 OR Y0(X) (0 OR Y0(X))255 : A
=1
00720 IF (INT(X0(X))=255 OR INT(X0(X))=254) AND INT(Y0(X))<>255 : A=1 : X0(X)=X0
(X)+.000001
00730 NEXT X : IF A=1 : J=J+1 : PRINT "SORRY, CHANGE ABORTED." AS SPRITE WENT O
FF EDGE !" : PLAY 24;0,5 : I0=-I0 : IF J=2 THEN ERROR
00740 RETURN
00750 ON ERROR GOTO 750 : CURS 1,14 : PRINT "SPRITE TO COMPLEX TO DRAW." "MAYBE
TRY SMALLER SCALE?" : PLAY 4;5;3 : I=USR(32774) : CLS : GOTO 430
00760 INVERT INT(X1)+255,INT(Y1) : A=PEEK(258) : IF A=27 : Y1=Y1+S2 ELSE IF A=47
: Y1=Y1-S2 ELSE IF A=0 : X1=X1+S2 ELSE IF A=43 : X1=X1-S2
00770 IF X1(0 : X1=0 ELSE IF X1)255 : X1=255 ELSE IF Y1(0 : Y1=0 ELSE IF Y1)255
: Y1=255
00780 INVERT INT(X1)+255,INT(Y1) : K1$=KEY : IF SEARCH(S1$,K1$) <> 0 THEN 350
00790 IF K1$("&:" AND K1$)"0" : S2=VAL(K1$) ELSE IF K1$() "P" THEN 800 ELSE IF R0=
1 THEN RETURN ELSE 300
00800 CURS 1,9 : PRINT "DOT POS ="INT(X1-00)/"INT(Y1-00) {A10 32} "STEP SIZE"S2
: GOTO 760

```


POCKET PROGRAMS

Microbee

```
10000 REM POKE DATA INTO MEMORY
10010 REM LET E=ADDRESS OF DATA FOR SPRITE TO DRAW
10020 REM LET X,Y = CO-ORDINATES TO PLOT SPRITE AT
10030 REM GOSUB TO THIS ROUTINE TO PLOT SPRITE
10040 X=X-128 : Y=Y-128
10050 A=PEEK(E) : E=E+1 : B=PEEK(E)
10060 E=E+1 : C=PEEK(E) : IF C=255 THEN RETURN ELSE IF C=254 THEN LET E=E+1 : GO
TO 10050
10070 E=E+1 : Y=PEEK(E) : ON ERROR GOTO 10080 : PLOT A+X,B+Y TO C+X,D+Y : GOTO 1
0090
10080 ON ERROR GOTO 10090 : PLOT C+X,D+Y TO A+X,B+Y
10090 A=C : B=D : GOTO 10060
```

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POCKET PUZZLE

As a child you probably played a handheld version of Pocket Puzzle. In this game the computer jumbles up the letters 'A' to 'O' and leaves you the task of sorting them into alphabetical order. The 15 letters are contained within a 4 by 4 square and only those adjacent to the blank square can be moved.

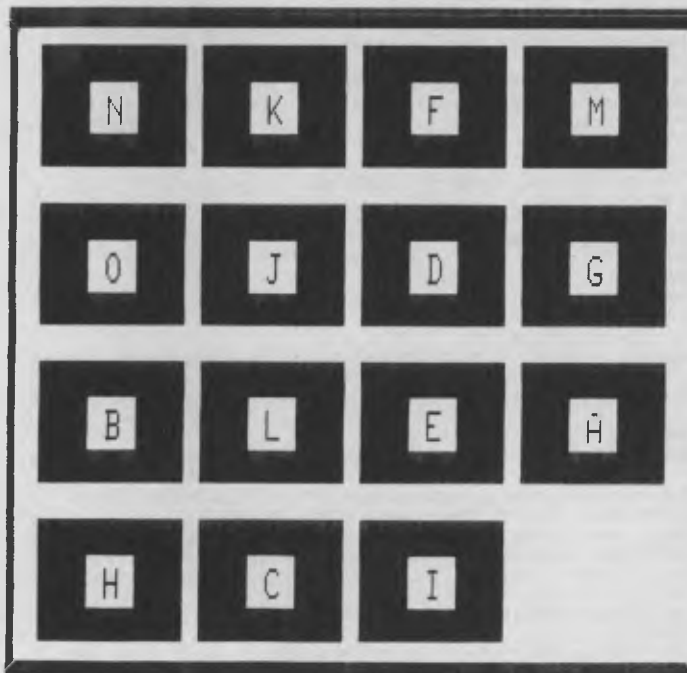
Lonnie Riley
Banyo, Old

```
00100 REM ***** Pocket Puzzle *****
00110 CLEAR : CLS : LORES : DIM P(16), G(100) : F=16
00120 POKE 257,2
00130 H1$=KEY$
00140 INPUT "Do you want instructions (Y/N)? "H1$
00150 IF H1$="Y" THEN GOSUB 640
00160 CLS
00170 REM ***** Create Puzzle *****
00180 RESTORE 700
00190 PLOT 0,45 TO 85,45 TO 85,8 TO 0,8 TO 0,45
00200 CURS 110 : PRINT "Pocket Puzzle" : PLOT 91,41 TO 118,41
00210 FOR X=1 TO 15 : READ A,B,C : FOR Y=1 TO 9 : POKE 60000+A+Y,188 : POKE 6000
0+B+Y,255 : POKE 60000+C+Y,143 : NEXT Y : NEXT X
00220 REM ***** Jumble up the letters *****
00230 FOR X=1 TO 16 : P(X)=0 : NEXT X
00240 FOR X=1 TO 15
00250 Y = INT(RND*15) + 1
00260 IF P(Y) > 0 THEN 250
00270 P(Y)=X
00280 NEXT X
00290 REM ***** Display letters on blocks *****
00300 FOR X=4 TO 12 STEP 4
00310 Y=133+(X/4*192)-192
00320 CURS Y : PRINT "CHR(P(X-3)+64)" " : CURS Y+10 : PRINT "CHR(P(X-2)+64)"
"
00330 CURS Y+20 : PRINT "CHR(P(X-1)+64)" " : CURS Y+30 : PRINT "CHR(P(X)+64)"
"
00340 NEXT X
00350 FOR X=10 TO 30 STEP 10 : CURS 699+X : PRINT "CHR(P(12+X/10)+64)" " : NEX
T X
00360 REM ***** Accept Input *****
00370 CURS 430 : PRINT "Your move : "
00380 CURS 494 : PRINT (A17 32) : PLAY 1,1 : CURS 494 : INPUT G1$
00390 CURS 558 : PRINT (A17 32)
00400 Y=ASC(G1$) : Y=Y-64
00410 FOR X=1 TO 16
00420 IF P(X)=Y THEN LETM=X
00430 NEXT X
00440 IF (F=M+1) OR (F=M-1) OR (F=M+4) OR (F=M-4) THEN 470
00450 CURS 558 : PRINT "Sorry! Try again." : GOTO 380
00460 REM ***** Blank out square to be moved *****
00470 RESTORE 700 : FOR X=1 TO M : READ A,B,C : NEXT X
00480 FOR X=1 TO 9 : POKE 60000+A+X,32 : POKE 60000+B+X,32 : POKE 60000+C+X,32 :
```

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```

NEXT X
00490 REM ***** Display square in new position *****
00500 RESTDRE 700 : FDR X=1 TD F : READ A,B,C : NEXT X
00510 FOR X=1 TO 9 : PDKE 60000+A+X,188 : POKE 60000+B+X,255 : PDKE 60000+C+X,14
3 : NEXT X
00520 POKE 60000+B+4,32 : POKE 60000+B+5,P(M)+64 : POKE 60000+B+6,32
00530 P(F)=P(M) : P(M)=0 : F=M
00540 REM ***** Determine if puzzle solved *****
00550 Y=0 : FDR X=1 TO 15
00560 IF P(X)(<>)X THEN LETY=1
00570 NEXT X
00580 IF Y=0 THEN CURS 812 : PRINT "Congratulations!" : PLAY 1:2:3:4:3:2:1 : GOT
0 600
00590 GOTO 380
00600 H1$=KEY$
00610 CURS 881 : INPUT "Play again? "H1$
00620 IF H1$="Y" THEN 110 ELSE END
00630 REM ***** Instructions *****
00640 PRINT : PRINT "Welcome to Pocket Puzzle!"
00650 PRINT : PRINT "This is the same Pocket Puzzle that you have probably\"pla
yed as a child.\"
00660 PRINT "The computer will mix up the letters A to O and it is your job\"to
sort them into alphabetical order. Only letters\"ajacent to the blank square c
an be moved!"
00670 PRINT : PRINT
00680 PLAY1 : INPUT "Press any key to continue "H1$ : RETURN
00690 REM ***** Data statements for graphics *****
00700 DATA 1505,1569,1633,1515,1579,1643,1525,1589,1653,1535,1599,1663
00710 DATA 1697,1761,1825,1707,1771,1835,1717,1781,1845,1727,1791,1855
00720 DATA 1889,1953,2017,1899,1963,2027,1909,1973,2037,1919,1983,2047
00730 DATA 2081,2145,2209,2091,2155,2219,2101,2165,2229,2111,2175,2239
    
```



Pocket Puzzle

Your move :

?

Sega

STAR WAR

This program is for the Sega home computer. It will also work on the Sega 3000 and 3000-H, and can be run from a disk.

Jan Jacobsen
O'Sullivan Beach, SA



**KANKA
SOFT**



By Jan Jacobsen (C)
FROM S.A USER CLUB

```

U
10 REM *****
20 REM ***      BY      ***
30 REM ***      JAN JACOBSEN      ***
40 REM ***      (C) 1985      ***
50 REM *****
60 SCREEN 2,2:COLOR1,15,,15:CLS
70 RESTORE
80 COLOR1,10,(0,0)-(255,191),10
90 COLOR1,6,(136,8)-(224,60),10
100 COLOR1,6,(130,168)-(255,191),10
110 LINE(130,168)-(255,191),1,B
120 LINE(143,80)-(247,152),1,B
130 LINE(136,8)-(231,60),1,B
140 COLOR1,15,(148,80)-(240,152),10
150 LINE(8,8)-(120,176),1,B
160 COLOR1,15,(8,8)-(115,176),10
170 CIRCLE(88,39),1,1,,,,BF
180 CIRCLE(75,38),1,1,,,,BF
190 CIRCLE(198,106),1,1,,,,BF
200 CIRCLE(206,106),1,1,,,,BF
210 CIRCLE(202,110),2,1,,,,BF
220 CURSOR134,170:PRINT"By Jan Jacobsen (C)
230 CURSOR134,179:PRINT" FROM S.A USER CLUB"
240 R=R+1
250 READX,Y
260 IFX=0THENREADX,Y:LINE(X,Y)-(X,Y)
270 IFX=-1THEN530
280 LINE-(X,Y)
290 GOTO240
300 DATA0,0,76,12,70,20,71,28,73,32,73,34,72,40,73,44,74,50,72,56,68,64,60,72,52
,78,46,88,42,96,40,100,40,112,42,120,40,128,38,136,35,138,32,138
310 DATA 2,124,32,150,36,151,40,150,44,149,48,148,52,146,55,159,56,160,86,174,84
,170,80,166,68,156,64,154,62,145
320 DATA 72,147,79,143,80,156,84,160,108,166,116,166,112,162,90,154,90,136,92,13
,2,96,124,102,116,102,112,102,108,100,104,98,100,98,96,100,92,102,88
330 DATA 104,84,105,80,106,76,104,72,100,60,94,48,94,40,93,32,97,28,99,24,100,20
,99,14,94,16,92,18,88,23,84,25,83,20,80,16,76,13,76,12
340 DATA 0,0,44,114,42,120,42,123,48,132,52,146,0,0,58,94,60,96,64,100,66,104,66
,108,66,120,64,128,62,140,62,145
350 DATA 0,0,75,17,74,20,73,24,76,28,78,29,79,28,79,24,77,20,75,17,0,0,81,19,82,
,24,83,29
360 DATA 0,0,84,64,85,68,85,72,85,76,84,81
370 DATA 0,0,94,17,92,20,89,24,88,29,0,0,92,20,90,24,87,28,93,25,95,21,0,0,87,35
,84,39,84,45,0,0,76,36,77,44,74,47,74,49,80,55,88,48,91,40
380 DATA 0,0,81,47,79,49,79,51,79,49,76,47,0,0,77,53,78,52,79,52,80,53,0,0,90,38
,86,41,0,0,85,47,82,49,0,0,85,49,82,51
390 DATA 0,0,68,64,66,76,68,84,70,88,71,92,73,96,74,100,76,116,0,0,80,79,78,88,7
9,100,79,112,78,116,0,0,94,80,93,92,91,100,87,112,0,0,100,92,91,112,0,0,79,143,9
0,134,0,0,95,111,72,118,0,0
400 DATA 164,86,207,144,207,148,0,0,168,84,188,110,0,0,184,104,186,96,185,85,0,0
,186,94,182,90,181,85,0,0,178,105,167,97,0,0,171,103,165,104,161,101,0,0,196,120
,204,132,0,0,210,138,216,144,217,148,0,0
410 DATA 213,140,216,138,220,132,221,128,220,124,213,112,211,108,211,105,214,104
,216,102,216,100,212,98,209,98,204,96,200,97,196,98,192,98,187,100,187,104,193,1
08,193,114,0,0
420 DATA 187,111,192,114,194,115,204,115,210,107,210,104,208,100,212,100,213,101
,212,102,210,103,0,0
    
```

Sega

```

430 DATA 185,117,190,117,197,122,204,120,208,118,0,0,213,134,209,138,204,137,202
,137,0,0,216,128,212,125,208,124,204,126,204,132,206,134,204,132,202,133,200,134
,200,135,204,135,0,0
440 DATA 193,110,186,110,0,0,204,115,200,112,197,109,192,106,196,103,192,101,191
,103,193,106,0,0,186,111,184,114,183,114,184,115,186,115,0,0
450 DATA 140,12,140,28,144,28,144,24,148,28,152,28,148,20,152,16,152,12,144,18,1
44,12,140,12,0,0
460 DATA 156,12,156,28,160,28,160,24,164,24,164,28,168,28,168,12,156,12,0,0,160,
16,160,20,164,20,164,16,160,16,0,0
470 DATA 172,12,172,28,176,28,176,28,176,18,184,28,188,28,188,12,184,12,184,20,1
76,12,172,12,0,0
480 DATA 192,12,192,28,196,28,196,24,200,28,204,28,200,20,204,16,204,12,196,18,1
96,12,192,12,0,0
490 DATA 208,12,208,28,212,28,212,24,216,24,216,28,220,28,220,12,208,12,0,0,212,
16,212,20,216,20,216,16,212,16,0,0
500 DATA 144,36,144,48,156,48,156,52,144,52,144,56,160,56,160,44,148,44,148,40,1
60,40,160,36,144,36,0,0
510 DATA 164,36,164,56,180,56,180,36,164,36,0,0,168,40,168,52,176,52,176,40,168,
40,0,0
520 DATA 184,36,184,56,188,56,188,48,196,48,196,44,188,44,188,40,200,40,200,36,1
84,36,0,0
530 DATA 204,36,204,40,212,40,212,56,216,56,216,40,224,40,224,36,204,36,-1,-1
540 PAINT(141,13),1:PAINT(157,13),1:PAINT(173,13),1:PAINT(193,13),1:PAINT(209,13
),1
550 PAINT(145,37),1:PAINT(165,37),1:PAINT(185,37),1:PAINT(205,37),1
560 FORT=1T0500:NEXTT:GOTO570
570 CURSOR15,180:PRINT"INSTRU Y or N"
580 AN$=INKEY$:IFAN$=""THEN580
590 IF AN$="Y"THENBEEP:GOTO 1550
600 IF AN$="N"THENBEEP:GOTO 680
610 FORT=1T0100:NEXTT:GOTO570
620 REM *****
630 REM *      STAR WAR C 1985      *
640 REM *      BY                    *
650 REM *      JAN JACOBSEN          *
660 REM *      ADELAIDE USER'S CLUB *
670 REM *****
680 C=12:MAG1
690 GOSUB1470:GOSUB1100:GOSUB1290
700 A=0:XX=102:YY=80:X1=0:Y1=0:RN=0:G=0:S0=0:MU=16:SC=0:MI=0
710 Y1=0:X1=INT(RND(1)*100)+50
720 RN=INT(RND(1)*15)+1
730 SPRITE0,(XX,YY),0,4
740 ONRNGOTO750,760,750,750,760,760,750,760,750,760,750,760,750,770
750 SPRITE1,(X1,Y1),4,15:G=1:S0=6:GOTO 780
760 SPRITE1,(X1,Y1),7,8:G=2:S0=7:GOTO 780
770 SPRITE1,(X1,Y1),12,10:G=3:S0=10
780 IN$=INKEY$:IFIN$=""THEN860
790 IN=ASC(IN$)
800 IFIN$=" "THENSOUND5,1,15:GOTO 930:GOTO 780
810 IFIN=29ANDXX>17THENXX=XX-20
820 IFIN=30ANDYY>15THENYY=YY-20
830 IFIN=31ANDYY<145THENYY=YY+20
840 IFIN=28AND XX<172THENXX=XX+20
850 SPRITE0,(XX,YY),0,4
860 X2=INT(RND(1)*3)
870 IFX2=0THENX1=X1+S0
880 IFX2=1THENX1=X1-S0
890 Y1=Y1+S0
900 IFMI>=10THEN990
910 IFX1>=182ORX1<=160RY1>=160THENMI=MI+1:BLINE(40,180)-(70,190),1,BF:CURSOR 45,
182:COLOR11:PRINTMI:GOTO 710
920 ONGGOTO750,760,770
930 IF XX+8>=X1+4 AND XX+8<=X1+13 ANDYY+8>=Y1+4 AND YY+8<=Y1+13 THEN SPRITE1,(X1
,Y1),16,6:GOTO 950
940 SOUND5,1,0:GOTO810
950 SOUND4,0,15:FORA=0T080:NEXT: SOUND0:IFSO=6THENSC=SC+30:GOTO980
960 IFSO=7THENSC=SC+80:GOTO980
970 IFSO=10THENSC=SC+200:GOTO980
980 BLINE(175,165)-(195,191),1,BF:CURSOR175,180:COLOR10:PRINTSC:GOTO710
990 CLG:SOUND0:CURSOR90,95:PRINT"YOUR SCORE";SC:CURSOR95,70:COLOR15:PRINT"GAME O
VER ""
1000 LLINE(20,10)-(240,35),6,B
1010 CURSOR36,20:COLOR5:PRINTCHR$(17);"S T A R W A R S "

