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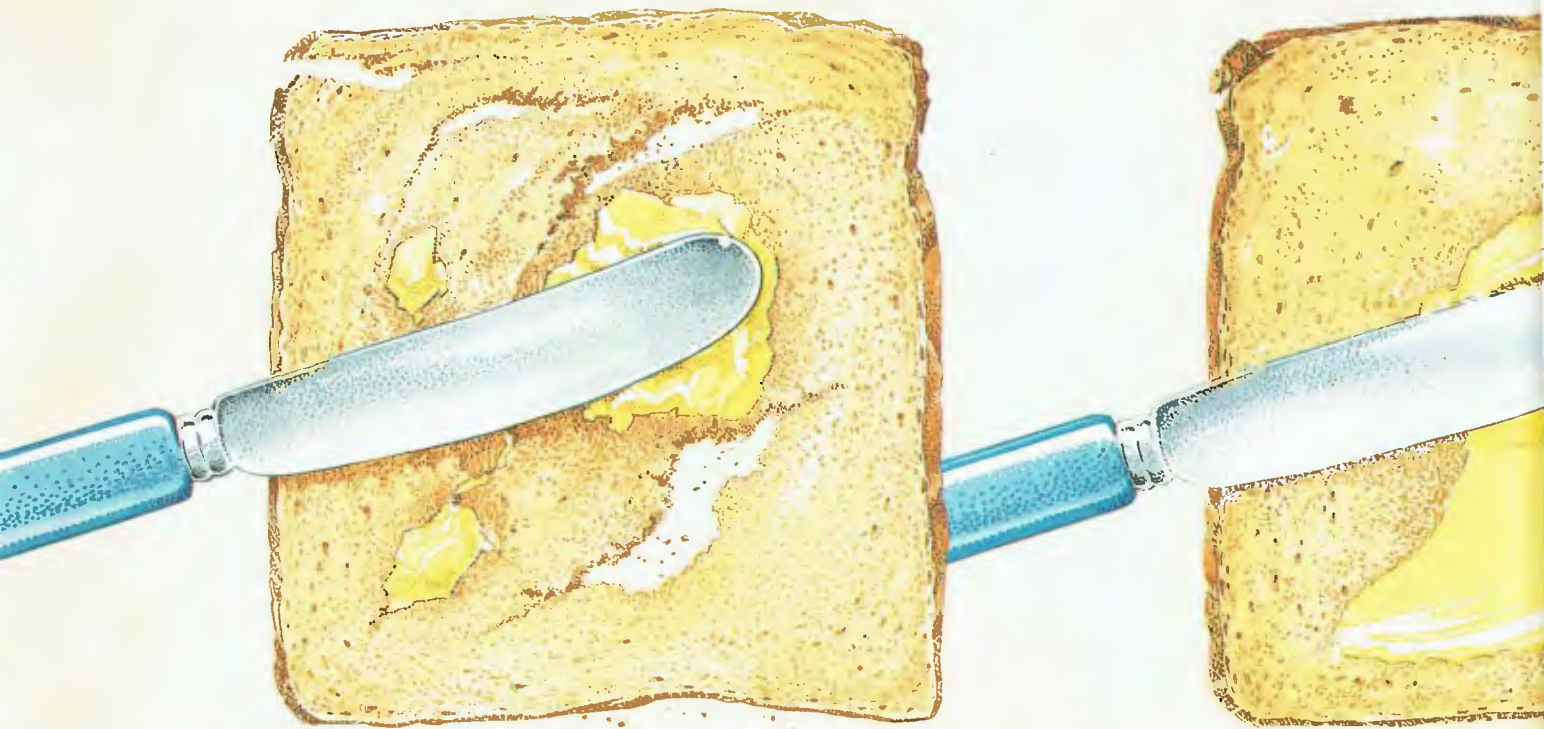


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# A LOT HAS IMPROVED SINCE YO



BUTTER USED TO BE HARD TO USE.

NEW TECHNOLOGY MADE

*You're probably quite happy with your current word processing software. Then again, you were probably quite happy with hard butter. Certainly, hard and soft butter look and taste similar. But when soft butter came about, it made life a lot easier. Which is exactly what would happen should you use Microsoft Word 4 for IBM PS/2 P.C.'s and compatibles.*

*Word 4 has the best implementation of the features that are most requested by word processing users. In fact, Word 4 is everything you'd expect from the leaders in software technology.*

*Most importantly, all the improvements to Word 4 will improve your productivity.*

## FASTEST W.P. SOFTWARE OF ALL.

For a start, it's exceptionally fast. Word 4 beats all the major word processors when it comes to speed (some functions are more than twice as fast).

You'll find amazing speed improvements in scrolling, file load and save, cursor movements and pagination.

You'll also use half the keystrokes that you would use with any other word processing software.

It's also easier. Word 4 works and looks the way you want it to.

Some of the features include a clean screen option, line number printing, paragraph borders to create organizational charts and a line and column counter on the screen.

It's also the only word processing program that has automatic redlining, to make it easier to track revisions and show changes made to a document.

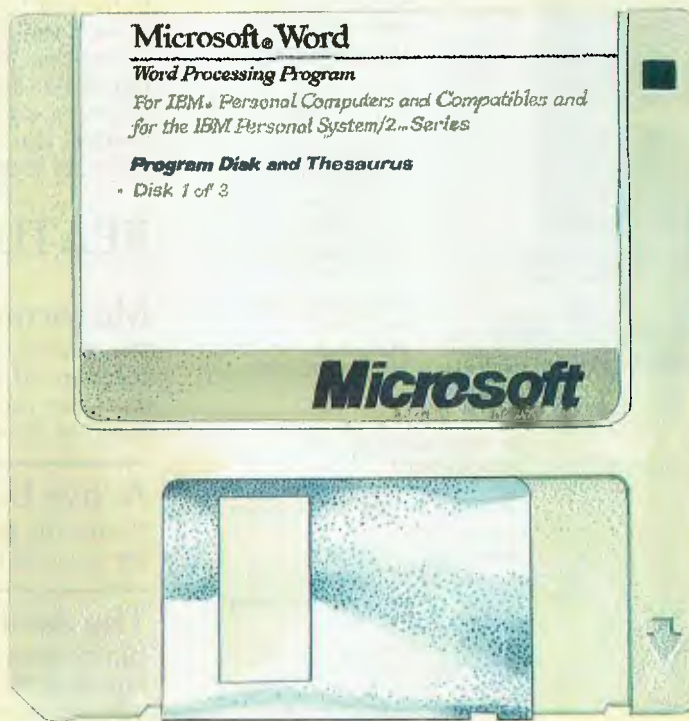
Word 4 will help you look more professional. The high quality output allows you the best appearance in important printed documents. This will, of course, make you stand out from the rest.

## THE MOST POWERFUL MACRO CAPABILITIES AVAILABLE.

An exciting addition has made Word 4 a fully programmable word processor.

The new macro facility will save you time by automating long chains of commands, with a single keystroke taking the place of many. The newest

# U LAST BOUGHT W.P. SOFTWARE.



IT MORE VERSATILE.

THE SAME HAS HAPPENED TO W.P. SOFTWARE.

Word has document management and retrieval. This feature is designed to make it easy to search for and locate documents and manage large directories.

You don't need to remember a cryptic eight-character name as you do with other software.

A summary sheet contains such information as the author, date and time created, document title, and comments. Even words and phrases within the document can be used to search for it.

Style sheets are now even easier to create. Any formatting in your document can be copied and recorded as a named style and can be applied to other text.

This way, you don't have to re-key previous formatting, resulting in a consistent look within your document.

## THE LARGEST PC-BASED THESAURUS IN THE WORLD.

Microsoft Word 4 has expanded its spelling dictionary. Now, 130,000 words can be easily checked. It also has a thesaurus, to help you find the right words for your thoughts.

You'll have many words to choose from, 220,000 to be exact, as it's the largest and most complete PC-based thesaurus in the world. Of course, one of the best things about Microsoft Word 4 is it can convert many popular word processing programs, so it's easy to switch over to Word 4. It's also easy to learn, so you'll have no changeover problems. To prove it, Microsoft is offering a Word 4 evaluation pack. It's available for only \$25.

To see just how much better Word 4

is compared to your present word processing software, simply call Microsoft now on (02) 452 5088 or toll-free on 008 226 850 and ask about the \$25 evaluation pack.

In fact, as Microsoft are always ahead of the field, you should call them for any of your software requirements.

Especially when it comes to your bread and butter.

For more information on Word 4, please send to Microsoft, Freepost 3, Forestville, New South Wales, 2087.

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**Microsoft Word 4**  
FOR PS/2 PC'S AND COMPATIBLES.

# CONTENTS



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## NEXT MONTH INCLUDES

Part 2 of our annual printer feature will cover dot matrix printers and daisy wheels (and an innovative combination of both!). We've included a look at two print enhancement packages — how'd you like letter quality printing from a dot matrix machine?

If your interested in high quality screen output, don't miss our hi-res look at the latest offerings from NEC and Thompson. Or if keeping track of what you're doing is a problem, check out our reviews of two very good project managers. A mouse is becoming increasingly necessary for many packages, but many of them come without a driver, so we tell how to write your own. And if you want to take it all with you, Jan Roberts, puts the new Zenith and Hewlett-Packard portables through their paces.

## Printers

In the last 12 months laser printers have gotten smaller, more powerful and cheaper — they've become serious contenders for general use in small businesses and the home. But if graphics are the main draw, what about an inkjet; or for something completely different, a thermal printer? Our survey of features (and prices!) will help make up your mind.

## FEATURES

### Microcomputers in Education 14

The Ministry of Education in Victoria has recommended a number of PCs for classroom use — an excellent guide if you're considering a machine for educational use at home.

### Active Learning Systems 22

Having the right product isn't enough: the market must be ready for it, too.

### The Acorn Archimedes 25

Our resident alternate microprocessor architecture guru, Roy Hill, is impressed with the latest offering from the makers of the BBC (but he's not ready to buy!).

### Printers 29

Part 1 of our annual printer feature covers lasers (including reviews of the new Ricoh PC 6000 and LP4150 from Mitsui) and inkjets and thermal printers.

### Magic Squares 44

Tim Hartnell dives into the ancient and arcane field of 'magic' squares.

## REVIEWS

### Hard Copy 48

Chris Allen has been browsing in his local bookstore

### The Franklin Spelling Ace 51

Nevermind your spelling — what about help with crosswords, Scrabble or almost any other word game?

### Pop it up . . . 54

TSRs represent an excellent solution to the single-tasking limitations of DOS, but which one suits your particular needs?

**Modemming along . . .** 64  
 Netcomm offer the largest range of modems available to the general user — Keith Mackay reports on three of the range (and Matt Whelan tells of a 'spectacular' new communications program).

**The Anitech ALR386** 68  
 Group A computing with Ewart Stronach (a petrol head from Wayback).

**Compaq Portable 386** 72  
 A top-of-the-line offering from the purveyors of advanced technology (coupled with with reliability).

**Acer 910 by Multitech** 76  
 Not a clone by any name . . .

**The Designer Series** 78  
 How'd you like to create a database in Turbo Pascal in as little as twenty minutes — and have fantastic reporting facilities?

**DSE's PC Mouse** 81  
 Here's one rodent John Hepworth was reluctant to see leave his home . . .

**PC-Debtors** 84  
 A low cost accounting package for small businesses.

**Words, Words, Words** 86  
 Wordcraft Release 3.2 — all it lacks is a spreadsheet.

**INSTRUCTION SET**

**The Attainment of Assembly** 90  
 — **Part 4** Creating a useful library of subroutines.

**Coming to grips with networking** 102  
 — **Part 4**  
 Stewart Fist connects the LANs possibilities

**Graphics Techniques** 109  
 Last month, Miroslav Kosteci was in animated orbit. Now he's moved into memory and interrupts . . .

**Turbo Tips** 116  
 A powerful PATH and searching for non-executable files in a logical fashion.



**PUBLIC DOMAIN**

**New Products** 118  
 The Amiga Power Pack, a movie manager, 300 routines for Turbo Pascal and the RealWorld . . .

**The Prophet** 129  
 Any more requests for hard copy will be filed in the bin!

**Your C64** 133  
 Getting into Assembler.

**Your Mac** 135  
 Apple has upset the big punters in the software world.

**Your Amiga** 140  
 A noisy fan and Public Domain software.

**Your Atari** 143  
 The Tech-Soft ROM clock module.

**Your Amstrad** 146  
 Fascinating fractals.

**IBM Underground** 149  
 The Baker's Dozen from Jim Button.

**Your Microbee** 151  
 Enhancing your Microbee.

**Microbee File** 156  
 At last — WordStar Release 4!

**Your IBM** 159  
 DOS logical files.

**Cursory Glance** 162  
 High prices and legal responsibilities.

**IT HAD  
TO HAPPEN!**

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## WHERE ELSE BUT

**DICK SMITH  
ELECTRONICS**

# Are you really being serviced?

**I** FIND it annoying (and, recently, expensive) that our high-tech industry has such a low-tech service component. And I'm not too sure that the concept of cheap, throwaway electronics is such a good one when it encourages people to take the easy way out.

I can understand the local car dealer's workshop doing a straight swap for any faulty 'computerised' components (although it is ridiculously expensive) — I'd prefer them not to touch the stuff anyway — but high-cost, high-tech computer service departments should be able to do better.

My Hewlett-Packard Laserjet Series II broke down recently. Now that in itself is a miracle — the laser printer has turned out to be the most reliable piece of office equipment I've seen. Less impressive, however, was the \$650 bill for repairs. I delivered the machine to the HP workshop three days before Christmas, and it was fixed the next day — but the instant service was only the result of an 'instant solution', swapping the faulty circuit board.

Given the nature of the fault, I'll bet HP can fix my old board for about \$10 and less than an hour of a competent technician's time, so if they re-sell mine to the next person they're looking at a several hundred dollar profit. If they don't fix it and sell it, then we're both wasting several hundred dollars.

Why not put the \$10 and an hour into my board in the first place? Because things just don't happen that way these days. At least, not often.

If one of my Compupro systems breaks, we get to see the 'old school' in action. Because it's an S-100 Bus system, I can easily separate the problem board, so I take it out and courier it to Rod Whitworth at Automation Statham. I will usually know within an hour of it arriving there which *chip* is the problem. More often than not I will get the board back without an invoice at all.

I remember a disk drive problem on Christmas Eve a couple of years back. I took it out to Rod and turned

up there right in the middle of the office party. Did I have any chance of getting it fixed for Christmas? Of course, *and* I got a free steak from the barbie while Rod waved his magic wand over it.

I'm convinced I could have got Rod to fix my Laserjet. Even though he doesn't have the HP service info, circuit diagrams and so on, he has a similar machine. He would have simply swapped boards until he pinpointed the problem, then studied the faulty board until he had a reasonable idea of where the particular fault might happen. Then he'd prod around with his test gear to find which chip wasn't behaving as it should. And all this would have cost me less than \$650. Why can't the people who know where to look, do so?

The big companies should have service departments that good — after all, service backup is one of the major reasons people pay a premium for a 'name' brand. Yet, it seems only the small organisations (and then only a few of them) have the dedication to do things that way. They're the people who know, use and care about their products, and are qualified, by experience as much as education, for the job.

I realise it isn't easy for companies to find technicians that qualified, but I think HP has them. It's just that in many cases you can fix problems much more rapidly by the board-swap method, and speed is a big selling point when your computer gear is broken down.

I must admit, I was pretty pleased with the service, despite the price — especially when so many people in this business don't know how to spell the word, let alone provide it. The number of times I've seen service technicians and service managers who know less about their products than I do is frightening. (Some may say it's frightening that *anyone* knows less about a product than I do, but they're just being nasty!).

Next time my laser breaks down, I think I'll give Rod a try anyway . . .

MATT WHELAN

# American Graffiti

When I was asked for a few remarks from the States on printers, the first thoughts I had were that I'm all for them, in all forms, shapes and sizes. Thought number two was that, fortunately, the computer industry, as it often does, has picked up on my enthusiasm and is making printers easier to use, more reliable, and so on. Thought number three was that printers are an interesting example of how so often, one aspect of the business drives the other — in this case, you could argue that desktop publishing has driven printer manufacturers, and vice versa. If I can digress for just a moment, those thoughts quickly brought back some memories from the days of second-generation (for the youth in our audience, that means transistorised) printers.

If you read YC (how else would you be reading this?), you know that of course none of YC's printer advertisers would ever lie, or even stretch the truth a tiny bit. Nevertheless, no matter how much enjoyment those ads promise, today's printers can't begin to give you the fun that mainframe printers used to give us old computer geezers. Printers were always a great source of amusement for professional DPer's. You could always count on the printer to keep you amused when there was nothing else to do.

IBM made a large, work-horse printer called the 1403. One thing it could be used for was making music. The heart of the 1403 was a mechanism called a 'print train', which consisted of a bunch of letters stamped onto small pieces of metal. These were connected to each other to form a chain, perhaps somewhat like a freight train, and was driven around the mechanism by a motor. At the proper moment, little hammers in the device were pushed forward to slam the letters onto the paper.

Someone figured out that by printing the 'right' letters, in the right sequences and at the right times, the 1403 could produce 'music.' (Herbert von Karajan might hesitate to call it music, but then again, it was a helluva lot better than some of the stuff that the kids listen to today.) In those days, the study of music was believed to

be closely related to skill as a programmer, and that was one source from which the industry recruited programmers, so it was probably one of those folks who first noticed it.

Anyway, some enterprising folks (no one knew exactly where those card decks came from — they just seemed to appear in the computer room, somehow, perhaps a bit like the underground material circulating in totalitarian countries) spent many hours figuring out what to print, and how to print it, to make different tunes.

We had a whole drawer of card decks for making music, each appropriately labelled — Beethoven's Ninth, Petula Clark's Downtown, Happy Birthday, and so on.

---

## *Closely related to printer music was printer 'art.'*

---

When things got slow in the computer room — usually, around 11pm Saturday — you'd crank up the printer for some music. (This was always somewhat furtively, on the theory that even though it was a totally innocent activity, the bosses and managers would frown if they observed the worker bees seeming to enjoy themselves.) Little did we know: of course, they knew all about it, and they only showed signs of cracking down when someone began using a card deck that played a mildly dirty song (by today's standards it was quite innocent.)

Closely related to printer music was printer 'art.' We had several card decks that could print a 'picture' of a shapely lass in a provocative pose. After you printed it the first time, a message appeared at the bottom saying, 'To see more, turn on the next special switch.' (The computer that drove the printer had eight special switches that could be set by hand, and which a program could interrogate.) You'd throw the switch, load in the card deck, and the woman would appear with a bit less clothing. This went on for seven switches. When the deck was loaded in for

the last time, with all eight switches set as suggested, of course one expected to see the lady *completement au naturel*, as the French might say. (This being a family magazine, I thought it better not to translate that racy French euphemism.) That, of course, was where IBM got its message in. Any hint of raciness was gone. Instead, the last time around, the young lady appeared wearing a signboard saying 'Sorry, IBM can't do everything.'

The music ended when IBM put a motor-driven enclosure around the printer to muffle the 'noise,' but that was OK, because as inventive programmers, we soon figured out some new ways to have fun. Someone found out that there was a command that could be issued from a program to raise or lower the printer cover. When or if you wanted to bedevil the computer operator, you'd make the program raise or lower the cover a few times. This was always an especially good trick to do in the very wee hours, or with one of the operators who was a bit too fond of the bottle.

There was one thing that was absolutely guaranteed to drive the operators crazy. Formally, these were called 'high speed' printers, but they could be made to spit out paper, without printing, even faster than they'd print. You'd set things up so that the computer operator was safely away from the printer, then all of a sudden, make the printer start spitting paper so that the terror-stricken operator would have to race over to stop it. (Stop that snickering, kiddies. In those days, we weren't fortunate enough to have the wonderful toys and computer games you kids have today, so we had to make do with what we had and be grateful!)

One time, I almost got fired because of something related to a printer. I had a card deck that printed out a picture of Snoopy sitting on his doghouse. A colleague would notice it, ask for a copy, so I'd oblige by him my copy and printing another one. I decided the thing to do to save time was to print multiple copies, so I decided to run it on 6-part paper. Unfortunately, this whole scene was observed by a company vice-president, who hap-

pened to be in the vicinity. When he saw why the paper had to be changed, he was unequivocal: 'Fire the SOB!' Fortunately, he was taken to the hospital the next day with an attack of bleeding ulcers (I am not making this up!). In the excitement, his subordinates dismissed his outburst on the grounds that it was his ulcer talking, not him, and I was spared.

Ah, those were the days. Just try to have fun like that with today's printers!

Well, you've all been a lovely audience, and I'd love to say more about printers for micros, but as we say on American television, I see our time is just about up, my oh my, where did it all go? We'll see you all next month.

### News

Apple Computer made several highly interesting announcements recently at the MacWorld Expo, held annually in San Francisco. Apple introduced a family of three laser printers, replacing its current Laserwriter line. Apple's Laserwriter II printers carry list prices from under \$US2,000 to \$US6,600. Oddly, however, Apple's Laserwriter IISC (\$US2,800) will not be able to use Postscript software to print differing type fonts and styles — and it will connect only to one Apple machine! (And here we thought Apple had learned its lesson about open vs closed architectures with Lisa and the original Mac!).

Apple also announced a joint development effort — exact nature to be announced later — with Digital Equipment Corp, that will allow Apple hardware to connect to Digital hardware so that Apple machines can, for example, be used as terminals with DEC VAX systems. Up to now, this has been a small though burgeoning market for many small, independent companies which have made connectivity products for needs such as this.

### Short bytes

Some Compaq 386 machines rated at 'only' (!) 16 MHz are actually 20 MHz machines, using the higher-frequency Intel chip. Compaq apparently had to resort to the faster chips when it was unable to secure enough of the slower ones. It's nice to see users as the beneficiaries of a manufacturer's departure from specs, for a change!

□ **Mail Order Dealers, take note:** A dozen US mail order firms have formed the Micro Marketing Council, apparently stung by consumer complaints about shoddy or unethical advertising, marketing, and billing practices. The council will develop ethical guidelines for mail-order merchants.



# The Computer Trader

## HARDWARE UPDATE

(At these prices clones should not even be considered.)

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- \* 8088 CPU
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# CANBERRA COMMENT

## New Telecom communications links

The first links in Telecom's Integrated Services Digital Network (ISDN) are expected to be ready this year. The network supports voice, text, graphics and data with a socket in the wall for any type of terminal. The Australian network is similar to that proposed by other OECD countries.

Telecom is developing its high capacity digital network initially for telephones with extensions for ISDN. Later this year, primary rate access at two megabits per second will be available for Local Area Networks (LANs). Private Automatic Branch Exchanges (PABXs) will also tap into the LAN network this year. In 1990, Telecom hopes to have a basic rate access of 64 kilobits a second for terminals.

A government report on office technology says it is important for the Australian ISDN system to be ready at the same time as those in other countries or Australia will lose a competitive edge in computer linked networks.

The report goes on to say that organisations will develop office technologies with greater confidence if they know what the communication standards will be. Telecom is already telling customers about standards through its Telecommunications Industry Liaison Committee.

ISDN is probably one reason Telecom is proposed time rate charges for local networks. As local computer networks grow the extra revenue for Telecom from time rates will be enormous.

## Surveyors go for computers

Computers have made a major impact on employment in the surveying industry, according to a recent Senate Report.

Until the 1960s, surveying was unaffected by technological change. Then came new ways of taking measurements, including infrared measuring, and the use of laser instruments. Now satellites are being used to fix positions with Doppler instruments. Yet none of these changes have had any real effect on employment of surveyors.

The 1980s have seen extensive software development for surveying and drafting, reducing the time needed to do survey

work. As well, computers can now automatically transfer field data to office computers.

Despite the introduction of computers, surveyors have not lost jobs. The ratio of surveyors to new building construction has stayed constant. At present there are about 3500 registered surveyors in Australia.

However, according to the Institute of Surveyors modern computer drafting has almost eliminated the pen-in-hand drafts-person.

Engsoft Pty Ltd gave evidence which backed this claim to the Senate Committee. Engsoft's computer drafting system produces charts directly from a surveyor's calculations. Although no precise figures are available, the Institute of Surveyors believes technical drafting assistant's jobs are disappearing.

Government departments now using the Cadd (Computer aided drafting and design) system in Canberra are relying on consultants. At present there are not enough Government technicians with Cadd experience to operate the systems and this situation is expected to continue for some time. Meanwhile, Cadd consultants are making big money from government drafting offices.

The Department of Science report says Cadd reduces by 75 per cent the time needed for any drafting design. Applied to a large engineering program, computers could reduce the number of skilled jobs by about one-third.

## Australian computer exports

Many taxpayers believe only public servants live and work in Canberra, however over 40 per cent of the ACT workforce is privately employed.

Wang, for example, has been manufacturing computers in Canberra since 1983 and employing a workforce of about 160. The Wang plant is in a technology park near the Canberra CAE and the Bruce TAFE.

The Canberra plant was originally set up to service a Department of Social Security contract. The contract, which is now nearing completion, involves networking 210 Department of Social Security offices Australia wide. Another 80 administrative offices also share the system.

Over 10,000 color terminals, providing word processing data and graphics, are linked to 300 Wang VS computers. These in turn are networked to seven mainframes, one in each capital city. In addition, there are 1500 printers in the system. About 15,000 Social Security staff have access to the network.

On-line operations include enquiry, updating the database, training, assessment of claims and payment calculations. A Wang VS minicomputer monitors the entire system from the Social Security Department's centre in Canberra.

The Social Security mainframes hold records on 4.5 million Australians. Imagine what might happen if those mainframes are ever allowed to talk to the tax office computers...

Whenever Wang is mentioned you think of office word processors. However, word processors are now only about 40 per cent of Wang's sales.

The manager of Wang's Canberra manufacturing operation, Wes Smith, said Wang was no longer in the PC market in Australia. It does market a laptop computer which Brothers manufactures, however Wang now concentrates on minicomputers and office workstations where the company believes there are reasonable profits. Also Wang has just recently ceased making printers.

Smith says the manufacturing operation in Canberra is expanding through export sales. This involves building hardware with specifications for different countries. Keeping up with overseas specifications is one of the trickiest areas for any Australian manufacturer exporting products. At present, Wang is working towards completely automating its component board assembly line in Canberra.

Software is a vital part of any local computer operation. Recognising this, Wang spent three million dollars last year on research and development of Australia software.

Wang employs 1200 people in Australia and links its offices with an electronic mail network. The network has 9000 terminals world wide incorporating two satellite links.

Smith also believes that the next five years will see rapid expansion of microchip technology in Australia. □

# MICROCOMPUTERS IN EDUCATION

The Ministry of Education in Victoria (and other States) has recommended a number of PCs for classroom use giving teachers guidelines to follow.

Mark Kosten reports on four of the contenders . . .

In Victoria, four main computers are recommended by the Ministry of Education: the Apple IIe, BBC Master series, IBM IX and Microbee Premium. There are four others noted as being suitable for more advanced computing: the Atari 1040ST, Apple IIGS, Commodore Amiga and the Apple Macintosh. Also, a version of Logo was tested on each to see how they handle this simple and common graphics language.

## Apple IIe

How many people have not heard of the Apple computer, the machine that really started the whole PC revolution? Until recently the Apple II was the mainstay of the line. Amazingly, the II series did not alter significantly from when it was introduced in 1977 until 1986. There were the Plus, Europlus (with PAL card) and IIe (with a redesigned motherboard and more memory). The IIc model is almost aberrant in this line of computers, being portable and without option slots.

Most recently the IIGS was unveiled, upgrading the Apple II series significantly.

The Apple IIe embodies quite an old architecture in the 8-bit 65C02 processor running at 1 MHz. Nevertheless, in these days of 32-bit superminis, I am continually amazed at how much can be squeezed out of so small and ancient a microprocessor.

Arguably, the great success of the Apple IIe is its open architecture. There are

seven slots inside the computer that allow the addition of a multitude of peripherals, such as co-processors, parallel and serial ports, and modems. Over the years the number of peripherals that work with the Apple IIe has grown very large, and many of them are education orientated. Its proven track record and availability of a huge amount of software and peripheral hardware mean that a school buying into this system is unlikely to make a mistake.

The Apple IIe system reviewed came with the now standard 80 column card and added memory to make a total of 128 kilobytes. It also had, as standard, a super serial card (RS232 port) and a disk drive controller card. The unit had a colour monitor and two 5 1/4 inch disk drives. The keyboard is miles ahead of the original mushy one, and includes a numeric keypad.

Connections are simple as the plugs are all different, so it is difficult to go wrong. Power for the disk drives comes from the system unit, so at most two power cables are necessary, one for the system unit and

the other for the monitor. I do not like the system-on switch which is hidden in the back next to the power cable.

A colour monitor was a long time coming for the IIe. The IIe could always generate colour but its quite good resolution was wasted on low resolution televisions. The supplied unit is very nice, making readable 80 column monochrome text.

Originally, the Apple IIe only had its operating system, called Applesoft, in ROM. It is an extended Basic that allows saving of programs onto a cassette player. Later, when disk drives became available, a DOS was released. It resides on a disk and is loaded during booting up. This DOS was finally upgraded to version 3.3 and was later changed significantly with the introduction of ProDOS.

ProDOS is a hierarchical filing system; it can divide a disk into separate directories that are linked in a tree structure, where the root is the top directory, and the branches sub-directories. This system is necessary when disk capacities become large and a single directory is not able to hold enough files.

Software is supplied on one disk, ProDOS on one side and System Utilities on the other. The ProDOS side is for systems with less than 128 Kbyte of memory (such as older Apple IIs). The System Utilities side is for Apples with 128 Kbyte or more. They are basically the same, except the Utilities disk has more features and Help.

It should be noted that to move from older DOS 3.3 disks to ProDOS it is necessary to physically copy files off one disk and onto another. If you do not have enough memory you need two disk drives. Also, binary files and random access Basic generated files will not copy properly. DOS 3.3 Basic programs will probably have to be altered to work on ProDOS since it is a new operating system with different characteristics.

It is quite easy to get the system up and running, although the colour monitor is a

### AMSEC

THIS REVIEW was written by AMSEC consultant Mark Kosten. AMSEC is a Melbourne based software evaluation group with consultants in the workplace, in primary and secondary schools and in various tertiary institutions around Australia. AMSEC may be contacted at PO Box 140, Hurstbridge, Victoria 3099. □

beast, weighing much more than the rest combined. Fortunately, the top of the system unit is very hard plastic and able to cope — even if my arms couldn't! The door on the disk drive are also very poor, requiring some manipulation to open and close them.

The Apple IIe is not ergonomic nor is it particularly fast. Its builtin graphics and sound are not exemplary. It is also more expensive than its immediate competitors. However, it does have mountains of software and hardware peripherals to overcome some of these limitations. The solution to this problem is clear — perhaps its time the IIe is put to rest and thus allow the Apple IIGS to become the mainstay?

### Product Details

Product: Apple IIe  
 From: Apple Computer Australia  
 16 Rodborough Rd,  
 Frenchs Forest 2086 NSW  
 (02) 452 8000  
 Price: \$1495 for Apple IIe with mono monitor, 5¼ inch Unidisk, Apple Logo and AppleWorks.



## IBM JX

The IBM JX is rather unusual as far as the IBM product line is concerned. It was made in Japan for the Asian and Australian markets *only* and significantly differs from other IBM PCs in appearance and functionality. The JX runs its own version of PC-DOS using 3½ inch disks and a slightly different colour graphics standard. The keyboard is very different. Indeed the standard version is a bit of a disaster in that a couple of keys from the IBM PC keypad are missing.

A better than average, medium resolution colour screen is standard on the JX. The colour graphics card is an improvement on the standard CGA card of the IBM PC in that it allows for 16 foreground colours, compared with 4 on a PC. The builtin tone generator has three voices (compared with one on a PC) which may be programmed in parallel to produce three-part harmony. An enhanced version of Basica (which resides in ROM) allows full access to the improved colour graphics and tone generation.

The JX uses the 8088 processor, but the motherboard is completely different to the IBM PC. Surface mount technology



and LSI chips keep the board simple and should cut down on breakdowns. Under the disk drives are two slots for ROM cartridges. These are fairly rare as they are actually from the IBM PC Jr.

Although the processor works at 4.77 MHz (the same as the IBM PC), the computer is overall quite slow. Even Norton's SI shows a relative speed index of 0.9 compared to a standard PC. This criticism is perhaps rather unfair, though, as it must be kept in mind that the JX is more akin to the PC found in the corporate office than the company it keeps in the classroom. In the educational environment it is a very powerful computer.

The JX is not really an IBM PC compatible, but an IBM PC Jr compatible. The PC Jr was released in the US by IBM as the af-

fordable education/home computer. Actually, it was not affordable in comparison to its competitors so customers stayed away in droves. IBM's first PC clunker.

By contrast, the JX has been quite successful in Australia. There is now a selection of educational software available for the JX consisting of software originally written for the IBM Jr or compatible PC software transferred to 3 1/2 inch disks. Being 95 percent compatible, most of the Public Domain PC software runs on the JX. Still, this does not compare with the mountain of educational and home-use programs available for the Apple in particular. Nevertheless, the JX is the only computer that can really transcend the education market and reach the home and business areas of computing.

This is all very well, but when all is said and done the JX is, in fact, no more. Although it has been discontinued by IBM, there are still some left with dealers who are selling them at very low prices. It is only a matter of time before IBM releases the PS/2 Model 25 as its education model for Australia as it has done in the US.

### Product Details

**Product:** IBM JX  
**From:** IBM Australia  
 Connara Ave, Pennant Hills 2120 NSW  
 (02) 634 9111  
**Price:** \$1812 for IBM JX with colour monitor, dual 720 kilobyte 3 1/2 inch disk drives and PC-DOS 3.2

## BBC Master Series

The BBC Master range of computers is made by Acorn Computers in Britain in association with the British Broadcasting Corporation. It was for a time one of a few high quality 'home grown' computers from Britain. It was certainly the only one that was designed for, and aimed at, the education market from the very beginning.

The Master Series came out 1986 and considerably enhanced the BBC line. The range is based on the Master 128, which uses the 65C12 processor (similar to the one in the Apple IIe, but faster and more powerful). This can be upgraded with the addition of co-processor boards, including one that runs MS-DOS (similar to the IBM PC). There is also the Master Compact, which is physically smaller and uses only 3 1/2\*thinch disks.