```

POCKET PROGRAMS

Sega

```
1020 PRINTCHR$(16)
1030 LINE(10,170)-(250,190),6,B
1040 COLOR14:CURSOR20,180:PRINT "KANKA Software (C)1985 By Jan Jacobsen"
1050 CURSOR52,130:PRINT"Do you want another game":COLOR7:CURSOR114,145:PRINT"(Y/
N)"
1060 IFINKEY$="Y"THENGOSUB 1290:GOTO700
1070 IFINKEY$="N"THEN1640
1080 GOTO1060
1090 RESTORE1480
1100 SCREEN2,2:COLOR,1,,1:CLS
1110 LINE(20,10)-(240,35),6,B
1120 LINE(10,170)-(250,190),6,B
1130 CURSOR36,20:COLOR5:PRINTCHR$(17);"S T A R W A R S "
1140 PRINTCHR$(16)
1150 SPRITE0,(50,70),4,15
1160 SPRITE1,(50,100),7,8
1170 SPRITE2,(50,130),12,10
1180 CURSOR80,78:COLOR15:PRINT"S C O U T     e 30 PTS"
1190 CURSOR80,108:COLOR7:PRINT"P A T R O L     e 80 PTS"
1200 CURSOR80,138:COLOR10:PRINT"F I G H T E R e 200 PTS"
1210 COLOR14:CURSOR20,180:PRINT "KANKA Software (C)1985 By Jan Jacobsen"
1220 RESTORE1260:FDRJ=1T0110:READF:SOUND1,F,14:SOUND2,F+1,14:SOUND3,F*2,14:FORDE
=1T030:NEXTDE,J
1230 READD
1240 IFD=0THENSOUND0:CLS:RETURN
1250 SOUND0,RETURN
1260 DATA 196,196,196,131,392,392,175,165,147,262,392,392,392,349,330,294,262,39
2,392,392,349,330,349,330,349,294,294,196,196,196,294,294,196,220,220,349,330,29
4,262,262,294,330,294,220,247,196,196,220,220,349,330,294,262,392,294,294,392,34
2,440,440,698
1270 DATA 698,659,587,523,523,587,659,587,440,494,392,392,523,466,415,392,349,31
1,294,262,392,784,196,196,196,262,392,392,349,330,294,523,392,392,392,349,330,29
4,523,392,392,392,349,330,349,294,294,294,294,0
1280 RETURN
1290 SCREEN2,2:COLOR,1:CLS
1300 FORP=0T0150:X=INT(RND(1)*200):Y=INT(RND(1)*170):E=INT(RND(1)*14)+2:PSET(X,Y
),E:NEXT
1310 CURSOR140,180:COLOR10:PRINT"SCORE":CURSOR10,180:COLOR10:PRINT"MISS"
1320 COLOR6:CURSOR215,5:PRINTCHR$(17);" S "
1330 COLOR15:CURSOR215,25:PRINT" T "
1340 COLOR4:CURSOR215,45:PRINT" A "
1350 COLOR7:CURSOR215,65:PRINT" R "
1360 COLOR14:CURSOR215,105:PRINT" W "
1370 COLOR10:CURSOR215,125:PRINT" A "
1380 COLOR6:CURSOR215,145:PRINT" R "
1390 PRINTCHR$(16)
1400 FORCI=1T020STEP1
1410 CIRCLE(25,25),CI,11
1420 NEXTCI
1430 LINE(215,0)-(245,155),4,B
1440 LINE(210,0)-(250,155),4,B
1450 PAINT(211,1),4:PAINT(246,1),4
1460 RETURN
1470 RESTORE1500
1480 FORA=0T019:READRE$:PATTERNS#A,RE$:NEXT:RETURN
1490 GOTO1480
1500 DATAF0F0C0C100010015,15000100C1C0F0F0,0F0F03B300B000AB,AB00B000B3030F0F
1510 DATA80C0E0A1E3A3E79E,3FE7A1E0A0E0C080,010307B5C7C5E779,F9E7B50705070301
1520 DATA0001021E3A57BAE7,0100000000000000,0080407B5CEA5DE7,8000000000000000
1530 DATA00000000002050B9,47A77FA344990403,0000000000040A91,E2E5FEC5229920C0
1540 DATA43A30B1C1E3F3F7F,FF7F7F3F3F1D3800,0B1B3A70F2E1F8FE,FFFEBECC6B2900B
1550 SCREEN 1,1:CLS:PRINT "STAR WARS"
1560 PRINT"You are a member of the'FIGHTER SQUAD'"
1570 PRINT "You are in your Fighter reday to blow up the EMPIRE Fighter"
1580 PRINT "The Fighter move randomly in a down direction and are petty hard t
o catch.
1590 PRINT "IF you let more than ten EMPIRE Fighter get away,you'll lose y
our job.
1600 PRINT "So hurry up!Jump into your space ship using the cursor key movements
(up, down,left and right),and speed to it!
1610 FORT=1T0 1500:NEXTT:PRINT :PRINT "Press any key to continue"
1620 IN$=INKEY$:IFIN$=""THEN1620
1630 GOTO 680
1640 SCREEN 1,1:CLS:PRINT "BYE":STOP
```

What the Industrial Design Council thought about Labtam Computers



The Industrial Design Council of Australia thought the Labtam Series 3000 computers were that good, they bought two.

Labtam Series 3000 multiple user computer systems in 8, 16 or 32 bit configurations built for personal/ micro/ and mainframe computer applications.



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Labtam Computers, You now know about us.

Public Domain

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<i>"Only the naive believe they need just a phone, modem and RS232 port to get their computers into the mad social whirl of bulletin boards, international databases and electronic mail ..."</i>	
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<i>Where we let you have your say (uh-oh).</i>	
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<i>PC-File III is an alternative to the kinds of expensive and complex database packages we talked about earlier in this issue — how elaborate does your electronic filing system need to be?</i>	

THE INTERNATIONAL EXPERT Systems Conference brought together some 500 participants from 18 countries to discuss the latest developments and ideas in the field of expert systems. Due to become an annual event in London, the conference also included an exhibition of the latest products in this area; in fact, the overall impression was that one-third of the participants was trying to sell its wares to the other two-thirds!

Applications of expert systems described at the conference included fault-finding in many types of equipment, medical and biomedical diagnosis, VLSI design, configuration of control valves, process control, scheduling, aircraft design, financial planning, career guidance and corrosion protection — the applications of knowledge engineering can these days be seen to cover a wide range.

Expert System Shells

There are now some 20 expert system shells on the market, with new releases being added every month. Some consist of old shells recycled under a new name (instead of following the usual practice of issuing new version numbers); for example, Expertedge for the IBM PC is a rehash of TESS (The Expert System Shell), which was originally marketed as NEXUS. Even after all these rebirths I still don't find it a particularly attractive package. It has a colourful window-based user interface, which I feel is more a sales promotion feature (windows are in) than something of real use.

My main problem with TESS/Expertedge is the terms used in the manual seem to differ from those common in most other literature in the field, making the concepts more difficult to grasp and the instructions on its use harder to follow. After all, ease of entering data is of major importance in a shell.

Xi, a new product from Expertech Ltd, is claimed to make the knowledge input particularly easy. I tested the coin identification example (see YC, September 1985) on the knowledge engineer demonstrating the product, and we had a running version literally within minutes.

Alex d'Agapeyeff, the chairman of Expertech, explained how Xi managed to overcome the knowledge elicitation bottleneck so often cited as the main limiting factor to the more general use of expert systems. According to him, when you have an expert who is confident in his or her knowledge and can communicate it clearly, he or she will enjoy communicating it in short bursts

The first International Expert Systems Conference was held in London from 1-3 October, 1985. In this first instalment of a regular column on expert systems, Dom Swinkels summarises the latest news and developments in the field as they emerged at this meeting of 'experts'.

using Xi whenever the urge for expression strikes; there is no need for long sessions with the system.

I hope to do a full review of Xi and another product from Expertech called the Expert Tutor soon; the latter is a knowledge-based tutor designed to help decide how the new technology of expert systems can best be applied. Both will be available in Australia soon at a price of \$1495 for Xi and \$400 for the Tutor, or \$1700 if you buy both.

An expert system produced with a PC-based shell shouldn't be expected to be a major all-wise advisory system, but rather an informative 'trained parrot' type of system, and keep in mind that occasional failures will occur. Such an expert system also can't be expected to show any 'common sense'; even the most thorough and expensive systems often fall short of that. Simple PC-based systems will, however, allow much useful knowledge to be shared easily, and they free the expert from having to give the same advice repeatedly. This is not unlike the use of spreadsheets, which allow the rapid analysis of data by performing routine calculations quickly, thus allowing the user more time to concentrate on exploring more interesting relationships.

Other Uses for Shells

The view expressed by a number of the speakers at the conference was that shells also have a role to play in the development of major knowledge-based systems requir-

ing many man years of effort. In this case shells could be used for experimentation to find how best to structure and represent the knowledge. Such prototypes would be discarded as soon as the limitations of a particular shell become apparent, permitting quick feedback between the customer, the expert and the knowledge engineer. In a new discipline such as knowledge engineering, which has not yet developed a sound methodology, the rapid prototyping approach seems sound. It's also doubtful whether anyone has yet reached the performance limits of most of the shells, which means this method should have a reasonably useful lifespan.

Shells now available include SXpert, which runs on the Sinclair Spectrum with a microdrive and does a similar job to Expertease (see YC, September 1985), and Microexpert, marketed by McGraw-Hill Book Company (UK) for around 50 pounds. The latter product is at present available for the IBM-PC and will shortly be released for the Apple II and Macintosh machines. Written in Turbo Pascal, it comes in both source and compiled code versions on the same disk, giving the user the opportunity to run the system as is or to enhance and customise the software to suit his or her own purpose using Turbo Pascal.

Many more shells were released at Comdex in November, which should lead to a fall in price and an increase in quality for this type of software.

The Guide to Expert Systems

The Guide To Expert Systems is the title of a book by Alex Goodall, just published by Learned Information (Europe), the organiser of the Expert Systems conferences and publisher of the monthly journal *Expert Systems*. *The Guide to Expert Systems* is the best introduction to the concepts and the applications of expert systems I have seen. Chapter headings are:

1. What are expert systems?
2. Expert system applications.
3. The reasoning power of expert systems.
4. The advantages of expert system shells.
5. Inside expert systems.
6. Building an expert system.
7. Who builds expert systems.
8. The history of expert systems.
9. The future of expert systems.

The book is easy to read and we can assume Alex Goodall knows what he's talking about since he is managing director of Expert Systems International of Oxford,

one of the few companies with experience in building expert systems in a commercial environment. The book is strongly recommended reading for anyone interested in expert systems.

Conclusions

The number and variety of expert system shells are increasing rapidly, which will soon drive the costs down. As I see it, eventually there will be four types of software every microcomputer owner will need to consider: a word processor, database, spreadsheet and now an expert system shell. I have yet to see the first ad for a computer with bundled software including an expert system shell, but I'm sure it can't be far off.

Table 1 gives further details of some of the products from the UK mentioned in this article. I am not aware of any of these being available in Australia yet, so you'll have to write to the relevant companies for further details; Expertech expects to appoint an Australian agent soon. Note all the prices are in pounds sterling. □

Table 1. Expert system products.

Product:	Expertedge — updated version of The Expert System Shell (TESS)
Price:	650 pounds
From:	Helix Expert Systems, St Bartholomew House, 92 Fleet Street, London ED4Y 1DH, England.
Product:	Xi — tool for building your own expert system applications.
Price:	495 pounds
From:	Expertech, 172 Bath Road, Slough SL1 3XE, England.
Product:	The Expert Tutor — an expert system tutor to help you understand what expert systems can do.
Price:	140 pounds
From:	Expertech — see above
Product:	Microexpert — an expert system shell written in Turbo Pascal with source code provided.
Price:	49.95 pounds
From:	McGraw-Hill Book Company (UK), McGraw-Hill House, Shoppenhangers Road, Maidenhead SL6 2QL, England.
Product:	<i>The Guide to Expert Systems</i> - 220-page book
Price:	15 pounds
From:	Learned Information (Europe), Besselsleigh Road, Abingdon, Oxford OX13 6LG, England.

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Release 2

Since 1-2-3 has so many more users than Symphony and Jazz, the new release should be of interest to most. Has Lotus managed to improve the program, which has been on the top of the bestseller list for so long?

The answer is yes. Release 2 has improved and enhanced 1-2-3, without making it more difficult to learn and use. In fact, it's fashionable today to cite 1-2-3 as an example of a software product which is so logically designed and so well documented it's easy to learn. Compared with most of its illogical and poorly documented competition that's probably true.

Release 2 comes in an attractive slip case containing three comprehensive manuals (Getting Started, Tutorial and Reference), which include keyboard guides for various computers, a number of key templates, a quick-reference manual, two customer assurance plans, a leaflet entitled 'How to Start 1-2-3 from a Hard Disk', and a binder containing the six disks and various odds and ends.

The copy protection used in Release 1A requires you to have the system disk in drive A, even when using a hard disk. This is messy — the whole idea of having a hard disk is to save having to fiddle around with floppies. Release 2 uses a software protection scheme from Softguard (dBase III uses an earlier version of the same system), which allows you to run the program from the hard disk without a floppy in drive A. This is better, but hard disk users will have a problem when they come to back up their files. Softguard works by copying three hidden files to widely scattered locations on the hard disk, and also keeps count of the number of 'installs' you've done (only one is allowed). If you don't 'uninstall' before you do a backup you'll lose your only copy. Lotus suggests using the DOS RESTORE/P command so you don't restore read-only

files, but of course this won't work with tape backups. The uninstall program is quite simple and doesn't take long, but it requires you to insert two floppies, which is annoying.

Lotus has revised the installation instructions and the 'Getting Started' manual is the easiest manual to follow I've come across. The Tutorial and Reference manuals are also new and feature a greatly expanded section on macros. Oddly, there is no mention of the changes from the earlier versions anywhere in the documentation. So, here goes.

You no longer have to put DOS on the program disk — the program is too large to fit (170 Kbytes compared with the previous 90 Kbytes). Printgraph is still on a separate disk, so floppy disk users need to swap disks around. There are quite a few additional commands, but they've been added to the end of each menu, so existing 1-2-3 users can easily ignore them for the time being. Some of the new commands are listed in Table 1.

The last of these commands can be quite useful: you can go out to DOS, format a disk or call up a directory listing and return to 1-2-3 by typing EXIT <enter>. Another useful command is /Worksheet Global Zero, which suppresses the display of zero values, whether entered as numbers or as the result of a calculation. Lotus adds a cautionary note, warning that you could overwrite unprotected cells.

The new buzzphrase for the latter part of 1985 was 'Sparse Memory Management'. Release 1A allocated memory to all cells within the top left and bottom right corners of the rectangle that had been used, including blank cells. With sparse memory management Release 2 allocates memory only to those cells with information in them, so a worksheet can occupy less memory. It has been well publicised that Release 2 can use the Intel Aboveboard (and other similar designs) to utilise more

than the normal 640 Kbyte limit. However, there are limitations: the ordinary onboard 640 Kbytes are still used for data, although formulae are stored on the Aboveboard.

Limitations

Pie charts can only be displayed and printed in one colour, and then only in outline. Symphony lets you add cross-hatching to each slice of the pie, to allow the use of colour and to explode one or more slices. In fact, this is the only use I've been making of Symphony lately; I found it too hard to learn. Since Release 2 of 1-2-3 allows you to do all the things with pie charts you could do with Symphony, my copy of Symphony is going back on the shelf. Any offers?

Lotus seemed reluctant to provide much information about macros with Release 1A. Advanced macro commands have now been added and the /X macro commands available in previous releases are still supported. Terms like IF, GET, LET, BRANCH and DEFINE are used, which should be familiar to programmers and allow quite sophisticated programs to be written. BREAKOFF disables the <Ctrl-Break> key combination, effectively preventing a user from stopping a macro half way.

The Translate program converts the format from one program to another. Programs which can be converted are 1-2-3 Release 1A, 1-2-3 Release 2, dBase II, dBase III, DIF, Symphony release 1.0, Symphony release 1.1 and Visicalc.

Security has been increased. You can still protect ranges to prevent them being accidentally written over, but now there is also a new Hide command, which applies to columns (/Worksheet Column Hide and its opposite /Worksheet Column Display) and ranges (/Range Format Hidden). You can hide any kind of cell entry with the Hidden format; Lotus recommends you protect the range by /Worksheet Global

Protection to prevent the possibility of writing over the contents accidentally. Because that command is global, you need to unprotect specific cells with /Range Unprotect to enter data. You can also use a password to protect a file when you save it by typing the filename followed by <space>p<enter> and the password after /File. However, if you forget the password you're in *big* trouble. Increased security means increased complexity.

Lotus has also added a number of features already introduced with Symphony, including extra cursor movement (Big Left and Big Right), date and time display, coloured and crosshatched pie charts (as mentioned earlier), string arithmetic and the 'Compose' sequence used to enter characters which aren't on the keyboard.

The range of @ functions — built-in formulae which perform specialised calculations — has been expanded to 82.

Conclusions

Lotus has maintained the level of simplicity which made 1-2-3 such a success. At the same time, the program has been expanded to correct flaws and add more features, many of which have come from Symphony. These functions have been added so Release 1A users can change to Release 2 and feel at home. They don't need to learn or unlearn anything — they can just keep going until they're ready to tackle the new features. In some instances the documentation is an improvement on the original.

Table 1.

/Worksheet Page	Insert page break
/Range Value	Convert formulae into values
/Range Transpose	Copy, switching columns and rows
/Data matrix	Invert or multiply matrices
/Data Regression	Perform linear regression
/Data Parse	Break lines into individual cells
/System	Invoke DOS

Reservations

My reservations concern Symphony. What is its future now? I haven't seen the new release, so please bear that in mind. The main problem is Symphony integrates many programs which individually aren't the best on the market. Lotus 1-2-3 may still be one of the best spreadsheets in the marketplace, but what about the other components of Symphony, database, communications and word processing? How does Symphony compare with dBase III and R:base, with Crosstalk and Relay, with Microsoft Word and Wordstar? The answer is not very well. Now Lotus seems to be cutting the ground from under its own feet by moving 1-2-3 into the position where it has matched the more advanced features which used to be exclusive to Symphony.

Should existing users of Release 1A upgrade or not? At the time of writing, upgrades were available for \$50 if you purchased Release 1 after August 1 1985, or \$200 if purchased earlier. My advice is if you have one copy of Release 1A, it's worth upgrading it, but if you have more than one copy, weigh up the relative advantages of upgrading some copies against the disadvantages of having different versions of the same program. I would certainly want one copy of Release 2, just because of its great pie charts, but in a large organisation I doubt if it's worthwhile to upgrade every copy. Oh yes, and if you're thinking of buying either 1-2-3 or Symphony, go for 1-2-3 Release 2 and buy something else if you want a database manager, communications or a word processor. □

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Your BONDWELL



Any Port In A Storm?

The Bondwell supports two serial I/O (input/output) and one parallel port, and although the simplest configuration is to attach the printer to the parallel port, either of the serial ports can be used, provided a little care is taken with the printer configuration.

It's important to remember the Bondwell doesn't support hardware handshaking in any form. To explain the implications of this, it's necessary to examine how a serial port operates and what 'hardware handshaking' means.

Each piece of data in the computer (in this case, each character to be printed) is represented by eight binary digits or bits, which can be turned into voltage levels and presented to the printer on eight separate wires at once. This is called parallel communication.

Serial communication involves presenting each of the eight bits, again as a voltage level, on one wire. If the printer knows when each character starts and stops it can reassemble the bits into one 8-bit character and print it.

Serial transmission obviously requires more work by the transmitter device and the receiver, but enables bi-directional communication to be established with only three wires: transmit, receive and ground. This makes serial data transmission the only feasible method for long-distance communication.

The most common standard for voltage levels and current flow for small computers is known as RS232. Current loop, which was used for older-style teletypes, is still used occasionally.

Although serial transmission requires only three wires, the RS232 standard specifies a 25-pin interface because the standard was originally developed for communication between a terminal and a modem, and a large number of control signals were included in the interface to enable the two devices to operate together intelligently. These control lines include signals to indicate the modem is switched on, that it's connected to a phone line and that there's another modem at the other end of the phone line. There are also signals to tell the modem the terminal is on and is ready to receive characters, as well as signals associated with data timing.

Don't Shake Hands With The Bondwell

Many of these signals can be ignored when connecting a printer to an RS232 serial

port. In most cases a printer/computer connection uses just one control line — a simple signal from the printer to indicate whether or not it's ready to receive another character. The computer is set up to monitor the signal on this line. If the printer isn't ready for another character, it changes the voltage on the line; the computer waits and the receive data line isn't used. This technique is known as hardware handshaking.

The Bondwell doesn't support hardware handshaking. Instead, it uses a communications protocol known as XON/XOF, which requires the printer to advise the computer it isn't ready to receive another character, by transmitting a command down the computer's receive data line. The computer monitors this received data line and when it gets the 'stop' command it halts data transmission. It continues to monitor the line until it receives a 'go' command. The 'stop' and 'go' commands could be any suitable character or word, but the XON/XOF protocol specifies that the 'stop' command is character Hex 13 (XOFF) and the 'go' command is character Hex 11 (XON).

Note in hardware handshaking mode the computer responds to a change in the voltage level of a dedicated wire, while in XON/XOFF mode it responds to characters received on the 'receive data' line. Clearly, XON/XOFF protocol has advantages where the number of signal lines to be used must be kept to a minimum, such as with telephone communication.

The XON/XOFF protocol requires a little more intelligence in the printer than the simpler hardware handshake, but this

doesn't mean printers which don't have XON/XOFF can't be used with the Bondwell. If the computer never receives an XOFF command it assumes the printer is always ready to receive data. This will be the case whenever the printer buffer is large enough to hold whatever characters can't be printed. Either a very large buffer or a very slow data transmission rate will ensure the buffer never overflows, so the printer never has to transmit the XOFF character.

If the transmission rate (the baud rate of the port) is set slower than the print rate, the buffer will never overflow and the printer will never have to issue an XOFF. For instance, a printer capable of 80 characters per second (cps) could be set up with a transmission rate of 600 baud. For this purpose, you can consider the baud rate as 10 times the character rate, so 600 baud is about 60 cps. (The actual rate is perhaps a little less than this, since the computer may occasionally have to access the disk.) With characters being received at less than 60 cps and printed at about 80 cps, the buffer should never overflow and characters shouldn't be lost.

However, the print rate is likely to be less than the quoted 80 cps. Form feeding is a particularly slow procedure and, if the printer doesn't have a very large buffer, characters may be lost if the computer keeps transmitting data while several form feeds are executed. For an 80 cps printer without XON/XOFF protocol, 300 baud (approximately 30 cps) would be a safer transmission speed.

Even this slow speed will produce a buffer overflow if the printer pauses for a pap-

er or ribbon change, or if it's switched off-line for any reason. If this is likely to happen, a printer which supports XON/XOFF is necessary.

When set up in XON/XOFF mode the printer issues an XOFF command as the buffer fills. This is usually carried out when the buffer is 75 to 90 per cent full, since the computer often takes some time to detect the XOFF and stop transmitting. When the printer clears its buffer to about 10 to 25 per cent of its capacity, it issues the XON command and the computer resumes transmission.

Some printers in XON/XOFF mode issue an automatic XON at the start of the line and an XOFF at the end, then print the line; so, in effect, the line of characters is the buffer.

If the printer supports XON/XOFF the data transmission rate becomes less important. It may as well be set to the highest rate the printer can cope with: 1200 baud on some printers and 9600 baud on the faster ones. The higher speed means the

Bondwell spends less time transmitting the data, which is useful if the printer is operating in the background.

The above explanation should make the comments in the manual a little clearer. Your first choice is a printer with a parallel interface: the Bondwell defaults to the parallel port as the printer on power up, data transmission is very fast and you're unlikely to experience interfacing difficulties.

Second choice is a serial printer which supports XON/XOFF. Make sure XON/XOFF protocol is selected for the printer, and set the baud rate for both the printer and the Bondwell to the highest speed available. Printers which support XON/XOFF usually have a good-sized internal buffer, and this arrangement will be almost as efficient as using the parallel interface.

Third choice is a serial printer which doesn't support XON/XOFF. In this case the baud rate must be set so characters are transmitted more slowly than the print rate, and you should be prepared to lose characters if the printer runs out of ribbon

or develops a paper jam.

The Bondwell supports internal printer buffering or spooling, which means characters to be printed will be stored in the Bondwell until the printer is ready to receive them, and as a result the printout will seem to finish long before the printer has printed the characters. The program can continue the next job while the printer churns out the accumulated characters, or you can exit the print program and start another task. Your printout will continue to appear unless you press RESET.

One effect of this is to make Wordstar's simultaneous printing and editing almost unusable, especially if your printer has a large buffer. The combination of internal spooling and a big printer buffer makes the printer appear ready to receive the next character, so the program never has time to look at the keyboard to see what you're typing. The payoff is the printout is completed (as far as Wordstar is concerned) super-quickly, so you can resume full-time editing sooner. □

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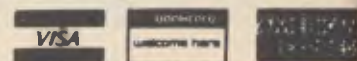
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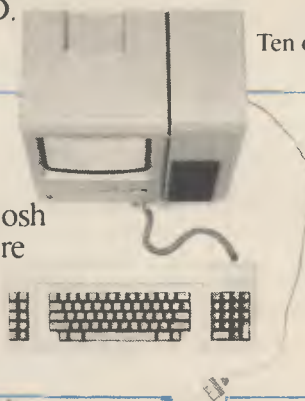
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IN NOVEMBER'S column I mentioned the Computer-in-a-Book and its extended documentation. Thanks to a member of SMUG, I've had the opportunity to take a good look at that manual, and I congratulate Microbee Systems on an excellent piece of reference material. It contains a wealth of new information, including full details on the use of Wordbee and Telcom. The BASIC manual has been rewritten and many sections have been expanded and illustrated with better examples.

The best part of this new documentation, however, deals with CP/M, or rather ZCPR2, which is the operating system supplied with the Computer-in-a-Book. Features of ZCPR2, along with reasons for its existence, are covered in full. True, there are a few spelling mistakes and lines omitted, and some confusing examples, but the information is all there — it's well worth \$49.50. The manual has been supplied with all upgrades and new machines since September, but if you bought or upgraded your machine before that date you might be able to get a good deal on the manual by taking your receipt along to your local Microbee sales office and asking nicely.

Bally Who?

In the past there's been a lot of song and dance about any changes made to the Microbee, but recently a new machine was released without any ballyhoo. The new CIAB doesn't use 6116 memory chips (or the battery backup), but does incorporate the latest dynamic RAM. More importantly, a screen deglitching circuit has been added, to get rid of those annoying black flecks which appear on the screen when you use graphics or machine code routines. The circuit does slow the Microbee down a fraction in its execution of screen access commands, but on the whole it's a great improvement.

I've also received the first set of updates for my Microbee hardware notebook, which I've found useful for checking up on

odd problems.

Incidentally, I've heard of two Microbee owners who received exceptionally good service on their old machines from Microbee Systems — it seems the company is building up its machine and customer support mechanism as time goes by. Owners of other brands of micros often complain about the complete lack of support for their machines, so we're lucky to have locally made units.

PM Alive and Well

I received a letter from the suppliers of the Printer's Mate program I mentioned some time ago. Icarus Software is pleased to announce the program is alive and kicking and can be purchased at 8 Maplin Place, Rossmoyne 6155. I've also noticed almost all the Mytek programs are now available on the two disk formats, as well as on tape, from Wasp Soft, PO Box 268, Mortdale 2223.

I'm always eager to hear about good programs for the Microbee, so if you have a favourite which hasn't been reviewed in this column, please drop me a line. I'd also love to hear from anyone who has played the Pogov Manor game, since the author didn't appreciate my comments on this adventure at all.

Soon to be Published

I saw an interesting disk program recently, which unfortunately isn't available commercially. It presents the operator with a menu from which any program can be selected and run, without having to type out the name of the program or worry about whether it's in Microworld BASIC or machine language. The program performs a DIRectory of the disk's contents, and moves the cursor around under keyboard control to the name of each program, highlighting them as it moves. The name of a chosen program is then PEEKed from its screen position, parsed into two words (to

find out the program type — MWB or M) and an appropriate run command is issued. The concept is quite clever; a program can be incorporated onto any disk and will operate automatically from then on. Even more importantly, the program can be made to auto-execute as soon as BASIC is called on the 13 cm disk machine. The menu program can be made to auto-operate on the CIAB when BASIC is called, by simply incorporating its name after calling BASIC; BASIC MENU, for example, would run the MENU program.

I've been promised an even more updated version of this program, incorporating machine language routines to speed up the cursor movement, and will make sure it's published as soon as possible.

Wildly Possible

The first three *Wildcards* books have had great hints and tips for programming the Microbee, so I lashed out and bought the fourth volume, which contains 15 program listings consisting mainly of games with PCG graphics. I would like to have seen more details on using machine code routines to speed up BASIC games — or perhaps more machine code listings, such as the excellent Brickball game in *Wildcards Three*. Still, this latest volume fills a need, and I'm looking forward to the next book in the *Wildcards* series. I know the authors would like to hear from anyone with worthwhile programs or hints to go into volume five.

Microbee Systems' excellent journal, *On-Line*, continues to provide a valuable source of information for Microbee owners, and is now on sale at selected newsagents. If you haven't had the chance to look at a copy I'd recommend you invest in the latest issue.

Finally, I've heard the Glyphics Software Company has just produced an updated version of the useful Write Hand Man program, which now incorporates a calculator mode. □

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Software

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Paxus, (02) 925 8333
Price: \$3000

A stripped-down version of Hartley's IBS accounting software, which runs on the IBM XT and AT computers. It can run on two terminals on the XT and four terminals on the AT, and is compatible with the larger IBS package. Additional modules, such as a Report Writer and Integrated Financial Modelling, can be added for \$750 each.

Cross-cheque

Custom-Made Software,
(02) 399 8520
Price: \$240

Cross-cheque allows businesses and individuals to track their income and expenditure. It runs under MS-DOS, PC-DOS or CP/M and is suitable for businesses too small for general-ledger processing. Cheque and banking details can be entered easily and payments to credit card organisations can be divided into several components corresponding to different expenditure categories. Several cheque accounts can be handled at once and the reports consolidated over all accounts or restricted to one.

Diagram Master

Sourceware, (02) 411 5711
Price: \$659

A graphics tool for the IBM PC/XT/AT and compatibles, Diagram Master produces presentation-quality diagrams. The user is prompted through the creation of organisation charts (management hierarchy charts) and Gantt charts (activity schedules). A free-form drawing board and a library of 100 business shapes (?) are included. The package is menu-driven and offers eight typefaces, including a symbol font.

Filepro 16

Multisoft, (09) 322 6637
Price: \$995

A menu-driven database system, Filepro 16 allows 16 million records per file, 999 fields per record and 4608 characters per record. Emphasising ease of use, Filepro 16 allows automated command procedures as well as menu-driven interaction, and it is

possible to write procedures which include Filepro's own modules or DOS commands. Available for single-user and multi-user systems.

Fincalc

Financial Systems of Australia,
(02) 223 1077
Price: \$1900 for the complete system

Fincalc is a suite of 37 programs which perform financial computations and produce finance schedules covering a wide range of business applications. Designed to be immediately usable without any computer programming or spreadsheet knowledge, the six available modules are Loans, Leases, Hire Purchase, Time Series, Internal Rates of Return, and Interest and Annuities. The software runs on the IBM PC and compatibles with 256 Kbytes RAM and one disk drive. Modules may be bought separately.

Framework II

Arcom Pacific, (07) 52 9522
Price: \$1095

An updated version of the integrated software package, Framework II includes an 80,000-word spelling checker, visible page breaks and a built-in mailmerge capability. The spreadsheet works twice as fast as the original and employs a new technique to make better use of available memory. A special 'library cabinet' is loaded automatically, allowing recorded abbreviations, macros and a phone book to be permanently online. Registered Framework users can upgrade for between \$200 and \$250.

Graphtime II

Multisoft, (09) 322 6637
Price: \$95; site licences from \$180

A new Australian-developed business graphics package for IBM and compatible micros. Designed for use with dBase II/III and Multiplan (or with data entered from the keyboard), the package consists of three main modules: business graphics with fourteen graph types; a full-screen colour graphics editor; and a text font editor. It can be either menu- or command-driven and a macro facility is included for commonly used command sequences and to control slide shows.



Sybiz Shopkeeper

Sybiz, (08) 333 0988
Price: Around \$1100

Designed to help managers of retail stores keep track of stock control and accounting, Sybiz Shopkeeper runs on a 128 Kbyte Macintosh sitting on a cash drawer and is coupled to an Imagewriter printer. It keeps track of every stock item and provides a record of its sale, enabling the production of sales and stock reports whenever required. It has built-in security and can keep track of 2000 separate stock items divided into 50 departments and handled by 50 shop assistants.

Microsoft software for the IBM IX

Microsoft, (02) 452 5088
Microsoft has released versions of a number of its application and language packages for the new IBM IX. Available at the same price as IBM PC versions, each package is designed around the 9 cm disk format. Packages available are: Serial Mouse, Multiplan, QuickBASIC, Pascal, FORTRAN, COBOL, Macro Assembler, C Compiler and Windows.