The computer is quite large for its type. The system unit includes the keyboard, slots for ROM cartridges and a multitude of ports for connection to other equipment. The ports are located under the unit in a recess, making them inaccessible unless the unit is turned upside down. The keyboard is full featured but the right side, with arrow keys, is rather haphazardly laid out and the function keys are numbered 0 to 9.

The Master 128 maintains compatibility with the earlier models A and B, thus accessing a stock of excellent educational programs. It is considerably more advanced than the previous range. The Master 128 includes an area of ROM separated from the main block and the ability to take co-processor boards.



The extra memory is significant because, as with many older processors, software requirements have outgrown RAM. By using extra banks of memory that are switched in and out as necessary, it is possible to plug in ROMs or load them off a floppy disk and not diminish memory that is required for graphics or workspace. This extra memory is called 'sideways' ROM/RAM, of which there are four.

The ROM programs can be bought as ROM cartridges and plugged into the two slots just above the keyboard or they can

be bought on diskette and loaded from there.

It is possible to use cassette tape as the storage medium for programs but this is, after all, the 1980s. Disk drives are certainly recommended *but* — there are two disk filing systems, DFS and ADFS. ADFS is more advanced and includes a hierarchical filing system (with subdirectories) and the ability to use 3 1/2 inch disks. ADFS cannot be read under DFS, preventing backward compatibility for those schools which have older BBC micros.

A unit housing two 5¼ inch drives was supplied with the review machine. They worked without incident and must be seriously considered unless the system units are part of a network.

The monitor was a non-standard colour screen which had nice resolution but was rather bulky. The colour certainly enhanced the programs used.

I did have one problem with the BBC. I found it unbelievably complicated to operate in comparison to the other computers tested! If it has to be used outside of a standalone program some knowledge of its complex memory configuration and sideways memory is required. My feeling is that operating this machine fully would be too complicated for primary school kids.

#### Product Details

Product: BBC Master 128

From: Acorn Computers

Review copy from:

BBC Centre 2000, 423 Clarendon St,  
Sth Melbourne 3033 Vic.

(03) 690 8180

Price: \$2018 for unit with 3½ inch disk drive, HPD-10 colour monitor, monitor stand and software.

## Microbee 128 and 256TC

Microbee Systems started in a very small way some 8 years ago making a do-it yourself kit. In this kit was the first model Microbee containing a Z80 microprocessor. It could run CP/M (the ruling operating system of the day), use disk drives and make relatively high resolution graphics. At the time it was fantastic value for quite an advanced system.

Education departments of the various states picked up the Microbee, particularly in NSW, so moving it from a hobbyist's computer to an education computer very quickly. Unfortunately, the past few years have been very tough for Microbee Systems. The Microbee did not keep pace with technological changes and development of new computers challenging the Macintosh and Amiga slowed down.

Recently Microbee was acquired by Impact, a manufacturer known for its laser printers, so perhaps the injection of fresh capital will revive the 'bee.

I had two Microbees to review, the 128K model and the 256TC. The 128K is very



familiar, with the small keyboard/system unit virtually unchanged from day 1. However, with the supplied dual 3½ inch disk drive unit and monochrome monitor, the Microbee system turns out to be quite bulky. It follows the same style of keyboard/system unit as the 128K model, but has a much better keyboard, with all the IBM PC keys, and an integrated 3½ inch disk drive.

Both computers use a Z80 chip, which must be considered *passé* now, but then the other units tested are hardly in the forefront of microprocessor technology either. As you have probably guessed, the 128K model has 128 Kbyte of RAM memory and the 256TC has 256 Kbyte. They use CP/M as the operating system which has been altered to use Z80 instructions, so it is slightly more interesting to use than the CP/M most of us grew up on.

Fortunately, using these Microbees does not require extensive knowledge of CP/M. They are supplied with Shell, a layer on CP/M that uses a graphic screen to help the user access files, run programs and perform routine chores, such as formatting and sysgening new disks and backing up. Shell is very simple to operate and a worthwhile addition, especially for the younger computer users.

#### Product Details

Product: Microbee Premium

From: Microbee Systems

Review Copy from: Microbee  
Computer Centre, 164 Kingsway, Sth  
Melbourne 3205 Vic.

(03) 696 3111

Price: \$1497 for unit with colour monitor, 3½ inch disk drive and WordStar Professional.

*Education departments of the various states picked up the Microbee, particularly in NSW, so moving it from a hobbyist's computer to an education computer very quickly.*

## Logo

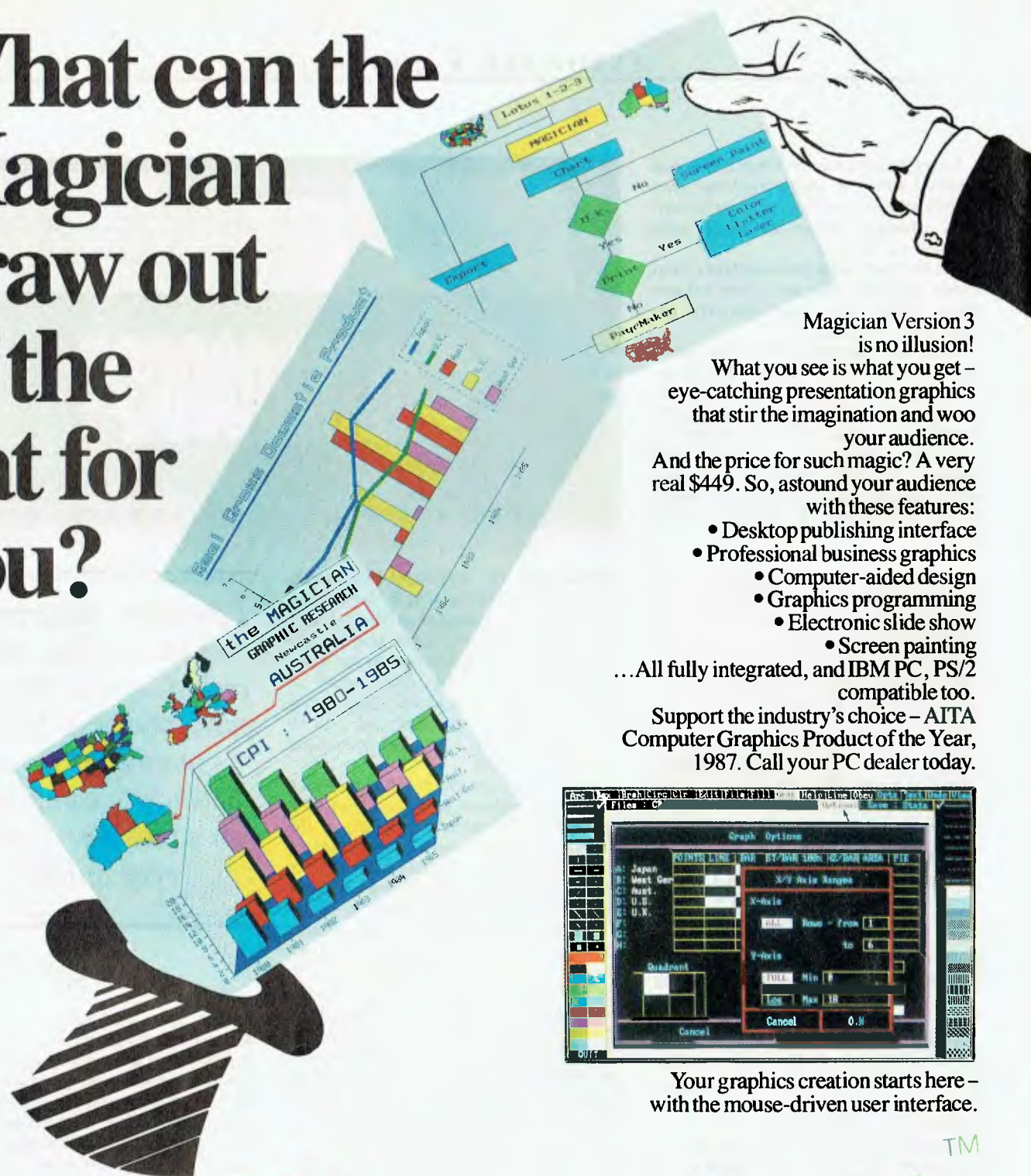
Logo is a computer language that manipulates graphics. It has become immensely popular for teaching children how to program, make graphics and introduce them to computers. I tried a version of Logo on the four review computers and all I can say is they all worked very well and virtually all in the same way. Naturally, there are different implementations of Logo with their own idiosyncrasies, but learning Logo on any of these computers is more than acceptable.

#### Summary

These four computers are very different. They are essentially incompatible and really should not be mixed in the same classroom. I would say that having more than two of the four in a school would be inefficient, involving a lot of effort supporting them.

The four education computers's Achil-

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les heel is also their greatest asset — they are old technology, but because of this there are many, many programs available to do and teach just about anything (although, this is arguable for the IX). Unfortunately, PCs change so rapidly with new models and software that it is possible a conservative approach to choosing com-

puters for the classroom can lead to a form of computer illiteracy.

The Apple IIe, BBC and Microbee machines have been around for a long time. Attempts to make them easier to use, more kid-proof and upgrade performance have been varyingly successful. The Apple IIe is probably the least changed, which

shows what a brilliant concept it was in the first place. The BBC and Microbee have both undergone significant model revisions, with different operating systems and incompatible hardware. By no coincidence, they are also finding it the most hard going in today's education market.

Acorn, Apple and IBM have or are rumored to have, new computers that are waiting to take over from their previous mainstays in the education market, with snazzy graphics, sound and at least some compatibility with previous models.

It is interesting that the 'specialist' computers recommended, the Macintosh, Apple IIGS, Commodore Amiga and Atari, and recently the Acorn Archimedes (at least in West Australia), are clearly where the future of school computing is going. Expensive? Yes, but what fun the kids will have! □



**Product Details**

Product: Logo  
 From: Prologic, 19 Cato St, Hawthorn East 3123 Vic.  
 (03) 209 0222  
 Price: \$165 untaxed for Apple IIe. Price range for Logo varies up to \$800 depending on machine and capabilities.

*Note: All prices quoted in this article are the recommended education prices. Any queries concerning the computers mentioned here should be directed to the companies quoted under Product Details.*

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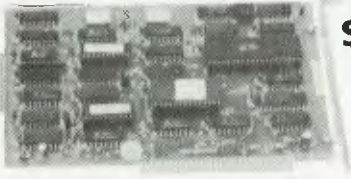
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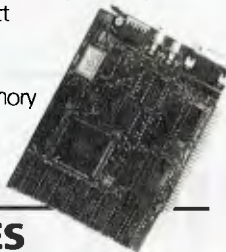


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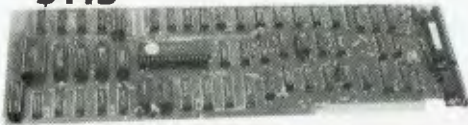
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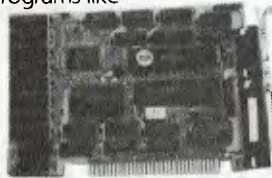
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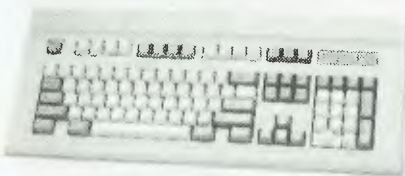
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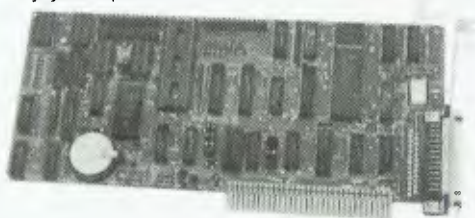
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# Active Learning Systems

## Delivering the World!

Having the right product isn't enough: the market must be ready for it, too.

**A**CTIVE LEARNING Systems of Queensland promised the world and they seem to have delivered with their range of educational databases: One World, Australia: A Profile, Hometown: A Local Area Study, and USA in Profile. Sales have been strong in the US (helped by the US National Education Association's 'seal of approval').

But they haven't been quite so successful at home. As ALS Software Development Manager Mari Gray pointed out: 'A lot of schools don't even have computers. (We're lucky in Queensland, the government has installed IBM computers into every High School.)' ALS has also found that many Australian teachers are slow to accept the use of computer software as text and reference material.

*'US sales will actually be subsidising the Australian school market.'*

These are problems that all Australian education software producers are facing and ultimately many, like ALS, will turn to a more advanced, concentrated market like the US. As Gray puts it, 'US sales will actually be subsidising the Australian school market.'

The long road to developing a strong and respected software house started in a garage hidden away in the holiday village of Byron Bay NSW. Now, its products are on the recommended software lists from

California to New York; the Michigan State Government were so impressed with ALS they were given a grant to set up an office there. Recently, they have been concentrating their efforts in California and Queensland because 'they are more progressive in education' (Gray).

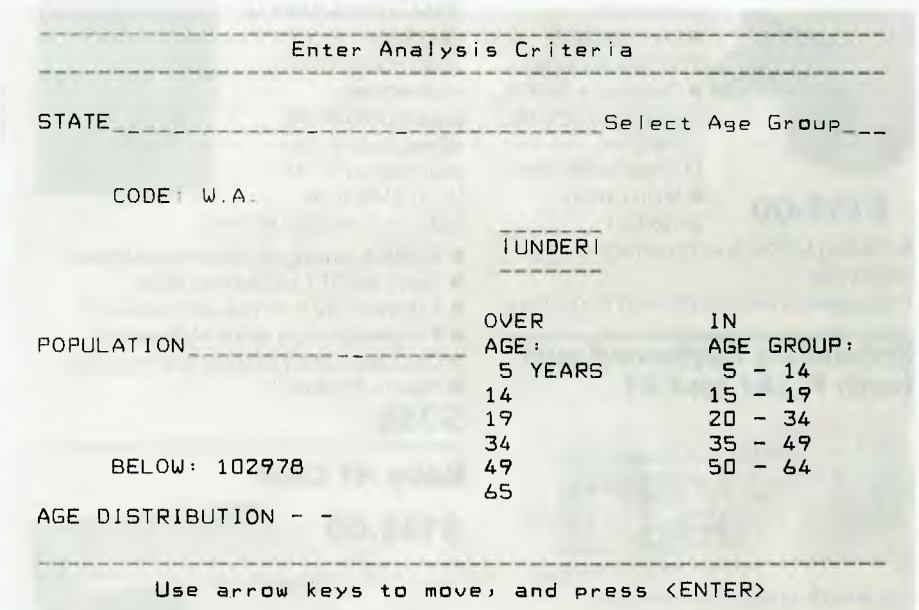
Gray, a former Melbourne primary school teacher, stopped teaching when she had children. Later, 'I wanted to contribute to education, but I didn't want to go back in the classroom.'

While never particularly interested in

computers, Gray decided to take a course in Fortran to 'keep a friend company', and found she really enjoyed it.

With the financial support of a private investor, she then set out to develop programs which 'actively involve the user in data manipulation, interpretation and collection; categorization and classification; analysing, generalising, and drawing conclusions.'

Most of the excitement at ALS these days is over the release of Algebra Graf(x), the company's first mathematical program



**Figure 1.** *Australia: A Profile* is a database with information compiled for the 142 Australian Bureau of Statistics' regions. Information covers major towns, area, population, growth, age distribution, birthplace, school leaving age, housing, employment, vehicle ownership, and industrial and agriculture activity.

which is designed for use at any grade level and in any subject where graphs, equations, functions, algebra and trigonometry are encountered. The program not only plots mathematical functions, but enables the user to enter and edit the equations on the screen, and to be compared with graphs of other equations.

Quizmaster is the most recent offering — it allows teachers to put in their own data which can be used for revision and testing. Gray describes it as 'a fun way for kids to be tested on factual information and ... they can research topics that are of interest to themselves, and create their own games' based on that research.

The first program out of the ALS stables was One World which covers 178 nations with 33 fields of data, including the country's geographic location, regional grouping, population, area, exports, religions, type of government and a host of economic statistics. An option in which the user can compare up to three of 20 types of information aids analysis of the statistics; for example: How many French speaking countries export copra and import coffee? (Only one: Comoros in the Mozambique channel.)

Following close on the heels of One World came Australia — a Profile and USA in Profile. Designed as companion packages for One World, they are a comprehensive file of the statistical information on 142 regions in Australia, and the 50 States of America. While similar in structure to One World, these two contain more social and demographic variables such as percentage unemployed, number of cars, and individual and family income.

ALS literally localised their ideas to develop Hometown — A Local Area Study. This program utilizes the natural interest everyone has in their hometown to motivate students. Working much like a database manager, Hometown provides a framework for storing and retrieving information about the local community. With it, students can conduct surveys, collect and analyse data and design reports based on the results.

According to ALS, the State Education Departments of Victoria, New South Wales, the Northern Territory and Independent School Systems in the ACT and NSW have recently placed bulk orders; the Western Australian Education Department was the first — in 1984 it purchased 250 One Worlds for use in its schools after 'rave' reviews from department officers. All Active Learning System packages were

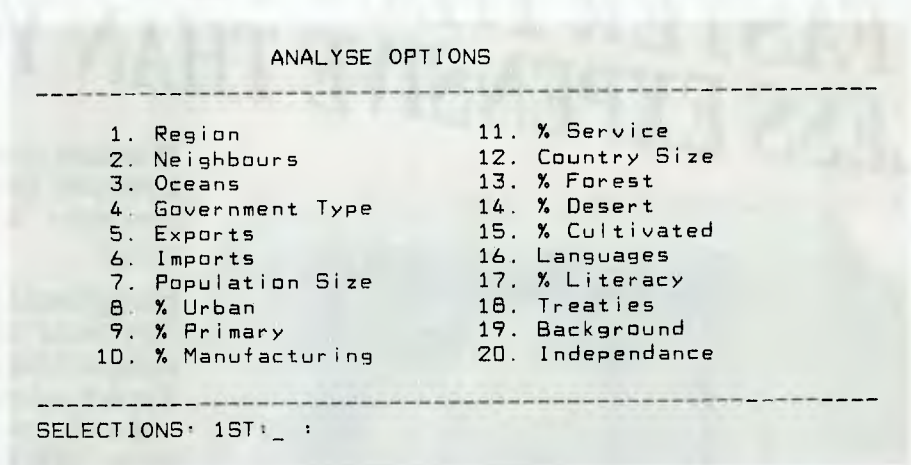


Figure 2. One World contains demographic and geographic information about all the countries of the world. A companion manual has maps, general notes, reference tables, as well as a guide to the program.

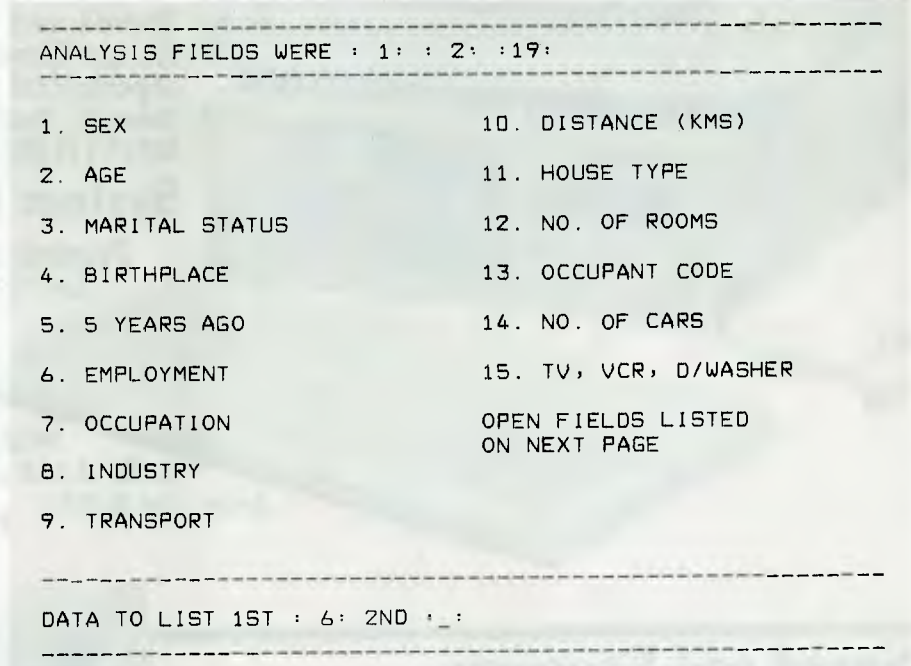


Figure 3. Hometown provides a ready made framework in which students can store, analyse, and compare information collected in field surveys.

developed for use on the Apple II series, IBM PC, Commodore 64, Microbee and BBC machines, except Algebra Graf(x) and Quizmaster which will only be available for IBM and Apple II series computers. 'Most schools concentrate on MS-DOS and Apple systems, and that is the market we are aiming for,' said Gray.

Each package comes as two diskettes, a comprehensive instruction manual, a

step-by-step user's guide, maps, teacher's notes and extensive classroom materials ready for duplication. Gray admits that the packages are a little dearer than the competition's, but thinks the programs are more than a little better. And — registered users get their packages updated regularly with the latest information. If you'd like to know more about ALS' range, call them on (07) 350 2500. □

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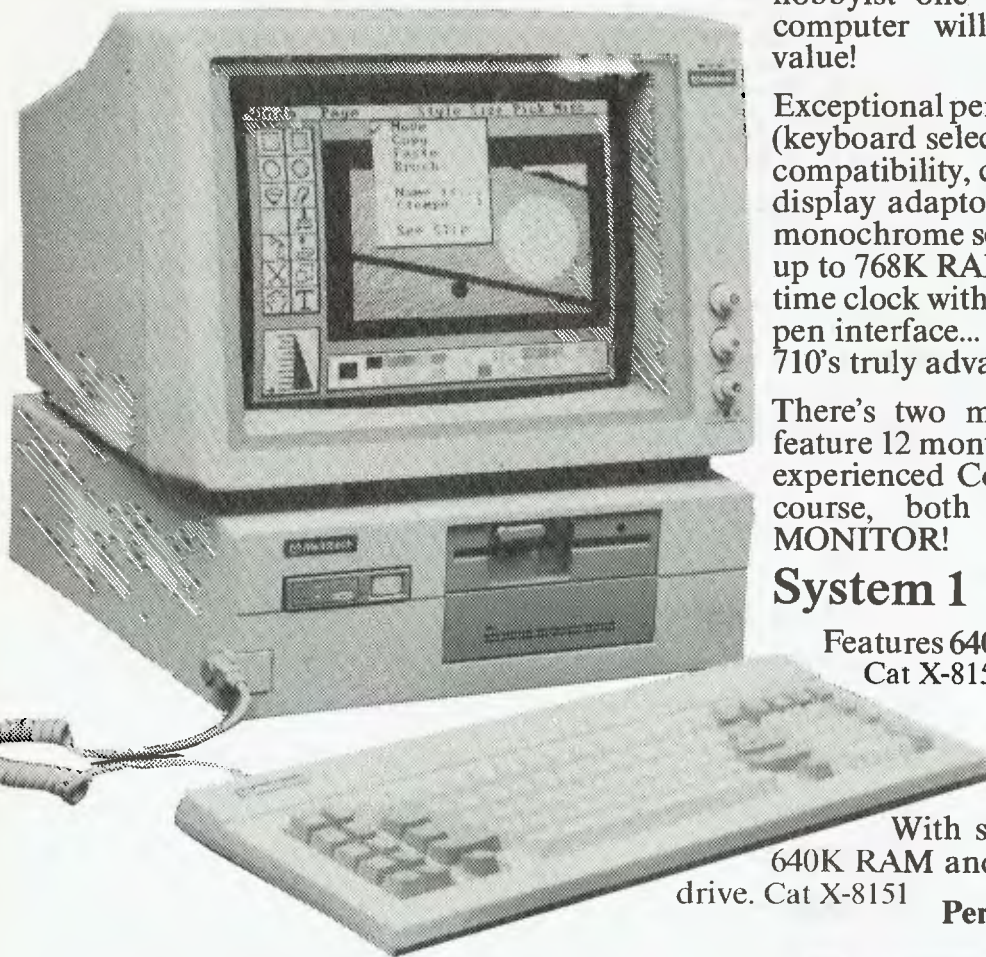
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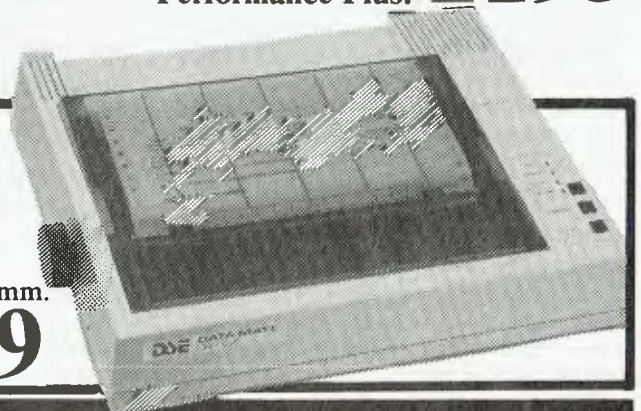
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# The Acorn Archimedes

Our resident alternate microprocessor architecture guru, Roy Hill, is impressed with the latest offering from the makers of the BBC (but he's not ready to buy!).

**T**HE LONG-AWAITED Acorn Archimedes has finally arrived! If you've read my recent articles in YC on the Novix chip and the Transputer, you'll have realised that I'm highly interested in the technological advances being made in the area of alternate microprocessor architectures. Here, at last, is a chance to see whether the goods are being delivered, or whether it's all just sales and backroom hype.

The Archimedes was delivered in two large boxes — the system unit in one box and the monitor (they seem to get heavier and heavier) in the other. I opened the system unit and my first impression was that a lot of thought had gone into the presentation of the machine. The manuals were in their own individual compartments and not just thrown into the bottom of the box. In fact, I have become used to assembling, installing and testing machines with no instructions at all. The review machine supplied was the Model 310, which contains 1 megabyte of RAM, plus 240 bytes of battery-backed CMOS RAM, 512 Kbytes of ROM and an 800 Kbyte 3½ inch floppy drive.

The system unit is extremely light — so light, in fact, that my 12 year old daughter Janelle was able to handle it with ease. I am used to hefty machines with hefty power supplies (and hefty price tags), so this was quite a surprise. The keyboard is an (almost) IBM extended type. The difference is in the last row of keys on the numeric keypad. And this was where the first minor irritation arose: the plug for the keyboard is one of the newer 'IBM Mini' styles and is located in the lower front recessed portion of the system unit. Full marks for placing it in the front, deduct 10 for making it so hard to get to.

I had to get down on my hands and knees in front of the unit, with a pencil torch in my mouth, to plug in the keyboard. I guess this isn't a major hassle, as one wouldn't need to remove the keyboard often, but it did take about 10 minutes to install it properly. The function keys (12 of them) are red, which is a remnant from the old BBC machine, also



made by Acorn. Note the adjustable plastic prompt card window, which contains a replaceable, application specific card — very handy.

The Archimedes is also supplied with a three button mouse which plugs into the keyboard — the left button selects, the middle one brings up an appropriate menu and the right is used to alter. An excellent feature is that the menus pop up at the cursor location rather than at the top of the screen.

The monitor, which carries the Archimedes logo, is a Taiwanese RGB and is quite hefty. It took Janelle and myself quite a bit of juggling to take it out of its box. It was here that a *big* fault appeared. The makers had placed it inside a fairly thin polythene bag, which was obviously not static proofed. As I removed the bag from the monitor, the hairs on my arms fairly stood on end.

This served as sufficient warning to take more than normal care, so I connected the

signal cable (a bit too short for my liking) to the monitor and held it against an earthed power supply I had on my workbench. Sure enough, a 20 kV (plus) spark jumped from the pins to the case of the supply. I can only speculate on what would have happened if I'd connected it directly to the Archimedes.

The power cables for both the Archimedes and its monitor are the new triangular (IEEE) style and the monitor plugs into an outlet in the system unit. A 10-point bonus here — both the monitor and the keyboard plugs (both male fittings)

(which is really the Basic Reference Manual). Both manuals are well laid out, and in most cases easy to follow. The manuals are as good as most I've seen, but still fall short of what I consider to be appropriate.

A Music Editor program is provided with the Welcome Disc. The instructions in the manual are sufficiently vague to make it necessary to experiment before it becomes clear just what the documentation means. Also, several functions didn't work as expected, and when I tried to save part of a small piece of music, the machine just *beeped* at me rather unhelpfully.

and speedily responsive. No over running or undershooting — a pleasure to use.

The power of this machine is evident in the game — the 'lander' is a 3D figure with full rotation and tilt. It travels over a real time 3D landscape, drawn in 16 colours, using fuel (every time you boost the lander a multi-coloured ion stream is ejected) and destroying objects (which explode in multi-coloured particles). The landscape has contours and other geographic features, as well as a seascape. Pretty impressive, eh? Would you believe me when I tell you that it runs in interpreted Basic? Indeed it does — so does the window manager program. If anyone disbelieves that RISC-based computers can give standard Von Neumann processors a caning, let him try Archimedes. Other software on the Welcome Disc provides a Notepad, Calendar and Paint function. All of these worked as expected.

### I/O

The rear panel of the system unit is fairly bristling with I/O facilities, including a 32 ohm outlet for stereo headphones, a mono (composite) video adapter, the CGA adapter, the RS423 serial port, the Centronics parallel port, the Econet networking port and the power inlet and switch. At the top left hand side of the rear panel can be seen the two 'podule' expansion units. These can be used for adding anything from a second processor card to a networking adaptor. However, it is unlikely that Acorn will be swamped with calls from manufacturers desperate to produce 'podule units,' so Archimedes purchasers will probably have to rely on the boards that Acorn themselves produce.

Opening the system unit is a fairly trivial matter — it has to be, as the battery backed clock takes 2 AA sized alkaline batteries. (I am at a loss to explain why Acorn didn't opt for either Lithium cells or Nicads which last much longer. Acorn seem to have really tried to perform well on presentation but have missed out on several details like this.) There are three screws located at the top of the back panel and one on each of the front side panels. With these five screws removed, the top simply slides to the rear.

This exposes the fairly sparsely populated interior, which in the unit I evaluated only contained the motherboard, the floppy drive and the power supply. The latter is fairly interesting in that it supplies power to the motherboard via a series of spade lugs, rather than a polarised power connector. (Anyone removing the motherboard from the system unit had better



**Figure 1.** The keyboard is similar to that of an IBM AT — the red function keys are a remnant of the old BBC Model B. Note the adjustable plastic prompt card window, which contains a replaceable, application specific card.

were provided with dust covers. The mouse came in its own little dustproof plastic bag, so once again, some thought has obviously gone into presentation.

The model I received for this review was one level above the base grade model and only had an 800 Kbyte floppy installed. The only software supplied with the machine is a Welcome Disc; any application programs will cost extra. Basic is provided both in ROM and as a RAM executable floppy file, and is quite adequate. The floppy drive is located on the front right of the system unit, and the whole section is tilted upwards at an angle of about 10 degrees, which makes inserting a floppy that much easier. The floppy drive also comes with a yellow plastic head protector, which is used to prevent any shipping damage.

### Documentation

At this stage, I thought it wise to consult the manuals, as I was about ready to fire up. There are two manuals provided, a Welcome Guide and a User Guide

There was no error message, and nothing in the manual either. I must have half expected this, as I had only entered 5 or 6 bars before trying to save it. I contacted the distributor, who promised to send me an updated Welcome Disc (I'm still waiting for it!).

### Lander

The disc also contains several other small applications programs, as well as a game called Lander. I had seen this game demonstrated at a sneak preview of the Archimedes, back in September and was anxious to obtain 'expert' assessment of it. My three children — Cameron, Andrew and Janelle — are all game experts, having conquered Sammy Lightfoot, Archon and Donkey Kong on the Apple. They were unanimous in their assessment of Lander — the graphics are incredible!

I think they would have preferred to use it with a joystick, but the mouse was acceptable. In fact, the mouse is one of the best I've used. It was both highly sensitive

make a good note of which connector goes where.) The power supply is one of the switched mode variety, which helps explain the low weight of the system unit. It has plenty of reserve connectors for adding podules and a hard disc.

### The Motherboard

The first thing of note about the motherboard is that Acorn have placed all the normal 'glue' logic inside PALs (Programmable Array Logic). There are three of these (aside from the ARM processor itself), with the fascinating names of Anna, Albion and Arabella. They all bear the Acorn label, so were evidently made for Acorn by an Asian firm (Acorn are now part of multinational Olivetti). The operating system and Basic are stored on the four ROMs in the rear right of the board; they are labelled ARTHUR1 through ARTHUR4 (obviously Acorn have 'seeded' this board with the letter A.)

The ARM (Acorn RISC Machine) processor is the biggest of all these chips and is located underneath the floppy cable. The chip is a 32-bit, 8 Mhz RISC (Reduced Instruction Set Computer) based processor. In this case, clock speed is not a valid indicator of processor performance. It is quite possible to have an 8 MHz RISC processor running at 10 to 15 MIPS (Million Instructions Per Second). To give an idea of the speed, Acorn claim 4901 Dhrystones/second (a measure of computing 'efficiency') for the A310 model, while quoting 458 for an IBM AT and 3748 for a Compaq DeskPro 386.

This is another advantage of using CMOS RISC processors and gate arrays. They consume less power and thus run cooler. In the centre right of the board is a huge 3 x 32-pin connector, which I can only assume is provided for podules. There are several other connectors dotted around the board, so at least Acorn seem to have designed this machine with the future in mind.

### Software and the Operating System

As I mentioned earlier, BBC Basic is provided in ROM and as a disc file, and is fully described in the Basic Reference manual (part of the User Guide). As one would expect, it contains all standard Basic commands, as well as those necessary to address I/O devices, including direct addressing of screen locations and disc files. The Reference Manual is 490 pages long and covers most of the commands reasonably well. An exceedingly brief summary (just enough to be danger-



**Figure 2.** The rear panel of the system unit with a 32 ohm outlet for stereo headphones, a mono (composite) video adapter, the CGA adapter, the RS423 serial port, the Centronics parallel port, the Econet networking port and the power inlet and switch. At top left hand can be seen the two podule expansion units.

ous) of operating system commands is given in Appendix C and the I/O call summary in Appendix D.