Multiplan 2.0

Microsoft, (02) 452 5088
Multiplan 2.0 for MS-DOS sports a 255-column by 4095-row spreadsheet, faster background calculation, simple importing and exporting of data to Lotus

1-2-3 and a macro facility for storing often-used command strings. Users can quickly combine information from many spreadsheets into a summary, and built-in mouse support is provided. MS-DOS users who purchased the product after October 1, 1985, can get a free upgrade. Purchases prior to this date can be upgraded for \$125.

Notebook II

Multisoft, (09) 322 6637
Price: \$285

Notebook II is a text database manager. It has a built-in text editor which allows notes to be typed in directly, or files can be read in from a word processor. The information may then be reorganised or retrieved and printed in any format. Notebook II can manage 50 fields and 10 pages of text per record, with record numbers limited only by disk space. Text can be searched by record number, a quick FIND command, or a SELECT command which will find text anywhere in the database.

Pagemaker

Software Corporation of Australia,
(03) 699 7255
Price: \$895

Software Corp describes Pagemaker as "desktop publishing software" for the 512 Kbyte Macintosh. Designed for use with

NEW PRODUCTS

the Apple Laserwriter, Pagemaker provides an electronic layout board for designing newsletters, price lists, training manuals, presentations and other business publications. With Pagemaker, you can take documents from Macwrite, Macpaint, Macdraw and Microsoft Word and produce documents which combine graphics and text in almost any layout.

Triad T3 word processor

Technical Imports, (02) 922 6833
Price: Around \$1000

This word processing package has been specifically designed for scientists and engineers. It allows you to type subscripts, superscripts and complex expressions in a variety of fonts. A library of chemical structures can be called up with a couple of keystrokes. It runs on the IBM PC/XT/AT and compatibles under DOS 2.0 or higher. A monochrome monitor is acceptable, but you need a colour graphics adaptor.

Tallscreen

Ksoft, (052) 21 6197
Price: \$99.95

Tallscreen is a resident screen and keyboard enhancement utility. It allows you to customise DOS to your own needs — you can define keys to suit your own preferences, create help screens, set screen attributes and write custom profiles. Tallscreen occupies about 65 Kbytes of RAM, runs on the IBM (and compatible) range of PCs and has a simple one-step installation procedure. It provides a review of 65 Kbytes of screen data, the ability to re-use commands by pressing the F10 key and full-screen editing within DOS.

Quaddrive

Digital Business Systems,
(062) 91 6320
Price: \$77

This Australian-developed package lets you use 96 tpi drives, such as the Teac 55F, National 561S and Mitsubishi 4853, on the IBM PC, PC/XT, or compatibles with PC-DOS 3.0 or 3.1. This gives you a total of 806 Kbytes per disk in a 10-sector format. You can read, write and format standard 48 tpi disks in a 96 tpi drive, and boot from a 96 tpi drive A. The

stepping rates of each drive can be individually set as low as 2 milliseconds. PC-DOS with Quaddrive dynamically adjusts to the different disk formats.

QuickBASIC

Microsoft, (02) 452 5088
Price: \$175

QuickBASIC is a BASIC compiler compatible with the interpreter sold with all MS-DOS machines. Claimed to be three to 10 times faster than the interpreter, QuickBASIC includes structured programming features such as subprograms, a library facility, alphanumeric labels (instead of line numbers), multi-line functions and the WHILE/WEND, FOR/NEXT and IF/THEN/ELSE control structures. It requires an absolute minimum of 128 Kbytes of RAM and MS-DOS 2.0 or higher.

Samna Plus Turbo

Arcom Pacific, (07) 52 9522
Price: \$1095

A "turbo-charged version" (they've let those PR people off their leashes again) of the Samna Plus office automation software. It allows the exchange of data between Samna Plus and popular programs such as Lotus, Symphony and Supercalc 3; provides support for both draft- and correspondence-quality printers; and has increased performance speed.

New Machines

Quattro Microcomputers

ICL, (02) 452 9900
Price: From \$6299

This range of ICL micros uses the Intel 8086 processor running at 8 MHz. They are multi-tasking, multi-user systems capable of supporting a maximum of four users operating four tasks concurrently. The operating system is C.DOS (also known as CCP/M-86 v. 3.1S), which comes with an introductory package called Learn. The machines can also operate in 'PC mode', allowing them to run certain MS-DOS software. The base model comes with dual 782 Kbyte disks, and hard disk versions are available.



Vectra PC

Hewlett-Packard, (02) 888 4444
Price: From \$6033 (excluding tax)

A modular desktop PC with IBM PC/AT compatibility, the Vectra is claimed to run 30 per cent faster than the AT. It is available in a variety of configurations, including the Vectra Office which

provides advanced word processing capabilities. The entry-level system comes with 256 Kbytes of RAM and a single 360 Kbyte floppy disk drive. This can be expanded to 3.64 Mbytes of RAM and a 40 Mbyte hard disk. The Vectra has a high-resolution monitor and an enhanced keyboard.

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PC-7000

Sharp Corporation, (02) 728 9111
Price: \$3210 (excluding tax)
This transportable IBM PC/XT compatible features the first generation of illuminated crystal displays (ICDs), providing 25-line by 80-character (640 by 200 pixels) text display and graphic images. It has two built-in 13 cm floppies, 384 Kbytes of RAM and an Intel 8086 processor operating at 7.37 MHz. Other features are a battery-supported real-time clock, an adaptor for an optional colour monitor and an optional expansion unit with a 9 cm, 10 Mbyte hard disk drive and three expansion slots. Sounds interesting.

new spray-coating process to eliminate light reflection, and it has long-life phosphors and a high scan rate. When used with the new STB Super Res 400 colour graphics card, the CD-240 supports 16 colours and 4000 characters in 400-line resolution.

ADE-55 colour monitor

ADE Computers, (03) 568 7877
Price: \$795

Compatible with the IBM PC and clones, this monitor provides colour, green and amber modes — selectable by the operator. In colour mode it provides eight colours in two intensities.

Corvus Omninet Network Transporter

Horizon Computer Corporation,
(02) 498 6611

Price: \$390 (for Macintosh);
\$850 (other machines)

The Transporter allows a large variety of micros to be connected to the Corvus Omninet, providing sharing of Corvus mass storage and communication between the micros. The network card connects to the modem port via a 25 cm flat ribbon cable, or it can be configured to operate from the printer port. Horizon regards the Transporter as a high-performance alternative to the Appletalk network.

Cirtech Flipper RAM Card

Thinking Systems, (02) 560 0666
Price: \$799

This card provides a full megabyte of memory to the Apple II+, or IIe, conforming to the new Apple standard for increased memory. Additional Flippers can be plugged in, to increase memory to a maximum of 6 Mbytes. Claimed to be compatible with all software, including Appleworks, the card features a 'Flip Flop Program Manager' which allows you to zoom between programs in various sections of the RAM disk. The Flipper will fit any standard slot in the IIe and II+.

Laserjet Upgrade

Impact, (02) 406 6611
Price: \$995

This upgrade for the Hewlett-Packard Laserjet provides emulation of the Diablo 630 daisywheel, Epson FX100, NEC Spinwriter and Oume daisywheel printers; a more extensive font library; resident logos and signatures; bar-coding capabilities; a menu-driven LCD display; extensive line and box drawing with a wide range of area fill capabilities; and extended communications interfaces. Impact replaces the HP controller with its own board, either on-site or at the company's premises in Chatswood, NSW.

Irwin Backup Tape Subsystem

Datacraft Office Systems,
(02) 438 3688

Price: From \$1100

The Irwin Tape Subsystem can be supplied either as an add-in device, physically located within the PC unit, or as an external stand-alone device which sits neatly beside the PC with a separate power supply. A 10 Mbyte hard disk PC can be backed up on tape in 16 minutes, while a 20 Mbyte PC/AT can be backed up in 12 minutes. The subsystem plugs into an existing floppy connector on the back of the PC.

LZR 2600 laser printers

Dataproducts, (02) 957 5844
Price: From \$23,000

A range of laser printers all capable of producing 26 pages a minute. The bottom-of-the-range 2610 provides line-printer emulation at approximately 1700 lpm. The 2630 emulates the Diablo 630 daisywheel standard, with one

Services

Tango videotex service

Creative Communications,
(02) 957 1633

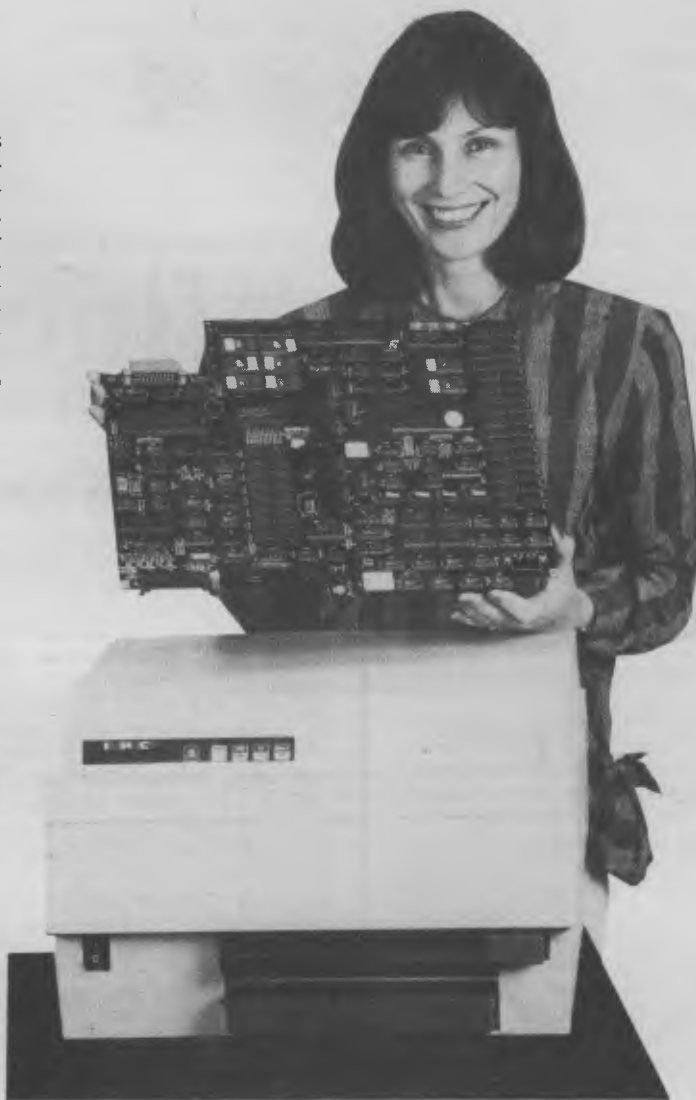
Creative Communications has created a database on Viatel, called Tango, which provides information on the latest hardware, software and computer shop specials for Apple, Apricot, BBC, Commodore and Olivetti products. There are also special bulletin boards for authorised dealers. Accessed through page 244 on Viatel, Tango allows users to get up-to-date information on computer shop products (as well as providing a problem-answering service). Retailers can buy a directory listing or full advertising facilities.

Peripherals and Extensions

CD-240 colour monitor

Roland Corporation, (03) 241 1254
Price: \$1104 (excluding tax)

A high-resolution colour monitor developed for use in precision graphics, computer-aided drafting and other applications requiring sharp screen presentation. The 30 cm screen has dark glass and a black matrix screen coupled with a 0.31 mm dot pitch. The monitor has been treated with a



NEW PRODUCTS



processing, a spreadsheet, telex capabilities, wide-area networking, the Unify database management system, a complete general ledger accounting system, and an electronic diary and time-management system.

Furniture

D248L Workstation and D20 computer table

ADE Computers,
(03) 568 7877

Price: \$474 for the workstation;
\$234 for the table.

These two units from ADE can be used separately or together. Both are mobile and have good shelf area for storage and a printer slot for rear paperfeed. The workstation has a work area of over one square metre, while the table has an area of over 0.6 square metres. Both units are supplied in a knocked-down form and are easy to assemble on site. □

2630 "matching the output of about 20 daisywheel printers". The 2650/55 and 2660/65 incorporate line printing, letter-quality modes and bit-mapping capability for text and graphics output. The 2660/65 supports Postscript, A3 paper size and a high-capacity sheet feeder.

PT210/211 terminal

ADE Computers, (03) 568 7877
Price: \$1295

This terminal integrates ANSI and Data General compatibility. It has a tilt screen, smooth scrolling, 24-line by 80-column display, plus 25th-line status display, full editing, visual and print attributes and a screen saver. The display is green phosphor.

The First Nice Modem

The Nice Computer Company of
Australia, (09) 321 6636
Price: \$279

This is a cheap modem offering a lot of features. It provides CCITT 300 baud, 1200/75 baud, 75/1200 baud, 600/75 and 75/600 baud communications, as well as Bell standards 103 and 202. It has its own telephone and power supply and is available in an RS232 model for most computers, and a special Commodore 64 version which includes free terminal, file transfer and videotex software. It is ful-

ly Telecom approved and has a 12-month warranty. Just wish it had a different name.

Workless Station document scanner

Remington Office Machines,
(02) 269 0925

Price: From \$16,000

A desktop optical character recognition scanner from a United States company, Dest. The base model will read documents at the rate of 150 pages an hour, with automatic feeding and formatting. ROM software provides recognition of 12 fonts, including proportionally spaced text. The error rate on clean documents is less than one substitution error in 300,000 characters.

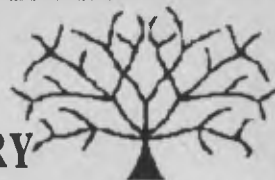
Miscellaneous

NEAT

Neology, (02) 662 4111

NEAT is a complete software and hardware 'solution' from Neology, a leader in Unix-based systems. It combines AT&T's Unix System 5, the complete repertoire of Neology business software, and peripherals such as Apple's Laserwriter and Case communication equipment. The software includes full-powered word

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Your APPLETOSH

I'M GOING to continue with the Apple II this month, introducing you to a number of new programs which give the Apple II a more Macintosh-like appearance.

Mouse Series

International Solutions is distributing an exciting range of programs called the Mouse Series. Some of the programs in the series are: Mousedesk, which provides a desktop environment; Mouse Word, a full-function word processor; and Mouse Calc, which makes heavy use of the mouse and Macintosh-like interface, and also has the ability to display three-dimensional colour graphs.

Another new program, Pinpoint, contains a set of eight desk accessories which can be installed with most existing Apple II ProDOS programs, Mousedesk or BASIC. The desk accessories are accessed by pressing the solid-apple-P key, which then invokes a small window on the screen from which you can select a Pinpoint accessory.

The program I obtained cost \$US69, so it should retail here for between \$120 and \$150. The eight accessories are:

- Notepad. This lets you record notes, limited to 32 lines, which are compatible with Appleworks files. You can also read text that has been constructed by Appleworks.
- Envelope Addresser. A neat accessory which lets you select the name and address out of a textfile and use it for the envelope. You then position the text on an envelope displayed on the screen, and print directly to the printer.
- Calculator. This is a simple pocket calculator similar to that in the Macintosh; it has a 16-digit display and adds, subtracts, multiplies and divides. If a number is too large, it is displayed in scientific notation. The results of calculations can be cut and pasted into any Appleworks document. A quaint touch is the OFF key, which is a quit key.
- Typewriter. This is one function which seems to have limited usefulness, turning your \$4000 system into a \$200 typewriter. Designed to let you type a line of text and then output it to the printer, it will support all printer attributes. I suppose as a desk accessory in another program, such as the Manzanita accounting package, this may be useful.
- Graph Merge. An accessory which is worth the price of the program itself, this merges Mouse Paint or Dazzle Draw pictures into any Appleworks textfile, with a limit of 16 pictures for any one file. You can select all the picture or crop it using the cursor keys. After selecting 'print', you can print the picture in half or full width and height, and in either normal or inverse modes.
- Diary. This program lets you make notes about appointments on a daily basis. The month view shows appointments for the current month, last month, and the next two months, while the day view shows the current day and summaries of the next two days.
- The Telephone Dialler. Type the number you want to dial into a package, select the dialler and the program will call the number for you. You can set up the program for rotary-dial phones, which lets you use it in Australia. The only limitations I found were the

BY ANNETTE BROWN

need to pick up the handset before the package finished dialling and to switch the modem off when the other party answered in order to increase the volume. I used the Apple Modem 1200.

- Communications. The communications package supports 300 and 1200 bits per second data transfer with half or full duplex, seven or eight data bits, one or two stop bits, odd, even or no parity and linefeeds after carriage return. You send and receive files in Appleworks textfiles, and the program is claimed to work with any Apple, Hayes or US Robotics-compatible modems. I used the program to talk to the *Your Computer* bulletin board, jumping out of this article and logging on with no problems. When I've finished, I'm going to send this article to *Your Computer* via the Pinpoint communications program and the bulletin board, so the fact you're reading this is proof it works!

Modified DOS

As I mentioned in my review of the 9 cm disk drives, I expected the introduction of a third-party-modified DOS 3.3 which would access the extra disk space on the Unidisk 3.5, currently a ProDOS-only device.

Microsparc of the USA (which produces *Nibble* magazine) has such a program, called UniDOS. It claims it is fully compatible with all DOS 3.3 applications — except those utilities which make use of the DOS 3.3 fixed memory locations and utility routines. I have written to Microsparc to obtain a copy of the program and will review it in a later issue. □



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- Apple and Sirius/Victor formats
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Smartpath

WITH DOS 2.00 came the introduction of subdirectories. What a great advance — files would no longer be confused in one directory. But some programs which were written before the advent of DOS 2.00 were inconvenient to use once files were spread around the various directories. The PATH command of DOS 2.00 solved the problem for self-contained programs, but those which used overlays were in trouble.