I have a big complaint about the I/O commands — they all commence with the '\*FX' prefix, followed by one or more numerical parameters. They make no attempt to be mnemonic so that the system programmer will have to keep the reference manual close by whilst writing programs. System level work is difficult enough, without having to continually refer to a manual for command syntax.

Other software stored on the Welcome Disc includes '65Arthur,' which enables the Archimedes to run existing BBC programs, FPEmulator (a floating point emulator used by compilers), WIMP and RAM Basic, neither which worked due to a 'System reported error. No room in RMA.' No explanation in manual, either. I think a little more work is required in the documentation department. In fact, none of the files worked as I would have expected.

As mentioned above, I contacted the Australian agents for the machine who promised to send me an upgrade disc that fixed these various bugs but since that was never forthcoming, I can only guess that it does as promised. If their 'before sales service' is that slack, I can't help but wonder what it's like after you've handed your money over.

### Summary

At the price of the Model 310 Archimedes, would I buy it? Well I think I'd wait just a little while, until the promised MS-DOS podule with an 80186 is available and then I'd probably be in the market. The MS-DOS podule promises IBM compatibility, so one could have the best of all

worlds. In my opinion, processors like the 80xyz, 68abc and 32efg have had their day. The Archimedes (and the Amiga, which is reputed to be coming out with a transputer as its processor), plus the Novix Forth chip are examples of RISC type processors and I am sure this is the processor of the future. Also, I have my doubts about the supplier coming to the party with upgrades once the mandatory warranty period expires, given their sluggishness in responding to my request for additional information and the bug free Welcome Disc. □

### Product Details

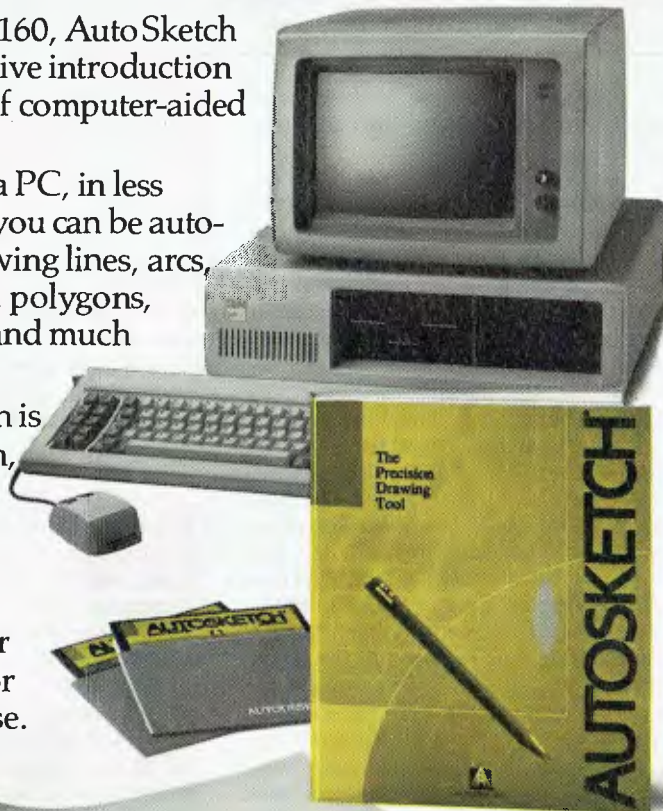
**Product:** The Acorn Archimedes  
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**Price:** \$800 colour monitor  
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 \$2750 Archimedes 310 system unit  
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**L**ASER PRINTERS come in all sorts of sizes and configurations. You can find a model to suit your purposes, whether it be for simple word processing printouts, page-makeup using desktop publishing software, bar-code printing, or an office workhorse capable of handling a number of applications with a high throughput and a long life with few maintenance worries.

Within the range of laser printers presently available, there are 6 and 8 ppm (page per minute) models which sell for around \$4000. You can get 10 and 12 pages per minute for \$7600, and 15 for \$13,000. However these printers should not be judged on their rated page output alone, since there are other factors such as the number of fonts available, the amount of printer RAM for page manipulation and font storage, and the inclusion of a DTP language such as PostScript.

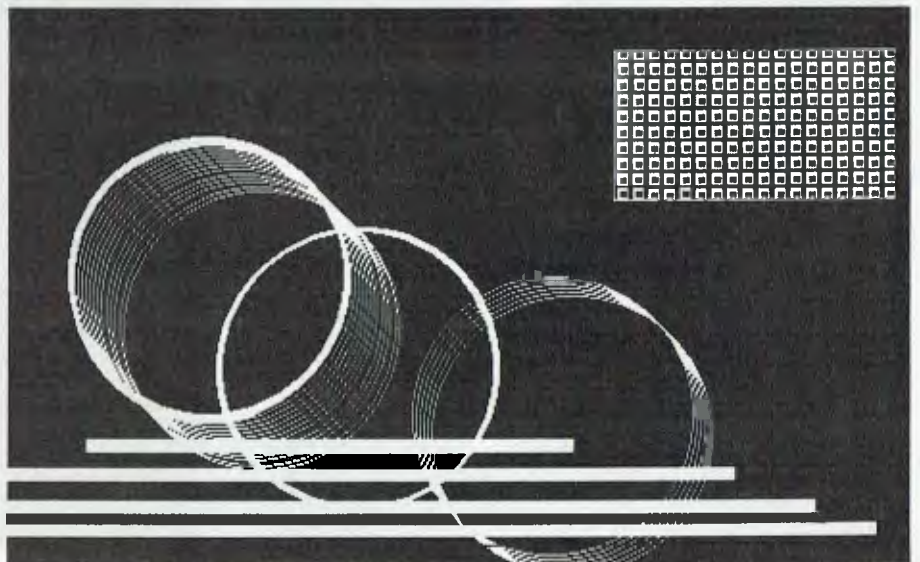
At the upper end of Mitsui's range is the Ricoh LP4150, described as a desktop unit, with the capability to print at up to 15 ppm. (These ratings should be taken only as a guide — the actual throughput is going to vary enormously with the application.) It comes with 1.5 Mb of standard RAM, expandable to 2 Mb. It is designed for volume office work, and has a duty life cycle of 1.5 million pages.

For this, you pay just under \$11,000 which makes the LP4150 good value at this end of the market. You get as standard, eight resident fonts, dual paper input trays that hold 250 sheets each, and a dual stacking paper output system. All fonts are available in landscape or portrait format, and nine barcode styles are also available.

The printer took just under half an hour to set up, and full instructions were pro-



*The top-of-the-line, 15ppm Ricoh LP4150.*



*The LP4150 gave the 'truest' black we've seen from a laser printer.*



## Part 1

# PRINTERS

## Lasers, Inkjets and Thermals

No doubt about it — laser printers are the way of the future. In the last 12 months the price of entry level machines has dropped by almost one third, the number of available brands has almost doubled and the machines have gotten smaller and more powerful. But if you're interested in graphics, an inkjet printer (about one quarter the cost of a laser) could well be all you need — and they print in color. And for something different, there's always a thermal printer . . .

IT IS NOW possible to buy an entry level laser printer for less than \$4000. At that price, letter quality, low noise production, and the ability to combine text with graphics becomes an attractive proposition for small businesses and some home users. Apple has released its new range of LaserWriters and Hewlett-Packard has its new LaserJet Series II printers, both under \$6000. In the last twelve months a number of other new brands and models have found their way into the market, but the technology is still generally based around either the (second generation) Canon laser engine or the newer Ricoh engine.

In this survey, the latest offerings from all of the major suppliers have been listed, and we've included a few of the lesser known ones, too. Not every laser printer on the market is here, so use this survey as a guide to only — you should have a fairly precise idea of the features you want and the money you can spend *before* you go shopping.

When choosing a laser printer, bear in mind that although they all give 300 dpi (dots per inch) resolution, they may have other features which you could find useful for your particular application. Some new models, such as Texas Instrument's Omnilaser 2106, offer increased compatibility and flexibility with PostScript. HP LaserJet Plus and HP Graphics Language plotter emulations as standard. Others, such as the new Canon LBP-8II have features such as rectangular painting patterns, startup macros, raster and vector graphics, page overlay, and multiple overstrike

Most of these machines have quite a small footprint (and are light) when compared to first generation laser printers — generally around 450 x 480 mm for the Canon based units, and 400 x 410 mm for the Ricoh. When you are looking at laser printers, you will notice that several brand names might share a remarkably similar looking outer casing; some can only be identified as being different by looking at the logo. This isn't a new development in the burgeoning world of computer hardware clones — it's a reminder not to judge a printer by its cover.

Printer A might be going cheap, but looks exactly the same as printer B. Don't buy it unless you have checked out what both A and B have on offer beneath their lids. Work out first of all what you want the laser printer to do for you. Look at the software for desktop publishing (or any other application you'll want the printer for) before you rush out and buy one.

Do you want to simply print high quality letters from your word processor, or do you require something a little more flexible? Now you can more or less purchase several printers in one, and you often a number of printer emulations as standard.

This is made possible through installing the various emulations into the printer's RAM. Many of these machines have more RAM than their host computers, and this can also be a big plus, since it means that fonts can be downloaded into the printer's memory, thus freeing up space in the memory of the host computer.

Other ways and means exist whereby fonts are made accessible to the printer

through the use of cartridges. These can be plugged into a slot, or slots, in the side of the printer. Again, before you buy, check with the specifications to see just how many of these font cartridges are available, if they are suitable for your applications, and how much they are.

Paper handling also varies between the machines, and most manufacturers offer an optional 250-sheet input tray. The more expensive machines are geared up with two input trays and an output tray which can handle 500 sheets. Paper up to legal size, standard photocopy paper, coloured paper, transparencies, letterheads, envelopes and labels can all be handled by most of the laser printers we surveyed. Also, in most of the newer machines, the stacking of pages face down as they are printed saves re-shuffling, some machines even offer a choice of face-up or -down output.

Most printers now have both RS232C serial and Centronics parallel ports as standard equipment. Some have extra interfaces installed or available as options.

There are many factors involved in choosing the right laser printer. Hopefully, our survey will give you some ideas about where to start, or, if you are already a laser user, it will give you a guide about new developments. The most important consideration of all (apart from the price, perhaps) is whether it will operate from your software, and if it will link up to your computer.

*Note: The print speed and other specifications quoted are manufacturers' ratings and should be taken as a guide only; the last*

quoted dimension is the height. We've included distributors' names and phone numbers — if your local computer shop can't supply the printer you want (or would like to have a look at), give the distributor a call to find out the closest dealer. Do not buy a printer you have not tried with your computer or with the software you want to run. (All prices are tax inclusive.)

**Oasys Laserpro Express**

From: Kenelec,  
(03) 560 1011 from \$3670

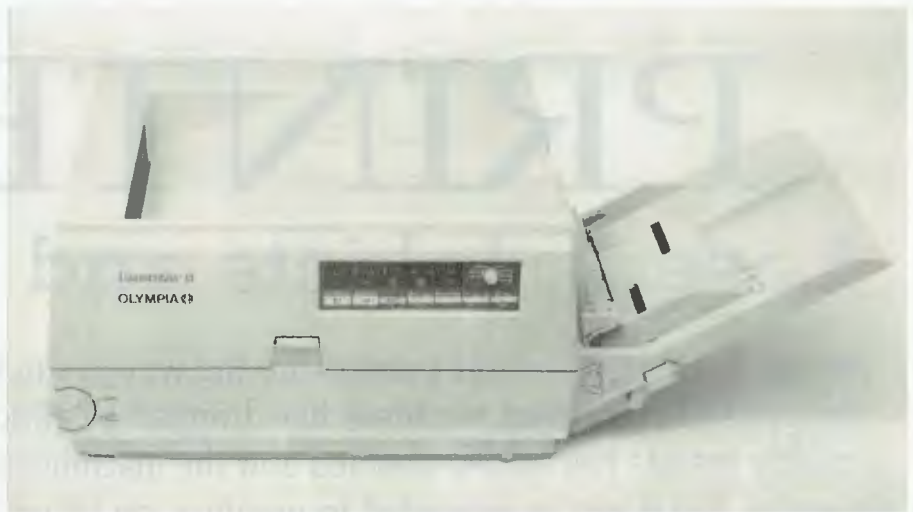
There are three 8 page per minute laser printers in the Express range. Each one comes with font download capability, and four printer emulations: HP LaserJet, NEC 3550, Diablo 630, and Epson FX-80. The print engine is the Oasys proprietary one with a print life of 300,000 pages, and a duty cycle of 3000 pages a month.

**Print Speed:** 8 pages per minute

**Compatibility:** HP LaserJet Plus, Epson FX-80, Diablo 630, IBM Proprinter, NEC Spinwriter 3550. RS232C and Centronics Parallel interfaces.

**Print Styles:** 19 resident bit-mapped fonts (includes portrait/landscape orientation). Fonts can be downloaded from the Oasys library. One cartridge slot; fully compatible with all HP font cartridges (optional).

**Front Panel:** 6 push buttons with alpha-numeric display.



The Olympia Laserstar 6.



The Epson GQ-3500 has an 'exit selector' for face-up or -down output.

**Maintenance:** Toner cartridge and drum set replaceable. Dry toner; 3000 pages per toner.  
**Dimensions:** 406 x 408 x 308 mm  
**Weight:** 22.6 kg

**Impact LS800-01**

From: Impact Systems,  
(02) 969 2699 \$3915

At the low end of Impact's range of lasers, this 8 page per minute printer is available in a number of different configurations of resident fonts, emulations, memory and graphics. The list of possible emulations and

**Helv Bold**

Courier  
Courier Landscape  
**Courier Bold**  
Courier *Italic*

Tms Roman  
Tms Roman Bold  
Tms Roman *Italic*  
Tms Roman Comp.  
**Tms Roman Comp. Bold**  
Tms Roman Comp. *Italic*

Tms Roman  
Tms Roman Comp.

Line Printer  
Line Printer Landscape

**ABCDEFGHIJKLMNabcdefghijklmn1234567890**

ABCDEFGHIJKLMNabcdefghijklmn1234567890  
Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ Ⓗ Ⓘ Ⓢ Ⓣ Ⓤ Ⓦ Ⓧ Ⓨ Ⓩ ⓑ ⓓ ⓔ ⓖ ⓗ ⓙ ⓚ ⓛ ⓞ ⓟ ⓠ ⓡ ⓢ ⓣ ⓤ ⓥ ⓦ ⓧ ⓨ ⓩ ⓪

**ABCDEFGHIJKLMNabcdefghijklmn1234567890**  
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The 15 resident fonts in the Oki LaserLine 6 include both landscape and portrait orientations.

configurations from this local company, is the most extensive we have seen, and the needs of most computer users should be adequately covered, whether they are using personal systems or networked to mainframes. And if that's not enough, you can plug in an Impact Megacartridge, which will add more fonts to your set-up.

**Print Speed:** 8 pages per minute

**Compatibility:** A wide range of optional configurations in fonts, emulations and memory. From 1 to 35 resident fonts, PostScript, HP Laserjet Plus, Diablo 630, NEC, Epson FX-100, Lineprinter, Plotter, bar codes, IBM, Wang, and Decmate emulations. Memory can be configured from 256 Kbyte to 4.5 Mbyte RAM, depending on the model.

**Print Styles:** Up to 16 resident fonts with over 8000 variations according to model. Megacartridges plug in for extra fonts.

**Front Panel:** 16 character LCD status display. Programmable set up preferences.

**Maintenance:** Duty cycle 5000 pages per month; machine life 300,000 pages.

**Dimensions:** 482 x 454 x 263 mm

**Weight:** 20 kg

### Ricoh PC Laser 6000

From: Mitsui,

(02) 451 7711

\$4075

One megabyte of RAM, expandable to 2, and an optional second 250 sheet input tray, as well as a small footprint and a low price make this laser printer an attractive proposition for small businesses.

**Print Speed:** 6 pages per minute.

**Compatibility:** Diablo 630 emulation.

**Print Styles:** Eight resident fonts; supports up to 32 fonts per page from the builtin fonts, font cartridges or fonts downloaded from the host computer. All fonts can be printed in portrait or landscape orientation on the same page in bold, with shadow or underline.

**Front panel:** All normal printer functions, plus portrait/landscape print selection, hex print, auxiliary paper tray, font and interface selection (Centronics or serial)

**Optional Emulations:** Epson FX-80, IBM Proprinter, HP Laserjet Plus.

**Graphics:** Can print up to a fully bit-mapped legal-sized page.

**Dimensions:** 410 x 400 x 200 mm

**Weight:** 15 kg



Above: The Impact Laser 800 desktop range. Below: The Brother HL-8.



### Oki Laserline 6

From: IPL-Datron,

(02) 698 8211

\$4482

A low priced laser printer with basic features and HP Laserjet compatibility. Optional 550 page input tray, 150 page output tray. Optional memory expansion cartridge for half-page 300 dpi graphics and extra font cartridges.

**Print Speed:** 6 pages per minute

**Compatibility:** HP Laserjet emulation.

Serial and parallel interface.

**Print Styles:** 15 resident fonts (includes landscape and portrait orientations); extra fonts in optional cartridges.

**Front Panel:** Numeric status readout, five button control panel.

**Maintenance:** 180,000 page life, or five years. Duty cycle 3000 pages per month.

**Dimensions:** 409 x 418 x 228 mm

**Weight:** 17 kg





Colour graphics from Hewlett-Packard's PaintJet.

### LaserJet Series II

From: Hewlett-Packard,  
(03) 895 3895 \$5958

A second generation LaserJet that is 36% lighter and costs less than the original, and is more reliable. It is fully compatible with the PCL level IV LaserJet Plus printer — PCL is HP's Printer Command Language, which has (almost) a de facto standard.

**Print Speed:** 8 pages per minute.

**Compatibility:** LaserJet Plus, parallel and serial interface.

**Print Styles:** 6 internal fonts and 23 symbol sets. Courier, Medium; portrait and landscape. Compressed Line Printer. Downloadable fonts from cartridges, up to 32 resident at one time. Up to 16 fonts printed per page.

**Front Panel:** 16 character LCD front control panel for user configuration and customising.

**Maintenance:** Single component toner cartridge prints approximately 4000 pages of normal text.

**Dimensions:** 454 x 482 x 228 mm  
**Weight:** 19 kg

### TI Omnilaser 2106

From: Texas Instruments,  
(02) 887 1122 New release

This printer must come close to winning the compatibility award: it has four interfaces, including AppleTalk, RS232C and Centronics parallel ports; and four printer emulations, including HP LaserJet Plus, HP Graphics Language, and the Diablo 630 standard. It also has ten resident PostScript fonts, which in their various styles add up to 35 resident typefaces. This printer is suitable for a wide range of desktop publishing applications. If your printing requirements extend to PostScript, HP LaserJet Plus, and the plotting capabilities using HP-GL, this could be the one for you.

**Print Speed:** 6 pages per minute

**Compatibility:** These printer emulations are standard: Diablo 630,

HP LaserJet Plus, TI 855 DP/WP (includes Epson, MX 80 Grafrax and Qume Sprint II escape sequences), HP 7475 A Plotter (HP-GL language).

**Front Panel:** 2 line by 16 character LCD status readout. 6 function keys and 4 cursor keys, for menu driven parameter selection. From the control panel, the user can select typefaces, emulators, paper orientation, tray selection, paper size, and communication parameters.

**Maintenance:** 3000 prints per month duty cycle. 180,000 print machine life

**Dimensions:** With paper tray,  
635 x 404 x 205 mm

**Weight:** 17 kg

### Star Laser Printer

From: Star Micronics,  
(02) 736 1144 \$4995

One Megabyte of memory, four fonts in residence, and four printer emulations are standard in this printer from Star Micronics.

**Print Speed:** 8 pages per minute.

## WYSEpc 286 Model 2112



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- Small Footprint
- Software Security
- Enhanced MS-DOS 3.2

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40 MB Mono System

**fr \$5,340**

## WYSEpc+

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- 12 Months Warranty
- Enhanced Keyboard
- 2 Serial Ports, 1 Parallel Port

Fully Configured  
20 MB Mono System

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**Compatibility:** Epson EX-800, Diablo 630 ECS, IBM Proprinter, HP LaserJet Plus. Three interfaces: RS232C, RS422, and parallel.

**Print Styles:** Four fonts resident.

**Front Panel:** Status readout, six control buttons.

**Dimensions:** 454 x 492 x 219 mm

**Weight:** 20 kg

### LaserWriter IISC

From: Apple,

(02) 452 8000

\$5995

The new range of LaserWriters from Apple has been released — the IISC is the entry-level, single user model for the Macintosh. The Apple range is the only one that looks distinctively different from the outside, but underneath is the Canon second generation LBP-SX engine. (That's the one that prints a maximum of 8 pages per minute, has a 300,000 page-rated lifespan, provides 'true' blacks, and has a 33 percent longer-life toner cartridge than previous LaserWriters).

The 'SC' in the name refers to SCSI (Small Computer Systems Interface) which transfers data at high speed for fast printing and allows daisy-chaining of up to six additional peripheral devices, such as a hard disk.

The LaserWriter IISC does not support the PostScript Page Description Language. For Postscript you will have to go up the ladder to the LaserWriter IINT (NT for Network), at \$9495. Further up the scale again is the LaserWriter IINTX (\$12995) with a Motorola 68020 processor. This is claimed to give a printing rate of up to four times faster than previous LaserWriter printers.

All three printers in the range use the same engine, but they have a different controller board. This gives the user the option to upgrade from the SC to the NT to the NTX by changing boards. There is also a choice of face-up or face-down output and an adjustable manual feed for labels and envelopes.

**Print Speed:** 8 pages per minute

**Compatibility:** Single Macintosh Plus, SE or II systems through the SCSI port. The LaserWriter IISC relies on Quick-Draw, a set of text and graphics routines built into every Mac. System software 5.1 or greater.

**Print Styles:** Four Macintosh fonts on disk: Times, Helvetica, Courier, and Symbol.

**Dimensions:** 470 x 508 x 218 mm

**Weight:** 20 kg



*The LaserWriter IISC from Apple.*



*The MT910 from Microprocessor Applications.*

### Mannesmann Tally MT910T

From: Microprocessor Applications,

(03) 894 1494

\$7619

Ten pages per minute and dual input 250 page paper bins are standard on this high throughput printer. There is a range of Mannesmann laser printers to suit particular applications, including industrial graphics, word processing, data processing and desktop publishing.

**Print Speed:** 10 pages per minute

**Compatibility:** Diablo 630, Epson FX, IBM Proprinter, HP LaserJet Plus, Oume Sprint II. Modular interface: RS 232C serial or Centronics parallel.

**Print Styles:** Six resident fonts; extra fonts downloadable with optional cartridges.

**Front Panel:** 16 character alphanumeric status display. Menu prompt buttons. Simple presentation.

**Maintenance:** 600,000 page life

expectancy; 5000 page toner cartridge life.

**Dimensions:** With trays,

912 x 458 x 366 mm

**Weight:** 31.75 kg

### Toshiba Laser Printer

From: Toshiba,

(02) 887 3322

\$7656

Twelve pages per minute and a long service life of 600,000 pages, (extendable to 1.2 million), plus the ability to accept up to three font and emulation cartridges simultaneously mark this printer as being different from the others. It also has a Toshiba printer engine, with an optional Toshiba 2-bin sheet feeder for an extra 500 sheets.

**Print Speed:** 12 pages per minute

**Compatibility:** Standard emulations include HP LaserJet Plus, Diablo 630, Toshiba P351/Oume Sprint II, IBM Graphics. One parallel and one serial interface.

# SELTIEC

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**M1082: SUPER COMPILED GAMES (8).** Arcade-type versions of 21 (pontoon), Lazy Monday, Galaxy-type Space Shootout, Sopwith (Bi-plane dogfight simulation).

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**M2049: INTEGRATED UTILITY FOR PERSONAL MANAGEMENT.** Like Sidekick, with calculator, notepad/editor, appointments calendar, address database, cut and paste, file management, etc.

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**M3026: TOUCH TYPING TUTOR - PRACTICE AND EVALUATION.** Lets you read text from screen, use own text, reports speed/accuracy.

**M3031: SCREEN GRAPHICS FOR WORD PROCESSING.** Does fancy borders and lines for screens, tables, charts.

**M3032: MERGE FOR WORD PROCESSING.** Controls small database for names, addresses, etc, which it adds to form letters to personalise.

**M3033: SUPERFDG INDEX.** Examines your text for readability and complexity. Helps you judge whether your talk or article is suitable.

**M3034: VERSATILE PRINTER SETUP.** Printer controls can be configured for many printers, including IBM, Epson, Okidata, Gemini, NEC, Laserjet, which are preset.

**M3035: PRINTER UTILITIES** for Epson compatibles. Produces justified copy on dot matrix, has memory resident setup utilities, multiple font printing, etc.

**M3036 + : FULL-FEATURED WORD PROCESSOR WITH COURSE.** Many features that you can use and routines that you can borrow, modify, learn from in your own programming. 3 disks.

**M3037: WORD PROCESSOR THAT INPUTS SPREADSHEET VALUES.** Transfer figures from spreadsheets to include in reports. Will also update changes in value.

**M3038: DESKTOP PUBLISHING.** Word processor for high quality printing, multiple columns, extended ASCII (solid lines/borders, foreign characters), mora/less lines per page, variable print size, merge files, etc.

### GRAPHICS

**M4001: SELECTEO GRAPHICS.** Some of the best programs, including a picture-graphics set of commercial standard.

**M4002: SLIDE PRESENTATION.** Prepare transparencies for overhead slides.

**M4014 + : COMPUTER-AIDED DESIGN.** Dancad-3d will do complex drawing, 2 or 3 dimensions, print sharp lines for mechanical drawing, illustrations, animate parts. We've squeezed 4 disks on to 2. \$24.

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**M9001: BASICA/GWBASIC COMPATIBLE INTERPRETER.** Runs programs written in industry standard Basic.

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The LZR1230 from Dataproducts.

**Print Styles:** Four resident fonts. Simultaneously accepts up to three cartridges with multiple fonts; HP compatible. Will take downloadable fonts. All fonts can be portrait or landscape, bold, italic or half-tone, reversed image, half or double size; 216 combinations per font.

**Front Panel:** Alphanumeric status display, user-select buttons, and cartridge slots easily accessible on the front of the machine.

**Maintenance:** 25,000 pages per month duty cycle; 600,000 pages printer life, extendable to 1.2 million with optional service kit.

**Options:** Dual sheet feeder, 500 sheet capacity. Toshiba straight path envelope feeder automatically feeds up to 100 envelopes. Output jogger/collater for separation of output.

**Dimensions:** 500 x 483 x 320 mm  
**Weight:** 36.3 kg

### Dataproducts LZR 1230

**From:** Dataproducts,  
 (02) 451 3533 \$8340

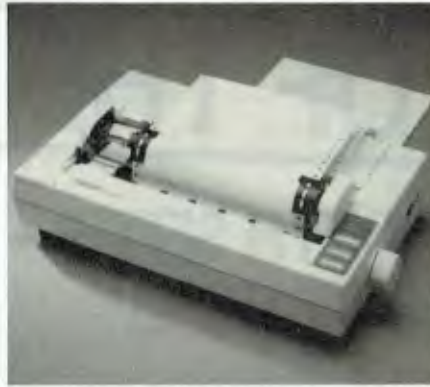
This is a 12 page per minute printer, which uses the LZR 1230 engine with a rugged construction: the estimated life of the printer is 600,000 pages. It can support up to ten workstations, with a duty cycle of 10,000 pages a month.

**Print Speed:** 12 pages per minute  
**Compatibility:** Diablo, Epson FX-80, HP LaserJet Plus emulations. Three concurrent interfaces: Centronics parallel and two serial RS232C.

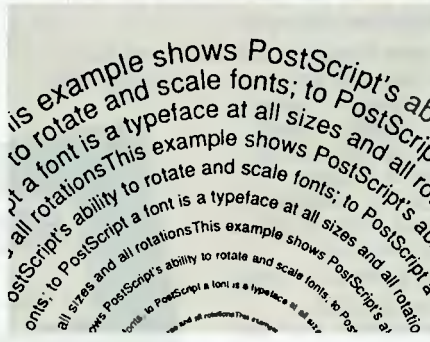
**Print Styles:** Four resident fonts. IBM PC Graphics Character set.

**Front Panel:** 16 button keypad, 16 character liquid crystal status display. Menu driven system.

**Maintenance:** 600,000 page life, 10,000



The Epson IX-800 Inkjet.



NEC's LC-890 Silentwriter includes PostScript.

page per month duty cycle. Cartridge replacement of developer, toner and fuser.

**Dimensions:** 493 x 479 x 321 mm  
**Weight:** 38.5 kg

### Ricoh LP4150

**From:** Mitsui,  
 (02) 451 7711 \$13,194

High speed and compact, this top end printer is supplied with 1.5 Mbyte of RAM, expandable to 2; 26 fonts, a programmable dual paper feed system and a dual paper output stacking system.

**Print speed:** 15 pages per minute  
**Compatibility:** HP LaserJet Plus, Diablo 630, Epson FX, IBM Graphics, HPGL 7470/75 plotter emulations.  
**Maintenance:** Duty life cycle 1.5 million pages.

### NEC Silentwriter Series

The NEC Silentwriter printers have a different operating system from laser machines, but they are basically used for the same purpose: desktop publishing and quality, low noise printing. They are operated by a light powered LED (light emitting diode)

array. The array is stationary and self-aligned to the photoconductor, which, according to NEC, totally eliminates distortion; with no moving parts, maintenance costs are reduced to a minimum. Compared to the newer 8 page per minute laser printers, they are slightly larger and heavier.

### LC-850/815 Silentwriter

**From:** NEC,  
 (02) 438 3544 \$5988

**Print Speed:** 8 pages per minute  
**Compatibility:** Emulates IBM Proprinter 4201. Dual Centronics and RS232C interface.

**Print Styles:** 4 resident fonts; optional dual font cartridges give an additional 8 fonts for online use. Portrait or landscape orientation.

**Front Panel:** Four button selection, plus status readout.

**Maintenance:** Toner and drum in separate cartridges.

**Dimensions:** 470 x 530 x 280 mm  
**Weight:** 30 kg

### LC-860/866 Silentwriter

**From:** NEC,  
 (02) 438 3544 \$7114

As for the LC-850, with HP LaserJet Plus emulation, dual sheet feeding (500 sheet capacity); 1.3 Mbyte memory.

### LC-890 Silentwriter

**From:** NEC,  
 (02) 438 3544 \$10,438

As for the LC-866, with PostScript language, Appletalk/RS422 interface, 3 Mbyte memory.

## INKJET PRINTERS

Many users need a printer capable handling graphics, but they don't particularly need the other advantages of a laser printer (speed and the host of fonts that are available, for example). Inkjet printers may well be the answer — as well as offering very high quality four colour graphics, they are as quiet as a laser printer at a fraction of the cost, although they lack the laser's power and flexibility; and they can print straight text.

Essentially, inkjets work the same as dot matrix printers, but the matrix of pins has been replaced by ink nozzles (which is why they are so quiet — they squirt, rather than hammer). Quality is a function of the number of nozzles (as opposed to pins); currently both 9- and 24-nozzle machines are available. The

primary disadvantage they have is maintenance: while most of the new machines are self-cleaning, they are still more of a problem to keep running properly than other types of printers.

**Epson IX-800**

From: Epson,  
(02) 452 5222 \$1450

This 9-nozzle inkjet has cartridge ink supply for simple ink changes. Each cartridge is rated to last for several hundred pages (depending on the application, of course). A simple stirring lever allows the user to refresh the ink supply to prevent clogging.  
**Print Speed:** Draft 240cps, NLQ 45cps  
**Compatibility:** Epson ESC/P standard. Both Centronics parallel and RS232C serial interfaces.

**Print Styles:** Two fonts, four sizes.  
**Dimensions:** 485 x 302 x 103 mm  
**Weight:** 6.0 kg

**QuietJet**

From: Hewlett-Packard,  
(03) 895 3895 \$1229

The standard unit cannot take paper wider than A4; a wide carriage unit is also available (\$1716). Both friction feed for single sheets and pin feed for continuous paper are standard; HP recommend the use of HP inkjet paper.  
**Print speed:** Draft 160 cps; NLQ 40 cps  
**Compatibility:** Centronics parallel and RS232C interfaces standard.

Compatible with most popular business software applications; and with HP, Apple, IBM, and IBM compatible computers.  
**Print Styles:** HP Roman 8; IBM PC character set.

**Dimensions:** 527 x 214 x 118 mm  
**Weight:** 4.3 kg

**Epson SQ-2500**

From: Epson,  
(02) 452 5222 \$2540

True letter quality 24-nozzle ink jet printer with semi-automatic cleaning; uses ink cartridges. Very fast output.  
**Print Speed:** Draft 540cps, LQ 180cps  
**Print Styles:** 5 fonts, 4 sizes  
**Dimensions:** 618 x 380 x 135 mm  
**Weight:** 11.2 kg

**PaintJet**

From: Hewlett-Packard,  
(03) 895 3895 \$3271

This printer combines quality colour graphics for overhead transparencies and reports and has near letter quality



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"synonymous with plotters - not surprising since they have approx. 80% of Australian market share"

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- 9 PIN NLO  
(1) Epson LX800, 180cps, 2 fonts, pull tractor 435  
Star NX10, 120cps, tear bar and push tractor 435  
Microline 182, 120cps, bottom feed, tear bar, tractor 445

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- 24 PIN LETTER QUALITY  
Epson LQ850, brand new release 659  
(2) NEC P2200, 168cps, push tractor & document 779  
lead, 6 fonts  
NEC P6, 216cps, quiet, 10 fonts, (pin tractor +\$89) 765

**9 PIN NLO**  
Epson FX800, 260cps, 2 fonts, pull tractor call  
(3) Epson EX800, 300cps, 2 fonts, push tractor 995  
Fujitsu DL3400, 216cps, 2 fonts, push tractor 1040

**BUSINESS & PERSONAL 132 COLUMN PRINTERS** call

- 24 PIN LETTER QUALITY  
Epson LQ1050, brand new release 810  
NEC P7, 216cps, quiet, 10 fonts, (pin tractor +\$135) 995  
Fujitsu DL2400, 216cps, 2 fonts, push tractor 1040

**9 PIN NLO**  
Epson FX1000, 240cps, 2 fonts, pull tractor 1625  
(3) Epson EX1000, 300cps, 2 fonts, push tractor 1440  
Fujitsu DX2400, 220cps, 2 fonts, push tractor 1340

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**PRINTERS - 24 PIN LQ**  
Epson SQ2500, 540cps, ink jet, serial & parallel, 1765  
5 fonts (tractor +\$110) 1440  
(3) Epson LQ2500, 300cps, serial & parallel, push tractor, 5 fonts, 1340  
Fujitsu DL2400, 240cps, push tractor, 2 fonts, serial & parallel, bottom feed, 2050  
Microline 294, 400cps, colour multistrike, parallel, tractor 1765  
NEC PS(L), 264cps, colour multistrike, parallel, 7 fonts

**NOTES:** (1) New Release - The successor to the top selling LX86 with many new features. (2) New Release - Revolutionary design, outstanding value and quality. (3) Colour kit option can be installed by user. (4) NEC's LED array technology reduces operating costs by about 40%.