Wordstar and dBase II don't recognise subdirectories; they use overlays. They can look at other drives for files, but can only work within the default subdirectories. Enter a niggling problem: if your copy of Wordstar and its overlay files are in the WORDPRO subdirectory on your hard disk, some files which need editing are in your dBase subdirectory and the default directory is WORDPRO, Wordstar won't be able to find the files to be edited in the dBase subdirectory. If the default directory is dBase and the path is C:\WORDPRO, typing WS will start Wordstar, but when Wordstar

starts to look for its overlay files (for the screen messages and so on) it won't find them and will display the @@@@ message.

Smartpath to the Rescue!

A product of FBN Software, which also wrote and manufactures Smartkey and PC-Alien, Smartpath extends the DOS path command and allows programs such as Wordstar and dBase II to find their overlay files in other directories. On my machine Smartpath is in the utility subdirectory and the AUTOEXEC.BAT file includes two lines:

```
PATH C:\UTILITY;C:\WORDPRO
SPATH C:\WORDPRO
```

These invoke Path and Smartpath and make Wordstar available at any time from any subdirectory. The only penalty is some loss of speed, particularly when opening files, which is a small price to pay for such an enormous increase in flexibility.

Smartpath costs only \$30 and is available from FBN Software, 16 Coles Place, Torrens 2607.

DOS Redirection

DOS 2.00 also introduced the redirection of input and output. A program reading characters from the keyboard is said to be using standard input and a program writing characters to the screen is said to be using standard output. DOS allows the user to take input from a file instead of the keyboard and send the output to a file instead of the screen.

DOS treats the following devices as files:

CON: The screen and/or the keyboard.
AUX or COM1: The first serial port.
COM2: The second serial port.
LPT1 or PRN: The first parallel printer.
LPT2 and LPT3: The second and third parallel printers.
NUL: A null device to dump output.

Let's look at a few possibilities. Listing 1 shows a little Turbo Pascal routine (version 3.0), which takes its input from standard input, converts all upper case characters to lower case (including those with the Wordstar high bit set) and sends the lower case output to standard output. Programs taking standard input, modifying it in some way and sending the output to standard output are called filters, and there are three more called SORT.COM, FIND.COM and MORE.COM on your DOS disk.

DOS has four redirection options: input, output, append and pipe. A few examples which assume the default drive is the A drive are listed below. The prompt is shown as A>.

Output Redirection

```
A>DIR >FILENAME.EXT
```

DOS will get the directory of the A drive and send the output to the file called FILENAME.EXT. The angle bracket '>' at the left-hand end of FILENAME.EXT tells DOS to intercept the characters which are about to go to the screen, open a file called FILENAME.EXT and send those characters to that file. If the file already exists the contents are erased.

Any string of characters going to standard output (the screen) can be intercepted and sent to a file or to a device which DOS sees as a file. If you ask DOS to

```
A>TYPE FILENAME.EXT
```

the contents of FILENAME.EXT will scroll past on the screen. But

```
A>TYPE FILENAME.EXT >PRN
```

will send the contents of the file to the printer, and

```
A>TYPE FILENAME.EXT
>2NDFILE.EXT
```

will send the output to 2NDFILE.EXT.

Listing 1.

```
Program Lower;
($G512,P512,D-)
(Turbo Pascal program to read standard
input, convert all upper case characters
into lower case and write to standard
output Uses the MS-DOS 2.xx redirection
function to read and write files
Requires Turbo Pascal version 3)

The syntax is

A> LOWER <infile >outfile

LOWER can also be used in a pipe and
with the use of >> can append to existing
files. Refer to the DOS manual!

Var
  Ch: Char;
  ValCh: Integer;
  Copyright: String(50);

Begin
  Copyright := 'Copyright John Hepworth,';
  Copyright := 'Sydney, Australia';
  Copyright := 'October, 1985';

  while not EOF do

    begin
      Read(Ch);
      ValCh := Ord(Ch);
      If ((ValCh >= 65) AND (ValCh <= 90))
        OR ((ValCh >= 193) AND (ValCh <= 218))
        THEN Ch := Chr(ValCh + 32);
      Write(Ch);
    end;

    Write(Chr(26));

  end
```


Input Redirection

```
A> TEST.COM <INPUT.FIL
>OUTPUT.FIL
```

This line tells DOS to run a program called TEST.COM and, when TEST.COM expects keyboard input, get the input from INPUT.FIL instead. As in the previous example, the '>' tells DOS to open a file called OUTPUT.FIL and send the output characters to it. Again, if the file already exists the previous contents will be lost, but if they're still required you have to go through the Append procedure.

Appending Redirected Output

Yet another option is Append, which is invoked with a '>>'. If you want to send output to an existing file without erasing the previous contents, Append redirection will fit the bill. In these cases, the existing contents of the file are untouched and the newly redirected output is simply added to it. A command such as

```
A> DIR B: >> FILENAME.EXT
will tell DOS to get the directory of the B: drive and append it to the contents of
```

FILENAME.EXT.

Pipes

The piping option tells DOS to intercept the output to the screen from a program or function, input the stream of characters to a second program, which will then process them in some way, take the output from the second program and send that on to standard output.

DIR would normally send the file directory to the screen. Filters like SORT.COM and MORE.COM, which must be in the default directory or be able to be found via a path, can intercept the characters on their way to the screen, modify them and send them on their way. Other filters like LOWER.COM would also usually be used in a pipe. Displaying the directory sorted into alphabetical order can be done with the command

```
A>DIR SORT
which will take a directory, sort it into alphabetic order and output it to the screen, while
A>DIR MORE
```

will take a directory, display one screen, wait for a key to be struck and display a second screen. This will be repeated until the whole directory has been displayed.

Chaining

Redirected input and output commands can be chained, with the results of one redirection going forward to another. For example:

```
A>DIR LOWER SORT>OUTFILE.EXT
would take a directory, convert all upper case to lower case, sort that into alphabetical order, then write the result to the file OUTFILE.EXT.
```

Experiment with redirection of input and output. Some tasks, such as landing the heads of a hard disk, can present the user with the need to make careful choices of a range of options. Using redirection to tell the landing program to get its instructions from a file could prevent unfortunate errors (and there are many such situations). Filters such as SORT, MORE, FIND and LOWER, and the ones you write yourself, will smooth your path day by day. □

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Con/ST/YC

WHEN WE talk about computers it's always wise to remember we're talking about a circuit board with a pile of chips on it. The computer may possess a certain purity of logic and be capable of fantastic number crunching, but when you really get down to it, this pile of circuits is totally useless unless it can communicate with you.

Two-way communication requires both parties to receive and transmit information. As a carbon-based life form, we humans have spent hundreds of thousands of years evolving eyes, ears, fingers and lips for communication, while the young silicon mind has only its electronic I/O (input/output) ports. In other words, humans and computers speak different languages.

The typical human approach to language barriers is to employ translators — someone who can speak both languages to act as a go-between. We've taken this same approach with computers, creating peripherals — machines which bridge the language gap. The two most common peripherals are the keyboard for human input and the screen for computer output. They're so important almost all computers come with them built-in and even give them special 'default' status so you don't have to open and close them as you do with other peripherals. It's easy to think of the screen and keyboard as being part of the computer, rather than peripherals. After all, the only peripherals your friendly salesperson ever mentioned were the ones he or she could sell you: printers, disk drives, modems and so on.

The communication analogy is quite useful to remember when you're programming. Every time you call for input from the keyboard or output to the printer or disk drive you're asking your silicon colleague to communicate with an 'outsider'. In human communication we use rather sophisticated software. If I speak to you and you don't respond, for example, I'll check to see if you're actually listening. Maybe I'm talking to myself! If my error checking tells me I'm alone I'll give up trying to talk and find something else to do.

Our silicon friend has the same problems. Let's suppose your program has in-

structed the computer to talk to the printer. Your code might be:

```
10 OPEN4,4:PRINT#4,"ALL IS WELL":
PRINT#4:CLOSE4
```

This line seems pretty simple, and if your printer is plugged in and switched on all will be well. But what if you'd forgotten to power it up? The poor computer would be trying to talk to someone who wasn't there! If your program was in BASIC you'd get a "DEVICE NOT PRESENT" error and your program would crash — not disastrous in this example, but what if you were just about to print the results of a set of calculations which had taken hours?

Fortunately for us, the C64 designers thought about this sort of thing and have included a status register, which is situated at location 144 and can be read without PEEKing by the reserved BASIC variable ST. Every time you attempt to communicate with an external peripheral the status register and the value of ST are set. If all is well ST will equal zero. If you modify our example as shown below, you trap out this error condition.

```
10 OPEN4,4:PRINT#4:TS=ST:CLOSE4:
FTS 0 THEN PRINT "PRINTER
PROBLEM":GOTO 30
20 OPEN4,4:PRINT#4,"ALL IS WELL":
PRINT#4:CLOSE4:GOTO40
30 REM CONTINUE PROGRAM FROM
HERE
```

As it stands, this program won't crash if the printer is not turned on: it will flash a message on the screen and continue. Note that because ST is updated after every I/O operation it's wise to store it in another variable, in this case TS. ST is a reserved variable, which means you may never assign a value to it: ST=0 is an invalid statement. Similarly, keep in mind that Commodore BASIC uses only the first two letters of a variable name, so STRENGTH, STONE, STRAIN and so on are invalid variable names.

When ST doesn't equal zero, its value tells you information about the nature of the error. The error values take on different

meanings, depending whether you're using the serial bus (printer, disk drive) or the cassette or RS232port. For example, ST=128 means a serial bus device isn't present, or the cassette has come to the end of the tape.

A further use for ST is when reading data from disk or tape. ST=64 means you've come to the end of the data to be read. A more detailed explanation of the STATUS register values can be found in the 'Programmers Reference Guide' on pages 85 and 292.

Disk I/O

You should use both ST and the disk error channel when accessing the disk drive. The disk error channel, is 15. Always OPEN 15,8,15 before you open any other disk channel and don't close 15 until all other channels have been shut down. I usually place a statement like INPUT#15,ENS,EMS,ETS,ESS immediately after I open a disk file (for both read and write operations). If VAL(ENS)=0 I know all is well. If not I may be trying to read a file which doesn't exist, or create one which already exists. EMS will tell me which track and sector caused the error, which is useful when you're using relative files.

I use the status register to look for problems while actually reading or writing the data; if you don't know how large the file is, watching for the ST=64 condition will alert you to the end of the file. Computer I/O is a large subject, so I'll discuss various aspects in greater detail during the next few months.

Static Electricity

I recently heard of a case where a poor 64 received a fatal dose of static electricity. The user was working in a carpeted, air-conditioned building and accidentally touched the pins on the joystick port when reaching for the On/Off switch. The subsequent static discharge was too much for at least one of the 64's vital organs. Traumas of this kind can be avoided by earthing yourself before touching your machine, or by leaving the joystick plugged into port 2 (the one closest to the On/Off switch). □

RECENTLY, A REVIEW of our FBS software was published in your magazine. It appeared to concentrate on a journalistic style more suited to a five-year-old's fantasy comic strip, rather than a serious attempt to review a professional software package of which many hundreds are in successful daily use in accounting for the financial transactions of Australian businesses.

Supposing your magazine to be fair and democratic, we would appreciate our response to be printed in full, with similar prominence to the original inaccuracies ... perhaps with the headline:

'FBS Charges Your Computer with Inaccurate and Biased Review'

Recently, a panel of judges selected the two best Australian business software products during the PC85 Exhibition held at the World Trade Centre in Melbourne. One of the products chosen was Future Business Systems' General Accounting System. The panel of judges included highly qualified computer professionals, academics, business computer products users, accountants, and business executives. One of the major reasons given by the panel of judges for choosing the FBS product, was its high-quality documentation.

The FBS manual displays every screen and report in the system, and uses a unique, simple method of allowing users to move directly from a display screen to the exact page in the manual which explains that screen in detail. This is done without having to search through any index whatsoever!

A clear introduction to the FBS system is given at the start of the manual. This introduction covers many topics specific to first-time users. We certainly believe it is most important for our users to read this section very carefully. In addition, we believe it is particularly user-friendly to point this out to purchasers of the package.

The four FBS distribution diskettes contain demonstration data, which enables new and potential users to immediately copy the FBS master diskettes onto either floppy or hard disk-based computers.

The FBS system is a completely interactive, real-time, high-speed, random-access, disk-based system, totally unlike the punched card-based batch processing systems available in the 1960's, to which the review alludes.

One of our previous reviews (*Australian Micro Computerworld* — April 1984) describes the FBS manual presentation thus:

"It was bound in black plastic; attractive

and a good size. One of FBS's features was the way the manual used the same references as the software. The system menu, therefore, was also the index to the documentation.

We found the error message section of the manual to be particularly good. The messages were not cryptic, nor were the suggested actions."

We wonder whether *Your Computer's* reviewer was even aware that the manual has an appendix covering error handling.

Password protection is available on all modules in the system. Each module may have a different password if required.

In the stock system, 'goodies' (products, as referred to in the review) that do not require entry by packs or cartons are clearly discussed in the manual — section 2.21.4.

Extremely efficient programming techniques used in the FBS data file designs include double-linked lists throughout the transactions files. In effect, this means an immediate path exists between a master record (for example, a debtor), and each of its appropriate transactions embedded anywhere in the transaction file. In addition, all master files are indexed, and indexes are constantly maintained in strict alphanumeric ASCII order. Deleted records are placed on a free list and re-used upon entry of new information.

At no time did your reviewer contact Future Business Systems to obtain this or any other information concerning the product under evaluation.

The processing date is purposely held in a local FBS file since, in practical use, it is highly likely that the processing date would not be 'today's' date, but could quite easily be yesterday's date, or last Friday's date, or even last month's date, and the user may not wish to alter his system date.

The FBS software has been developed in Australia, a fact that seems to have escaped the reviewer. Why he would be confused as to whether the date format was American (mmddyy) or Australian (ddmmyy) seems rather ridiculous.

We appreciate the comment that 'the package also has a number of typographical errors'. If we can be given details of which one or two of the 50,000-odd words in the manual is misspelt, we will correct them forthwith.

Many of our users have stock items such as cheese or fluids, and it is imperative that they be able sell and record sales of, say, 1.45 kg of cheese, or 34.3 litres of a particular chemical.

We find it ludicrous that the reviewer has interpreted this excellent feature as "the quantity fields in the stock control system are in currency format (that is, as dollars and cents)."

FBS software is currently installed on around 100 different types of computers and printers. We have purposely not used onscreen graphics to ensure this flexibility.

In addition, we believe unless the user has a laser printer (highly unlikely at this time), it would be totally inefficient for the application program to print graphics 'boxes' around invoice and statement data. To produce such boxes on other kinds of printers would be extremely noisy, slow and expensive, and would give the resulting printout an unprofessional appearance.

FBS allows name keys to be entered either in upper or lower case, each of which forms a unique code. We have many users of this flexible coding.

Wildcard searching is an extremely powerful feature of the FBS system. For example, during the invoicing process, while actually entering line items, the user can look up both debtor and product codes in situ.

As to the charge that our FBS software is boring ... we suggest the reviewer take more time off to play *Space Invaders*.

Sol Millin
Future Business Systems

The way we read it, our review was a "it's basically a sound package, but boring (a natural for accounting programs) and a little dated in design" rather than the complete put-down you seem to have read into it. Perhaps our biggest mistake was not acknowledging that this is typical of accounting software, which would have shown more clearly that yours is competitive in its field.

The selection of FBS as one of PC85's top accounting systems is fair comment on the state of software design in this area — we're looking forward to the day when we see an accounting program which exhibits some of the creativity, thoughtfulness and flexibility that is consistently appearing in much cheaper packages these days.

Our reviewer is well qualified both in knowledge of the requirements of accounting systems and in the art of modern software design. While conceding the validity of several of your opinions (and most of the points raised are just that — differences of opinion), he stands by his judgement of the product.

If you feel it is appropriate, we'll be happy to re-examine the FBS package in the light of your comments.

IBM UNDERGROUND

HEAVYWEIGHT products like dBase II and Dataflex are useful for complex tasks, but are too expensive and too complex for many home and business applications. Enter list management programs, which act as the electronic equivalent of a box of eight-by-five file cards. Many commercial programs are list managers, with glossy packages and prices to match.

PC-File III is an excellent list manager, costing \$70, \$10 or nothing! It's distributed through the public domain software channels (except for bulletin boards), but as user-supported software it's close to becoming commercial. Users are encouraged to make copies and give them to their friends or workmates and, if satisfied, to send a donation of \$70. In return for the donation a printed manual and a copy of the latest update of the program will be supplied.

A copy of the manual is on the disk for the user to print out, but to encourage users to make the donation, occasional paragraphs are left out. However, the deletions are pretty minor. I started using PC-File while my printed manual was in the post and had few questions which weren't answered in the manual on the disk.

I use version 3.0 of PC-File III to maintain a number of databases at home and work, for purposes as diverse as the membership records of a local community group, the subject details of a large number of photographic negatives and the maintenance history of over 1000 pieces of heavy equipment. Setting up a new database takes less than 10 minutes. Such speed of use makes

PC-File essential for those tasks for which writing a program in dBase II or Dataflex will take more time than the database might save.