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software & more 2850  
Roland DXY 990, for the professional engineer & draughtsman

**LASER PRINTERS - TEXT**  
Epson GQ3500, 6ppm, 7 fonts, 640K, parallel 2985  
(4) NEC Silentwriter LC815, 8ppm, 4 fonts, 128K, serial & parallel 3935  
Ricoh PC6000, 6ppm, 8 fonts, 1Mb, serial & parallel 3367

**- TEXT & GRAPHICS (HP LASERJET PLUS COMPATIBLE)**  
Epson GQ3500, 6ppm, 7 fonts, 640K, parallel 3155  
(4) NEC Silentwriter, LC890, 8ppm, 4 fonts, 1.4Mb, serial & parallel 4725  
Qume Laserten, 10ppm, 33 fonts, 512Kb, serial & parallel 3940  
Ricoh PC6000, 6ppm, 8 fonts, 1Mb, serial 4385  
Ultra compatible, 6ppm, 9 fonts, 1.5Mb, serial & parallel 3250

**- POSTSCRIPT**  
4N (4) NEC Silentwriter LC890, 8ppm, 35 fonts, 3Mb, serial & parallel 7825  
Qume Scripten, 10ppm, call for more details 9200

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CT0710 PRINTERS



The Tektronix 4696 Inkjet.

167 cps text. It can produce up to 330 shades of color with a resolution of 180 x 180 dots per inch. Both friction and tractor feed are available. HP Paintjet paper is recommended for 'brilliant colours and high-contrast graphics.' Other paper may be used for draft quality.

**Print Speed:** NLO 167 cps at 10 characters per inch; it takes 30 to 40 seconds for a typical page of text and 4 minutes for a full page of colour graphics.

**Compatibility:** Interface options are RS232C serial, Centronics parallel, and HP-IB.

**Print Styles:** 10 pitch Courier, 12- and 18-pitch Letter Gothic. Bold, underline, subscript, and superscript.

**Maintenance:** Two disposable print cartridges: black is rated to produce 1100 text pages; the color cartridge can produce 180 pages of colour graphics, or 160 overhead transparencies. There is a total of 70 nozzles in the two print cartridges.

**Dimensions:** 442 x 302 x 98 mm

**Weight:** 5 kg

### Tektronix 4696 Inkjet

**From:** Tektronix,

2) 888 7066

\$3600

This printer is part of the range of printers, plotters, copiers, screen copiers, and rasterizers that are designed

for state of the art image processing applications, in full colour. Drop on demand inkjet technology and automatic washing and sealing of the ink heads when the printer is powered down are features which deliver consistent ink density and prevent clogging. Rated resolution is 120 x 120 dpi.

It produces up to 125 different half tone shades when used with Tektronix 4100 terminal firmware. With a 4510A rasterizer, it can produce over 130,000 colours and shades.

**Print Speed:** A4 size colour graphics is typically less than three minutes; transparencies, six minutes; text rate 35 cps.

**Compatibility:** Plug compatible with Tektronix 4100 Series computer display terminals. Eight bit parallel interface with an Amphenol 36-pin connector.

**Dimensions:** 506 x 343 x 153 mm

**Weight:** 13 kg

### Canon BJ-80

**From:** Canon,

(02) 887 0166

\$1295

Here is a speedy text and graphics printer that uses a bubble jet head with 24 nozzles. While the technology is slightly different to an inkjet, it has the same advantage over impact dot matrix printers in that it is much quieter.

**Print speed:** Draft 220 cps, NLO 110cps.

**Compatibility:** IBM PC (8-Bit parallel interface).

**Print styles:** Single font, normal or condensed, IBM graphics character set. **Front panel:** Very simple, with on-line, form feed, and line feed buttons.

**Maintenance:** The ink cartridge has a life of 2.3 million NLO characters, or 6 million draft characters. The print head has a life of approximately 200 million characters (10 times the life of conventional inkjet heads.)

**Dimensions:** 400 x 295 x 114 mm

**Weight:** 6 kg

### THERMAL PRINTERS

Thermal printers operate generally in the same way as dot matrix machines — the print head has a set of pins, but they are heated before being pushed against the paper, which is heat sensitive. Because the paper reacts to the heat, the pins don't have to be hammered against the paper; this results in very quiet printing. Unfortunately, the heat sensitive paper is expensive — even the least expensive paper gives a page cost of about 17 cents. Most thermal printers come with a ribbon that is blacked on one side which means the machine can also be used as a dot matrix printer. Generally, thermal printers are sold as a bundled peripheral as with the Sharp portable computers or integral with a machine, as with the Brother 600 series of typewriters or a number of calculators.

### Siemens PT85

**From:** Siemens,

(03) 430 7320

POA

Exchangeable font cartridges, high print quality and high 240 x 240 dpi resolution graphics plus operating 'noise' that is less than many laser printers, are features of that make this unit worth consideration. The paper feed system handles fanfold paper up to 250 mm wide, roll paper, and single sheets.

**Print speed:** Draft 70 cps; Letter Quality 35 cps

**Compatibility:** IBM, ISO standard control codes. Plug in program modules, interface modules, and data cables are options for particular configurations. Serial and Parallel ports.

**Print Styles:** 5 font cartridges, with more available shortly. Expanded print, bold, proportional, double height, superscripts, subscripts. Four character pitches.

**Dimensions:** 410 x 310 x 140 mm

**Weight:** 7.5 kg. □



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# MAGIC SQUARES

Tim Hartnell dives into the ancient and arcane field of magic squares — ‘magic’ because their rows, columns and diagonals add up to the same total.



MAGIC SQUARES have been amusing and intriguing man for a long, long time. The Egyptians and ancient Indians, the followers of Pythagorus and the ancient Chinese all dabbled in them, trying to tap the squares’ magical powers for divination and for plain old mathematical curiosity.

Squares having just two or four cells can’t form magic squares and represented chaos to the Egyptians, and squares of three, four, five or more cells were dedicated to the sun, the moon and the different planets (Falkener’s *Games Ancient and Oriental*).

The earliest magic square we know of, and the simplest, is the ancient Chinese square called the Lo-Shu —

8	1	6
3	5	7
4	9	2

As you can see, each row, column and diagonal adds up to 15. This is called a third order magic square, because it has three rows and columns. Magic squares, no matter how many rows and columns

they have, usually only show each number once. This means a 5 by 5 square will show 25 different numbers. As David King points out in *Magic Square Puzzles*, many odd order (that is third order, fifth order, seventh order and so on) squares, as the Lo-Shu demonstrates, also give the median value in the middle square, and the pairs of numbers balanced about the centre give the same total, 10.

A magic square, of order  $n$ , is defined as an array of  $n$  by  $n$  numbers, from 1 to  $n$ -squared, so that the sum of each row, column and main diagonal is constant — *Game Playing with Basic*, Spencer. The Lo-Shu, as you can see, fits into this definition, as will all the squares your computer generates using the programs here.

Third order squares are a cinch to produce on the computer, and Listing 1 can produce a whole bundle of them for you.

This first program works on the principle that you can form a third order square just by selecting a starting number (which we’ll call  $x$ ) and then adding to it —

$x+5$	$x$	$x+7$
$x+6$	$x+4$	$x+2$
$x+1$	$x+8$	$x+3$

```

10 REM INSTANT MAGIC SQUARE
20 CLS:N=INT(RND(1)*99):PRINT "INSTANT M
AGIC SQUARE"
30 PRINT TAB(4);N+5;TAB(8);N;TAB(12);N+7
40 PRINT TAB(4);N+6;TAB(8);N+4;TAB(12);N
+2
50 PRINT TAB(4);N+1;TAB(8);N+8;TAB(12);N
+3
60 PRINT "THE TOTAL IS";3*N+12
70 PRINT "-----"
    
```

Listing 1. Instant Magic Square.

```

10 REM INSTANT MAGIC SQUARE - TO SOLVE
20 CLS:N=INT(RND(1)*99):PRINT "INSTANT M
AGIC SQUARE"
30 A(1)=N+5:A(2)=N:A(3)=N+7:A(4)=N+6
40 A(5)=N+4:A(6)=N+2:A(7)=N+1:A(8)=N+8:A
(9)=N+3
50 FOR J=1 TO INT(RND(1)*5+1):A(INT(RND(
1)*9+1))=0:NEXT J
60 PRINT TAB(4);A(1);TAB(8);A(2);TAB(12)
;A(3)
70 PRINT TAB(4);A(4);TAB(8);A(5);TAB(12)
;A(6)
80 PRINT TAB(4);A(7);TAB(8);A(8);TAB(12)
;A(9)
90 PRINT "THE TOTAL IS";3*N+12
100 PRINT "-----"
    
```

**Listing 2.** Instant Magic Square to Solve — this will generate third order squares, but leave it to you to work out some of the numbers in it.

If you want your computer to generate third order squares, but leave it to you to work out some of the numbers in it, use Listing 2. This program will produce output like this —

```

INSTANT MAGIC SQUARE
  0   0   92
  91  89  87
  86   0   0
THE TOTAL IS 267
    
```

You have to work out the numbers which are printed as zeroes.

Now third order squares are not very challenging to solve. We need to move to higher order squares in order to really get the brain cells working.

We've seen that the Lo-Shu adds up to 15, and Listing 1 will always tell you the total of the rows, columns and diagonals. Is there a formula for working it out? There is, but only when the digits from 1 to *n*-squared are used (such as using 1, 2, 3, 4, 5, 6, 7, 8 and 9 for a third order square; and 1 through to 16 for a fourth order square). In this case, the total is given by the formula —

$$n \times (n\text{-squared} + 1) / 2$$

In the case of the Lo-Shu, this is —

$$3 \times (9 + 1) / 2 = 30 / 2 = 15$$

If you want a program to produce third order squares for you to solve, and which are somewhat more interesting than those produced by the first two programs, enter Listing 3 and run it. This will count the number of guesses it takes for you to solve the square and uses both negative and positive numbers.

```

10 REM Idaho Squares
20 REM (c) Tim Hartaell, 1987
30 REM Interface Publications
40 GOSUB 250:REM INITIALISE
50 J=J+1
60 CLS
70 PRINT:PRINT:PRINT TAB(3);
80 M=0
90 FOR Z=1 TO 9
100 PRINT B(Z);" ";
110 IF 3*INT(Z/3)=Z THEN PRINT:PRINT:PRI
NT TAB(3);
120 IF B(Z)=A(Z) THEN M=M+1
130 NEXT Z
140 PRINT
150 IF M=9 THEN PRINT "YOU'VE SOLVED IT"
:PRINT "IN JUST";J-1;"GUESSES!":END
160 PRINT:PRINT "THIS IS GUESS NUMBER";J
170 PRINT:PRINT "YOU HAVE";M;"RIGHT":PRI
NT
180 INPUT "ENTER YOUR GUESS";X
190 FOR Z=1 TO 9
200 IF B(Z)=0 AND A(Z)=X THEN B(Z)=X
210 NEXT Z
220 GOTO 50
230 END
240 REM *****
250 DIM A(9),B(9)
260 A=INT(RND(1)*9)+1
270 B=INT(RND(1)*9)+1
280 C=INT(RND(1)*9)+1
290 D=INT(RND(1)*9)+1
300 IF A=B OR B=C OR A=C OR A=D OR B=D O
R C=D THEN 270
310 A(1)=A+B
320 A(2)=A-(B+C)
330 A(3)=A+C
340 A(4)=A-B+C
350 A(5)=A
360 A(6)=A+B-C
370 A(7)=A-C
380 A(8)=A+B+C
390 A(9)=A-B
400 FOR Q=1 TO 9
410 B(Q)=A(Q)
420 NEXT Q
430 B(A)=0
440 B(B)=0
450 B(C)=0
460 B(D)=0
470 J=0
480 RETURN
    
```

**Listing 3.** Idaho Squares to Solve counts the number of guesses it takes to solve the square and uses both negative and positive numbers.

We started off by considering the Lo-Shu square. Another famous early square was created by the German Renaissance painter, engraver and woodcut designer Albrecht Durer, who included his square in the engraving called 'Melancholy'. Finished in 1514, the artist managed to include the date within the square itself —

```

16  3  2 13
 5 10 11  8
 9  6  7 12
 4 15 14  1
    
```

The total for this square, given by our formula, is —

$$4 \times (16 + 1) / 2 = 34$$

As with the Lo-Shu, the numbers in the Melancholy square balance about the centre point, with each pair totalling 17. Listing 4 will produce as many fourth order squares as you like, including negative numbers as well as positive ones this time, for a bit of variety. Here's a typical square produced by the program —

```

-68   45   74  -155
-41  -40  -69   46
-98   17  -12  -11
103 -126  -97   16

THE TOTAL IS -104
    
```

```

10 REM MELANCHOLY SQUARE
20 CLS:DIM A(4,4)
30 FIRST=INT(RND(1)*100)
40 AJUMP=INT(RND(1)*100-RND(1)*100)
50 BJUMP=ABS(INT(RND(1)*AJUMP))
60 FOR J=1 TO 4
70 FOR K=1 TO 4
80 IF K=1 THEN A(J,1)=FIRST:GOTO 100
90 A(J,K)=A(J,K-1)+AJUMP
100 NEXT K
110 FIRST=FIRST+BJUMP
120 NEXT J
130 PRINT "INTERMEDIATE STAGE":GOSUB 240
140 PRINT "NOW SWAPPING VALUES..."
150 A=A(1,1):B=A(2,2):C=A(3,3):D=A(4,4)
160 A(1,1)=D:A(2,2)=C:A(3,3)=B:A(4,4)=A
170 A=A(4,1):B=A(3,2):C=A(2,3):D=A(1,4)
180 A(1,4)=A:A(2,3)=B:A(3,2)=C:A(4,1)=D
190 PRINT:PRINT "FINAL FORM IS":GOSUB 240
40
200 TTL=A+B+C+D
210 PRINT TAB(6);"TOTAL IS";TTL
220 END
230 REM *****
240 REM PRINT OUT
250 FOR J=1 TO 4
260 GOSUB 350
270 FOR K=1 TO 4
280 M$=STR$(A(K,J))
290 IF LEN(M$)<4 THEN M$=" "+M$:GOTO 290
300 IF A(K,J)<0 AND LEN(M$)<4 THEN M$="
"+M$
310 PRINT " |";M$;
320 NEXT K
330 PRINT " |"
340 NEXT J
350 PRINT "-----":REM 21
-'s
360 RETURN
    
```

**Listing 4.** Melancholy Square will produce as many fourth order squares as you like, including both negative and positive numbers.

As the construction of these squares is somewhat more complex than the third order ones, the program has to produce an 'intermediate stage' square on its way to completing a proper one. The program prints out this intermediate stage so you can see it on the way to completion. It is a relatively simple process. The program creates a series of numbers (like 1, 2, 3, 4

and so on, or 4, 8, 12, 16 and the rest) and then puts them down in sequence —

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

Then, it goes along the diagonals (1, 6, 11, 16 and 4, 7, 10, 13) swapping each one of these numbers with its opposite number, so 1 is swapped with 16, 6 with 11, 4 with 13 and 7 with 10. Once it has swapped them over, it prints out the final form of the square, along with the total —

16	2	3	13
5	11	10	8
9	7	6	12
4	14	15	1

### Benjamin Franklin

Now you probably know that Franklin was statesman, writer, politician and so on, but it is unlikely that you would have thought of him as a mathematician. But it appears from his journal that he was. Never a modest man when speaking of his accomplishments, Franklin noted:

*In my younger days, having once more leisure time (which I still think I might of employed more usefully) I had amused myself in making these kind of magic squares, and at length acquired such a knack at it, that I could fill the cells of any magic square of reasonable size with a series of numbers as fast as I could write them . . . ('Scripta Mathematica,' Anema)*

Franklin wasn't interested in mundane magic squares such as produced by the programs in this article. He wanted them to total if added up in corner diagonals, horizontal and vertical zig-zags and so on. One of his more celebrated efforts —

52	61	4	13	20	29	36	45
14	3	62	51	46	35	30	19
53	60	5	12	21	28	37	44
11	6	59	54	43	38	27	22
55	58	7	10	23	26	39	42
9	8	57	56	41	40	25	24
50	63	2	15	18	31	34	47
16	1	64	49	48	33	32	17

Modest old Ben claimed: *You will readily allow the square . . . to be the most magically magic of any magic square ever made by any magician.* ['Scripta Mathematica,' Bragdon]

### Latin Squares

With the exception of the third order Idaho Squares, we've concentrated so far on magic squares which use numbers which follow each other in a sequence of some kind. Latin Squares are formed by numbers which have no regular relationship to each other. King, in *Magic Square Puzzles*, says that a Frenchman, Phillipe de la Hire (1640-1718), was the first to work out a way to easily construct Latin Squares.

As our next program, Listing 5, is based on this method, I've called it after the author of the book. It chooses ten numbers at random between 0 and 999, and then constructs a pleasantly fiendish fifth order square from them, by adding the following Latin Square to the randomly-chosen, non-duplicated numbers —

0	3	1	4	2
4	2	0	3	1
3	1	4	2	0
2	0	3	1	0
1	4	2	0	3

```

10 REM KING DAVID SQUARES
20 CLS:PRINT "CONSTRUCTING...PLEASE STAND BY..."
30 DIM Z(2000),A(5,5),B(10),C(4),D(4)
40 FOR J=1 TO 10
50 K=INT(RND(1)*1000):IF Z(K)<>0 THEN 50
60 Z(K)=1:B(J)=K
70 NEXT J
80 PRINT "THE CORE NUMBERS ARE:":TTL=0
90 FOR J=1 TO 10
100 PRINT B(J);:TTL=TTL+B(J):Z(B(J))=0
110 NEXT J
120 PRINT "TOTALLING":TTL
130 REM *****
140 PRINT:PRINT "NOW CHECK FOR DUPLICATE S":FLAG=0
150 FOR J=6 TO 10
160 FOR K=1 TO 5
170 M=B(J)+B(K)
180 IF Z(M)<>0 THEN FLAG=FLAG+1
190 Z(M)=1:PRINT M;
200 NEXT K
210 PRINT
220 NEXT J
230 IF FLAG=0 THEN 280
240 PRINT FLAG+1;"DUPLICATE(S) FOUND"
250 PRINT "I WILL HAVE TO START AGAIN"
260 FOR J=1 TO 2000:Z(J)=0:NEXT J:GOTO 2
0
270 REM *****
280 PRINT "NO DUPLICATES FOUND":PRINT
290 FOR K=0 TO 4
300 C(K)=B(K+1):D(K)=B(K+6)
310 NEXT K
320 FOR J=1 TO 5
330 FOR K=1 TO 5
340 READ P,Q
350 A(J,K)=C(P)+D(Q)
360 NEXT K
370 NEXT J
380 PRINT "KING DAVID SQUARE TOTALLING";
TTL:PRINT
390 FOR J=1 TO 5
400 FOR K=1 TO 5
410 M#=STR$(A(J,K))
420 IF LEN(M#)<6 THEN M#=" "+M#:GOTO 420
430 PRINT M#;
440 NEXT K:PRINT
450 NEXT J
    
```

```

460 REM *****
470 REM DATA
480 DATA 0,0,4,3,3,1,2,4,1,2
490 DATA 3,4,2,2,1,0,0,3,4,1
500 DATA 1,3,0,1,4,4,3,2,2,0
510 DATA 4,2,3,0,2,3,1,1,0,4
520 DATA 2,1,1,4,0,2,4,0,3,3
    
```

*Listing 5. King David Squares generates magic squares based on Latin Squares, which are formed by numbers which have no regular relationship to each other (the squares in the previous programs all used numbers which followed each other in some sequence).*

Here's a sample square produced by this program —

KING DAVID SQUARE TOTALLING 5121

1472	897	887	764	1101
996	1537	1037	790	761
355	654	870	1769	1473
1643	1705	791	219	763
655	328	1536	1579	1023

### De la Loubere

The envoy of Louis XIV to Siam in 1687-1688, De la Loubere, apparently learned the method of constructing magic squares which bears his name today while in that country. It's a fairly tiresome process to follow his instructions by hand to create a magic square, so I've taught the computer to do it — see Listing 6.

The De la Loubere method has the advantage that you can specify any order square (third, fifth, nineteenth or whatever), and give it a 'starting number' (the lowest number which will appear in the final square) and the method will produce a square to order. A sample square produced by Listing 6 —

7 BY 7 MAGIC SQUARE,  
STARTING WITH 12

41	50	59	12	21	30	39
49	58	18	20	29	38	40
57	17	19	28	37	46	48
16	25	27	36	45	47	56
24	26	35	44	53	55	15
32	34	43	52	54	14	23
33	42	51	60	13	22	31

```

10 REM MAGIC SQUARE GENERATOR
20 CLS:INPUT "SIZE OF MAGIC SQUARE";A
30 INPUT "AND THE NUMBER TO START WITH";
C
40 CLS:DIM B(A*2,A*2)
50 PRINT A;"BY";A;"MAGIC SQUARE, STARTIN
G WITH";C:PRINT
60 F=C:X=1:IZ=1:J=(A+1)/2
70 B(IZ,J)=F:F=F+1:IF F>A*C-1 THEN 140
80 IF X<A THEN 100
90 X=1:IZ=IZ+1:GOTO 70
100 X=X+1:IZ=IZ-1:J=J+1:IF IZ<>0 THEN 12
0
110 IZ=A:GOTO 70
120 IF J<=A THEN 70
130 J=1:GOTO 70
140 FOR K=1 TO A:FOR J=1 TO A
150 T=B(K,J):IF T<10 THEN PRINT " ";
160 IF T<100 THEN PRINT " ";
170 PRINT T;NEXT J
180 PRINT:PRINT:NEXT K
    
```

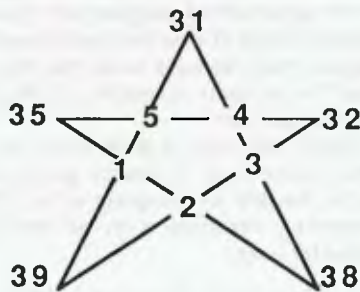
*Listing 6. Magic Square Generator uses the De la Loubere procedure which allows you to specify any order square and give it a 'starting number' (the lowest number which will appear in the final square).*



*Benjamin Franklin claimed one of his efforts was 'the most magically magic of any magic square ever made by any magician.'*

**Starry, starry night**

Finally, as a break from magic squares, I thought I'd write a program (Idaho Stars given in Listing 7), which produces 'magic stars'. Here's a sample —



As you can see, each line on the star adds up to the same total. In this program, a new star is generated on each run. Two or three of the numbers are changed to zeroes and you have to work out — just as with the Idaho Squares — what the missing numbers are.

All these programs, by the way, can be downloaded from our Bulletin Board, or you can get them from me on disk for the IBM PC (along with 40 or so other intriguing mathematical programs) for \$10.00 (\$8.33 if you are exempt from sales tax; I'll take cold hard cash, cheque or credit card). Tim Hartnell, Interface Publications, 34 Camp St. Chelsea, Vic 3196. I'd be very interested in seeing any other programs you develop which use quite different methods to generate magic squares. □

```

500 REM Set up star
510 CLS
520 DIM A(10),B(10)
530 GO = 0:SCORE = 0
540 A = INT(RND(1)*9) + 1
550 B = INT(RND(1)*9) + 1
560 C = INT(RND(1)*9) + 1
570 D = INT(RND(1)*9) + 1
580 E = INT(RND(1)*9) + 1
590 IF A = B OR A = C OR A = D OR A = E
THEN 550
600 IF B = C OR B = D OR B = E THEN 550
610 IF C = D OR C = E THEN 550
620 IF D = E THEN 550
630 X = INT(RND(1)*3) + 1
640 A(1) = X
650 A(2) = X - B + C + D
660 A(3) = A + E
670 A(4) = A + D
680 A(5) = X - B - C + E
690 A(6) = A
700 A(7) = A + C
710 A(8) = A + B
720 A(9) = X - 2*B + 2*D + E
730 A(10) = X - 2*B - C + D + 2*E
740 FOR J = 1 TO 10
750 B(J) = A(J)
760 IF A(J) = 0 THEN RUN
770 NEXT J
780 B(INT(RND(1)*10) + 1) = 0
790 B(INT(RND(1)*10) + 1) = 0
800 B(INT(RND(1)*10) + 1) = 0
810 RETURN
    
```

*Listing 7. Idaho Stars produces magic stars — a new star is generated on each run. Two or three of the numbers are changed to zeroes and you have to work out what the missing numbers are.*

```

10 REM Idaho Stars
20 REM (c) Tim Hartnell, 1987
30 REM Interface Publications
40 GOSUB 500:REM Set up star
50 GOSUB 360:REM Print Star
60 GOSUB 90:REM Ask for guess
70 GOTO 50
80 REM *****

90 REM Ask for Guess
100 IF SCORE > 0 AND SCORE < 10 THEN PRI
NT "You have SCORE right so far":PRINT
110 GO = GO + 1
120 PRINT "This is go number"GO:PRINT
130 PRINT "Enter any number which you"
140 INPUT "think is part of the star";G
150 SCORE = 0
160 FOR J = 1 TO 10
170 IF G = A(J) THEN B(J) = A(J)
180 IF B(J) <> 0 THEN SCORE = SCORE + 1
190 NEXT J
200 FOR P = 1 TO 1000:NEXT P
210 IF SCORE < 10 THEN RETURN
220 REM *****

230 GOSUB 360
240 PRINT:PRINT "Yes, you've solved it!"

250 PRINT:PRINT "And it only took GO goe
s..."
260 FOR P = 1 TO 1000:NEXT P
270 PRINT "Press 'Y' if you'd like to"
280 PRINT "try another Star of Idaho,"
290 PRINT "press 'N' to stop....."
300 A$ = INKEY$
310 IF A$ <> "n" AND A$ <> "N" AND A$ <>
"Y" AND A$ <> "y" THEN 300
320 IF A$ = "Y" OR A$ = "y" THEN RUN
330 PRINT:PRINT "OK, thanks for playing"
340 END
350 REM *****

360 REM Print star
370 CLS:PRINT:PRINT
380 PRINT TAB(11);B(1)
390 PRINT:PRINT
400 PRINT TAB(2);" ";B(2);" ";B(3);" ";
B(4);" ";B(5)
410 PRINT
420 PRINT TAB(7);B(6);" ";B(7)
430 PRINT
440 PRINT TAB(10);B(8)
450 PRINT
460 PRINT TAB(4);B(9);" ";B(10)
470 PRINT:PRINT
480 RETURN
490 REM *****
    
```

*The Egyptians and ancient Indians, the followers of Pythagorus and the ancient Chinese all dabbled in them . . .*

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# HARD COPY

Chris Allen has been browsing in his local bookstore, discovering three books that may interest programmers.

## dBase III Plus — The Complete Reference

WALK INTO ANY decent bookshop and look in the computer section — you will probably find from six to sixty books on dBase III. The spectrum seems to be completely covered: from 'everything you ever wanted to know about dBase but were afraid to ask' to 'everything you already knew about about dBase but wish you didn't.' The only problem is in deciding which of the many books available is of use to you. This decision can prove to be a hit or miss affair — rather expensive considering the price of technical books.

These books all seem to be of two types: for the novice and for the expert. The 'how to' books usually have at least several chapters of tutorials on dBase III Plus and some even discuss programming in layman's terms.

This is fine for someone new to programming. A programmer who has not used dBase III Plus could learn from such a book but would soon become frustrated when trying to find facts quickly.

I've just come across a book which is a 'hit' for people who know how to write programs. *dBase III Plus — The Complete Reference* by Joseph David Carrabis, is a hefty 'desktop resource' that tries valiantly to live up to its title (and for the most part succeeds).

The book takes the simple approach of trying to give a comprehensive explanation of all the commands in dBase III Plus. The commands are grouped together by function type such as file creation, networking and data location. A newcomer to dBase III will have no trouble finding the commands they need.

Each command is well explained, with examples of its uses in programs and the different tricks it can be put through by experienced programmers. The appeal of this book comes from its excellent coverage of the language. It is over 700 pages in

length but has no tutorials or introductions to programming. The indepth explanation of each command and function relieves you from having to experiment or look to other sources to round out its meaning.

If your best friend never remembers to return your Ashton-Tate manuals, this book should get you through. And if you already know how to program but perhaps you're a novice to dBase III Plus, or if you're developing an application, then this book is recommended for you.

## The IBM PC AT Programmer's Guide

The 'standardization' microcomputers has meant that books on the subject of hardware are a rarity. Most books dealing with IBM or compatible machines relate to a given software package, be it a language, a spreadsheet program or some other application. In general, they do not attempt to explain the operating system or the inner workings of the PC you are using. It is assumed that if you don't already know enough about the system, that you will find out from another source.

*The IBM PC AT Programmer's guide is such a source.*

This book explains the hardware setup of the IBM AT, how it differs from the IBM XT, and the opportunities for the programmer and end user that this system offers.

Most regular readers are familiar with the AT's specifications from a 'sales' point of view; that an AT is faster than an XT, that the faster the clock speed the faster the processing and that the more memory you have the better. If you manage to keep up with all the information presented to you each month you will also have a fair knowledge of the more subtle differences/benefits of the AT.

*The IBM PC AT Programmer's Guide* presents that information and more in one concise volume. You don't have to search through 18 months of *Your Computer* magazines to find that one particular

titbit of information you were wondering about. This book is especially useful to potential buyers of an AT compatible system who are familiar with DOS or the XT and wish to know more.

Although the title indicates that the book is for programmers, most of the information in it is of use to all users. In fact I found it to be interesting casual reading the first time I perused it (I left the more detailed technical sections for later study). The approach is concise but does not make too many assumptions about the reader's background. And the structure of the book makes it easy to determine the areas that do apply to you.

There are eleven chapters; the major ones discuss the machine in depth, its main memory, DOS 3.0 and the PC AT BIOS. A number of chapters cover the background of DOS, its structure, BIOS and DOS interrupt services and Intel 8086 'family traits'. Each chapter presents interesting information about the AT in different levels of detail. The DOS user would be interested in most of the information presented, but there is also information for the experienced programmer. From a technical point of view, this book does not surpass Peter Norton's works but the approach is far more accessible to the less experienced user.

Overall this book is good value, in the area it addresses. A concise perspective on the the IBM AT computer which offers interesting information to all levels of computer users.

## Using and Programming the IBM PC AT

Thor Petersen has written a book which attempts to address the same area as *The IBM PC AT Programmer's Guide*. The approach, however, is rather different.

This book seems to address the complete novice. The first thirty-odd pages detail IBM's corporate history since 1914. The next thirty pages read like an old sales brochure for IBM. The hardware configuration and the various options that were available at the time are listed in a rather mundane way, reminiscent of the 'general' computer information books pumped out in the late '70s. By the time such details appear in print they have become irrelevant.

The author then speed tests the AT using Basic and C programs as examples of how the AT is faster than the PC and why disk access makes a difference (because disk access is the slowest part of any computer system compared to RAM memory access). Although the point about access times is correct, this information tends to date as disk drives and process speeds vary with new models (and clones). Even more time relevant is the section which reviews the alternatives to the IBM machine. The Sperry, Texas Instruments, Compaq and NCR equivalents of the IBM AT are listed, but the specifications of all of these machines are out of date. The microcomputer market changes far too rapidly for a book to accurately give guidance to the current buyers' options. That sort of information is more current in journals such as *Your Computer*.

The last section (forty pages) of this book is a tutorial on Basic programming.

To sum it up, the first third of the book is too flimsy to be of use, the second third is dated beyond use already and the last section is shallow enough to be useless.