First Impressions

From the DOS prompt type 'PC-File'. An introductory logo appears and the user is asked to indicate the drive containing the database. The names of the databases on the selected drive are then displayed and the desired database is marked with the cursor keys and selected by pressing F10.

If an existing database is not required a new database can be defined by typing the name of each field into a box and the length of the field into a box next to it. When all fields are defined, pressing F10 creates the database and takes the user to the main menu.

The main menu has 12 options:

- F1 ADD — Add a record
- F2 MOD — Modify a record
- F3 DEL — Delete a record
- F4 DIS — Display a record
- F5 FIN — Find a record
- F6 LIS — List or clone
- F7 SOR — Sort the index
- F8 UTI — Utilities
- F9 NAM — Alter field name or mask
- GLO — Global update or delete
- KEY — Set up the smart keys
- END — End or change database

Pressing function keys F1 to F9 or typing the three-character command invokes the selected action.

Displaying a Record

Let's look at the record displaying option.

When you press function key 4 the following line will appear at the bottom of the screen:

KEY, or #n,*,+,-,++,—,

A box into which the user's response is typed appears beneath this line. Let's ignore 'Key' for a moment. Typing '#n' will display the 'nth' record, while '#123' will show record '123'. Entering '*' displays the record most recently used by PC-File, while typing '+' moves to the next record, '-' to the previous record and ' ' to the last record in the database. Typing '++' or '--' shows the first 70-odd characters of the next or previous 20 records in browse mode. In version 3.0 the PgUp and PgDn keys also browse the database.

PC-File calls the first field in the record the 'Key' field. If none of the other options was chosen, it will attempt to find whatever was typed into the box in the Key field of each record. The search is case-insensitive and will display all records where the first few characters are the same as the desired fragment.

Each record is displayed very quickly; the speed at which the screen is rewritten is only restricted by the PC's hardware. Other records can be found using the same techniques as in the initial search. Hitting either F10 or enter with nothing in the response box returns the user to the initial menu.

Add, Delete and Modify

Finding a record to delete or modify is carried out in exactly the same way as putting a record up for display. When you find a record which should be deleted, two

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options are offered: <delete> or <keep>. Once deleted the record is gone for good, so this elementary safeguard is essential. Records are modified by overtyping each field requiring alteration and pressing F10 when all alterations have been entered.

PC-File adds records at the end of the database unless a record has been deleted. In such cases, records to be added may be inserted at the location of the deleted record.

Finding a Record

Using the Key function of the display option works quite well for many searches when the first field is unique and the desired contents of that field are known. But someone casting a play might be looking for a male lead, between 20 and 25 years old, 1.8 metres tall and weighing 80 kg. The Find function allows you to search up to 10 fields. In each field the search can be for contents equal to, less than, greater than or not equal to the desired value.

Searches can be made for fields where the string matches the leading characters. Alternatively, a search can be made for the

selected string anywhere in the field, and a soundex search is also available. 'Soundex' searches for strings which sound like the requested string. Search is a truly powerful option — I wish some mainframe databases had such flexible search routines.

Sorting, Reports and Cloning

PC-File can take a database and print out selected fields and selected records using formats pre-defined by the user. Mailing labels can be printed and 'cloned' databases can be created, with additional fields inserted or existing fields removed, and field lengths can be altered in the process. Again, selection of records to be printed can be made for a logical relationship of up to 10 fields.

Reports and cloned databases are created in the order in which they exist in the database index, but if a different order is required the database index can be sorted using a built-in Sort function.

Import/Export

PC-File can import and export files in Mail-

merge, Visicalc, PC-Calc, .DIF and text editor formats. Many popular packages, including dBase II and Lotus 1-2-3, can read and write .DIF files and PC-File can interchange data with them. However, PC-File doesn't provide utility programs to directly read or create dBase II .DBF files. I'm preparing a utility program in interpreter BASIC to convert files from .DBF to .DIF, which will allow users without a compiler or a copy of dBase II to take a .DBF file and create a .DIF file to read into PC-File.

PC-File III is a really useful product. It seems to be reasonably bulletproof, is very fast for most functions and unbeatable value for the price. Get yourself the free evaluation copy — I'm sure you'll cheerfully send off the donation. □

Max no of records	32,767
Max no of fields	42
Max field size (chars)	65
Max no of indexes	1
Max no of sort control fields	10

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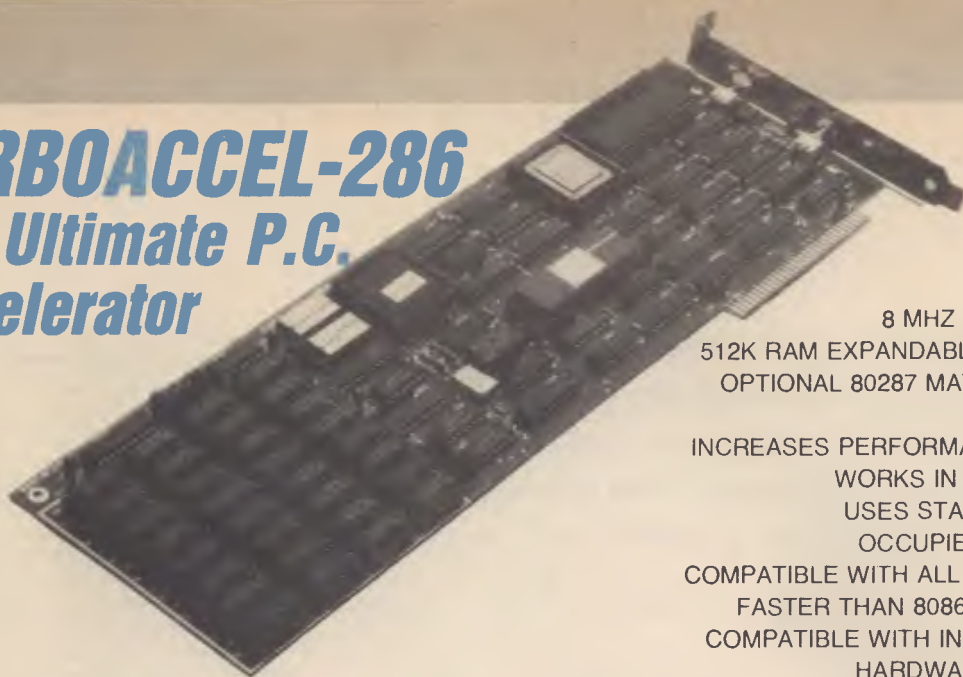
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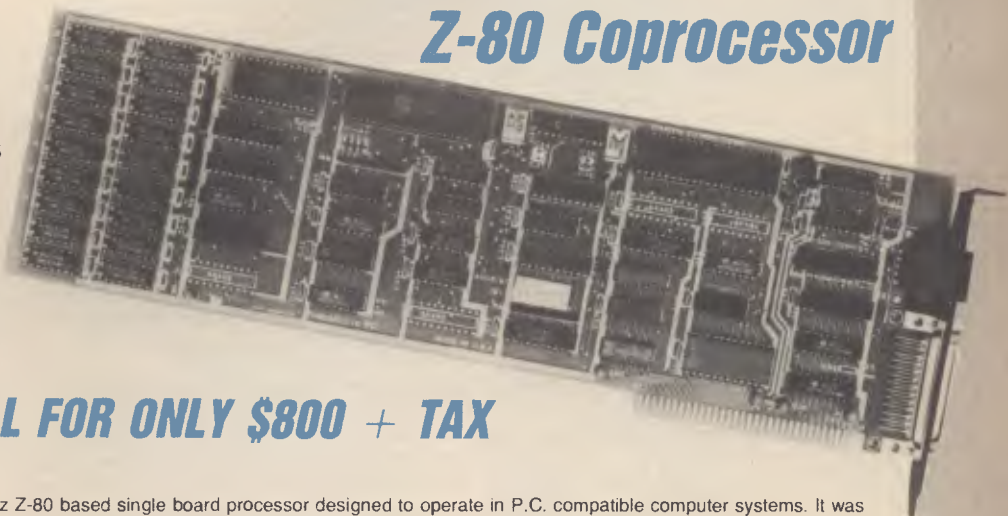
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The large base of CPM software can be run on TurboSlave-P.C. A CPM emulator program is included for this purpose. Applications will run faster in most cases because of the high speed 8 megahertz Z-80 and large memory space.

TurboSlave-P.C. is supported by the TurboDOS operating system (separately purchased option) allowing up to sixteen TurboSlaves to be connected to a P.C., each running a user on a dumb terminal. Each user can run CPM and MPM compatible programs with full record locking security.

TurboSlave-P.C. can be used as a background processor for communications, print spooling, data encryption and a host of other special purposes. Utility software to help develop these applications is included at no charge along with comprehensive technical documentation. A user library of software has been started to share applications as developed.

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One of the best places to get information and help with a particular machine is through a computer user group or club. Such little pockets of wisdom are scattered throughout Australia, as you can see from this listing which we publish every couple of months.

Australian Capital Territory

ACT PC Users' Group, Nick Hammond, PO Box 188, Parkes 2600. Meetings last Monday each month at Reid Tafe, 8.00 onwards. (062) 86 1102.

ACT VIC-20 Users' Association, Chris Groenhout, 25 Kerferd St, Watson 2602. Meetings first Monday each month at Boys' Grammar Scout Hall, Red Hill, 7.30 onwards. (062) 41 2316.

Albury Wodonga Apple User's Group, Jenny Scott (secretary), (060) 24 3225 or Don McLennan (president), (060) 46 028; meets second Wednesday every month at Wodonga High School at 7.30 pm.

ATARI, Chris McEwan, co-ordinator, ACTARI, PO Box E112, Canberra 2600, (062) 88 7861.

Apple User Group (ACT), Jeff Brock, 1 Buckley Circuit, Kambah 2902, (062) 31 3630.

Australian ZX80 Users' Association (AZUA), David Vernon, 50 Waller Crescent, Campbell 2601; for ZX81, ZX Spectrum and Sinclair QL owners. Meets on the last Wednesday of every month at the Woden Valley High School library at 7.30 pm.

Canberra ACT Sirius User Group, Jim Bland, (062) 81 2824, (062) 81 2832.

Canberra CompuColor Club (CCC), Meets 7.30 on first Sunday of every month at the offices of Digital Equipment, 28 Lonsdale Street, Braddon ACT.

Canberra Microbee Users' Group, Meets 7.30pm on first Tues of every month at Woden Valley High School Library. Bill Horsfall (062) 58 3193. PO Box 227, Weston Creek, ATC 2611.

Canberra Micro-80 Users' Group, Harry Cooper, 113 Owen Dixon Drive, Evatt 2617; meetings 3rd Monday each month, 7.30 pm in the large theatre, 'I' Block, Reid TAFE, for System 80, TRS80 and similar. (062) 58 3700.

Canberra NEC Users' Group, Mal Smith, PO Box 173, Belconnen 2616; meets first Tuesday each month at Main Conference Room, CSIRO Headquarters, Limestone Avenue, at 7.30. (062) 54 1614.

Canberra Osborne Group, c/o Geoff Cohen, PO Box 136, Kippax 2615, (062) 54 7608.

IBM User Group, Ron Pollack (president), PO Box 501, Sydney 2001; meets third Monday of every month on the 11th floor, 50 Bridge Street, Sydney in the Price-Waterhouse seminar rooms at 5.30 pm. (02) 290 3655.

Kaypro User's Group (ACTKUG), meets on the third Thursday of each month from 6.30 pm in the J Block theatre, Canberra TAFE, Constitution Avenue, Reid. Contact Des Ireland, on (062) 47 5330.

Micsig, Registrar, PO Box 446, Canberra 2601.

PC Users' Group (for users of IBM PC and similar machines); meets on the last Monday of each month at 8 pm in the main theatre, Building J, Canberra TAFE. Contact address: PO Box E188, Parkes, ACT 2600.

Sirius/Apricot User Group, M J Sim, 253 Hindmarsh Drive, Rivett 2611; meetings 7.30 pm third Tuesday each month, 88 Wollongong Street, Fyshwick 2609.

New South Wales

Albury-Wodonga District Microbee User Group, Eric Eulenstein, 202 Kooba St, Albury 2640, (060) 25 1601.

APF Users' Group, Norm McMahon, 288 Kissing Point Road, Turrumurra 2074, (02) 44 2645.

Apple Team Australia, 5 Walpole Place, Wahroonga 2076; (02) 48 1018.

Apple Users' Disk Exchange Club, Phillip Donnadieu, Flat 1 8-10 Lancelot Street, Allawah 2218; (02) 579 4547.

Apple Users' Group, Colin Rutherford, PO Box 505, Bankstown 2200; meets 6.30 pm second Monday of each month (Tuesday after public holidays) at Sydney Grammar School, Stanley Street, Sydney. (02) 520 0926.

Atari Computer Enthusiasts, Tony Reeve, PO Box 4514, Sydney 2001.

Ausborne, The Secretary, PO Box C530 Clarence Street, Sydney 2001; meetings third Wednesday each month at 6.30 pm in the North Shore Council Chambers, Cnr Miller and McLaren Streets, North Sydney 2060. (02) 95 5378.

Ausbug, Stephen Ford, PO Box 62, Londonderry 2753.

Bankstown-Fairfield Computer Group, Arthur Pittard, 36 Hubert Street, Fairfield 2165; meets 4th Wednesday of the month at Canley Vale High School, Prospect Road, Canley Vale at 7 pm, (02) 72 2881.

BBC Educational Users' Group of NSW, Dick Cleary, PO Box 939, Darlinghurst 2010; meets 7.30 pm third Wednesday of each month at various locations.

Blue Mountains Microbee User Group, Roger Cooper (president), (047) 58 7238.

Blue Mountains Computer User's Group, Eric Lindsay (secretary), 25 Reserve Avenue, Blaxland 2774, (047) 51 2632.

Bondwell User's Group, Ray Richards, 7/39 Ross Street, North Parramatta 2151, (02) 683 3940.

Broken Hill Microbee Users' Group, Peter Cotter, 533 Radium Street, Broken Hill 2880, (080) 88 1621.

Casio PB 700 User Group, Terry Gill, 27 Greenleaf Street, Wentworthville 2145, (02) 636 1652.

Central Coast Apple Users' Group, C W Lee, 662 The Entrance Road, Wamberal 2260; meetings first Tuesday each month at the Niagara Park Public School from 7.30 pm. (043) 84 3419.

Central Coast Microbee Club, Max Maughen, PO Box 36, Ettalong Beach 2257, first Tuesday every month at Applied Technology, West Gosford. (043) 24 2711.

CompuColor Users' Group, Tony Lee, 52 Cowan Road, St. Ives 2075, phone (02) 449 8824.

Cooma Microbee User Group, Phil Zikan, PO Box 92 Cooma 2630, (064) 82 3315; meets on the second Friday of the month.

Cumberland Computer User Group, S O'Neil, (02) 682 3851.

Dataflex User Group, Roger Walker, (02) 699 3877.

dBase Users' Group, PO Box 297, Neutral Bay Junction 2089; meets every second Tuesday each month at the Cowper Room, St. Andrew's House, corner Bathurst and Kent Sts, Sydney.

DEC Personal Computer Special Interest Group, Marion Rhydderch, DEC Australia, Northern Tower, Chatswood Plaza, Railway Street, Chatswood 2067, (02) 412 5252.

Dubbo and District Microbee Users' Group, Coralie Taylor, 18 Cunningham Street, Dubbo 2830; meets fourth Wednesday each month at 7.30 pm in the Dubbo High School Computer Room.

Griffith Computer Association, Ron Gauci, PO Box 425, Griffith 2680, (069) 62 5877.

Griffith Microbee User's Group, Ingmar Meins, (069) 62 3074; meets the fourth Monday of each month at Neighbourhood House at 7.30 pm.

Hawkesbury Apple User Group, Secretary Steve Bennett; meets fourth Monday each month at 7.30 pm, Richmond Primary School, (045) 78 2195.

Hawkesbury Commodore Computer Club,

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Richard Farrell, 12 Inverary Drive, Kurmond 2757; meets fourth Tuesday of each month at 7.30 pm at Neighbourhood Centre, West Market Street, Richmond 2753.

Hawkesbury Microbee Computer Club, Bruce Rennie, 6 Warks Road, Kurrajong Heights 2758; workshops 7.00 pm third Friday, and general meetings 7.30 pm first Friday of each month in the Microbee Network Room, Library Building, Richmond High School, Cnr Penrith and Lennox Streets, Richmond 2753. (045) 67 7329.

Hitachi/6809 User Group, meets on the first Saturday of each month, at 2 pm; contact Robert Lohr on (02) 662 4150, after 6 pm for locations.

HP Desktop Computer Users' Group, Dr R W Harris, CSIRO Division of Mineral Physics, PMB 7, Sutherland 2232, (02) 543 3460.

Hunter Users' Group — All Microcomputers, Secretary, PO Box 39, Broadmeadow 2298; meets on the second Wednesday of each month in Room 308, Building W, University of Newcastle, at 7.45 pm. Membership is primarily Apple II oriented, but anyone with interest in micros welcome.

Illawarra IBM PC Club — All IBM compatibles, Dick Adams (secretary), c/o John Lysaght Ltd, Delivery Code 29, PO Box 77, Port Kembla 2505; (042) 75 6721.

Illawarra Microbee Computer Club, Ronald Read, PO Box 271, Warrawong 2502; meets every 4th Monday at 7.30 pm, Wollongong Institute of Education, Northfield Ave, Gwynneville; (042) 71 2384.