If you want to program in Basic, buy a book on the subject. There are many useful titles available. If you want to find out the configuration of the standard IBM AT, ask an IBM dealer. If you want information on speed tests and comparisons with the different brands available, read *Your Computer* magazine. If you want a summary of IBM's history, then buy this book, although it seems like an expensive way of attaining this information. □

**Book Details**

Title: dBase III Plus — The Complete Reference

By: Joseph David Carrabis

Publisher: Osborne McGraw Hill, 4 Barcoo St. East Roseville 2069 NSW (02) 406 4288

Price: \$47.95

Title: The IBM PC AT Programmer's Guide

By: James T. Smith (Waite Group)

Publisher: Brady Group, USA

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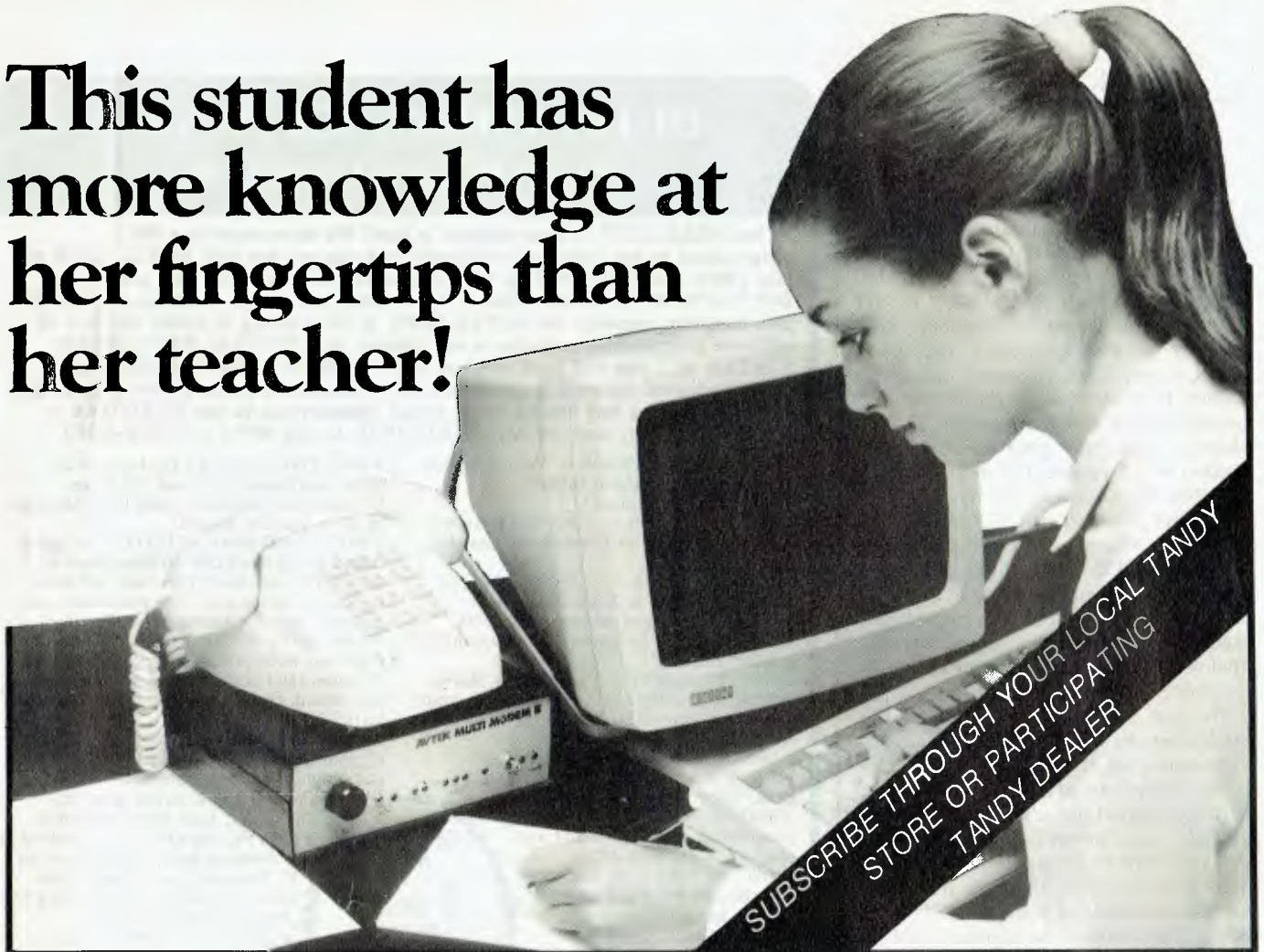
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Sian Smith (of AMSEC) found this dedicated spelling checker is also great for crosswords, Scrabble or almost any other word game (how many five letter words can you think of beginning with 'a' and ending with 'g'?)

---

*There is probably no hope  
for you anyway if your  
spelling is that bad!*

---

Oxford Dictionary which weighs in at about 4 Kg or the Macquarie Dictionary at 2 Kg and one of the great appeals of the Spelling Ace becomes apparent. It really is small enough to pop into your pocket, handbag or briefcase and would be a boon to travellers who pass the hours with crosswords, Scrabble or other word games.

As a spelling checker it is simple to use. Simply type in your guess at how to spell a particular word and press the large Enter key. The Spelling Ace will either flash the word back at you if there is no error or it will give the message 'checking' before



presenting a list of possibilities that approximate to the letters you have typed in. So, type in 'recieve' and in five seconds you will be presented with 'receive' and 'relieve'. It appears unable to cope with two spelling mistakes in the same word. So 'proccesor' will bring you the message 'Sorry can't help' although 'processor' will produce the correct 'processor'. In this situation you can type in as much of the word as you feel confident about, say 'proc-', and the Spelling Ace will very quickly produce a list for you to go through. There will be 13 other words to

look at first, but eventually you will find 'processor'.

Had there been a range of possibilities, as there would be if you spelt 'guest' as 'gest', you would get a list to go through of gets, best, gist, gust, jest, lest, nest, pest, rest, test, vest, west and zest before finally reaching guest. With a dictionary even the worst speller would not be looking for 'guest' under 'b' or 'z'!

The message 'Sorry can't help' may also mean that the word requested is not in the lexicon of the Spelling Ace. These may be scientific, legal or medical terms, or

### AMSEC

THIS REVIEW was prepared by AMSEC, a Melbourne-based software evaluation group, PO Box 140, Hurtsbridge 3099 Victoria. □



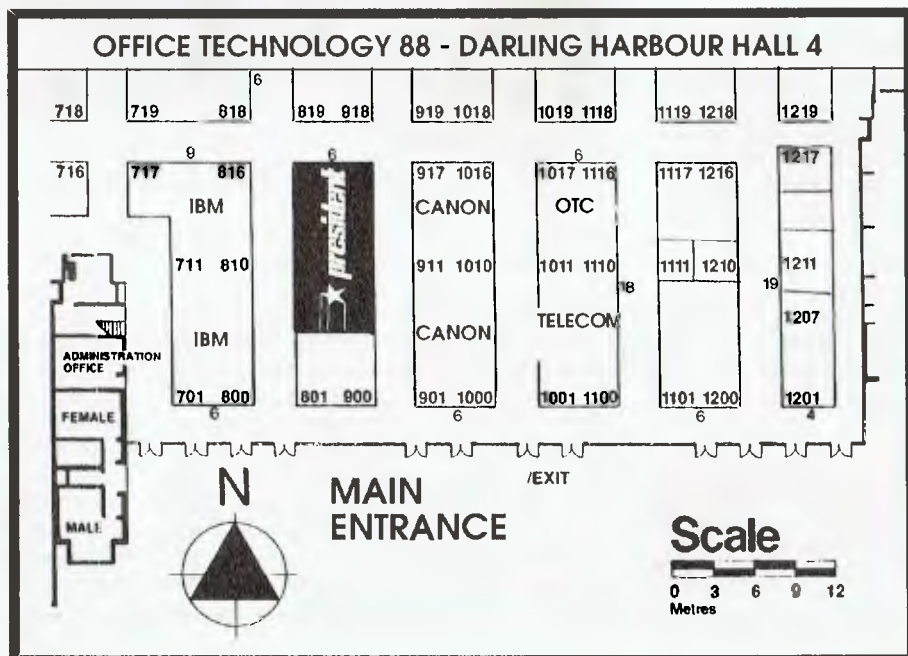
# See you at Darling Harbour

Yes, all the President crew will be there at the Office Technology 88 Computer show at Darling Harbour, commencing March 20th to 23rd.

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## DONT MISS IT!



they may be words not commonly found in the American vocabulary such as 'possum', 'biro', 'bloke', 'beetroot' and 'overproof'. Strangely, although such acronyms as UNESCO and USAF are listed, IBM is not. Likewise I found MD but not PHD.

If you think 'write' or 'right' are spelt 'rite' the Spelling Ace will not be of any help as 'rite' will be recognised as a perfectly respectable word and so no alternatives will be listed. There is probably no hope for you anyway if your spelling is that bad! This does however highlight the problems that arise when contextual clues are not able to be used.

### Entertainment

Where the Spelling Ace really shines is in the entertainment it can offer in concocting word lists or helping with word games, such as Scrabble, Hangman or crosswords. All of this makes it great fun for children (once they can get a turn at it), but it will not teach them how to spell and it will not really increase their word knowledge as no definitions are given. If they always get 'there' and 'their' confused, they will not find the answer with the Spelling Ace. If their spelling is truly erratic, as many young children's is, their attempts at a particular word will not be recognized by the computer or it will be interpreted as something completely different.

But it has the usual appeal of any technological toy and it will certainly amuse most children for many hours. My son finds it a great help when he is playing Hangman on the computer! There are various word games for which it is ideally suited — you may find that you want to make up others. For instance you can see how many five-letter words there are that start with 'a' and end with 'g'. The Spelling Ace will produce a list of six words. How many can you think of? Or try to find all the words starting with BLI-. Can you think of 52?

Stuck with a crossword clue, where you have B-C-A—E? The Spelling Ace quickly comes up with 'backache'. However if you find yourself stuck with —O-S-E-D, you will be given a list to choose from of 'hogshead', 'potsherd' and 'godspeed', so you will still have to decide what fits in best with the clue given. Unless you have quite a few of the letters already the Spelling Ace will not be a great deal of help to you, as it will produce a long list of words, which cannot be scanned but must be gone through alphabetically one at a time.

There are some other problems with the words listed. Spelling Ace is an American machine and so 'colour' is 'color', 'metre'

is 'meter' and words like 'wallaby' and 'mouthorgan' are not listed at all. According to the company marketing the Spelling Ace in Australia, there is an English version currently being developed in the UK; for the time being a card is to be included with the machine to show where English and American usage differs. The lexicon derives from the Merriam-Webster Ninth New Collegiate Dictionary, a highly respectable source, if you make allowance for the American bias.

Today most wordprocessors have spelling checkers. However many are tedious to use, require more RAM than you have available, or are not up to scratch in a variety of ways. The Spelling Ace may be the answer (and it doesn't not make an unpleasant beep when you misspell a word the way many spell checkers do).

Of course, the Spelling Ace will not replace your dictionary. You cannot look up a definition; it will not tell you the right pronunciation; it cannot give you the etymology of a word. It also has the weaknesses of all spelling checkers in that it cannot recognize the context in which a word is to be used and cannot recognize when a word is being used grammatically. It would be marvellous if it could give you lists of synonyms (for example: couple, pair, twosome) or of homophones (for example: pear, pair).

The Spelling Ace has 128 kilobytes of memory and runs on four AAA batteries which are easily inserted. Long life batteries are estimated to provide 20 hours of continuous use. The batteries are saved by automatic shutting off after about one minute of no keys being pressed.

### An Ideal Present?

Given its limitations, the Spelling Ace performs pretty well. So if you are likely to want to check your spelling as you write a letter on a plane; if you want an easily used umpire for Scrabble; or an aid when you are really stuck with the crossword; if you want to encourage in your children a sense of the infinite charm of playing with words — then the Spelling Ace may well be high on your list of birthday or Christmas presents. □

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# POP IT UP...

## SideKick and Pop-Up DeskSet

---

TSRs represent an excellent solution to the single-tasking limitations of DOS, but which one suits your particular needs? To help find the answer, Keith Mackay pops-up the exemplar TSR, SideKick, and a less known offering that pops-up Anything, in the first of a new series.

---

**T**ERMINATE and Stay Resident (TSR) programs, perhaps more commonly known as pop-ups, are loaded into RAM before the main application and monitor every stroke entered at the keyboard, waiting for the one which will activate it (the 'hot key'). At that point it takes over, leaving the main application suspended in memory and bringing a window to the screen or in some cases monopolising the screen entirely.

The hot key is normally an Alt combination: Alt-Ctrl calls SideKick, for example; Alt-/ calls SuperKey; and as the list of keys available grows shorter and shorter, more and more bizarre combinations are called into service: there is a public domain macro recorder whose hot key is Alt-~, not the most comfortable set of keystrokes, while the new Lotus TSR, Metro (reviewed in YC, Aug '87), uses Alt-Shift combinations requiring a certain amount of contortion. Many TSRs, however, allow the hot key to be changed.

The usefulness of TSRs lies in their allowing the user to access data without leaving the main application — to check a phone number or an appointment, for example, without unloading the spreadsheet — and for subsidiary applications of this sort.

Pop-ups go a lot farther than that, however. There are macro recorders; clocks; notepads, some of which approach the sophistication of fully-fledged wordprocessors; program tutorials and help systems; calendars, some with facilities for keeping track of schedules and sounding alarms when you've missed your train; spelling checkers and thesauri; outline processors; DOS emulators for disk management; database managers; ASCII code tables, and everything else the ingenuity of man can devise. I have even come across the

entire New Testament in the form of a pop-up, complete with the basic tools of biblical scholarship; and rumours have reached me of a TSR jokebase. In these articles, however, I shall be considering the mainstream TSR desk accessories: notepads, calendars, telephone directories, macro recorders and so on.

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*... certain programs will have no truck with pop-ups whatever — Ventura Publisher is a case in point, as are early versions of Microsoft Word.*

---

TSRs have, of course, their own set of problems. Although I understand the matter is currently under discussion by the leading software houses, there is as yet no generally agreed set of standards for the way in which TSRs handle I/O procedures, which means that by no means all TSRs behave themselves with all applications; while certain programs will have no truck with pop-ups whatever — Ventura Publisher is a case in point, as are early versions of Microsoft Word.

And of course, some TSRs are strong in one area and weak in others, which can lead to some interesting pop-up cocktails — Superkey for macros, the Phone Book and Clipboard from Metro, Turbo Lighting, and SideKick's NotePad and Calendar is a functional (if inelegant) mixture

which I shook together recently out of a spirit of enquiry and poured with WordStar 3. This sort of blend, even in less extravagant forms, gives rise to further difficulties — even such TSRs as are prepared to live together are prone to bicker among themselves if loaded in the wrong order, and when the squabbling becomes acrimonious, the normal result is a hung computer and the deployment of the reset button.

## SideKick

**T**HE FIRST TSR to hit the market was SideKick, which to some extent at least has become the exemplar of the pop-up. It is therefore appropriate to begin this series with a look at the latest release of SideKick, version 1.5, which includes a number of small improvements over earlier versions.

SideKick is available in either copy-protected or unprotected form. Its utilities consist of: Notepad, Calendar, ASCII table, Dialer, Calculator and Help, which (alas) offers advice only pertaining to SideKick itself.

SideKick runs under DOS 2 and its memory requirement ranges from a modest 60K with the minimum notepad size of 1,000 characters to the full-bore configuration of 105K, with the notepad size set at the maximum 50,000 characters. This is a lower figure than some other TSRs demand — Metro, for example, although it can be run on as little as 80K, does not

wield any real muscle until it has 130K or so to play with; and Homebase will chew up a good 256K if it is allowed to.

For those who are severely short of RAM, disk space or both, three cut-down versions of SideKick are included on the distribution disk, omitting one or more of the utilities: using the no-calendar version, the requirements drop to 58K of RAM and 33K of disk space; 46K of RAM and 27K of disk space are needed for calendar but no notepad; and the minimum configuration — perhaps designed for lonely programmers with neither telephone nor social life — has only the calculator and the ASCII table and asks no more than 29K of RAM and 17K of disk space (these figures are exclusive of the optional help file, which occupies 52K on the disk).

The manual is a paperback running to some 120 pages, and although prone to the occasional outburst of hyperbole, it is of a high standard in terms of information. The on-screen help, however, is so extensive that the manual is hardly necessary.

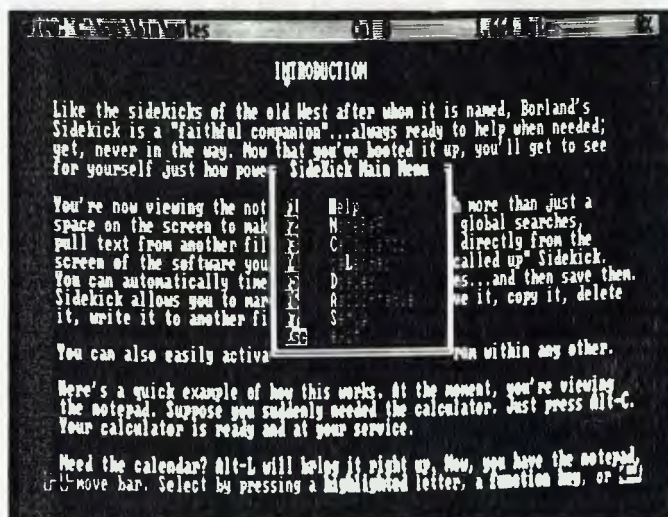
The installation program, SKINSTALL, allows screen type and colours to be changed, lets the user allocate RAM for the NotePad and sets up the port used for communications. A new feature in installation is Graphics Mode, which will prevent graphics applications from dissolving temporarily into Expressionist art when SideKick is invoked. Other configurations are set up within SideKick itself using the Set Up option, which establishes a default

search path for data files and records the current window positions as defaults.

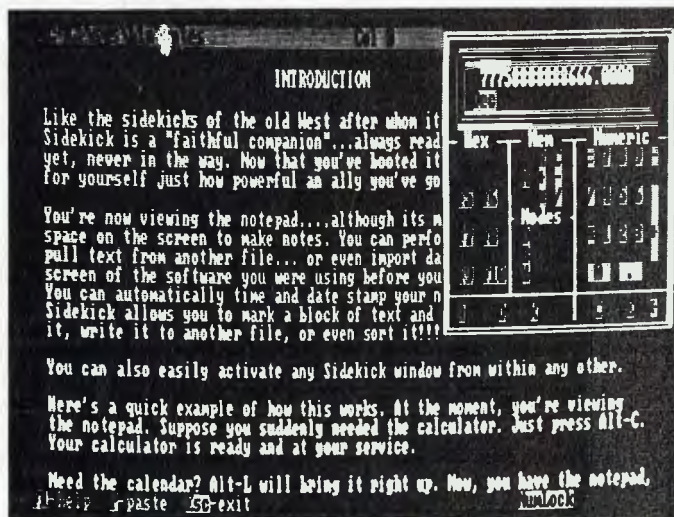
Either of two key combinations, Alt-Control or Left Shift-Right Shift, invokes the SideKick main menu, a tasteful little number which, like all the other SideKick utilities, can be moved to any area of the screen and displayed in any colour combination which pleases. A selection can be made from the menu in any of three ways: by moving the highlight bar; by pressing the highlighted letter, or by using a function key.

A utility can be removed from the screen in either of two ways: by pressing the Esc key, in which case the next time SideKick is invoked the main menu will appear with the highlight bar on the last utility used; or by pressing Alt-Ctrl again, which leaves the utility dormant until the next time SideKick is invoked, when the same utility reappears, sidestepping the menu. These relatively minor details are among the many features of SideKick which contribute to its overall elegance and ease of use.

Any number of the utilities can be brought to screen one on top of the other; and a utility once called can be called again: it is possible, if rather pointless, to call the ASCII table, the calculator, the ASCII table again, the notepad, the calculator once more, and so on until the screen is completely covered. Unlike many TSRs, SideKick has a built-in facility for removing itself from RAM: invoke the main menu and press Ctrl-Home Ctrl-End,



**Figure 1.** The SideKick main menu is invoked with Alt-Ctrl or Left Shift-Right Shift. Like all the other SideKick utilities, it can be moved to any area of the screen and displayed in any colour combination which pleases. Selections can be made by moving the highlight bar, by pressing the highlighted letter, or by using a function key.



**Figure 2.** The SideKick Calculator has an 18-digit 'screen.' The standard memory features are offered in addition to the four basic arithmetical operations, and calculations can be performed in base-10 arithmetic, Hexadecimal or Binary. Results can be Pasted to other applications.

although this only works if no other TSR was loaded after SideKick.

(Programs lacking this valuable feature can be dislodged by means of the public-domain utility TSR22, which can be downloaded from various Bulletin Board systems, including YC's).

### ASCII table

It is not often the average computer user needs to know an ASCII code, and when that eventuality arises there are a good many reference tables which will supply the information. There is, of course, no actual harm in having a set of ASCII codes available on screen, uninspiring though it is; although it is generally my own experience — an aspect of Murphy's law, presumably — that when I want to check an ASCII code, either I do not have SideKick running or I am using a program which will not tolerate SideKick. Assuming, however, that neither of these conditions is in force, SideKick's ASCII table shows the complete set of ASCII codes in both decimal and hexadecimal; and there isn't really much more that can be said about it.

### Calculator

The SideKick Calculator, like most of its imitators and descendants, displays a picture of a pocket calculator, which is largely a waste of screen space — the business end of the utility is the 18-digit 'screen' in which calculations are entered and the results displayed. The standard memory features of the pocket calculator are offered in addition to the four basic arithmetical operations, and calculations can be performed in base-10 arithmetic, Hexadecimal or Binary, which are of obvious interest to programmers. Calculator results can be passed to other applications with the Paste command.

There are a number of more sophisticated TSR calculators around — both Metro's and Pop Up DeskSet's, for example, will perform elaborate financial calculations, and it is becoming increasingly common for wordprocessors to include some sort of maths option — but SideKick's calculator is adequate for those of us who do not need to figure the pros and cons of wool cash sett futures for September 1989.

### Calendar

The calendar spans the years 1901 to 2099, which latter figure suggests a healthy optimism in all sorts of areas. Bearings are taken from the system clock and the display shows the current month and a few odd days of the preceding and

following months, with the current date highlighted. A separate window allows appointments to be entered, although, unlike some other accessories of this type, SideKick's appointments scheduler does not sound alarms when appointments fall due. Separate schedules can be kept for different individuals or — for those who like to separate business from anything else — for different purposes.

### Notepad

The NotePad is the only one of SideKick's windows whose size can be changed — the F9 and F10 keys respectively expand and contract the window. NotePad in fact constitutes a reasonably powerful wordprocessor, and offers most of the basic wordprocessing commands: search-and-replace, block marking and so on. Perhaps uniquely among TSR utilities of this sort, it will read WordStar files — as WordStar users will know if they have ever tried to TYPE a WordStar file, the high bit is set, which leads to a display containing all manner of curious characters. NotePad also uses WordStar commands, which makes it almost a mini-WordStar; but for the benefit of those whose education is deficient, many of the commands can be reassigned.

NotePad can also be used as a clipboard: pressing the F4 key removes the NotePad window from screen and allows screen contents to be marked for importing to SideKick. Text captured in this way — including graphics characters — can later be inserted or 'pasted' into other applications, and a paste delay can be set to cater for programs which cannot handle the speed at which SideKick exports data.

There are a couple of improvements on earlier versions of NotePad: a right margin can now be set and word wrap has been included.

### Dialer

For those who lack push-button phones with memory storage, a telephone dialer is a useful thing to have to hand, assuming, of course, that a modem is connected; while for those who have kept abreast of telephonic developments, it is probably more trouble than it's worth and certainly no faster. SideKick's dialer is Hayes compatible and dials numbers from the SideKick Phone Directory, which may be created using the NotePad. It will alternatively dial any number on the screen that conforms to the specifications of a phone number — that is, it contains brackets, dashes or other characters defined in installation.

### Improvements?

This latest release of SideKick offers no major improvements, and the program still does not have such a wide variety of accessories as some of its competitors. Nonetheless, SideKick remains a versatile and elegant program, thrifty of RAM, unobtrusive and very fast. It is also one of the better mannered TSRs and will generally cooperate with other pop-ups provided it is loaded last, otherwise it tends to steal screen vectors, thereby slowing down screen refresh in the case of programs which do not address the screen directly; and in severe cases hanging the computer altogether and leading to the use of the Big Red Button.

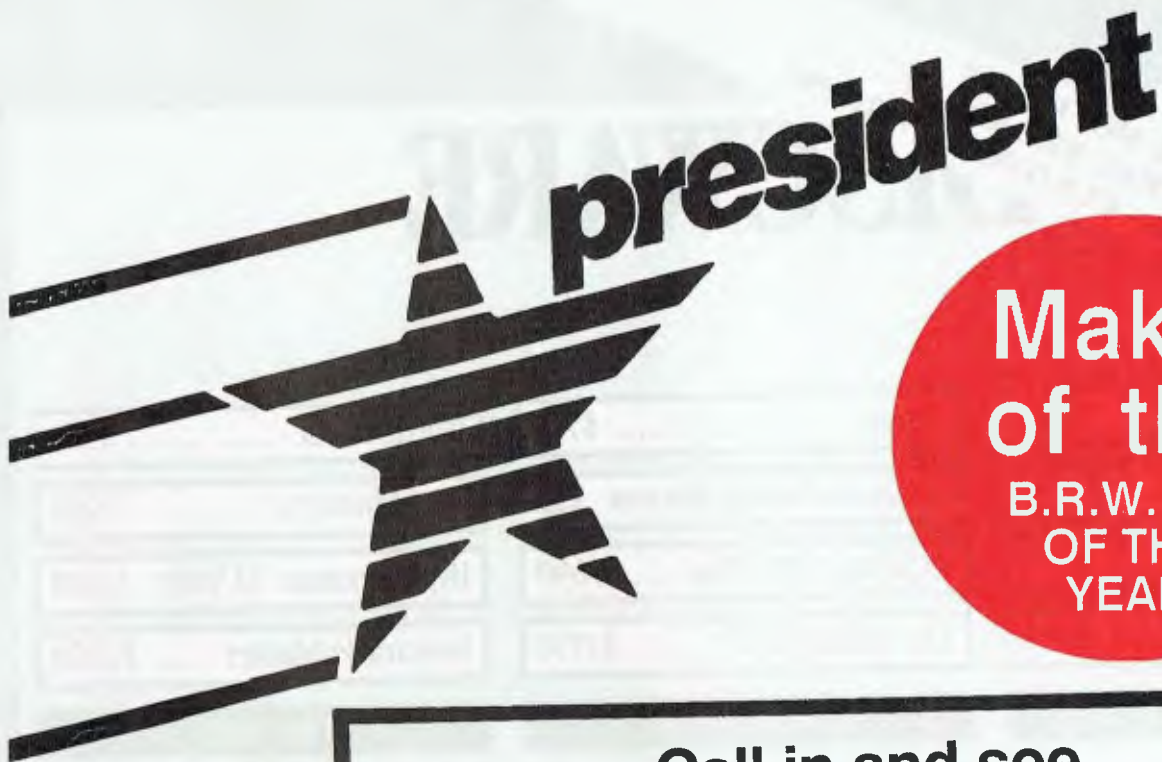
## Pop-Up DeskSet Plus

POP-UP DESKSET Plus, also marketed as Sage Desk-Set, runs under DOS 2 or higher and requires at least 64K of RAM. It occupies two floppy disks and is supplied with a 168-page paperback manual. It is not copy protected. The utilities consists of: Pop-Up Calculator, Financial Calculator, Word, PopDOS, Anything, Calendar, Alarm Clock, Voice, and TeleComm.

Pop-Up DeskSet's manual derives from that school of thought which assumes that the reader is totally unfamiliar with computers and must consequently have a vocabulary of one thousand words and suffer from such severely arrested mental development that he or she cannot be relied upon to proceed much farther than figuring out how to remove the cellophane from the package.

The first of these assumptions may be justified, but the second two are not — unfamiliarity with computers is not synonymous with either idiocy or subliteracy. Aside from the offensive aspect of this approach to manual writing (and aside also from the interesting question of why software houses bother writing programs for people they believe to be cretins), I suppose that anyone who gets the length of using a TSR is likely to appreciate the nature of the relationship between the keyboard and the screen, to have some idea of what RAM is, and to appreciate that files have to be saved if they are to be accessed again.

The authors of Pop-Up DeskSet's manual do not credit the user with knowledge in any of these areas and set out to instruct him or her with the assumptions mentioned above; and in the third case,



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EXPANSION:	6 x 16 bit slots. 2 x 8 bit slots.
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RAM:	640 KB	1 MB	2 MB
DISK STORAGE:	720 KB + 20 MB	720 KB + 40 MB	1.44 MB + 40 MB
INPUT/OUTPUT:	Ser/Par/Exp	Ser/Par/Exp/2 slots	Ser/Par/Exp



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INPUT/OUTPUT:	serial/parallel/game port/8 slots	
SCREEN:	mono	colour

## AST Premium 286

MODEL:	85	140
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saving files, manage to give the impression that they are speaking of an optional and not very important extra ('...you'll often want to store your notes on disk...').

On the other hand, the manual is reasonably thorough, and seems to revise its poor opinion of the reader slightly toward page 60; indeed, by page 105 it is happily chatting about correlation coefficients and the slope and y-intercept of a regression line, although right up to the very last chapter it continues to labour the point that any of the utilities can be accessed while another application is in use.

Any or all of the Pop-Up DeskSet utilities can be loaded, given sufficient memory: Calendar (34K), Calculator (16K), Financial Calculator (31K), Voice (16K), Alarm Clock (14K), PopDOS (20K), Word (53K), Anything (20K).

Pop-Up Word can use up to an additional 18K for document buffer space. Pop-Up Anything requires a further 7K unless the 'risky' option (I'll talk more about it later) is selected, and it can use as much as an additional 399K for executing a second program.

Data files will obviously increase this figure. This is far too much for a standard floppy disk, of course, but judicious placement of utilities would allow a twin-floppy system to boot from both drives, with either or both disks removed as appropriate.

There is no installation program as such — all that is necessary is either to make a working copy of the program on floppy disk or to copy it to a suitable hard disk directory. A procedure can be invoked to create or modify an Autoexec.bat file to load the required utilities.

## A New Order

Pop-Up DeskSet is sensitive to the order in which its utilities are loaded: Alarm Clock must be the first in and Pop Anything last. If either of the macro recorders ProKey and SuperKey is being used, Pop-Up DeskSet must be the last loaded. There is no way of unloading any of the utilities, as there is with SideKick and some other TSR programs — once Pop-Up DeskSet has claimed its allowance of RAM, it hangs onto it until the computer is switched off. The excellent public-domain program TSR22, however, which can be downloaded from many bulletin boards, allows TSRs to be dislodged.

Pop-Up DeskSet's colours can be changed either by entering appropriate commands at the DOS level or by toggling colour off and on with the Ctrl-C key while a utility is active. The range of colours em-

braces the standard blue, green, cyan, red, magenta, brown and black. Background colours cannot be changed, however. The utilities can also be moved around the screen, although, with the exception of Pop-Up Word, the size of the windows cannot be altered.

It is possible to change the hot key for both calculators, the Alarm Clock, Voice and Word at the DOS level with the command 'i=#', where 'i' stands for the invocation key and '#' is a code indicating the new key (a list of such codes appears at the back of the manual). With the exception of the calculators, help can be called for any of the utilities with the near-standard F1 key — the calculators reserve the function keys for other purposes and use H to call help.

---

*The utilities consists of:  
Pop-Up Calculator,  
Financial Calculator,  
Word, PopDOS,  
Anything, Calendar,  
Alarm Clock, Voice, and  
TeleComm.*

---

## Alarm Clock

Alarm Clock takes the time from the system clock and is invoked with Alt-A (or a user-defined hot key) to give a window 12 lines deep and 40 columns wide. Alarm Clock offers a number of features: it can, for instance, show a one-line digital clock in any of the four corners of the screen with the display appearing each minute, each hour or constantly, with or without a chime sounding on the hour. Up to six alarms can be set and combined with messages, which appear on the screen along with a chime which those suffering from a guilty conscience will find distressingly reminiscent of a police siren.

Alarms can be 'snoozed' — set to sound again five minutes later — reset for another time, or simply switched off altogether. The message box, however, is simply the standard Alarm Clock window — it would have been a better idea, perhaps, and certainly more elegant, to have provided a different display for messages.

Alarm clock also features a stop watch and a timed feed. This latter is a rather attractive option, allowing any DOS com-

mand to be set up for execution at a given time. In combination with a macro or a batch file, this is a feature with some potential for executing routine tasks while the operator is absent from the keyboard. If you wished to call an online database at cheap periods, or if you wanted to set up a file transfer to take advantage of off-peak charges, then a timed feed could be used to advantage with Pop-Up DeskSet's communications utilities.

## Pop-Up DOS

Pop-Up DOS, invoked with Alt-U, is a DOS emulator with a window 21 lines deep and 45 columns in width. The commands supported are: DIR, XDIR, CD, DEL, COPY, REN, TYPE, in addition to printer control.

DIR does exactly what its name would suggest: it gives a listing for any drive and any directory, along with the number of bytes free, just as the standard DOS command DIR does. Wild cards are permitted, as they are in all the Pop-Up DOS utilities.

XDIR does what DIR does but with the difference that the first few characters of data files are shown (which is not necessarily very helpful with a wordprocessor like WordStar, since the text is shown with high bit on, displaying those curious characters which make WordStar files virtually unTYPEable). Although a full text-search utility such as Norton's is necessary for comprehensive file hunting, Pop-Up DeskSet's XDIR could be useful for identifying files if you knew what the first few words were.

CD again corresponds to its DOS counterpart, changing the logged directory or drive. DEL erases files; and does so without requesting confirmation first, which could have some drastic results. And COPY, REN and TYPE, as one might expect, respectively copy files, type them and rename them.

CHKD is intended to show how much RAM is free, and so corresponds in part to CHKDSK. However, it displays only the memory free when PopDOS was loaded, which seems altogether pointless — as I write this article, I know I have about 28K free, with WordStar 4 running in the fullness of its might along with the complete range of Pop-Up Deskset utilities and one or two other things that usually creep surreptitiously into RAM when I boot The Engine, but Pop-Up Dos would have me believe I have 301K to play with.

The printer control utilities are a little more interesting, allowing any disk file to be printed in a number of 'special' formats, including superscript and subscript;

allowing codes to be sent to the printer; and, perhaps most usefully, allowing the printer and keyboard to be used as a typewriter, which is handy for such things as printing envelopes. There is nothing here that cannot be done with the average wordprocessor, however, although it is certainly useful to be able to access the printer without having to wait for the wordprocessor to wake up.

### Pop-Up Calendar

Pop-Up Calendar is invoked with Alt-D (for Date). The default display shows three months, with the current month in the middle and the current date blinking, and occupies 14 lines by 76 columns. A single-month view is available also, which occupies the entire screen. The calendar ranges from the year 1900 (when St. Patrick's Day fell on a Saturday), to 2027,

(when Honest Abe Lincoln's birthday will be celebrated on a Friday — Calendar displays a number of such anniversaries).

It can also be set up to display recurring events of more immediate personal significance, such as wedding anniversaries and probation appointments, and a number of files of such data can be maintained. Appointment details can be kept also, but there is no facility for sounding

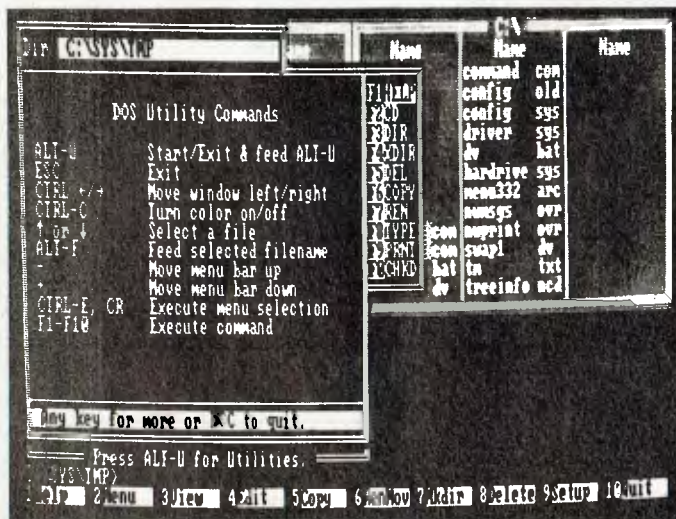


Figure 3. Pop-Up DeskSet's Pop-Up DOS, invoked with Alt-U, is a DOS emulator with a window 21 lines deep and 45 columns in width. In addition to printer control, the DOS commands DIR, XDIR, CD, DEL, COPY, REN, and TYPE are available.

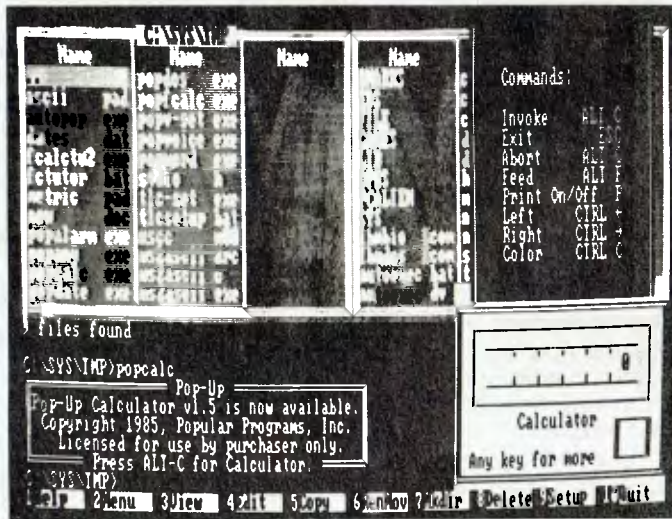


Figure 4. Pop-Up Calculator occupies 12 lines and 26 columns and is invoked with Alt-C (or a user-defined hot key) it's shown here with Help invoked. The four basic arithmetical operations are supported, and the display allows up to 15 digits. Ten memory registers are provided, in addition to the usual 'M' options of the standard calculator.

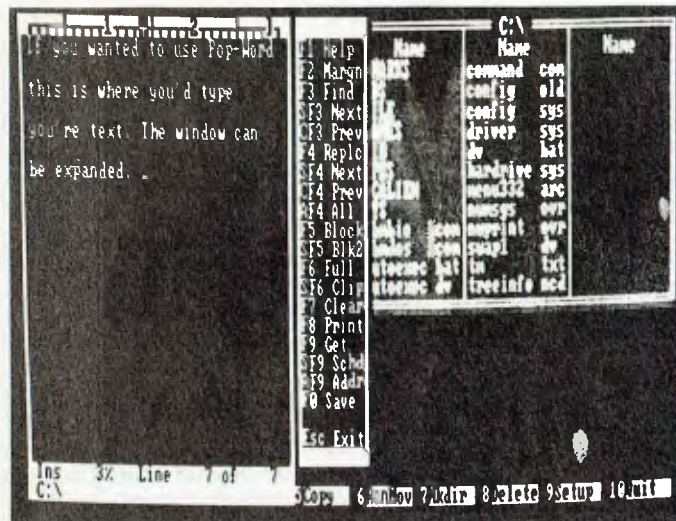


Figure 5. The window size of Pop-Up Word can be modified from a 25 columns by 25 line display to one occupying the entire screen. In addition to its wordprocessing features, it also includes an appointment scheduler and an address book. The normal maximum document size allowed is 4K, but an 18K buffer can be set up.

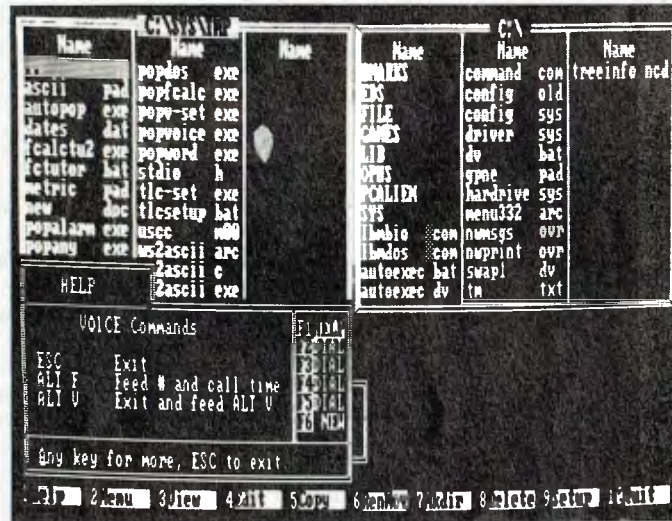


Figure 6. Pop-Up Telecomm consists Pop-Up Voice (shown above) and Pop-Up Modem, both of which require separate installation. Voice will dial telephone numbers entered at the keyboard or from either a database or from Pop-Up DeskSet's own Address Book, or, three telephone numbers may be accessed from Pop-Up Voice itself.

an alarm when they fall due, as there is in Alarm Clock — this would have been a useful inclusion.

### Pop-Up Calculator

Pop-Up Calculator initially occupies 12 lines and 26 columns and is invoked with Alt-C (or a user-defined hot key). It is intended to mimic a printing calculator, the results of calculations being displayed in such a way as to resemble a roll of paper emerging from the machine. This is inconvenient in that the 'print out' hogs further space and eventually conceals one third of the screen — more thought could have been given to the user's convenience and less to gimmickry.

The four basic arithmetical operations are supported, and the display allows up to 15 digits. As with most other pop-up calculators I have come across, invoking Calculator automatically toggles Num Lock on and leaving Calculator toggles it off. The results of calculations can be printed or passed to other applications. Ten memory registers are provided, in addition to the usual 'M' options of the standard calculator.

### Pop-Up Financial Calculator

Financial Calculator uses exactly the same display as Calculator and supports the same operations in addition to exponents, roots, logs both natural and base 10, financial analysis and statistics.

Financial Calculator has five modes: Normal, Statistics, Interest, Annuity Begin, and Annuity End. 'Normal' is the default, the other modes being selected with Ctrl-M, which moves through the modes in the order listed. A tutorial is included to outline the uses of these modes, and although brief, it does cover the main applications (and in the case of the Statistics mode, does so with an example using the Bleed-Em-Dry Insurance Corporation, which provided light relief).

My own mathematical skills go little beyond HSC level, so I am not qualified to pass an informed judgement on Financial Calculator, but it appears to me to be a tool of some sophistication.

### Pop-Up Word

Pop-Up Word is a wordprocessor and is the only one of the applications which allows window size to be modified. However, size modification extends only to choosing between two displays, one 25 columns by 25 lines and the other occupying the entire screen. In addition to its wordprocessing features, it also includes an appointment scheduler and an address

book. It's hard to understand why the former was not included with the Calendar and the latter made a separate utility. The normal maximum document size allowed is 4K, but an 18K buffer can be set up.

Pop-Up Word offers most of the features of the simpler wordprocessors: word-wrap, search-and-replace, block manipulation and so on. It also uses a number of WordStar commands as alternatives to its own commands, and dot commands are employed also. Its compatibility with WordStar stops there, however, as it is not able to read WordStar files — the dreaded high bit is shown. Similar difficulties were found with other wordprocessors, which severely limits the utility's use — certainly it is not possible to use it in all cases for multiple file editing, as the manual suggests. It is possible, on the other hand, to load multiple copies of Pop-Up Word and edit a different file in each, although in view of the difficulties mentioned, this may not be of any great use.

---

*... once Pop-Up DeskSet has claimed its allowance of RAM, it hangs onto it until the computer is switched off.*

---

Pop-Up Word also offers a clipboard, a utility for capturing screen output and transferring it to other applications. The clipboard is a relatively simple one, allowing no formatting of the material captured.

### Pop-Up Anything

Pop-Up Anything, according to the manual, allows any application program to become a pop-up. What it seems to do, however, is load a second copy of Command.com and run the additional application from that second copy, using the DOS Exit command to return to the first copy. The maximum memory allowance for Pop-Up Anything is 192K — this and various other parameters are set at the DOS level, including the 'risky' option, which is an additional 7K used to ensure that the second application is left stable before returning to the first.

Pop-Up Anything, in fact, is a good deal less exciting than it sounds: it is no quicker and no more convenient than sim-

ply leaving an application and loading another; and in any event, many of the more up-to-date programs already make provision made for the second Command.com and Exit combination.

### Pop-Up Telecomm

Pop-Up Telecomm consists of the two accessories, Pop-Up Voice and Pop-Up Modem, both of which require separate installation in order to set up the communications port being used, modem characteristics, and so on.

In combination with an autodial modem, Pop-Up Voice will dial telephone numbers entered at the keyboard or from either a database or from Pop-Up DeskSet's own Address Book. In addition, three telephone numbers may be accessed from Pop-Up Voice itself. The more modern telephones, of course, offer push-button dialing, redialing and number storage, which will make Pop-Up Voice unnecessary for many people. Those still using the older equipment, however, may find it useful.

Pop-Up Modem is a communications package offering the usual features of such programs with the added advantage that it can be run on top of another application. Like wordprocessors, communications programs, are generally very much a matter of taste and habit: Pop-Up Telecomm appears to function well enough, and as I suggested earlier, in combination with the timed feed it could be valuable.

Comparison with SideKick is inevitable and certainly Pop-Up DeskSet has one or two features which the old warhorse lacks. Pop-Up Anything and PopDOS are of very limited use, however, and the program must stand or fall on its other accessories and whether they offer any greater overall versatility. My own feeling is that they don't — the program gives an overall feel of having been cobbled together in a hurry, and I would prefer myself to stick with SideKick. □

### Product Details

**Product:** SideKick  
**From:** Borland International  
**Distributor:** TechPacific,  
 119 Farrars St, Sth Melbourne 3205 Vic.  
 (03) 690 9055  
**Price:** \$314 taxed

---

**Product:** Pop-Up DeskSet Plus  
**Distributor:** Mace Software, 23 Sylvan Rd, Toowong 4066 Qld  
 (07) 870 8600  
**Price:** \$69.95 taxed

# MODEMING ALONG ...

## The NetComm Auto Modem 1234, Smart Modem 1234SA and Datalock 1234SA

**M**Y FIRST MODEM was a large and chunky creature of dubious provenance connected via even more dubious soldering to a push-button handset of uncertain temperament and uncouth manners, the whole issue looking rather as though it had been thrown together out of discarded bean tins on a wet Sunday afternoon.

'57'. I called him, by reasons both of the resemblance alluded to and the number of attempts it normally took to coax him into anything in the way of communication. 57 had to be manually switched out of voice mode whenever one was fortunate enough to establish contact, had no support for autodialling — hence the push-button handset — and operated

NetComm offer the largest range of modems available to the general user — Keith Mackay reports on three of the range (and Matt Whelan tells of a 'spectacular' communications program soon to be bundled with NetComm's range).

*In appearance, these modems are very similar: sleek, elegant little beige boxes which occupy very little desk space.*

(using the term loosely) at 300 baud. He was used principally for exchanging data files with my associates, who live near me in the Blue Mountains and who are both patient souls — file transfer at 300 baud is only slightly faster than dictation.

300 baud is also much too slow for serious contact with bulletin boards (some boards, in fact, will not respond to 300 baud callers); and sending articles to the Sydney offices of *Your Computer* from the Blue Mountains was a costly proposition — we are already paying by the minute. I



**Figure 1.** The NetComm Auto Modem 1234 can handle from 300 to 2400 baud, both Bell and CCITT protocols, and features autodial, tone or pulse dialling, autoanswer, autodisconnect and asynchronous communications.



**Figure 2.** The NetComm Smart Modem 1234SA adds autoranging, synchronous communications and software to the features of the 1234.

eventually came to regard 57 as more useful for supporting the two volumes of the *Shorter Oxford Dictionary* which live on my desk as constant reminders of how few words I know, and I longed for something faster and less capricious.

My second, third and fourth modems were a very different matter — respectively the NetComm Auto Modem 1234, the NetComm Smart Modem 1234SA and the NetComm Datalock 1234SA. Being unable to use more than one modem a time, I handed two of them to my colleagues, and over the last five months these machines have had extensive use in data transfer, both within the Blue Mountains and between the Blue Mountains and Sydney.

In appearance, these modems are very similar: sleek, elegant little beige boxes which occupy very little desk space. All have a row of status lights on the front panel and, except for the 1234, a bank of switches also. All are fully Hayes compatible and are supplied with an external power supply and a piggy-back telephone plug, in both cases blessed with sufficient cable to allow the equipment to be used in real life — this is by no means always true of electronic equipment. A user's manual is provided, giving enough information to get the equipment up and running, although its organisation leaves a certain amount to be desired.

Baud rates range from 300 to 2400, including 1200/75, and is adjusted automatically to the incoming signal, although this feature can be disabled if necessary. Autodialling, autoanswer and autodisconnect are supported, and the Datalock 1234SA also offers call-back facilities and synchronous transmission. Another feature of the 1234SA is with a communications package called, simply, The NetComm Program; although I prefer Procomm, this is a perfectly adequate piece



**Figure 3.** The NetComm Datalock 1234SA has builtin error checking, data encryption and password/dial back as well as the standard features of the 1234SA.

of software and can also be used in Viatel access. (*This was Version 2 — for an update on the NetComm program, see the accompanying box item.*)

There is little one can say about any modem, with the exception of 57, whom I could dwell on at some length in words marked in the *Shorter Oxford* as 'obsolete in polite use'. A modem should do the job demanded of it with the minimum fuss and the minimum intrusion, and where necessary it should guarantee security, as the call-back feature of the Datalock model does.

Computer equipment in general and modems in particular by no means always live up to these requirements, but the NetComm products were uniformly trouble-free in operation and were sorely missed when NetComm ask for them back.

### Product Details

Product: NetComm Auto Modem 1234, Smart Modem 1234SA, Datalock 1234SA

From: NetComm Australia,  
PO Box 284, Pymble 2073 NSW  
(02) 888 5533

Price: \$1125 Auto Modem 1234  
\$1499 Smart Modem 1234SA  
\$1799 Datalock 1234SA. All prices taxed.

*The prices and configurations mentioned in the article were correct at the time of publication, but we understand that both are likely to change by the time you read this, so please check with NetComm, or your local supplier, for current details.*

## The NetComm Program

What communications package should you buy to go with your new modem? Until recently the choices included a number of excellent public domain packages (with the problem that, for the uninitiated, finding them was almost impossible), and a range of quite ordinary commercial

programs that sold for up to \$400.

Well, that formerly difficult decision has been made simple for those buying from NetComm, which will be bundling a spectacular new communications program with its modems by the time you read this.

The NetComm Program, Ver-

sion 3, is a far better piece of software than we have a right to expect of a hardware manufacturer (it's far better than any of the commercial packages I've seen from the software specialists), and is a good indication of NetComm's dedication to the communications market.

It's a state-of-the-art, user-friendly, powerful do-everything package. It handles

Videotext services like Viatel brilliantly, yet is also a feature-packed text communications package for inter-machine and bulletin board use.

Resplendent with pull-down menus, complete on-line help, a full programming language, and ultimate configurability (a host of options configurable for each individual service you use, right down to customised function keys), the NetComm

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## C.I.TOH

Program is a delight for beginners and communications hackers alike.

Its inbuilt support for multiple modems, a wide range of protocols (it's the first mainstream package to offer the latest in high-speed, advanced protocols, Zmodem) and the incredible flexibility endowed by the programming language and configurability is enough to have convinced me I should switch from my old favourite, Telix.

Mind you, I haven't switched yet... I've been running beta-test versions of the NetComm Program, and spending large amounts of time setting up is defeated when the programmers come up with a new version every week. So far I've only been 'playing', but now the final product is ready I'm going to give it some serious use.

The package includes almost everything that exists in the comms programs I use already, plus a whole lot they don't have. When I told the Cybersoft team (authors of the package), what I missed — items like Telix's circular dialling queue — the response was immediate.

'We can't include it in the package until Version 3.1, but in the meantime we will write a C2L program to do the job,' they said. No problem — C2L is the 'Cybersoft Communications Language', a powerful Pascal-style user programming language built into The NetComm Program. That it can be used to add features to the program 'at whim' says a lot for the flexibility of the package.

I have always hated The NetComm Program Version 2 — it followed the Crosstalk (ugh!) interface because that was the 'standard' of the time. Thankfully, NetComm has decided to set standards this time around rather than follow them.

The programmers (Cybersoft, also authors of the Gateway package for Viatel comms) have excelled. So has NetComm, for demanding the highest standards. Our congratulations go to both groups.

Where is everything ?

Connect	Edit	Run	File
<p>CALL LOCAL PICKUP ANSWER</p> <p>Allows you to call a remote service. If you have an auto dial modem then the call will be made for you.</p>	<p>DIAL DIRECTORY FILE C2L PRESET PROGRAMS SHORTCUTS JUMP KEYS MODEMS</p> <p>Allows you to add and change entries to the dialing directory, modem types. If you ever need to change the speed or connection details of a service then select this menu.</p>	<p>C2L PROGRAMS</p> <p>Run other programs that you have set up in the EDIT PRESET PROGRAMS.</p>	<p>UTILITY VIEW PRINT LOG CHANGE DIR DOS TRANSLATE REVIEW IMPORT EXPORT</p> <p>This menu allows you perform useful functions on files that you have on your disk.</p>

OFFLINE 17:32:15-

The File Help Screen from the NetComm Program Version 3.

Help	Connect	Edit	Run	File	Setup	Quit
Setup Form						
Screen <span style="border: 1px solid black; padding: 0 2px;">Colour</span>		Receive Buffer 4		Transmit Buffer 4		
Flash on YES		C2L Serial Size 2		C2L Pause Size 2		
Videotex Rom NO		Menu Key <ESCAPE>		Break Key <END>		
Diagnostic NO		Execute Key <HOME>		Execute C2L dialog.cex		
Startup Menu Quiet NO		Printer Parallel		Audit On YES		
Master dir e:\v3		Audit File test.aud		Area Code 02		
Data dir e:\v3						
Editor dir c:\bin\edit.com						
Download dir c:\						
Default Port 2						
Modem-Port 1 NETCOMM 1234						
Modem-Port 2 NETCOMM 1234						
F1 Help F2 Done ESC Quit				Toggle		

OFFLINE 17:39:43-

The Edit Modems menu for configuring the program for the particular modem that will be used.

Help	Connect	Edit	Run	File	Setup	Quit																
		<p>Help Dial Directory File C2L Preset programs Shortcut Jump Keys Modems</p>																				
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Modem Name</th> <th>Type</th> </tr> </thead> <tbody> <tr><td>DEFAULT</td><td>SmartComm</td></tr> <tr><td>IN MODEM</td><td>SmartComm</td></tr> <tr><td>MANUAL MODEM</td><td>Manual</td></tr> <tr><td>NETCOMM 12</td><td>SmartComm</td></tr> <tr><td>NETCOMM 12 4</td><td>SmartComm</td></tr> <tr><td>POCKET MODEM</td><td>SmartComm</td></tr> <tr><td>TRAILBLAZER</td><td>TrailBlazer</td></tr> </tbody> </table>	Modem Name	Type	DEFAULT	SmartComm	IN MODEM	SmartComm	MANUAL MODEM	Manual	NETCOMM 12	SmartComm	NETCOMM 12 4	SmartComm	POCKET MODEM	SmartComm	TRAILBLAZER	TrailBlazer				
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MANUAL MODEM	Manual																					
NETCOMM 12	SmartComm																					
NETCOMM 12 4	SmartComm																					
POCKET MODEM	SmartComm																					
TRAILBLAZER	TrailBlazer																					
		Help Quit Edit Copy Add Remove Search																				

OFFLINE 17:37:38-

The Set Up Form for configuring the program for the particular computer it will be used on.

# The Anitech ALR 386/220

## GROUP A COMPUTING



Ewart Stronach (petrol head from Wayback) has just done a few circuits with a Group A PC — it might *look* like the one on your desk . . .

**I**N THE MOTOR INDUSTRY, manufacturers pit their products for all the world to see in what is classed as Group A motor racing. Petrol heads can stand on the sideline and watch a car that looks much like the one they own perform at speeds that astound and amaze. These Group A cars are beyond the reach of mere mortals, the investment is horrendous, the fine tuning beyond the uninitiated and the ability to drive them to their limit granted to a carefully chosen few. Now comes a new group of PCs. Lets call them Group A PCs.

The progress of the humble PC has been swift indeed. When the original MS-DOS PC was launched, the speed factor was secondary to the ability of the com-

puter to perform better and cheaper than the currently popular CP/M systems in use in most small business. The early IBM, and the rash of clones it spawned, boasted up to 256 kilobytes of memory, one 360 Kbyte floppy disk and a bare minimum of peripheral boards. It cost about \$8000 in this lowly form and to aspire to the addition of a hard disk usually meant waiting until a rich aunt died or your purchasing officer had a mental aberration.

The early race was for speed; to this end, so called Turbo boards became available, which, when coupled with a V20 chip, pushed the old PC along at a respectable 2.7 times the original speed. For the non-technical out there, the speed at which a computer can work is governed largely by

the inbuilt electronic clock which times the movement of data between the various sections of the processing path. It is also governed in part by the speed at which the memory chips are capable of operating and we are talking in terms of nanoseconds, or one thousand millionth part of a second.

It soon became apparent that lots of time was being wasted while operators sat and waited for the computer to complete one task before anything else could be done and the race for more speed was on. The development of new CPUs, such as the 80286 and the 80386, allowed huge leaps in speed and a new super breed of computer has become available at prices not much more than the introductory prices of their forebears. A new contender for the crown in the Sheer Power, Total Grunt event is the newly released ALR 386/220.

All modern desktop units bear a certain similarity. The case must be a minimum size and is a compromise between something small enough to be moved from desk to desk and enough room inside for easy access to serviceable components. The ALR 360/220 is no outright winner in the beauty stakes, but then nor are the Group A cars. A pretty standard 53.5 cm by 42 cm and standing 16.5 cm high, the ALR 360/220 is of all metal construction with plastic fascia panels finished in the obligatory mouse gray and rat brown.

The keyboard is a later AT style with the function keys along the top of the board and separate lights to indicate Num lock, Cap Lock and Scroll. 102 keys in all. There is enough tactile feedback to make it very useable and it is of heavy enough construction to sit easily on a desk without wandering about during use.

### Configuration

**T**he ALR 386/220 comes with a 40 megabyte voice coil hard disk and a single 1.2 Mbyte floppy. There is an activity light for the hard disk on the front panel alongside a keylock and power on indicator. The absence of a reset button is a decided minus for those of us who play about with 'non standard' software and regularly lock up even the best of computers. The clock speed is software switchable by the combination of Alt/Ctrl and the plus or minus key. The use of these keys provokes a low or high pitched sound from the machine as a response. The machine was assembled and fully configured when it arrived (but I pulled it apart anyway)

The chassis is pressed metal and just a little more flexible than I would like. With

the case off, the base plate bends slightly when lifted by the front left corner but the support offered by the solid power supply and the cage for the floppy disks holds the right hand side firm. There is room for five half height devices.

The main board is very well built, solidly mounted and clearly marked. The socket which would normally carry the 8284 divider chip carries a small daughterboard with a 40 MHz crystal and divider which give the 386 220 its new higher speed. A full 2 Mbytes of probably 80 nanosecond RAM is already installed and a suite of utilities called Control/386 resident on the hard disk. A proportion of the speed available is from this software and I will return to this later. There are eight available slots but the left two, slots 7 and 8 are reserved for a further possible 4 Mbyte of memory giving a total available of 6 Mbyte, far removed from the old original 256 Kbyte! The documents suggest that a further board will soon be available with a potential maximum of 15 Mbyte.

The existing cards take up three of the available slots: a hard disk controller card, with provision for a second hard disk, a floppy controller, with a single 9-pin serial port and a parallel printer port, and a video card. The video card is a short card with mono, CGA and EGA display capability. Full compatibility of any display from a Hercules card to EGA is assured. Sockets are available on the mother board for either a 80387 or a 80287 maths co-processor, either of which would significantly speed up such applications as AutoCad or other programs requiring massive number crunching.

## Software

The software that comes with the machine, Control/386, is a suite of utility programs (loaded by CONFIG.SYS at power-up) which manage a series of performance enhancing tasks. Any disk accessing is optimised by use of a cache memory and extended memory, and compatibility of software written for lesser CPUs such as the 8088 and the 80286 is boosted by emulating those chips. Control/386 also provides emulation of AST Enhanced Expanded Memory Specification and Lotus/Intel/Microsoft Expanded Memory Specification hardware and software.

This offers 80386 based systems dramatic speed improvements by putting your memory where your program can use it. The HDCHECK utility checks the hard disk for correct interleave factor. If the interleave factor is set too low, the system

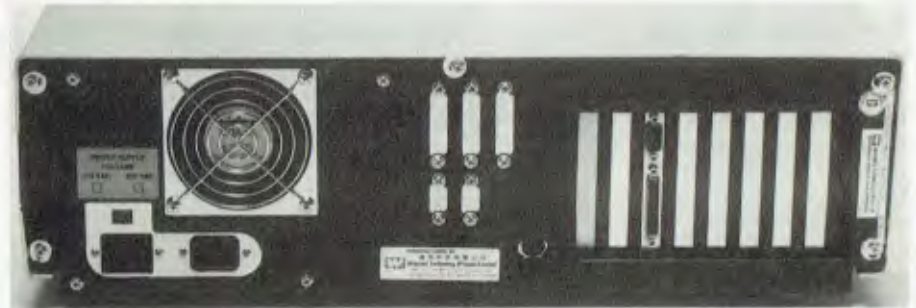
could need up to 17 revolutions of the disk to find all the data; if set too high the system would still need excessive time, resulting in noticeably slower performance. If HDCHECK reports that your disk is not running at optimum speed, HDFORM allows a low level reformat without loss of data.

## Over the pit

So much for the innards; a 5 litre V8 can be stuffed into a Morris Minor but that doesn't mean it will win Bathurst. How does the package actually perform in real life? Simply this: the ALR 386/220 is as fast as anything available on the market at this point in time, and thousands of dollars cheaper than the main contender in

changes in the unit's ability to perform in real time environment. I have not yet had the opportunity to bench test the recognised industry standard, the Compaq 386/20, but I am certain that the ALR 386/220 would produce results within a gnat's whisker either side of those from the Compaq.

The decision is not whether the ALR is faster than the Compaq, but whether your needs demand the awesome speed available from any 386 machine; if they do then it is a matter of which one represents best value. Price *must* be a major factor if all other parameters seem pretty close. The ALR 386/220 will retail for around \$5000 less than the Compaq in similar configuration.



**Figure 1.** While there are eight available slots, 7 and 8 are reserved for a further possible 4 Mbyte of memory. Three other slots are taken by the hard disk controller card (with provision for a second hard disk), floppy controller the video card. And, there's room inside for five half height devices.

the speed stakes, the Compaq 386/20. The need for raw speed becomes apparent in applications which require both rapid disk access and processing speed.

Lotus, when running a large spreadsheet on a standard XT, spends almost as much time doing its 'housekeeping' as actually producing results. For example: the time taken to load a 360 Kbyte file from a 'standard' AT machine is 36.13 seconds and on the ALR 386/220, a mere 17.95 seconds. To recalculate the same worksheet took 6.86 seconds on the AT and an astounding 2.91 seconds on the ALR. The same degree of time saving is available on dBase applications and in an office environment this means real time savings of a magnitude that time and motion experts only dream of.

Bench mark tests only go so far in testing a machine. Without an expert analysis of any of these tests, they only serve to indicate the potential of the units being compared. For example, different BIOS routines can make significant differences in reported times without any real

There are other 386 machines available at this sort of pricing structure, but to date most of them seem to be 16 MHz machines and are offered by considerably smaller organisations than Anitech. This does not mean lack of support but it makes good sense to deal with someone nationally represented and well enough capitalised to offer assurance of back-up service and peripherals.

## The tests

Let's take a look at some of the benchmark Tests. As the first decision is whether you do in fact need the additional speed of the 306/220 rather than which machine, I offer the following comparison between the ALR 386/220 and a standard AT, 286 based machine, running at 8MHz.

Good old Norton's System Information; this test examines the system and reports on configuration and offers a 'Computing Index' relative to an IBM XT. It confidently suggests that the ALR 386/220 is running a massive 21 times faster than the aforementioned IBM XT.

There were four other benchmarks conducted between the ALR 386/220 and the AT. Table 1 shows the results from the PC Magazine Laboratory Benchmark Series, a group of processor tests, written in C. The results of the memory access and disk speed time tests are shown in Tables 2 and 3.

The last two tests conducted were devised by Consulting Editor Matt Whelan and former Editor, Les Bell. The Lotus application (Table 4) loads a 300 Kbyte file, recalculates it and saves it to disk. The dBase application test in Table 5 is divided into several parts; part one measures the computing speed in a file creation exercise; part two measures a combination of computing speed and disk I/O, and part three measures straight file handling and disk accessing.

**The chequered flag**

The ALR 386/220 is as fast as any PC I have seen that has not been 'hot rod-ded'. There are a few new boards starting to appear on the market which will further enhance even machines as fast as this but their performance has not been proven enough for my liking.

Construction of the ALR is solid and good. I would have no hesitation in putting this machine into a rigorous work load situation and expecting it to perform faithfully. Support is definitely available together with an assured continuity of supply of parts and peripherals. As it is priced substantially below the perceived market leader, it must be good value. It is the nature of PC/XT/AT style hardware to become cheaper rather than dearer, but the movement of the Australian dollar against the Yen must take effect soon in the computer industry. Now might just be the time to join the big league and go Group A computing. □

**Product Details**

**Product:** ALR 386/220

**From:** Wearnes Technology

**Distributor:** Anitech

1 Carter St, Lidcombe 2141 NSW  
(02)648 1711

**Price:** \$7995 for system unit, 42 Mbyte hard disk, Video7 EGA card, 1.2 Mbyte floppy, enhanced keyboard, Speedstor utility program, Desqview version 2.0, Control/386

\$995 EGA colour monitor

Prices are taxed.

Prices are available on request for the 86 Mbyte hard disk, the 8 Mbyte memory expansion unit and the 80387 maths co-processor.

	Time in seconds:
1. 128K NOP loop:	1.64
2. Do-nothing loop:	1.48
3. Integer add loop:	0.77
4. Integer multiply loop:	0.49
5. String sort & move:	1.21

Speed index relative to 4.77 MHz PC	Speed index relative to 8.00 MHz AT
6.2	2.5
6.7	2.5
12.9	2.8
20.0	2.4
9.7	2.6

**Table 1.** The results from the PC Magazine Laboratory Benchmark Series, a group of processor tests, written in C.

	Time in seconds
1. Conventional read:	0.66
2. Conventional write:	0.61
3. Extended read:	1.37
4. Extended write:	1.37

Speed index relative to 4.77 MHz PC	Speed index relative to 8.00 MHz AT
9.1	2.0
9.8	2.2
N/A	8.5
N/A	8.5

**Table 2.** In the memory access test 256 Kbyte of conventional, LIM expanded and AT-type extended memory is allocated and 16,384 bytes are read in and written to, from local memory.

1. AT:	
1000 seeks:	
Sequential:	20.55 msec
Random:	71.35 msec
2. ALR 386/220:	
1000 seeks:	
Sequential:	4.12 msec
Random:	30.81 msec

**Table 3.** The results of the disk speed seek time test over 1000 sequential and random cylinder seeks.

	AT	ALR 386/220
Load file:	36.14 secs	17.95 secs
Recalculate:	6.86 secs	2.91 secs
Save to disk:	13.33 secs	12.96 secs

**Table 4.** The Lotus application loads a 300 Kbyte file, recalculates it and saves it to disk.

1. File Creation:	56.40 secs	22.46 secs
2. Index:	1.33.76 secs	36.71 secs
3. Delete and pack:	2.17.45 secs	52.75 secs

**Table 5.** The dBase application test is divided into several parts; part one measures the computing speed in a file creation exercise; part two measures a combination of computing speed and disk I/O, and part three measures straight file handling and disk accessing.



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### #90 & #594 GENEALOGY ON DISPLAY (2 disk set)

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### #105 PC PROFESSOR

A tutorial on the BASIC programming language which increases in complexity as the user progresses.

### #184 DISKETTE UTILITIES AND UNPROTECT

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An assortment of five games which will run on the Mono monitor.

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A fascinating game with extraordinary graphics. Excellent documentation for beginners with play levels from beginners to excellent.

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Six games to teach basic reading skills to a pre-reading child - positive reinforcement promotes "learning is fun" attitude.

### #669 & #670 GRAPHTIME II (2 disk set)

Business presentation graphics with line, column, and pie charts. Works with dBASE Multiplan and Lotus. Has help key.

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### #728 & #729 HOMEBASE (two disk set)

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### #751 AsEasyAs

A spreadsheet with ability to plot graphs. Has range formatting, does block copies, block moves, file extension is .WKS.

### #756 MEMOIRS

A diary system with encryption of the diary or an ASCII file.

### #760 MINIGEN

Turbo Pascal screen code generator - paint screens, open and close windows and create pull down menus.

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A Powerful expert system - has utilities to develop and test new expert systems. Good for classification tasks, troubleshooting and choosing from alternatives.

### #763 FINGERPAINT

One of the very few good paint programs that will run on a Hercules card, with variable drawing functions and text.

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### #802 LIFE FORMS

Many new features are added to the original Game of Life. Creates video patterns that evolve like biological cells. Very colourful.

### #806 & #807 THE REMARKABLE GENERAL LEDGER (2 disk set)

This Australasian written system not only includes a full general ledger but it has various reports on your entries, a bank reconciliation and trial balance.

### #811 INTELLI-TRIEVE

A weighted retrieval utility to use with dBASE III to extract information not considered in the original design.

### #812 & #813 SOAR (two disk set)

Service Orientated Accounts Receivable for businesses that provide services as well as products. Menu driven and easy to operate.