Illawarra Super 80 Users' Group, Jim O'Grady, Chairman, PO Box 1775, Wollongong 2500.

Macarthur Computer Association, J Napier, 23 Athel Tree Crescent, Bradbury 2560; meets first Monday each month at Airs High School, Briar Road, Campbelltown 2560, at 7.30 pm each month; all machines are catered for. (046) 25 2055.

Macquarie Microbee Users' Group, Brian Thompson; meetings first Monday each month at Denistone East Primary School at 7.30 pm. (02) 85 1659 after hours.

Macwest Users' Group, PJ Lynden, 11 Toohey Ave., Westmead 2145; Services will include newsletter, bulletin board and public domain library. Membership \$10 pa.

MEGS (Microcomputer Enthusiasts' Group), John Whitlock, PO Box 1309, Chatswood 2067; meetings third Monday each month at rear of St Andrew's Presbyterian Church, 37 Anderson Street, Chatswood 2067, (02) 638 1142.

Microbee Users' Club (Broken Hill), Peter Cotter, 533 Radium Street, Broken Hill 2880, (080) 88 1621.

Newcastle Microbee Users' Group, Lee Osman, 12 Cleverton Close, Warners Bay 2282, (049) 48 8813.

Newcastle Microcomputer Club, Angus

Bliss, PO Box 293, Hamilton 2303; meetings 7.30 pm second and fourth Monday each month at Room G12, Physics Building, Newcastle Uni. (049) 67 2433.

NSW Primary School Microbee Users' Group, Mr Peter Stretton, c/- Hunters Hill Primary School, Alexandra Street, Hunters Hill 2110.

NSW 6800 Users' Group, 27 Georgina Avenue, Keiraville 2500.

Northern Beaches VIC User Group, E. Tuxford, 161 Barrenjoey Road, Newport 2106, (02) 997 2467.

Northern NSW MICC Chapter, Alen Hartley, Durrurrabin via Dorrigo 2433, (066) 57 8160.

Open Access User Group, Steve Cook, Advanced Data Technology Pty Ltd, 1 Terrell Avenue, Wahroonga 2076; (02) 48 0511.

OSI Users' Group, Nigel Bisset, (02) 411 7142.

Pocket Computer Users' Club, George Antonijevic; for those interested in pocket computers, whatever the brand. Meetings held on the first Wednesday of each month at 7.30 pm at the Woodstock Community Centre, Church St, Burwood 2134, (02) 683 4296.

Sega Users' Club, Jim Robinson — Penrith branch, (047) 30 1834; Jeff Wilson — Parramatta branch, (02) 684 4128.

Sirius/Apricot User Group, Wayne Collom, Barson Computers; meets first Tuesday each month at 6.30 pm, Unit D, 55 Talavera Road, North Ryde 2113, (02) 888 9444.

Sorcerer Users' Group, PO Box E162, St James 2000; meetings third Friday each month at 8.00 pm in Greenwich Community Hall, Greenwich Road, Greenwich 2065.

Southern Districts Commodore Users' Group, Lex Toms, 3 Lucille Crescent, Casula 2170; meetings first and third Wednesdays each month, API Hall, Currajong Road, Prestons 2170. (02) 602 8691.

Sutherland Super 80 Group, Jim Traeger, (02) 525 2018.

Sydcom 64 (C64 User Group), Philip Dean, GPO Box 1542, Sydney 2001; meets on the second Wednesday of each month at the Abraham Mott Hall, Argyle Place, Miller's Point.

Sydney Forth Group, Peter Tregeagle, 10 Binda Road, Yowie Bay 2228; meets second Friday of each month at 7.00 pm in the John Goodsell Building, UNSW room LG19. (02) 524 7490.

Sydney Kaypro Users' Group, Hans Schneider, C/O Dr H. Schneider, Geography Department, UNSW, PO Box 1, Kensington 2003; meetings second Tuesday of each month, 8.00 pm, Burwood RSL Club. (02) 697 4400 (w) or (02) 309 2961 (h).

Sydney Lotus 1-2-3 User Group, Ron Pollak, (02) 29 5316.

Sydney Microbee User Group, David Butler, PO Box C233, Clarence St, Sydney 2000; meetings third Saturday each month 1-5 pm in the hall of Strathfield Girls' High School, (02) 92 6408.

Sydney Northside Apple Users' Group, Philip Webb, meets first Tuesday each month 6.30 to 8.30 pm, Willoughby Council Library, 411 Victoria Avenue, Chatswood 2067. (02) 419 3294.

Sydney TRS80 Users' Group, meetings second, third and fourth Saturday of each month at Botany. (02) 666 4716 bh.

System 80/TRS-80 & Colour Computer Users' Group, Jim Fisher, 37 Fairburn Avenue, West Pennant Hills 2120.

TAG — The Access Group, Bob Dolton, PO Box 943, Orange 2800; for Access and Actrix users.

The Great Western Computer Users' Group Jim Graham, PO Box 210, Wentworthville 2145; (02) 636 9219. All micro users are welcome. A 40-minute beginner's session is held at the beginning of each meeting. The club meets on the first Tuesday of each month, at 8 pm.

The Morrow User Group Alan Stern, (02) 750 8274; meets on the fourth Wednesday of every month at the Woodstock Community Centre, Church Street, Burwood at 7.30 pm.

Western Sydney PC and Compatible User Group, Ben Sharif, (047) 36 4825; meets on the third Sunday of the month at 1.30 pm, 27 Cosgrove Crescent, Kingswood 2750.

TI Sydney Home Computer Users' Group, PO Box 149, Pennant Hills 2120.

Tuggerah Lakes Computer Users' Group, Frank James, 125 Woolana Avenue, Budgewoi 2262; meetings second Thursday each month at Old Primary School, Wyong, at 6.30 pm. (043) 907 339.

Wagga Microbee Users' Group, John Simmons, 47 Undurra Drive, Glenfield 2650; meetings first and third Tuesdays each month in the Tolland-Glenfield Neighbourhood Centre at 8.00 pm. (069) 31 1302.

Wizzard User Group, John Mifsod, 150 Bouganville Road, Blackett 2770, (02) 628 0801.

ZX-Spectrum Users' Club, Craig Kennedy, PO Box 466, Epping 2121.

Victoria

Albury Wodonga User's Group, Jenny Scott (secretary), (060)24 3225 or Don McLennan (president) (060) 46 028; meets second Wednesday of every month at Wodonga High School at 7.30 pm.

Apple Users' Society of Melbourne, D Halprin, PO Box 43, Forest Hill 3131, (03) 387 3221.

Atari User Group Melbourne, Kelvin Eldridge, PO Box 173, Reservoir 3073.

Australian Forth Interest Group, Tony Latermore, PO Box 704, Sale 3850, (051) 44 2011.

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Australian North Star Users' Association, PO Box 194, Wangaratta 3677.

Ballarat Computer Users' Group, Publicity Officer: John Preston, (053) 31 4363.

BBC Users' Group, Mr Howell (Secretary), 1 Washusen Road, Heathmont 3135, (03) 420 2611 (B). Meets last Wednesday each month from 7 to 9.30 pm at Copiquet, 423 Clarendon Street, South Melbourne 3205.

Billanook Computer Forum, Maurie Canterbury, Cardigan Road, Mooroolbark 3138, (03) 725 5388.

Chip 8, 6800, 1802 User Group, Frank Rees, 27 King Street, Bort 3537.

Compucolor Users' Group, L Ferguson, 12 Morphett Avenue, Ascot 3342.

DEC Personal Computer Special Interest Group, see NSW entry.

Forth Interest Group, Lance Collins, PO Box 103, Camberwell 3124; meets on the first Friday of the month at the Bowen Street Neighbourhood Centre, 102 Bowen Street, Camberwell South 3124. (03) 29 2600.

Geelong Commodore Computer Club, D Gerrard, 15 Jacaranda Place, Belmont 3216, (03) 44 2863.

Geelong Computer Club, Colin Lowne, PO Box 520, Geelong 3220; (052) 55 1232. Meets at 8 pm, on the first and third Friday of each month in the rooms of the Geelong Amateur Radio Club, Storrer Street, East Geelong.

IBM & Columbia Computer Users' Club, Giles Bray, 22/11 Auburn Grove, Hawthorn East 3123; meets second Tuesday each month, 7.30 pm, at the Victorian College of Pharmacy, (03) 82 7632.

Kaypro Users' Group of Victoria, George Kunz, PO Box 159, Forest Hill 3131; meetings fourth Sunday each month at Burwood State College Community Resources Centre at 2 pm. (03) 857 5462.

KAOS (Ohio Scientific), David Anear, 49 Millewa Crescent, Dallas 3047.

Latrobe Valley Colour Computer Users' Group, George Francis, 31 Donald Street, Morwell 3840; for TRS80 and MC10 users. (03) 22 1389.

Melbourne Atari Computer Enthusiasts, PO Box 340, Rosanna 3084; meetings held on second Sunday of each month (except January) at 12 noon at Monash University Rotunda.

Melbourne Lotus 1-2-3 Users' Group, Robert Taylor, (03) 267 4800.

Melbourne Microbee Users' Group (MBUG Australia Inc.), President: Grant Forrest, PO Box 157, Nunawading 3131; meets at 7.30 pm on the second Wednesday of each month at Mount Waverley Community Centre, Cnr Miller Crescent and Stephenson's Road, Mount Waverley. Different types of membership, including country, bulletin board, city, and student. **Melbourne PC User Group — IBM and compatibles**, The Secretary, c/o Pannell

Kerr Foster, 14th Floor, 500 Bourke Street, Melbourne 3000, (03) 830 5067 between 6 & 8 pm; meets the second Wednesday of each month at 6 pm in the ground floor auditorium, Clunies Ross House, 191 Royal Parade, Parkville.

Melbourne Hitachi Users' Group, Branko Colavizza, PO Box 191, Rosanna 3084, (03) 434 2541.

Melbourne Super 80 Users' Group, Hon. Sec. Victor Shuttleworth, (03) 723 2713.

MICOM (Microcomputer Club of Melbourne), PO Box 60, Canterbury 3126. **National Mutual Micro Users' Group**, R Prewett, NMLA, PO Box 2830AA, GPO Melbourne 3001; for National Mutual staff. **National Sinclair User Group**, PO Box 148, Glen Waverley 3150.

NEC Portable Users' Group, D Green; meetings second Wednesday of each month at Myers Computer Centre, Lonsdale Street, at 7.30 pm. (03) 611 3380.

Northern/Western Suburbs Computer Users' Group, John King (Secretary), 284 Union Road, Moonee Ponds 3039. Contact CP/M Data Systems, (03) 338 9304.

Peninsula Computer Club, George Thompson, 3 Patterson Street, Bonbeach 3196; meets second Tuesday each month at Chisholm College, Frankston 3199; many types of computers catered for. (03) 772 2674.

Sega Users' Club, Peter Lindeman, 6 Bay Street, Port Melbourne 3207.

Seymour-Pucka Computer Club, Garry Sutton, 25 Malaya Road, Puckapunyal 3662; (057) 93 1091.

Sharp Computer Users' Association, The President, 7 Faye Street, East Burwood 3151.

Spectravideo Users' Group, Mitch Raitt, 3 Clivejay Street, Glen Waverley 3150, (03) 233 2357.

Sorcerer Computer Users' (Australia), Secretary, GPO Box 2402, Melbourne 3001.

TI-99/4A Users' Group Melbourne, Wayne Worlidge, 123 Ashburn Grove, Ashburton 3147, (03) 25 1832.

The Motorola User Group (MUGS), Clive Allan, 11 Haros Avenue, Nunawading 3131; group is interested in 6800/02/09-based computers, particularly if running Flex, although this is not a prerequisite to join. (03) 878 1298.

Upper Yarra Computer Reference Group, for microcomputer enthusiasts and educators. Contact Albin Wallace, Woori Yallock Education Centre, (059) 64 6617.

Victorian Association of Computer Educators, Arthur Totrall, PO Box 69, Whittlesea 3757.

B5*RR*NM Victorian Osborne Users' Group, Bill Baker, PO Box 169, Camberwell 3124, (03) 850 4187.

Victorian VZ-200 User Group, Luigi Chiodo, 24 Don St, Reservoir 3073, (03) 460 3770.

Victorian Wizzard Users' Group, Barry Klein, 24 Russell Street, Bulleen 3105, (03) 850 7275.

Wizzard User Group, for owners of Dick Smith Wizzard and Funvision computers. The group operates only by mail and phone at present. Contact Barry Klein, 24 Russell Street, Bulleen 3105, (03) 850 7275.

Yarra Valley Commodore User's Group — affiliated with the Melbourne Central Commodore User's Group, Barrie Vickers (secretary), PO Box 176, Lilydale 3140, (03) 735 0638; meets on the first Tuesday of each month at the Melba Hall, Cnr Market & Castella Streets, Lilydale at 8 pm.

Yarrowonga Computer User Group, Chris Younger, 10 Witt Street, Yarrowonga 3730, (057) 44 385; for all machines.

ZX81 Software Exchange, c/- Chips Taens, 5 Muir Street, Mount Waverley 3149.

Queensland

Adventure Club, Christine Ogden, 37 Samford Road, Leichhardt, Ipswich 4305; for all Adventure-type game players.

Adventure News, Stuart Elflett, MSF 550, Toogoolawah 4313. For Commodore 64 adventures only.

Adventure Special Interest Group, Ernie Sugrue, PO Box 594, Maryborough 4650.

Amstrad Postal Users' Group, Frank Elliot, 59 27th Avenue, Palm Beach 4221; a group for isolated Amstrad users — meets monthly by cassette.

Apple-Q — The Brisbane User Group, The Secretary, PO Box 721, South Brisbane 4101; meetings every third Sunday of month at Hooper Education Centre, Kuran Street, Wavell Heights 4012. Centre is open from 8.30 am till 4.30 pm; members encouraged to bring Apple along. **Australian Sirius Users' Group**, PO Box 204, Chermside 4032; looks after the needs of Sirius One and Victor 9000 computer users; (07) 350 2611.

BASIC User Group, Chris Lucey, Cranium Computers, 34 Lawless Street, Blackwater 4717.

Brisbane Medfly Users' Group, K J Walker, 120 Highgate Street, Coopers Plains 4108.

Brisbane Sinclair (Spectrum) Computer Club, V Lewis, 37 Samford Road, Ipswich 4305; meets third Sunday at Everton Park State High School, at 2.00 pm. (07) 355 7809.

Brisbane Super 80 Users' Group, Gary Gatfield, (07) 355 3173.

Brisbane Youth Computer Group, A Harrison, PO Box 396, Sunnybank 4109.

Brisbug, Roy Willie (Secretary), PO Box 305, Wynnum Central 4178. Meets at 2 pm on the 3rd Sunday of each month at the Toowong High School. (07) 393 3388.

Caims District Microbee Users' Group, Chas Eustance, 21 Marr Street, Edmonton 4869, (070) 55 4531.

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Commodore Computer Users' Group, Mr NR Chambers, PO Box 274, Springwood 4127, (07) 808 2125.

Computer Owners' Group, Betty Adcock, 42 Lucan Ave, Aspley 4034; meets second Wednesday each month, 7.45 pm; all kinds of computers are catered for. (07) 263 4268.

Darling Downs Apple Users' Group, Lloyd, PO Box 53, Darling Heights 4350. (07) 38 3060.

DEC Personal Computer Special Interest Group, see NSW entry.

Gold Coast Microbee User Group, Col McLaren, 1/100 Imperial Parade, Labrador 4215; meetings first Sunday each month, 3.00 pm, at the Southport High School. (075) 31 4610.

IREE Microcomputer Interest Group, N Wilson, PO Box 811, Albion 4010.

Mackay Microbee User Group, Geoff Gehring, PO Box 230, Mackay 4740, (079) 42 3214.

NEC User Group, David Clark, 18 Provence Street, MacGregor 4109, (07) 343 7680; meets on the first Friday of each month.

Osborne Users' Group of Queensland Uni, Glen McBride; meetings second Wednesday each month, open to all. (07) 870 1177.

Queensland CP/M Users, The Secretary, PO Box 1025, Milton 4064; meets on the last Sunday of each month at the University of Qld, Civil Engineering Room 1.01 (off Staff House Road) from 1 pm.

Sega Users' Group, Robert Horkings, PO Box 148, Fortitude Valley 4006, (07) 52 5603; meetings first Saturday of each month, YMCA Hall at 1 pm.

Southport Commodore Computer Users Group, Bill Fitzpatrick, PO Box 790, Southport 4125, (075) 32 0061.

Superboard Users' Group, Ed Richardson, 146 York Street, Nundah 4012.

Tandy, Apple, Commodore User Group, Chris Lucey, 34 Lawless Street, Blackwater 4717.

The Microcomputer Society, The Secretary, PO Box 580, Fortitude Valley 4006; meetings are held on the second Friday of each month in the Old Town Hall, corner Vulture and Graham Streets, South Brisbane 4101. Meetings start at 7.30 pm; if main gate is closed use the back stairway.

Townsville Microbee User Group (TMUG), Mannie Van Rijswijk, PO Box 5751 MC, Townsville 4810; meetings 7.30 pm on second and fourth Mondays each month on the Ground Floor, St Margaret Mary's Secondary School, Crowle Street, Hermit Park 4812.

TRS80/System 80 Computer Group, Secretary, 16 Laver Street, Macgregor 4109; meets first Sunday each month at Lindum Hall, Lindum Street, Lindum 4178, at 2.00 pm. (07) 343 5771.

University of Queensland Osborne User's Group, Glen McBride (president) (07) 870 1177, or Richard Duczmal (treasurer) (07) 377 3139; meets on the second Wednesday of the month, in the Axon building on campus. Membership is open to both students and non-students.

VZ-220/300 Computer Club, Michael Novakovic, 24 Albert Street, Goodna 4300. Phone (07) 288 3045 between 3.20 pm and 8 pm.

VZ-200 Pacific Region Club, J D'Alton, 39 Agnes Street, Toowong 4066, (07) 371 3707.
ZX81 Club, P Carswell, 22 Braud Street, Bundaberg 4670.

South Australia

Adelaide Atari Computer Club (AACC), Secretary, PO Box 333, Norwood 5067; meets at Gilles Street Primary School, City, on first Monday (second if first is on public holiday) of each month, 7.30 — 9.30 pm.

Adelaide Lotus 1-2-3 User Group, Paul Wragg, Pannell Kerr Foster, GPO Box 1969, Adelaide 5001.

Adelaide Micro User Group, Helen Ross, 36 Sturt Street, Adelaide 5000; for TRS80 and System 80 users.

Adelaide Osborne Group, Russell Barter, The Secretary, GPO Box 603, Adelaide 5001.

Adelaide Sega User's Group, Jamie Andersen, (08) 263 5020 (after 4 pm); meets on the first and third Wednesdays of the month, from 7 pm, at the Lutheran church hall, 137 Archer Street, North Adelaide.

Adelaide Super-80 User's Group, Mr L White, The Secretary, 503 Churchill Road, Kilburn 5084; meets on the third Monday of each month, (the second Monday in the case of a public holiday) at 7.30 pm in the canteen of Mason & Cox Foundry, 123 Hayward Avenue, Torrensville 5031, (08) 260 6226. Subscription: \$5 pa.

Aquarius Users' Club, Benedict Sabel, 7 Duncraig Lane, 5152. \$5 membership fee covers the cost of a bimonthly newsletter.

Beebnet, BBC and Econet User Group PO Box 262, Kingswood 5062; the group intends to produce a newsletter on a monthly basis. It is interested in any software producers or distributors who would be interested in serving the group's market requirements.

Commodore/VIC Computer Users' Association, Mr Eddie Hann, 13 Miranda Road, Paralowie 5108; the SA branch meets monthly.

CompuColor-Intecolor Users of South Australia, PO Box 86, Torrensville 5031, (08) 352 3296.

DEC Personal Computer Special Interest Group, see NSW entry.

IBM-PC South Australia Users' Group, PO Box 68, Walkerville 5081.

Kaypro User Group, Ralf Engler, 16/34 John Street, Payneham 5070.

Microbee Users' Group of South Australia (MUGSA), The Secretary, GPO Box 767, Adelaide 5001.

Sega Users' Club, H.A. Jacobson, 10 Pioneer Avenue, O'Sullivan Beach 5166; (08) 382 7967.

South Australian Apple Users' Club, I.H. Bagust, c/o The Bookshelf, 169 Pirie Street, Adelaide 5000, (08) 293 7183; meets on the first Friday of each month in the Prospect Town Hall.

South Australian Commodore Computers' User Group, Eddie Hann, Secretary, PO Box 427, North Adelaide 5006; meetings second Tuesday each month, 7.30 pm, at Royal Caledonian Hall, 379 King William St, Adelaide 5000. (08) 258 6367.

South Australian Foundation for Computer Literacy, Michael Kennett, PO Box 210, Norwood 5067; caters for children from six years (unaccompanied) or four years with older friend or brother or sister. Special emphasis on the needs of handicapped, educably disabled and socially disadvantaged children, but

*ITALall*ENDITAL children welcome. Family participation encouraged. (08) 51 5474.

South Australian Peach User Group, Geoff Drury, 27 Creslin Tce, Camden Park 5038; special interest group attached to the SA Microprocessor Group, which holds separate meetings; (08) 295 2778 ah.

South Australian Microprocessor Group Inc (SAMG), The Secretary, PO Box 113, Plympton 5038, (08) 278 7288.

Sorcerer Users' Group of South Australia, Don Ide, 14 Scott Road, Newton 5074.

South Australian Apple Users' Club, The Secretary, c/- The Bookshelf, 169 Pirie Street, Adelaide 5000.

South Australian Microprocessor Group Inc (SAMG), secretary Rick Matthews, 9 Anglesey Ave, St Georges 5064; (08) 79 3445; meets second Friday of every month, Institute of Engineers, Aust Bldg, 11 Bagget St, North Adelaide.

South East Computer Enthusiasts' Group, Glenn Mibus, 3 Millard St, Mount Gambier 5290; meetings second and fourth Tuesday of each month from 6.30 pm at Mt Gambier High School Computer Room, for all machines and interested parties. (087) 25 1046.

Northern Territory

Alice Springs Microbee Users' Group, Douglas Craigie, c/- PO Box 3230, Alice Springs 5750.

Darwin Microbee Users' Group (DBGU), Felino Molina, PO Box 3111, Darwin 5794, (089) 82 5613 bh, (089) 88 1455 ah.

Northern Territory Computer Club, Ian Diss; meets at Wulagi Primary School on

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the first and third Thursday of each month at 7.30 pm. Users of all machines and other interested parties welcome. (089) 27 9208.

Northern Territory 80 Computer User Group, R T O'Brien, 433 McMillans Road, Jingili 5792.

VZ-200 Users' Club, 7 Abbott Crescent, Malak 5793, (089) 27 2830.

Western Australia

Agriculture Users' Group, c/- Mr R Fenwick, Dept. of Agriculture, Albany 6330. For farmers and the agriculture service industries.

CU West WA Compucolor/Intecolor Users' Group, John Newman, 8 Hillcrest Drive, Darlington 6070.

DEC Personal Computer Special Interest Group, see NSW entry.

KAOS-WA, Gerry Ligtermoet, 39 Cloister Ave, Manning 6152; for Ohio Scientific Users. (09) 450 5081.

Kaypro User Group of Western Australia, Ainslie Sharpe, PO Box 91, Claremont 6010; meetings second and fourth Mondays of each month in the Canteen of the Department of Agriculture, Jarrah Road, South Perth 6151. (09) 384 5511.

Microbee Users' Group of Western Australia, The Secretary, 4 Garnkirk Road, Greenwood 6024, (09) 447 5366.

OSWEST-Osbome Users' Group of Western Australia, Mal Ferguson, PO Box 149, Applecross 6153; meets first and third

Wednesdays at the Palmyra Recreation Centre and the Subiaco Exhibition Hall respectively from 7.30 pm, for Osborne and other interested computer users. (09) 295 1449.

Perth 80 Users' Group, C Powell; for System 80 and TRS80 users. (09) 457 6849.
Perth Hitachi Peach Club, The Secretary, 1 Charf Court, Riverton 6155; for Hitachi Peach and 6809s. (09) 367 5880.

Sharp PC Users' Group, John Paulic, PO Box 79, Gosnells 6110, (09) 398 6303.

Sega Users' Group, John McClemmon, 33 Favell Way, Balga 6061; (09) 342 5905.

The Sorcerer & CP/M Users' of Australia, Dave, 22 Verbena Road, Willetton 6155, (09) 457 1917. Meets every fortnight.

Sorcerer Computer Users of Australia, The Secretary, 90 King George Street, South Perth 6151, (09) 367 6351.

The West Australian Atari Computer Club, Mr Alf Gaebler (Secretary), PO Box 7169, Cloisters Square, Perth 6000.

The WA Cromenco Users' Group, CA Marshall, Suite 2, 294 Rokeby Road, Subiaco 6008. Meets third Tuesday each month. (09) 382 2692.

VIC-Ups, G. Padfield, (09) 451 4629.

Western Australian Wizzard Users' Group, John Reid, 13 Wenlock Road, Wattleup 6166, (09) 410 2359.

Western Australian ZX Users' Group, Phil Taylor, (09) 328 4111 bh.

Western Australian University Computer Club, 2nd Floor, University of WA, Guild Building, (09) 386 1455.

Tasmania

Apricot User's Group, Rick Snell, PO Box 286 C, GPO Hobart 7001, (002) 23 399926.
DEC Personal Computer Special Interest Group, see NSW entry.

Devonport Computer Interest Group, John Steveson, RSD 422, Sheffield 7306, (004) 92 3237.

Down Under Atari User Group; contact Robert Bronstein, 191 Rokeby Street, Howrah 7018.

Spectravideo Computer Users' Group, PO Box 191, Launceston South 7249; membership costs \$20, which entitles members to a newsletter and to discounts on computer equipment. (003) 44 2493.

Tandy Hobart Users' Group, Ms KJ Rees, GPO Box 1271 N, Hobart 7001, (002) 72 1426; meets on the third Thursday of each month — contact Ms Rees for details of venue.

Tasbeeb, John Hannon, PO Box 25, North Hobart 7000; meetings first Monday each month at Elizabethan Matriculation College in D Block at 8 pm, for BBC computers. (002) 34 2704.

Tasmanian Apple Users Group, Ray Williams, PO Box 188, North Hobart 7008; meets third Tuesday each month at 8.15 pm, 73 Murray Street, Hobart.

Tasmanian TI User Group, Co-ordinator, 1 Benboyd Court, Rokeby 7019; meetings third Sunday of each month at University of Tasmania, room 373. (002) 29 4009.
TAS-Micro, Peter Deckert, 1/456 West Tamar Road, Riverside 7250. □

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Contributions to *Your Computer* are welcomed and will be given every consideration*. Please read these notes carefully to get an idea of the style and format we prefer. All Contributions: should include your name, address, and home and office phone num-

bers (in case we need to check details). Each page of your submission, and any material sent with it, should also carry your name.

Contributions by Telephone: Contributors who have modems and suitable software (in the MODEM7/YAM mould — see our stories on Christensen Protocols in the May and June 1983 issues) can arrange direct transfer to our computers through our Bulletin Board system, which is on-line 24 hours a day, seven days a week. Contact our office by phone for details on transferring material in this way.

Contributions on Disk: Contributions can be accepted in most disk formats, although some have to be converted outside our offices, which will add to the (often lengthy) delay between receipt and acknowledgement. The preferred medium is IBM standard format single-sided, single-density, 20 cm CP/M disks or IBM PC-DOS minifloppies. We can also handle, in-office, most soft-sectored 13 cm disks, thanks to PC-Alien — so unless you have a particularly strange format, send it on disk straight from your machine. Please pack them extremely carefully if posting and label all disks with your name, address and phone number.

Listings: Unless it is absolutely impossible, we want listings produced on the computer. This reduces the risk of error - if the computer typed it, the computer probably accepted it. Print listings with a dark — preferably new — ribbon on white paper, and try to format the output to a narrow (40-characters) width. If they can't be produced on a printer, borrow a good typewriter — hand-written material is likely to sit around the office for a year before someone can find time to type it all out for you! Please provide an account of what the program does, how it works and so on. Any comments on the program should refer to the address, line number or label rather than to a page number. Any comments on modifying the program to work on other machines will be appreciated. Try to include a printout of at least part of a sample run if possible.

Style: All items should be typed (or printed) and double-spaced on plain white paper. We will only accept original copies - no photostats. Include your name, address, telephone number and the date on the first page of your manuscript (all manuscript pages should have your surname and page number in the top right-hand corner). Be clear and concise, and keep jargon and adjectives to a minimum.

*Although the greatest care will be exercised with contributions, no responsibility can be accepted for the safety or return of any letters, manuscripts, photographs or other materials supplied to *Your Computer* magazine. If return is desired, you should include a stamped, self-addressed envelope. If return is critical — say it's something you can't afford to lose — then don't send it; we are careful, but we're not perfect. □

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YOUR computer

WE'RE NUMBER ONE!

Maybe you thought so already (and maybe not — there's no accounting for taste ...), but now it's official: *Your Computer* is the number one computer magazine in Australia.

Figures released just as this issue went to press show YC has regained its position as the *top-selling* computer magazine in the country, with an ever-so-slight lead over its only real competitor and a margin of thousands over the third-placed computer publication.

The others would seem to be so far out of the race they won't even put themselves in the hands of the starters, the Audit Bureau of Circulations — not surprising when in some cases their total

print run is less than our sales figure! Even the publishers who have to give their magazines away fall well behind our paid sales.

The ABC, an independent body which sends auditors in to publishing companies to check the figures, publishes figures for *average net paid circulation* over six-monthly periods.

The figures just released for the period April to September 1985, show *Your Computer* is in front with an average paid circulation of 23,898 copies each issue — an increase of around 400 over the previous period despite the launch of several new magazines.

In second place is *Australian Personal Computer* with 23,871 copies sold, well ahead of *Today's Computers* on 21,607.

TO STAY NUMBER ONE ...

You just have to keep working on it. Dammit. There goes our plan for an early escape to an island. Besides, we miscalculated last issue when we said we'd make a run for it before finishing this Yearbook — it had to go to press *before* the Christmas party. We'll have to do some work on our project management software.

The new plan is to build up an unassailable lead in the circulation race during the first half of 1986, then retire to the island — it will be just the right time of year to be sunning ourselves up north.

So let's get to it! Here's the planned feast for next issue:

First up, we're going to have some hot news for Microbee fans (and some great news for non-minibumpers who like exciting new machinery). We're sworn to secrecy, so we can't tell you whether the rumours about multi-processor 32-bit fancy-graphics machines which also run the existing software are true or not — you'll just have to wait and see. We can tell you that a host of upgrades to the 'standard' Bees you already know and love will only be a small part of the story.

February is the fourth anniversary of the launch of the original Bee — through the pages of YC — so we're celebrating with a special feature on *Microbee Systems*, the new name for the we've-gone-public Applied Technology. We'll talk to Concorde-brain Owen Hill, look inside his new machines, look at some Bee software, and generally be informative.

Bees run CP/M, right? CP/M is dead, right? Don't you believe it! We're co-starring CP/M for February, with a rundown/comparison of *Low-cost CP/M Machines* and a giant look at the well-populated,

well-priced, and highly polished world of CP/M software.

CP/M machines still provide some of the best low-cost high-powered doorways into personal computing, and we're not about to abandon our CP/M users — or those for whom a CP/M machine would still be the best value-for-money solution. How many megabits, megabytes, and megabucks do you need to type a letter, enter an invoice, or store some information anyway?

Programmer, author and educator extraordinaire Tim Hartnell joins the ranks of regular YC contributing editors in February with three specials (if we can fit them all in — you remember our disclaimers, don't you?). In the first he examines *Logo*, and provides a program which produces some extraordinary (there's that word again, almost) graphics. Then he tackles *Random Numbers*, and follows up with an easy, no-cost way for you to experiment with Forth — he's written a Forth Simulator, in BASIC. A great way to try-before-you-buy this enthusiast-breeding language.

Then we have a host of reviews: the *Thunderscanner*, a high-res digitiser for the Mac, the little NEC PC-8401B, the complex Qpro-4 database, *Microsoft Excel* (if we get our Mac back, huh Mr Apple, please ...), and *The Strategic Management Game*. If that doesn't take your breath away, then our *tutorials, columns*, and other regular features will.

It should also be explained to you, dear reader, that the special price you had to pay for this special Yearbook issue of *Your Computer* was a special offer of short duration. The February issue will revert to the same ol' boring price of \$2.95.

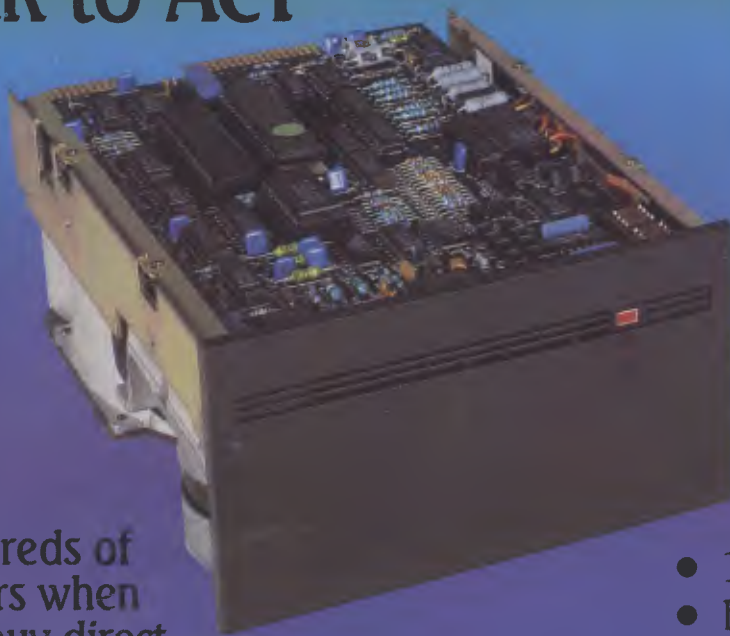
AND FOR OUR NEXT ACT

March — wow, Santa hasn't been yet and we're talking about March — will be another too-good-to-miss issue from the home of top-selling computer magazines. It's our search for the *best buys* on the Australian market. If you're thinking about buying your first — or second, or ... — machine, in any category, this is the issue for you.

A highlight of the best buys theme will be a preview of the *Personal Computer Of The Year* finalists. Remember, April is the big month for the announcement of the most significant awards in the Australian industry — this time you get a sneak preview.

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