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Programmers who complete this tutorial will then be very familiar with TURBO C

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# COMPAQ PORTABLE 386

## ABSOLUTELY MAGIC!

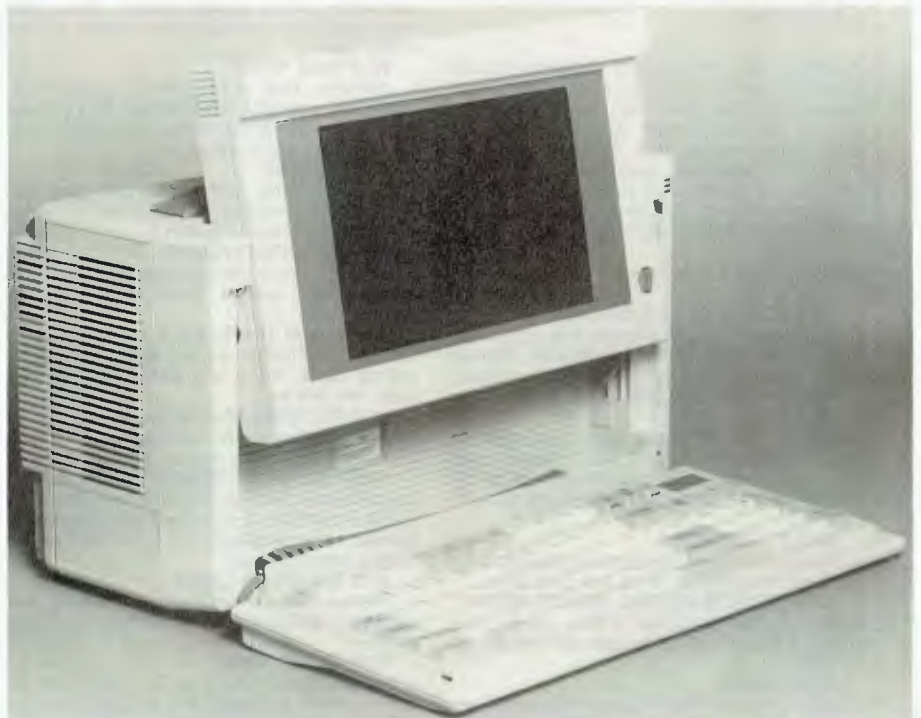
Compaq has developed a reputation for advanced technology coupled with reliability (for a price!) — its Portable III set the standard. John Hepworth tries its successor . . .

I HAVE JUST tested one of the very fastest IBM compatible personal computers available: the Compaq Portable 386 Model 40. Built into a case very similar to that of the 80286 powered Compaq Portable III, it is a horse of a different colour with processor speed surpassing the IBM PS/2 model 80, and rivalling some minis. Performance comes from an 80386 processor running at 20 MHz, and an 80387 maths coprocessor is available as an option.

Think of two shoeboxes, one on top of each other, in a greyish beige plastic, and you have the general idea of the look of the Portable 386 with the screen stowed and the keyboard clipped in place for transport. At 400mm wide, 230 high, 180 mm deep and approximately 9 kilograms, the Portable 386 is very much portable, and is easily carried by the sturdy padded carry handle on the top. Compaq suggests that it fits under a standard airline seat, and without checking the space under seats this seems quite reasonable.

### Keyboard

Undoing two latches releases the keyboard from the front of the machine, and undoing two more latches allows the screen to be swung up and out to a very convenient viewing position. The key-



*The screen has three  
brightness levels  
(bright/mid/off) which,  
along with the ability to  
have narrow or thick  
characters and normal or  
reverse video, gave  
excellent readability with  
all the software tested.*

board is a cross between the older AT keyboard and the newer 101 key enhanced version. It has 91 keys, including 12 function keys and a full numeric/cursor keypad. The additional cursor pad of the 101 key keyboard is one of the unlamented casualties of the successful effort by Compaq to minimise size without miniaturising the individual keys.

The keyboard is connected to the system unit by a coiled cord which plugs into a hidden socket beneath the lower right corner of the screen. The cord has plenty of length to allow easy placement of the keyboard relative to the system unit. Feel is good, with adequate tactile feedback but no mechanical noise. A soft click is electronically provided to confirm that the keystroke has registered. The home keys have little bumps which allow for easy and fast adaptation by touch typists.

My only reservation is one common to all keyboards other than the original PC keyboard. I use \*.\* quite often, and the original PC keyboard put the star, dot and enter keys conveniently close together. The Compaq Portable 386 has these three keys a little further apart, requiring a bit of a stretch, though it is far easier than on the 101 key Enhanced keyboard on IBM's PS/2 range.

## Screen

As mentioned earlier, the plasma screen swings up and out to an easy-to-see angle. The screen has three brightness levels (bright/mid/off) which, along with the ability to have narrow or thick characters and normal or reverse video, gave excellent readability with all the software tested. A brightness knob is at the bottom right of the screen but no separate control of contrast is provided. Two video modes are supported. These are CGA, both text and graphics, and 640 by 400 pixels graphics. Unfortunately neither EGA nor VGA is supported. Brightness was very good. I tended to run it on maximum brightness at all times, and in the typical brightly lit room at home or in the office, found it easy on the eyes and pleasant to use, though as with all monitors, very bright locations caused rather distracting reflections. A little co-resident program ADAPT.EXE sets the brightness level with which each colour is represented.

## Drives

At the top right corner of the system unit, next to the screen, is the power light and disk activity lights for the floppy and hard disk drives. On the right hand end is the opening for the 1.2 megabyte, 5<sup>1</sup>/<sub>4</sub> inch floppy drive, and a blanking plate over the hard disk. The test machine was a Compaq Portable 386 Model 40 (40 Mbyte hard disk). A Model 100 is also available, which has a 100 megabyte hard disk. The screen has three brightness levels (bright/mid/off) which, along with the ability to have narrow or thick characters and normal or reverse video, gave excellent readability with all the software tested.

The 1.2 meg floppy disk was particularly successful, and unlike some others I have used, it could reliably format and write 360k disks that could be read without error by my trusty PC. The 40 megabyte hard disk was reasonably fast, but the disk speed was the limiting factor on overall performance. Compaq states that the drives are shock mounted for reliability, but at the price I was not about to try the

drop test to see if they were right, though moving the unit around by car with all the normal vibrations and road shocks had no apparent deleterious effects.

On the rear panel are the power inlet and switch, along with serial, parallel and RGB ports. Either an external expansion unit or an external tape backup unit can be fitted to the Compaq Portable 386, and the rear panel has little rectangular holes where these clip on and a bus extension connector for logic and power from the system unit to either of these external devices. The expansion unit has two 8/16 bit slots and can use standard AT size cards. The expansion unit would be particularly useful if LAN cards are needed to connect to a Local Area Network or IRMA (or similar) boards are required to connect to a mainframe.

## Video and Sound

The plasma screen has CGA text and graphics with a better than average character shape, and also offers 640 by 400 pixel graphics. Neither EGA nor VGA are offered, and the external RGB port drives a monitor in CGA only. I found that the shadings in which text of most popular software was represented was particularly good and easy to read, with rarely a need to use ADAPT.EXE to gain additional legibility.

Given the price range in which the machine is placed, and the current emphasis on EGA and VGA it would have been nice if one of these more general high resolution standards had been offered and not just the 640 x 400 graphics which is not supported by a great range of software.

Sound from high level languages is very



Figure 1. The Compaq Portable 386's keyboard is a cross between the older AT keyboard and the newer 101 key enhanced version — it has 91 keys, including 12 function keys and a full numeric/cursor keypad.

## Memory

The test machine came with 1 megabyte of memory, and while this was adequate for normal DOS applications, it was less than optimum for Windows 386, for which 2 megabytes is more realistic. Windows 386 ran, and ran well, but did not have enough memory for some applications to run under it. Compaq uses the program CEMM.EXE to define the memory above 640K as expanded memory (after the Lotus/Intel/Microsoft specification) and/or disk cache to give additional speed. There are a range of alternative and optional memory cards, though none of these was tested.

much like that on a normal PC. With assembler, where the pitch and duration of notes is via internal timing loops, the high processor speed caused a shortening of the duration of notes and the transfer of them to above-audible frequency, rendering them unheard.

## Compatibility

There are three things to consider when testing a PC for compatibility with DOS software. The system unit, video, and the hard disk must all be compatible. In the case of the Portable 386 the system unit and video got a clean bill of health, but the 40 meg hard disk was something of an enigma. All software ran on the system

	Compaq Portable 386	IBM PC 4.77 MHz IBM PC	Toshiba T5100
Lotus Load	8.57	55.59	8.47
Recalc	2.08	22.69	2.52
Save	12.43	36.97	7.48
dBase Stage 1	105.37	917.4	122.20
Stage 2	74.25	372.40	79.90
Stage 3	82.40	431.25	88.70
CBServe2 (100)	1.16	15.59	1.29
BBBMARK	2.67	26.52	3.24
SysInfo	22.0	1	17.2
CORETEST			
Data transfer rate	228.4 kB/sec		225.3 kB/sec
Average seek	32.5 ms		25.5 ms
Track-track seek	1.8 ms		6.1 ms
Performance index	3.053		3.502

**Table 1.** The Portable 386 is right with low end minis as far as pure processor speed is concerned, although the hard disk speed is rather more ordinary. Speed is 10 to 15 times faster than a standard PC, and marginally faster than a Toshiba T5100 portable (also a '386 machine).

unit, including Microsoft Word 4, Lotus, Autocad, Norton Editor, LapLink, Telix, XTREE, dBASE II and dBASE III, Windows, Excel, Framework, Print-O, Turbo C, Turbo Pascal Version3 and Microsoft QuickBasic Version 3 etc. All software intended for CGA ran fine on the video adapter, including Flight Simulator which ran very close to standard speed. PC Mouse worked perfectly.

The hard disk was a different story. Normally DOS cannot have a logical partition over 32 meg, and a physical drive of over 32 meg usually has to be formatted as two logical drives, say C and D. Compaq has extended the possible configurations and its version of DOS can have a physical drive with up to 512 meg in one logical drive. In the case of the test machine, all 40 meg were in one partition, though the disk could have been formatted as two or more logical drives.

Formatting as one partition, using a new FAT structure, did cause some problems with disk manipulation software like Norton Utilities, Mace and the PC Magazine Benchmarks, all of which could be loaded from the hard disk and could then look at floppies but none of which could read the hard disk.

Formatting the disk using the old FAT structure would overcome the problem,

but require two or more partitions all less than 32 meg. Updates to Norton and the like, to handle the new FAT structure are also expected. Formatting one large physical drive as two or more logical drives offers significant operational advantages for many users, and so waiting for new versions of Norton or whatever which can handle the new FAT is of no pain at all.

### Performance

The benchmarks show a truly staggering performance for any PC, and even more amazing for a portable, being right with low end minis as far as pure processor speed is concerned. The hard disk speed is rather more ordinary, as is required when making a drive rugged enough for the rigors of portability. Compared to the 4.77 MHz IBM PC processor, speed is 10 to 15 times faster, and marginally faster than a Toshiba T5100 portable (also a '386 machine).

The hard disk performance is roughly twice as fast as an IBM PC, and marginally slower than a Toshiba T5100. The net effect for typical tasks involving computation and disk activity is that the Toshiba and Compaq will show overall performance so close that any choice should be made on the basis of other criteria. If the task is very disk intensive, then possibly

neither portable should be chosen and a 386 desktop with an exceptional hard disk selected instead.

I can't comment on the documentation as none came with the test unit, however in the past Compaq documentation has been clear, concise and well presented, and the same would be expected here.

### The bottom line

The Compaq Portable 386 is a top performing, top value unit with a few niggles. The 1.2 meg floppy is a very good example of its type, and can reliably read, format and write floppies to be read on normal 360k drives. Hard disk speed was a little disappointing, and disk intensive operations would almost completely be disk bound as the processor would complete its tasks in a fraction of the time of a disk transfer. Again the disks are of good speed compared to XTs, ordinary compared to many ATs and slow when compared to 386s

Video is conservative with CGA and the Compaq specific 640 by 400 graphics. EGA, MCGA or VGA should be offered, and while this could be done in a card in the externally mounted expansion unit, it really should be built in.

Comparisons are invidious, but having tested the Toshiba T5100 only a short while ago (YC, Feb '88), comparing it with the Portable 386 is inevitable. I prefer the hard disk and video of the Toshiba, and the keyboard of the Compaq (though both the Toshiba and the Compaq can use any AT keyboard, putting them level again). The ability of the Compaq to take an external expansion unit or tape backup is a plus, though the standard memory of the Toshiba is far more appropriate than that of the Compaq. Size and shape of the machines is of personal taste and in most other respects the two are so close as to render the choice rather difficult. The final characteristic — price — falls very much to the Toshiba — it costs 20 per cent less.

The Compaq Portable 386 is one of those highly desirable machines which could be either an executive's status symbol, or even better as a powerhouse for any real user of PCs. Absolutely magic! □

### Product Details

Product: Compaq Portable 386  
 Distributor: CCA Systems Pty Ltd, 100 Harris St, Ultimo 2007 NSW  
 (02) 660 0077  
 Price: \$14,500 with 40 Mbyte hard disk  
 \$17,500 with 100 Mbyte hard disk

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# THE ACER 910

## . . . from Multitech (via DSE)

With IBM's move away from the real world, the term 'clone' has lost its original negative connotation — it now means, simply, an MS-DOS machine. And these range from 'cheap and nasty' right up to the likes of this workhorse Jake Kennedy's been using . . .



**F**IRST, LET me declare a vested interest: the machine I am going to tell you about was not a pristine offering, polished shiny and loaded with titillating software, direct from the PR agency's megahype — it's a workhorse, my workhorse.

For some seven or eight months I've used the Multitech 910 as my work machine at home (a name clash with a Melbourne-based company gave us the name Acer 910 by Multitech). I doubt there are many other ATs that have run as much different software as this one — YC's Opus Bulletin Board was tested on it; and one night we had Concurrent DOS (and a few other odds and ends) running under DesqView talking to a remote CP/M system via modem using Telix (truth be known, we — my drunken friend and I — were playing Wizard on the remote system).

Most of the software YC is sent for review finds its way to the 910's hard disk (40 megabyte's worth — but thank heaven for ARC, there's about 60 Meg's worth of software on there; most of it's public domain and readily replaceable, but somehow I just can't bring myself to delete the likes of PC-RailRoad). Norton's (Utilities and Commander), SideKick, PC-Alien, Telix and WordStar are the 'residents' along with the supplied DOS 3.2 and GWBasic, but everything from Postcode to Crosstalk, from MicroEmacs to PageMaker, has passed through — yes, it runs Flight Simulator, and no, compatibility is not a problem.

Of all the 'standard-compatible' manufacturers, Multitech probably has one of the best overall reputations. Their factory in Taiwan produces components and complete PCs for a number of other suppliers, including at least one multinational which is closer to Uncle Sam than Chiang Kai-Shek.

But, what of the machine? Solid and business-like, was my first impression. And that's been borne out by time: the top of the system box hasn't bowed under the weight of the monitor, for example (don't laugh — I have friends who saved a quid by buying as cheap as they could, but then found that the box won't support the monitor; one of them puts the monitor on the floor when not in use; another has rigged a support across the top of the box with bricks and a broken up packing case).

The disk has had to work it's chattering little heart out over the months — I'm forever transferring files between the Bulletin Board, the YC system, and the 910, and trying out software. This means that in a very short time, the FAT is about the only contiguous block of data on the disk; so, out with Norton's disk optimiser (which re-writes all the files on the disk in contiguous blocks and makes a helluva difference to speed). But it also means the disk does a lot of work in a short time as it re-writes every file in a matter of minutes; I run the optimiser at least once a week. The disk has never missed a beat after some 2000 hours of use; incidentally, it's not showing any bad blocks, either.

After a lot of hard use, the keyboard still has the same positive feel it had when new; both audio (a mechanical click) and tactile feedback are excellent. For the furious typer, prone to RSI, it's equipped with non-slip pads and solid, snap-out feet. *And* it plugs into the front of the unit with ample cord to hold the keyboard on my lap while leaning back, feet-up. The only criticism I can make is that the home keys could use a knob or bump on them — I look at the screen while typing; having to sometimes look to find the home keys after hitting a function key or some finger-splitting WordStar command, is a bit of a nuisance.

The heart of the machine is an Award BIOS — one of the two or three most compatible — with an 80286 running at a software switchable 6 or 10 MHz (although the only time I've switched to 6 MHz was just to see if it worked). Standard configuration is 640K of RAM, but reconfiguring to 1 Mbyte was no problem.

The 910 is a small footprint machine, which offers the advantage of leaving some desk space while still offering six expansion slots (4 long and 2 short). There's room for three half-height units; standard configuration is a 1.2 Mbyte floppy drive and, as mentioned earlier, a 40 Mbyte hard disk, leaving room for a third drive. The Western Digital controller will handle



*Figure 1. The Acer's AT-style keyboard has excellent audio and tactile feedback — and it plugs into the front of the system box. Indicators for Caps, Num and Scroll Lock, and Power can be seen above the keypad.*

all of the various floppy formats, including 3½ inch. There are one parallel and two serial ports builtin. The video card is a three-in-one, which means it will support monochrome, Hercules monochrome (graphics resolution of 720 x 350 pixels) and a CGA.

The Reset button is handily placed in front; it's designed so that it's virtually impossible to knock it accidentally. The power switch is where it should be — front and center. The fan gives a steady whirring that I've not only gotten used to, but I found it's an aid to concentration in that it tends to block out distractions — it's noticeable, but not noisy. It's also a good reminder to park and power down when finished with the computer.

Norton's SysInfo (a comparison with an IBM XT = 1) shows a computing index of 9.8, a disk index of 3.0 and an overall Performance Index of 7.5 — the PI is a bit on the low side, but the disk (Coretest shows average seek time of 28 ms) is reasonably fast. Note that these times are given for comparison with other machines only. The only way to tell if a particular machine is too slow for an application is to try it — if you're a spreadsheet or graphics user, take a full blown spreadsheet or your favorite graphics program with you when shopping and try it: those few minutes will tell you more than any collection of benchmarks ever could.

There's nothing really than can be said

about the monitor — it's the ever-reliable TVM multidisplay that graces any number of machines (at least Multitech have enough pride in their name to badge it).

The documentation is above average — some one who's never seen a computer before should have no trouble following the clear instructions for setting up, illustrated with numerous diagrams and pictures. There's also enough technical information given on the unit to satisfy the most pedantic programmer — and illustrated step-by-step instructions for installing additional peripherals, changing the interleave, and so on.

As I said at the beginning, I've got a vested interest, so I'm not going to make a 'recommendation.' But — I think you'd be making a mistake if the Acer wasn't on your short list, whatever your use. This is a proven machine backed by a proven company; it'd be hard to go wrong with a rare combination like that. □

### Product Details

Product: Acer 910

From: Multitech Industrial, Taiwan  
Distributor: Dick Smith Electronics,  
(02) 888 2105

Price: \$4795 (taxed) includes 40 Mb hard disk and 3-in-1 video controller  
\$199 to 299 Monochrome monitor  
\$999 Colour monitor

# The Designer Series

— especially for developers and programmers

How'd you like to create a database in Turbo Pascal in as little as 20 minutes — and have fantastic reporting facilities? John Hepworth did (and so can you)!

The Designer Series from Royal American Technologies (wow, what a mouthful!) consists of three separately purchased modules. The modules are System Manager (which creates databases), Report Manager (which creates report routines for the database), and Impex (a data import/export/query utility). The Designer Series is an Australian product, but is sold around the world under the banner of Royal American Technologies of San Francisco. A Programmer's Guide is also available for those who wish to add their own code to that generated by the System Manager or Report Manager.

Databases are painted on screen. System Manager takes these database definitions and creates Turbo Pascal source code, and the user then compiles this Turbo code with a Turbo Pascal compiler.

## Creating databases

Creation of databases has always been a tedious art. Writing a micro based application tended to fall into one of several problem areas. One could write it in a language like Basic or Pascal, and spend days, weeks, months or years at the task. One could use a purpose built database language like dBase or Dataflex, and have a system which needs an expensive copy of the system or run time module to be supplied with the end user package.

Or one could always write a package in, say, dBase and compile it with a third party compiler, but you are up for the expense of both the original system and the

compiler; in some cases a run time module is still required as the compiler does not create native code for the target machine but a form of intermediate code. The real failing of most systems, to date, has been the lack of ability to control the content and appearance of reports.

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*The Designer Series is an Australian product, but is sold around the world under the banner of Royal American Technologies of San Francisco.*

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Before we delve deeper into the contents of the package, how it is used and the way the finished product works, I must tell you more of that 20 minutes to create a database.

## Speed

My first contact with the Designer Series came at a demonstration of three different database code generators at a user group meeting. David Horowitz, one of the writers of System Manager, sat down in front of the audience, and in 20 minutes created a database with two

separate but linked datafiles. Having defined the database, System Manager created the Turbo source code for it, Turbo Pascal compiled it and data entry was commenced. All this took less than 20 minutes! Try that with any other package.

My own first efforts took a little longer. The very first took an hour, including much reference to the comprehensive tutorial in the manual. After creating a couple of simple databases my time came down to around 30 minutes. Of course, creation of complex multi-screen and multi-file databases will take longer, but most of this time will be spent in planning the database rather than in creating it.

## The package

As mentioned above, the Designer Series has three separately purchased modules: System Manager, Report Manager and Impex. Typically, System Manager and Report Manager are required when developing a system, and are not needed by the end user. Impex is of greatest use to the end user, and the Programmer's Guide to advanced developers.

System Manager comes on five disks, of which three have the program and two are tutorial examples. Report Manager comes on three disks: two program and one tutorial. Impex has two program disks. A simple installation batch file creates a directory on the user's hard disk and copies the files across. Those 10 disks plus some working space take up over 3 megabytes of space, though not all the tutorials would need to be loaded onto the hard disk, and all modules are not simultaneously required on the hard disk. While an all floppy system can be used, it does require a fair degree of floppy shuffling, and a hard disk is recommended.

The System Manager disks are packed together with an excellent 386 page manual in a plastic cover. Report Manager's three disks are packed with a 135 page manual in another plastic cover.

while Impex's two disk are packed with an 87 page manual in another cover. The appearance of the product is excellent. The covers are white with a striking emblem. The disks are white with properly printed labels and the manuals are carefully and clearly written and presented. Colour highlights are used to draw the reader's attention to important points. The manuals also use extensive screen images to show what should appear on the user's screen. System Manager, Report Manager and Impex are not copy protected.

### Creating a database

The hard disk installation batch file creates a SB subdirectory on the C drive, and copies all the necessary files to it. The main System Manager program is contained in SBM.COM, and running it brings up the system. After an initial welcome screen, the user can select an existing system to be modified, or can enter the name of a new system to be created.

Typing in the name of the new system and pressing F9 moves us to the main menu. The screen display at this point offers a choice of activities on the left side which can be selected with function keys, sometimes in combination with the shift keys. Alternatively, the cursor keys can be used to highlight individual options. Information about the option under the cursor is shown in the right hand half of the screen, and pressing <enter> selects the option.

The options are -

- F1 — Paint Screens/Define Fields
- F2 — Generate Program Code
- F3 — Print System Definition
- F4 — Select Another System
- F5 — Menu Builder
- F6 — Modify Inquiry Display
- F7 — Modify File or Record Names
- F8 — User Functions & Menu Name
- F9 — Recovery Program Builder
- F10 — Reconfig. Program Builder
- Shift-F1 — Recover Current System File
- Shift-F2 — Report Builder
- Shift-F3 — Quit To DOS

Before we create a database, a quick look at the possible system specifications are in order. A database may have 16 screens and 16 datafiles. The datafiles may or may not be linked. More than one datafile can be displayed on a screen, and a datafile may be displayed on several screens. The effect of 'pop-up' windows can be simulated by alternating between two screens.

A system can have up to 64,000 records and there can be up to 16 keys per data-

file. The length of a key is set by the developer and can be any length up to the length of the field. As keys are kept in separate files, minimising the key length can make significant savings on disk space.

### Painting screens

Press F1, and we move into painting screens. The headings and prompts are typed in. Text can be centred by placing the cursor on the line and pressing Shift-F1. Boxes are created by pressing Shift-F6, moving the cursor to one corner and pressing enter and then moving the cursor to the diagonally opposite corner and again pressing enter. Boxes can have thin single or double lines or a thick line. In addition, it is possible to draw horizontal or vertical lines using any character. As previously indicated, it is possible to create up to 16 screens for a database.

^End	Last Line
^Home	Top of screen
AltC	Change command line display
End	End of line
Home	Start of Line
TAB	Goto start/end text
PgDn	Next screen
PgUp	Previous Screen
F1	Restore line
F2	Fill line/column
F3	Copy line
F4	Move line
F5	Clear to EOL
F6	Clear screen
F7	Insert line
F8	Delete line
F9	Exit
F10	Define fields
Shift-F1	Centre text
Shift-F2	Copy screen
Shift-F3	Copy fields
Shift-F4	Renumber fields
Shift-F5	Goto screen No
Shift-F6	Draw box
Shift-F7	Set colours
Shift-F8	Delete fields
Shift-F9	Show fields
Shift-F10	Restore Screen

*Table 1. The System Manger's keyboard and function key commands.*

### Defining fields

Pressing F10 after painting screens moves the user to field definition. Each field is separately defined, with details of screen number, file number, sequence number and field name. Fields can be numeric, character or auto, as selected by the user. An auto field enters a unique

number into the relevant field as the record is created. The key number, size, segment and key filename are also defined. Keys can be unique or duplicate, as may be required for employee numbers where each employee has a unique number and employee names where more than one Smith may be employed.

Acceptable entries into a field are defined in the field picture. The options include allowing any character, allowing only alphabetical characters, allowing only numeric, forcing all input to upper case, forcing all input to lower case and special, where leading characters of words are automatically upper case and other characters are all lower case.

Default values for fields as well as acceptable ranges of entries can be specified and error messages created when a data entry operator enters a value into a field outside the acceptable range. In addition, a field can be a calculation based on the contents of other fields, and this can also be set.

When the database screens have been painted and the fields defined, returning to the main menu by pressing F9 allows the System Manager to generate the Turbo Pascal source code, but first a couple of tasks remain. System Manager is self documenting. Pressing F3 from the main menu allows a print out of all the screen details, field sizes and pertinent information so that, should the system be lost at any time, recreation is easier.

Now press F2, and System Builder creates fast, well structured, Turbo source. It does it by looking at definition files created during the screen painting and field definition phases, and by reading in skeleton files of Turbo code. Within a couple of minutes the job is finished. It should be mentioned here that developers who want to modify the code generated have two options. They can take the output code and, using their favorite editor, modify it. Alternatively, if the same modification is required for every system created the skeleton file can be modified, again with a text editor.

At this point we could exit and compile the .COM file for the application, but System Manager has a couple more tricks. If a file is corrupted, then a file fix routine is required. Pressing F9 enters a routine which creates Turbo source code for a custom file recovery program for the newly created application. A different problem occurs if an existing application is modified, and the existing data must be transferred to the new configuration. System Builder can, by pressing F10, create more

Turbo source to take the data from the old system and enter it into the new system.

Now exit from System Manager and compile the three programs to run, fix and update the database using your own copy of Turbo Pascal.

### Running a database

DOS has limits in the number of files which may be open at a time. To overcome the problem, System manager uses a co-resident input/output program called SBMIO.COM which is run once in each session before the finished application is used. No problem occurs if the user forgets to run it, just a message that SBMIO.COM must be run. Systems created with System Manager run fast and clean, and seem to be quite reliable. The key in use for searches can be changed by the user from one to another of those defined earlier, and a mask set for the information being sought in a particular field.

### Report Manager

Creating printed reports requires a custom program to interrogate the data file. This is created by the Report Manager, another code generator run from within System Manager. Very flexible reports with powerful sub-total and total capability are possible. In addition, very attractive and flexible layouts are possible. One of my pet hates is a database which cannot wordwrap a long field down a narrow column, such as wrapping a 50 character field down a column 20 characters wide. Report Manager has the capability of wrapping a long field down as many as three lines.

The use of Report Manager is analogous to the use of System Manager, though the details to be defined are different. On completion of report definition, it again creates Turbo source code from skeleton files. The user then compiles the newly created source code with a Turbo Pascal compiler.

### Impex

A vital function of a database is to be able to import data from existing databases, and export it in a form that can be used by other databases. When setting up a system for the first time, System Manager has an import program which can import files which are either in Basic Sequential Format (better known as Mail Merge) with comma and quote delimiters, or System Data Format, where there are no delimiters between fields but where the fields are padded to a constant length with links. In addition, Report Manager can be used to create a report routine to output a report to a disk file.

\* Press Any Key To Continue . . . \*

#### Basic Personnel System

Basic Employee Data			
Employee Number	:	:	:
Last Name	:	:	:
First Names	:	:	:
Position	:	:	:
Starting Salary	:	:	:
Current Salary	:	:	:
Next Scheduled review	:	:	:
Date of This Review	:	:	:
New Salary This Review	:	:	:
Remarks/Notes	:	:	:

F3:Copy-Line F4:Move-Line F7:Insert Line F8:Delete Line AltC>ommand

Figure 1. Screen from a completed application built using System Manager. The database has three data files and two screens. Note the Training Profile popped up over the background.

```

Edit Mode: OVERTYPE
* FIELD DEFINITION *
Screen No. [ 1 ] File No. [ 1 ] Sequence No. [ 0 ]
Field Name [EMPLOYEE_NUMBER ] Field type [A] Field Usage [D]
Key No. [ 1 ] Key Size [ 0 ] Key Segment [ 0 ]
Key File [C:\STAFF1.K1 ] Key Type [U] Link File No. [ 0 ]
  
```

Field Picture	
10#	Default Value
	Range Check Expression
	Error Message For The Range Check Expression
	Key or Compute Expression

PICTURE ELEMENTS can be mixed and used with a variety of delimiters to ensure a pre-determined entry pattern. Picture elements are :-  
 X any character, A Alphabetical, N Numeric, U Forces to UPPER CASE,  
 L Force lower case, S Special Function. A number followed by a picture element specifies the number of elements to be expanded for that element which follows the number. e.g 20X = 20 of any character, USA = 1 Upper + 5 Alpha Etc.

F1: Abort F5:Clr-Eol F9:Edit-Done INS:On/Off DEL:Del-Char TAB:Margin PgDN:SkipPld

Figure 2. The Field Definition Screen with context sensitive help at the bottom.

Import and export under the control of the end user is done with the aid of the Impex package. Here ad hoc control of the data to be imported or exported is available.

### System distribution

A developer could create a database with System Manager and report routines with Report Manager and distribute only the compiled programs, along with SBMIO.COM and an installation program supplied with System Manager and Report Manager to configure SBMIO.COM for the exact hardware to be used. No royalties are charged for this, and the end user does not need a copy of either System Manager or Report Manager. While the end user can do without a copy of Impex, most will

find it essential and I would recommend to all system developers that they buy, and include with the system, a copy of Impex for use by their end users.

I like The Designer Series, and believe that all serious users and software developers need a copy. □

### Product Details

Product: The Designer Series  
 From: Royal American Technologies  
 Distributor: PC Extras, GO3 The Watertower, Redfern Hill 2016 NSW (02) 319 2155  
 Price: \$305 System Manager  
 \$209 Report Manager  
 \$209 Impex  
 All prices taxed.

# DSE's PC Mouse



Here's one rodent John Hepworth was reluctant to see leave his home . . .

**I**HAVE SPENT THE last couple of days playing with a new toy. No, it's not a new and faster PC, but one of those 'mouses' that escaped from Apple! There are a number of well known and respected mice for use with the IBM PC and its clones. Amongst them is the PC Mouse from the American company Mouse Systems, which is being distributed by Dick Smith Electronics in Australia.

Mice come in a number of physical configurations. They may have one, two or three buttons. Some sense movement optically, some mechanically. Some connect to a spare serial port while others have a special plug-in card which fits into

a spare slot, and are therefore labelled as a bus mouse.

The PC Mouse has three buttons, uses optical sensing, and is available in both bus and serial versions. Since it's an optical mouse, there are no moving parts — no wheels, balls or potentiometers. Instead, the mouse slides on felt pads over a reflective pad, which has a grid of vertical and horizontal lines printed on it. Movement of the mouse is sensed by reflection of the light from two LEDs (Light Emitting Diodes) on the underside of the mouse, one of which emits visible red light and the other infrared light.

The PC Mouse is an excellent size and

shape for my hand, with nicely rounded corners and generously sized buttons. I was able to use it for hours without any discomfort, while some other mice make my hand tired after a few minutes.

## Installation

**I**nstallation of the serial mouse could not be simpler. It is merely plugged into a spare serial port, and the computer turned before installing the driver software. The plug on the mouse cable has a 9-pin connector for use with ATs, Toshiba and so on; an adapter is included for connection to the typical 25-pin serial port of other PCs. While the bus mouse was not

tested, installation appears to be as easy as fitting any other short expansion board to a PC. A separate power supply for the mouse is not needed as it draws the energy it requires from the serial port.

Once installed, it is necessary to install some driver software so that the movement of the mouse can be recognised. Three different Basic driver programs are included. When the mouse is to be used with software which internally can recognise a mouse, then either MS MOUSE.SYS is invoked from the CONFIG.SYS file when the PC is booted, or MS MOUSE.COM is run from the DOS prompt. Either way, this attaches extensions to DOS which allow the movement of the mouse to be sensed. When used with packages such as Microsoft Word 3.1, Windows or Autocad these drivers allow the movement of a pointer anywhere on the screen and quite independent of the cursor.

## Menus

Quite a lot of software does not have builtin ability to exploit the use of a mouse, and here another program is used, called MOUSESYS.COM, which allows the movement of the mouse to be seen by the software as if the cursor keys were being used to move the cursor. MOUSESYS.COM expedites the use of many packages with quite complex multilayer pop-up menus.

The PC Mouse comes with ready to run menus for Symphony, dBase II, dBase III, FlashCalc, Framework, Javelin, Lotus 1-2-3, IBM Multiplan, Paradox, PFS:Professional Write, SuperCalc3, Timeline, Turbo Pascal, VisiCalc, WordPerfect 4.10, WordPerfect 4.20, PFS:Write, WordStar, WordStar 2000 and WordStar version 4.0. Other packages are catered for in one of two ways. There is a Generic menu system which allows the mouse to select 10 functions keys, Escape, Return, plus the slash and question mark keys, and by itself is enough for many packages.

Want to create a custom menu? Easy! The menus are in the form of .COM files which are loaded by MOUSESYS.COM. They are created as ASCII source code with your favorite editor or wordprocessor, and are given the extension .MSC. The source code is then converted to the appropriate .COM file with the program MSC.EXE, which is supplied with the mouse. It would be rather terrifying to have to start from scratch, writing that source code, but it isn't necessary. The .MSC files are supplied for all the menu files, and can be modified, copied, combined and extended. It took me around



**Figure 1.** The PC Mouse has no moving parts — no wheels, balls or potentiometers. Instead, the mouse slides on felt pads over a reflective pad, which has a grid of vertical and horizontal lines printed on it. Movement of the mouse is sensed by reflection of the light from two LEDs, one of which emits visible red light and the other infrared light.

ten minutes at my first attempt to combine parts of LOTUS.MSC and GENERIC.MSC, make some additions, name it PCF.MSC and create a menu .COM file for PC File Plus using MSC.EXE.

Regardless of which driver or software is used, operations are basically the same. The mouse is moved around the pad and the cursor moves on the screen in synchronism. In those rare occasions where the mouse travels off the edge of the pad before the cursor is moved far enough, it is merely picked up clear of the pad surface, and put down closer to the centre of the pad. Commands in application software are selected by placing the cursor, which may be an arrow head or other shape depending on the software, over the command and 'clicking' down one or more buttons. When MOUSESYS.COM and one of the menus is used, clicking the left button brings up the menu: options from the menu are chosen by moving the mouse and clicking again. In most of these menus the centre button is an Enter key and the right button Escape, but all can be easily changed.

## Compatibility

Compatibility is excellent. I ran the PC Mouse and its driver software with a lot of commercial and Public Domain software with no crashes, though I did find it necessary to load SideKick before the mouse drivers, and my copy of Flight Simulator did not want to know about the mouse. I found it very useful with that well known Public Domain package Dosedit, recalling and editing a stack of commands from the DOS command line. The tests were carried out with a Hercules board, and the video drivers support it and CGA in graphics modes as well as text. Use with an EGA is not specified in the manual, though in text or CGA emulation graphics modes it should be okay.

Documentation is also excellent. An 82 page Set Up and User Manual, and an 84 page Reference Manual are provided for the mouse itself, and a well illustrated 76 page manual for PC Paint Plus. The Reference Manual is chock full of information for programmers in any language so that they can include mouse interfaces in their programs. It also details the creation by users of their own menu systems and has a full description of each command in the menu language.

The price of the PC Mouse includes the driver and menu software. In addition, Dick Smith sell an entry level sketching package from Mouse Systems, called PC Paint Plus; both may be purchased as a bundle. PC Paint Plus is a competent first sketching package — it does not pretend to be a Cad package. Buyers should consider the potential savings of the bundle if they don't already have a sketching package.

Previously, I had reservations about the use of mice, as I am a touch typist with reasonable speed. After using the PC Mouse, I was converted. Neither mouse nor keyboard is perfect for all tasks, but there are applications for which a mouse is indispensable, including most graphics packages, Windows and Lotus. In others, like Microsoft Word, and PC File Plus, judicious use can reap benefits, while in others no benefit is to be had. Once tried, there is no way to give up using a mouse and I was very reluctant to see it go back.

## Product Details

Product: PC Mouse  
 Distributor: Dick Smith Electronics,  
 396 Lane Cove Rd, North Ryde 2113  
 NSW  
 (02) 888 3200 Price: \$249 PC Mouse  
 \$299 PC Mouse bundled with PC Paint  
 Plus. Both prices taxed.

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Prodession II	\$99
Qdos II	\$525
<b>Quick Silver/dBXL</b>	<b>\$99</b>
Rbase System V	\$1149
Sideways	\$129
SPF-PC 2.0	\$399
Stats 2	\$299
Superbase +	\$249
Super Calc IV	\$599

Symphony 1.2	\$949
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VP Planner	\$129
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PCW 802

# PC-DEBTORS

**I**N 1978, Russ Gracie was employing a bookkeeper three days a week in his automotive repair business. Even though computers were then something out of Buck Rogers, he could see the obvious advantages of having one to do the books. Unfortunately, there was no accounting software around that a small business like his could justify buying — either they were written overseas and not compatible with our bookkeeping methods, or were simply too expensive, or too complicated for his needs.

Eventually, Gracie decided to learn programming and write the software himself. After 18 months at technical college and countless sleepless nights, he had developed an accounts receivable package. Over several years, he was able to improve it to a point where it became a saleable

Here's a low cost accounting package for small businesses (summed up by John McLean) . . .

product in its own right — and PC-Debtors was born.

In late 1984, having put together a 'manual of sorts' (his words), the task of marketing the package began and Suburban Book-keeping was formed. Gracie soon found that selling software is a different ball game to selling car repairs —

after 12 months of effort, the company had sold only six copies.

Now, the story is considerably different — the company has hundreds of satisfied customers spanning every state.

## Debtors ledger

**T**o most small businesses, maintaining the debtors ledger is a time consuming, but necessary part of the job and it's certainly the single most expensive of a firm's accounting procedures.

With PC-Debtors, what was a costly exercise using a manual system now can be done in a quarter of the time, as Gracie found with his own business (and that translates into a 75 per cent saving in wages — a boon to any small business which finds its greatest overhead is wages).

```

MAIN MENU

TYPE
1  LEDGER      Access data in Ledger file
2  MASTER     Access data in Master file
3  CASH       Access data in Cash Sales Journal

4  REPORTS    Print periodical reports
5  STATEMENTS Print monthly statements

10 COPY      to Back-up disk
20 END

SELECT: _

* PC-DEBTORS * Copyright (C) by Suburban Book-keeping 1984,1987

```

```

CLIENT MENU

TOTAL RECORDS ON FILE: 5

TYPE
1: ADD      details of a new account.
2: ALTER   a Clients Details.
3: DELETE  a Client.
4: GET     a list of current clients.
5: INTERIM AGED Print an Interim Overdue List.
6: STATEMENT Print a single clients statement.

7: BACK    To main menu

SELECT-> ? _

```

```

REPORT MENU

TYPE
1  LEDGER      Reports on ledger entries.
2  MASTER     Reports on master file.
3  BACK       Return to Main Menu.

SELECT: _

* PC-DEBTORS * Copyright (C) by Suburban Book-keeping 1984,1987

```

```

INPUT DATA to LEDGER

INVOICE PROGRAM

TOTAL IN LEDGER = 12
THIS BATCH # = 3

LAST MOVEMENT : 11/87

WINTERS FOUNDRY
33 FORGE PLACE
BARLINGTON, ... 6866

INVOICE DATE      7/11/87
ORDER NO.        4552
GOODS             $ 268.00
S/TAX            $ 52.00
INVOICE NO.      1552
JOB #            991

INVOICE TOTAL= $ 312.00

CORRECT ? (Y or N) _

```

Figure 1. PC-Debtors is a menu-driven debtors ledger package designed for small businesses. Data is entered directly into onscreen forms.

**Installation**

The initial setting up of the system is quite straightforward. First the names and addresses of all the firm's debtors are entered and given a unique four letter code (this is preferable to numeric codes because in almost every situation, the names will be self-evident). While the Master File in the standard program is limited to 2000 debtors, that should be adequate for any small business.

The next step in setting up is to record any outstanding amounts owed — the program simply cycles through the list of debtors one at a time, and where a balance is owing, the amounts are entered. Following this, the heading which will be printed on monthly statements, reports and so on is entered.

Finally the operator may nominate up to two dissections for sales and name them appropriately. This handy feature allows for separate totals to be produced at month's end for, say, goods and sales tax, or in the case of a service business, parts and labour. These dissections will only appear on in-house reports, not on customer statements.

**Recording**

Access to the system for processing day to day data is performed using menus and all data files can be readily inspected and corrected if required. A hard copy report showing all of the ledger postings from the current batch is produced at the end of each input session.

At month's end, a well laid out statement is produced in duplicate for each debtor. Then, Audit Trial is printed — this is a full list of clients owing money to the business and showing the age of each debt. The last item produced is the Sales Analysis, which is a breakdown of the month's trading figures.

Summing up — PC-Debtors is a no frills system, written specifically for a small business requiring a computerised debtors ledger at an affordable price. The package is well-presented in a three-ring binder with a comprehensive manual which the first time user should have little trouble following. The program comes on one 5 1/4 inch disk, and a sample statement form is supplied.

Basic requirements are an IBM PC running DOS 2.0 (or later) with two floppy drives. □

**Product Details**

Product: PC-Debtors  
 From: Suburban Book-keeping,  
 4 Maybach Way, Dianella 6042 WA  
 (09) 276 1315  
 Price: \$165

OVERDUE LIST					
JULY 1987					
SUBURBAN BOOK-KEEPING					
*****					
	3 MTHS 4 OVER	2 MTHS	1MTH	CURRENT	BAL.
A.B.C BROADCASTING BOX 9974 G.P.O	0.00	1.00	1.00	12.00	14.00
A.C.B PRINTING 305 RAILWAY PDE.,	0.00	3.00	3.00	33.00	39.00
AMFOR MOTORS 141 KENSINGTON ST.,	0.00	4.00	4.00	0.00	8.00
ASSOCIATED SMASH REPAIRS 42 SUSSEX ST	0.00	2.00	2.00	0.00	4.00
AUTOLEC SALES 37 CALAIS RD.	0.00	0.00	0.00	99.34	99.36
AUTOHAUS PORSCHE 87-93 BULMER ST.,	0.00	0.00	346.83	163.32	510.15
AUTO TRADE AUCTIONS 22 BELGRAVE ST.	0.00	0.00	0.00	172.42	172.42
BAY CITY MOTORS GUILDFORD RD.,	0.00	0.00	104.25	459.45	563.70
BOWRA HOLDINGS 522 GUILDFORD RD.	0.00	0.00	0.00	47.24	47.24
BP PROMENADE (1986) 174 BRAND PROMENADE	0.00	0.00	451.66	29.36	480.02
B.P. PENINSULAR 174 PENINSULAR RD.	0.00	0.00	0.00	94.86	94.86
MR.BRAJKOVICH LOT 19, S.NTH.HWAY	0.00	0.00	0.00	37.20	37.20
	0.00	10.00	912.74	1147.21	
PERCENTAGE	0 %	0 %	44 %	55 %	
JULY CLOSING BALANCE					2069.95

Figure 2. PC-Debtors Audit trial — a list of all outstanding amounts and their age.

ANALYSIS			
SUBURBAN BOOK-KEEPING			
JULY 1987			
*****			
	Goods	S/Tax	BALANCE
OPENING BALANCE			\$ 13069.08
CHARGE SALES	2723.48	462.96	\$ 3186.44
CASH SALES	954.66	152.64	1107.30
	3678.14	615.60	4293.74
			\$ 16255.52
Loss DEBTORS RECEIPTS			\$ 3982.76
DEBTORS CONTROL CLOSING BALANCE			\$ 12272.76

# WORDS, WORDS, WORDS

## Wordcraft Release 3.2

**W**ORDCRAFT is a British-made package offering communications, graphics manipulation, a database for mail merge, and a wordprocessor. In its full might and glory, it is distributed on eight floppies and occupies the best part of 1.5 Mbytes of hard disk space in a directory with six subdirectories.

A spiral bound manual with padded vinyl covers is supplied, along with a rather swish padded vinyl slip case. This includes a Self Tutorial, which covers the program's features adequately enough.

Wordcraft runs under DOS 2.0 or higher and, not surprisingly in view of all its features, a minimum configuration of one hard and one floppy disk with 512K of RAM is recommended, although since the program makes considerable use of overlay files, it will run with less RAM. A memory check with Wordcraft running on a 512K machine revealed almost 400K free.

The graphics program Imagemaster, however, requires a minimum of 192K and preferably 384K. I would add to the recommended specifications a clock speed of 6 MHz or more, as the program is rather sluggish at 4.77.

The program is no longer copy protected — I understand that protection was dropped with the release of Version 2 — although the manual points out that the protection method used 'will cause loss of data if unauthorised copies are used.' Presumably this warning has been left in to discourage the faint-hearted.

Registration is necessary, however, before the program can become active: after Wordcraft has been installed, the user must contact the Wordcraft Registration Service (or in Australia, the distributor), who will reveal a registration number which must be entered before the pro-

**This month Keith Mackay writes with Wordcraft Release 3.2, a program that features its wordprocessing but only needs a spreadsheet to be a fully integrated package.**

gram can be used. The distributor assures me that not one of their 5000-odd registered users has complained about this, but it would certainly irritate me.

### Installation

**I**nstallation is a lengthy business, involving the invocation of the Winstall program, which creates the necessary directory and subdirectories and copies the files to them. It also writes a batch file to the root directory to call the program. This batch file can be moved elsewhere if required — I don't like to see anything on the root directory except Command.com, Autoexec.bat and Config.sys.

A full range of screen colours can be selected during installation, and multiple printers may be installed from the wide selection offered.

There is no on-disk tutorial as such. A demonstration program shows Wordcraft's major features, but does so too quickly to be of much use, and does not offer very much in the way of commentary. However, the sample texts used in the demo can be loaded to play with. Wordcraft is by no means an easy program to learn, and no such claims are made for it — the manual recommends that two days

be devoted to the process in a quiet place.

As I have remarked before in these articles, it is unreasonable to expect to learn a complex computer program in a matter of hours, and programs which stress ease of learning often achieve that quality at the cost of transparency in use. Far better a powerful program which requires a certain amount of study and application before it can be used with comfort than one which can be mastered in a short time but constantly proffers unasked for help files.

Once Wordcraft has been installed and loaded, the log on screen displays a registration number and this friendly notice: 'For the protection of bona fide users the Wordcraft program shall be used only on disks carrying the official registration label. Non-compliance is a breach of contract as defined in the Wordcraft Licence Agreement.'

As with the signs in supermarkets which inform customers that their bags may be searched for their own safety, there is room for some scepticism as to whose interests are being protected.

Pressing any key to continue brings up Wordcraft in command mode, with a two-line status line at the top of the screen, a two-line command line at line three, which also shows the current mode, and a ruler line at line five. The bottom two lines of the screen constitute a menu, showing labels for the function keys, but this display can be disabled. There is thus a maximum of 19 lines for text display on what is rather a busy screen.

### Modes

**T**wo major modes of operation are available: Command mode and Type mode, the former governing disk and file management and the latter covering pretty much everything else. The Escape key is used to toggle between the two. A

distinction is drawn between commands and controls: commands are concerned with operations which affect the whole file and are issued in command mode, while controls affect text and are entered in Type mode, in most cases by means of the function keys, with F1 bringing up different menus on the key labels.

The operations available from Command mode include:

**Save:** Adding the parameter /w saves the file in WordStar format.

**Get** loads a file, including standard ASCII files.

**Replace** saves a file without quitting.

**Insert** reads the active file into another file as a chapter.

**Directory** has a number of parameters: 'd' lists full details of all Wordcraft document or macros; 'f' lists the full directory of the disk in DOS format; 's' lists the shortened form of the DOS directory; 't' lists only files of the current extension type; and 'p' prints the directory as well as displaying it.

*Wordcraft's Batch Files allow Wordcraft commands to be carried out automatically, just as a DOS batch file executes a series of DOS commands.*

**Drive** selects the drive and directory for text files, as well as allowing a directory to be created or removed.

**Do** exits temporarily to DOS for executing DOS commands.

**Type** establishes text file extension — DOC is the default.

**Lock** and **Unlock** are concerned with password usage.

Any of these commands may be abbreviated to two or three letters, and the F1 key gives help for each command.

Text is displayed ragged-right and is automatically reformatted if additional text is entered, and as is often the case when this feature is used, there can be noticeable delays as the program does its sums, as well as a beep when you get ahead of the buffer — Wordcraft beeps a good deal, but fortunately this can be disabled.

If text is entered toward the end of a page, the cursor will suddenly leap to the top of the next page — this is not only rather disconcerting, but irritating when you want to see what you've just written. Equally annoying cursor leaps occur when text is deleted, and I frequently found myself wishing the damn thing would keep still.

Screen refresh and cursor movement

were rather sluggish on my own machine (a PC-XT compatible running, or rather creeping, at 4.77 MHz). Cursor movement is controlled with the arrow keys and various Alt combinations for moving from word to word or paragraph to paragraph, and the Home and End keys can be used in various combinations for getting to the top or bottom of page, document or text in RAM.

Name: Letter Blank		Date: 06-01-88		[DOC] Chapter: 1					
Col: 001/077		Line: 001/055/055		Page: 0001/0001		Chars free: 34218.		Drive: C	
Filling page 1					PRESS SPACE WHEN READY TO PRINT				
fill company					WARNING: Printer is off-line or busy				
<					>				
Mr S J Newman Managing Director Wordcraft International Limited Cowdray Avenue, Colchester Essex, England							6th January, 1987		
Dear Mr Newman:									
Thank you for your recent enquiry about our magazine and its place in the Australian market. As we discussed on the phone, we see ourselves catering to the needs of small business users — which most certainly includes 'professional' offices such as those of solicitors, medical practitioners and accountants — and home users. We take particular interest in the needs of those users who have made the leap and bought a computer, but then find themselves asking: 'How can I use it?' or 'What else can it do?'									
1 Next	2	3	4 Block	5 Block	6 Block	7 Next	8 Col.	9	10
Menu	Help	Phrase	Copy	Remove	Insert	Line	Cursor	Ruler	Cont

Figure 1. In Command mode, Wordcraft has a two-line status line at the top of the screen, a two-line command line at line three and a ruler line at line five — leaving a maximum of 19 lines for text display on what is rather a busy screen.

Name:		Date: 06-01-88		[DOC] Chapter:					
Col: 053/069		Line: 012/041/041		Page: 0001/0001		Chars free: 56228.		Drive: C	
*TYPE MODE*					Press F10 to clear functions display				
Times Roman Normal									
<					>				
Numeric columns:									
	January	February	March	Totals					
	121	15	14	150					
	45	125	18	188					
	85	85	75	245					
	25	35	45	105					
	158	145	120	423					
	147	142	132	421					
1 Next	2	3	4 Block	5 Block	6 Block	7 Next	8 Col.	9	10
Menu	Help	Phrase	Copy	Remove	Insert	Line	Cursor	Ruler	Cont

Figure 2. Wordcraft is generally menu driven with the functions keys used to select the desired operation. For example, in Command mode, F4 accesses the Numeric Column menu's facilities. The menu (at the bottom of the screen) can be turned off with F10.

## Eccentric

One rather eccentric feature is that there is no preset command to move the cursor back one word. This command must be tailored by modifying the 'skip unit', which is the amount of text which Wordcraft will cover in a 'skip', and may be defined as a word, a sentence or a paragraph. If no skip units are set, the skip keys Ctrl-Arrow Left and Ctrl-Arrow Right, will scroll one screen forwards or backwards respectively.

Another eccentricity is scrolling: the Page Up and Page Down keys move the text one page rather than one screen, which seriously limits their usefulness unless page length is defined as coterminous with screen length. Scrolling is in fact controlled by means of the F3 and F4 keys, although that statement requires qualification: scrolling is controlled by the F3 and F4 keys provided the F1 key has been used first to select the appropriate menu.

Strangely, perhaps — I would have expected things to have been arranged the other way around — F4 scrolls up, while

F3 scrolls down; and scrolling will not cross pages. This leads to frequent appearance of incomplete screens, even although there may be a good deal of text 'underneath'.

The net results are that one of the most basic and frequently used wordprocessor controls involves the use of up to seven different keys; and that managing to get a paragraph to appear in one screen can require considerable ingenuity. On the whole, I found moving around a file very awkward in Wordcraft, and considerably more difficult than in any other wordprocessor I have used recently with the possible exception of Samna.

One of the more interesting procedures in Wordcraft is search-and-replace, which involves the following steps:

- 1) Use F1 to enter Search Mode;
- 2) Nominate the direction of search — F8 selects from Forwards, Backwards, and This Page;
- 3) Nominate the method of search — F7 selects global replace, confirmed replace or replace a given number of times;

4) Press F3 and enter the string to be searched, including an underline at the end if plural forms and third-person singular verbs are to be found also. There is no limit to string length. Search is not case-sensitive, which means that unconfirmed change of case for selected strings is not possible. Press the Escape key to terminate.

5) Press F4 and enter the replacement string. Press the Escape key to terminate.

6) Press F6 to make the replacement when the target string has been found.

7) Press F1 to exit Search Mode.

This is without a doubt the most baroque and memory-taxing approach I have ever seen to what is among the most commonly invoked and useful of wordprocessing functions, and it would have been hard to devise a more effective strategy for discouraging its use.

Block movement is controlled with the F4, F5 and F6 keys once the appropriate menu has been invoked. This is one feature of Wordcraft which is quick and simple: marking a block to be deleted involves simply pressing F5 at the beginning

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and F10 at the end; and insertion and copying are equally simple — deleted text is stored in a buffer and may be undeleted anywhere else. The same keys from a different menu control column manipulation.

### Your Dictionary

The manual does not reveal the number of words contained in the main spell checker dictionary, although the file is about 112K in length, which would suggest a reasonably-sized vocabulary. The manual does state, however, that the main dictionary and the subsidiary dictionaries — created by the user — may hold up to 100,000 words.

Spell checking is invoked with the command 'spell' followed by the page number(s) to be checked — there is no command for checking the whole file. Specifying a final page which is clearly beyond the length of the file will do the trick, but this is a curious omission.

The checker is not fast partly because the command line echoes each word as the program compares it with its dictionaries. Working through an 11K file took it three minutes, running from a hard disk. The usual options of the more advanced spell checkers are offered when an unrecognised word is found: the word may be ignored, added to the dictionary or manually corrected; or it may be replaced with any of the alternatives which Wordcraft suggests. The suggestions, however, do not testify to a very sophisticated program — common typing errors such as 'hte' and 'thst' do not evoke any useful alternatives, as they do in a number of other programs.

The spell checker can also be used at command level for checking the spelling of individual words. Entering the first few letters of a word only will bring up a list of all words known to Wordcraft which start with those letters. The required word can then be selected from the display and incorporated in the text.

### Text Macros

The 'Phrase' option is Wordcraft's text macro recorder. There is no upward limit to the size of a Phrase, subject to constraints imposed by disk storage space and RAM. A Phrase is recorded by pressing the F3 key twice, selecting the key which is to hold the Phrase and then typing it. Phrases may contain commands also, although some are not allowed — the manual does not specify which, but I was unsuccessful in trying to build phrases which would beep at certain points or move to the top or bottom of the file.

There is, however, another Wordcraft facility which will allow commands to be carried out automatically. A phrase is played back by pressing the F3 key and the letter which holds the phrase. Playback is instantaneous. A library of Phrases may be saved to disk, and the command 'display' will list Phrases defined.

The Phrase feature can be used for more sophisticated purposes also. Perhaps the most useful is that a phrase command can be used for holding two files in RAM at the same time and switching between them — this is done by building a Phrase containing the entire current file and using Alt-X to clear the screen for the second file. Text can also be copied to a Phrase for later insertion into another file.

---

*As with the signs in supermarkets which inform customers that their bags may be searched for their own safety, there is room for some scepticism as to whose interests are being protected.*

---

Wordcraft's Batch Files allow Wordcraft commands to be carried out automatically, just as a DOS batch file executes a series of DOS commands. A Wordcraft batch file can be invoked after Wordcraft has been loaded to override the program's own defaults — to turn off the beep, for example, or set up a given configuration of tabs and margins. A may also display a message before a series of commands is executed — an 'Attention' command is used for this purpose.

Some sort of maths handling seems to have become *de rigueur* for more powerful wordprocessors. Wordcraft's Calculator follows this trend, offering the basic arithmetical operations, as well as horizontal totaling, constants and the usual memory features. A further refinement is Automatic Calculation, a powerful facility which allows certain values to be derived

automatically from other values. Thus invoices, for example, can be generated to show a total price including VAT, sales tax or any values which can be reduced to a formula.

The optional extra program Imagemaster allows graphics to be integrated with text. RAM is required as described above, as well as a laser printer, an image scanner, a CGA board and mouse. Not having access to all of these, I can do no more than record the fact the program exists.

### Start Talking

Space does not prevent a full treatment of Wordcraft's communications facilities. Briefly, however, files can be exchanged with other computers using either Wordcraft's own protocol or Xmodem. Auto-dialing and auto-answer are also supported.

Wordcraft also includes software which will allow the computer to be used as a terminal while still retaining all Wordcraft's facilities. This will allow direct asynchronous dumb terminal links to a mainframe, as well as connection to bulletin boards and electronic mail services.

Wordcraft is undoubtedly a powerful package, with a wide range of useful features. The manual seems to suggest that the program is aimed at the corporate market, and the only thing missing to make it a totally integrated office application is a full spreadsheet. Unfortunately, however, it has been encumbered with such an awkward set of commands and controls that its power is seriously compromised.

It looks good on paper, but when you sit down and drive it, it becomes clear that although a great deal of effort has been applied to incorporating as many wordprocessing features as possible and many ancillary options, insufficient thought has been given to the user's convenience — to ease of use.

It is not a program which offers much in the way of customisation: it is *there*, immutable and unbending — the program doesn't adapt to you, you adapt to it. If it could be given a less eccentric user interface, it would be an excellent program. □

### Product Details

Product: Wordcraft Release 3.2  
 Distributor: Personal Computer Software, 68 Alfred Street, Milson's Point 2061 NSW  
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## Part 4

# The Attainment of Assembly

---

Using the program from Part 3, John Summerfield shows how to create a library of subroutines and then tells how to improve the dump program so it works with any file and detects EOF properly.

---

**I**N JANUARY I left you with a program which can be used to dump files in hexadecimal. Unfortunately, there's a couple of design problems with it: It can't dump OBJ files (try it and find out why) and it only shows data in hexadecimal.

To be really useful, it needs to dump data in hexadecimal *and* character. It should be able to dump any file, too. This month, we will fix up these two problems, and start building up a library of subroutines too.

During the last month or so, I had a bright idea (all by myself, too: I'm so proud!).

I have trouble remembering all my own (that is, the ones I wrote) subroutines, what they do and how to use them. This is because I have a great library of subroutines I use to extend the functions of my PL/I compiler. They provide facilities such as directory searching, retrieving disk labels, date manipulation, loading and executing other programs.

I have been having equally great trouble keeping track of them: not finding them, but how to use them. I recently bought myself a little six-ring binder (like those you keep your computer manuals in, but smaller). I also bought a set of index tabs to fit. The whole thing cost about \$5.

I then spent an afternoon finding all the subroutines I could and wrote them up, one page each. Where a subroutine has multiple entry-points, there is one page for each entry-point. For each module name (which does not correspond to an entry-point), I have a page which lists all its entry-points, and the names of all the subroutines it calls. The entry-point description gives the entry-point name, source-code language, parameter summary, returned information (for functions), and a brief summary of what it does.

The front page contains a list of all the modules. No page numbers are necessary because the each module and entry-point has its own entry, and they are all in alphabetic order.

It's so wonderful I reckon I'll get another one for my assembly-language subroutines. I recommend you get one now and start documenting all the subroutines we write. Visit your stationer soon!

## New instructions

**W**e have a few new instructions summarised neatly; there aren't so many because I've covered those I use most.

**COMMENT** — This is another way of including comments in your program. It's most useful in places like the start of procedures, where you want to include several lines of comments. The comment lines don't need the semicolon at the start. The first non-blank character following the word COMMENT is used as the delimiter, and comments extend up to the next delimiter.

**CLC** — Clears the carry flag.

**ES** — is used as a prefix to a storage address to instruct the CPU to use a segment other than the default. In this case, we used the Extra Segment register: we could equally well use any other segment register in the same way.

**EXTRN** — is used to declare symbols which appear in other source modules. The external symbols can be instruction labels (defined as NEAR or FAR), or data areas (BYTE, WORD, DWORD) or numbers (ABS, defined with EQU). External symbols are resolved by the linkage editor, MSLINK.

**JAE** — Jump above or equal. If the carry flag is zero, jump to the target location.

**JNB** — Jump Not Below. Same as JAE.

**JNC** — Jump No Carry. Same as JAE.

**LODS** — This instruction loads a byte or word from the location pointed to by DS:SI.

**MASM** — needs to know the size of the value to be stored. There are several ways to tell it: for example —

---

```
LODS BYTE PTR (SI) ;load a byte
LODS AL             ;load a byte
LODSW              ;load a word
LODSB
```

---

I prefer the third and fourth examples: to my mind shorter is usually clearer. C programmers will love this instruction because it does two things at once: it loads AL (LODSB) or AX (LODSW) and increments SI (LODSW adds two to it).

**MOVS** — is used to move a string from the area pointed to by DS:SI to the one addressed by ES:DI. Register CX contains the number of bytes to copy. There are two forms —

**MOVSB** (move string-bytes) and **MOVSW** (move string-words) — Both forms require the same number of clock cycles on CPUs other than 8088, V20 and 80188, so when you combine it with the REP prefix, it's often quicker to do a little more work and use MOVSW. As for LODS, there are various ways of coding it —

**MOVSW** ; move a word  
**MOVS byte ptr (si)** ; move a byte.

When coupled with the REP prefix, it's a great way to move things around.

**PAGE** — With no operands, PAGE tells MASM to print a new page heading NOW.

**PAGE+** — tells MASM to increment the first part of the page number, and set the second part to 1. It then prints a new page heading. This form allows a page-numbering sequence like 1-1, 1-2, 1-3, 2-1, 2-2 and so on.

**PUBLIC** — is used to tell MASM that the named symbols can be referenced in other source modules. It's complementary to EXTRN. You are responsible for ensuring the definitions are consistent: if you try to call a data area, you can. It mightn't be useful, though.

**REP** — is used as a prefix to the various string-manipulation instructions, of which STOS is one. It causes a two-instruction loop. You use it like this —

```
MOV DI,offset there ;where to put it
MOV AX,2020h ;two blanks
MOV CX,20 ;we go around this
                many times
REP STOSW ;repeat the STOSW
                instructions
```

During operation, this instruction causes the register CX to be decremented for each iteration. The loop is repeated until CX becomes zero: if CX contains 20h, the loop is executed 32 times. These instructions will caused a string of 40 blanks (20 words) to be stored at the bytes starting at THERE. This instruction is usually combined with MOVS, STOS, CMPS and SCAS (we'll talk about SCAS in another Part).

**STOS** — This instruction stores a byte or word in the location pointed to by ES:DI. In our programs, ES will usually contain the same value as DS, so watch this one when that condition isn't true.

**MASM** — needs to know the size of the value to be stored. There are several ways to tell it: for example —

```
STOS BYTE PTR (DI) ;store a byte
STOS AL ;store a byte
STOSW ;store a word STOSB
```

This is another instruction for C devotees! It stores AL (STOSB) or AX (STOSW) and increments DI (STOSW adds two to it). When combined with the REP prefix, this is an excellent way of setting consecutive bytes (or words) to a desired value.

**SUBTTL** — Provides a subtitle line for each page of the listing. You can have as many as you like.

**TEST** — This instruction has the same forms as ADD, SUB and so on. It performs an AND of the two operands, which may be 8 or 16 bits, and sets the flags. It discards the result. It's used to test bits within a byte or word. For example —

```
TEST AL,1
JZ ItsZero
```

## GAPS IN PARTS?

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— tests the low-order bit of AL. If it is zero, a branch is made to the instruction labelled ITSZERO.

**TITLE** — Provides a title line for each page of the listing. Your ration is one title statement in one assembled module.

## Getting Serious

This month, we also want to get a little more serious about accessing disk files. So far, we have pretended that they are text files (the console, to be precise). We have found some of the limitations to this approach: we stop at ^Z; we don't stop very neatly if there isn't any ^Z; and, we stop rather abruptly if we encounter ^C within the data.

There are a couple of major ways of reading files on MS-DOS (apart from the tricks we've used so far).

We can do it in much the same way we did with CP/M, using File Control Blocks. DOS calls 0Fh to 24h, 27h and 28h use FCBs. If you want to use them, go right ahead. As far as possible, I won't. They are intended for compatibility with CP/M and MS-DOS 1.0. They are not compatible with Xenix, and provide less flexibility than those calls that are.

Alternatively, we can use file handles. These are like logical unit numbers in Fortran, or file pointers in C.

When we use the OPEN function, MS-DOS returns a number which we must present to MS-DOS for other operations on the same file. As programmers, we don't need to be concerned with the value of the number: we simply store it somewhere and use the value as a parameter on other calls. It is simple to use, and requires no special control-block (unless a 16-bit word can be considered a control-block).

In practice, these handles are sequentially-assigned numbers: they start from zero. However, the first number returned from an OPEN call will usually be 5. Table 1 lists those file handles that are predefined.

Handle	Standard Definition
0	Standard Input, can be redirected. It's usually assigned to the console.
1	Standard Output, can be redirected. It's usually assigned to the console.
2	Standard Error File. This cannot be redirected, and so should be used for error messages. It's directed to the console.
3	Standard Auxilliary device. It's attached to the serial port, AUX.
4	Standard printer. It's attached to the printer port, PRN.

**Table 1.** A list of predefined file handles.

I will use those DOS calls that use file handles for I/O (except for console, AUX and PRN) as a general rule.

To process a file with MS-DOS, we have to open it for input, output or update; read and/or write to it as the application demands; and, close it. Although not strictly essential if we haven't changed

the size of the file, it is worth telling DOS we have finished with it. Certain CP/M and CP/M-86 programmers thought it wasn't necessary to close files that hadn't been extended, but their programs cause problems on Concurrent CP/M-86, which locks the file against other users and tasks when it's opened, and releases the lock when it's closed.

If you close files when you finish with them, any file-sharing software (such as network software) has some chance to let others use them in their turn.

Besides, DOS won't let you have more than 20 open files at a time, much to my dismay. Additionally, you can re-position to a different location in the file.

MS-DOS treats the file as an amorphous sequence of bytes. When you read from or write to a file, you specify the number (from 1 to 65535) of bytes to be transferred. The next call can transfer a different number of bytes.

MS-DOS has no concept of a record size. When you read a file, it's up to you to determine the record boundaries. When you write a file, you tell MS-DOS the length of each individual record as it's written.

You can reposition to any byte in the file. You can do so relative to the beginning of the file, to the end of the file, or to your current position.

The file position is a 32-bit byte offset. Note, however, that MS-DOS supports a maximum disk size of 32 megabytes. (If you have a larger disk than that, you must partition it into several logical drives.)

Having said that, there are two common schemes for determining record boundaries on MS-DOS: either all records are the same size, or, we use some kind of delimiter (in text files, it's CR/LF). And, there are a couple of other ways: there are no record boundaries (COM files); or, there is some internal control information (OBJ and EXE) files that lets it (or programs that use the files) work it out.

## Program Changes

I have made a few changes to our program from January — see Listing 1. Since I want to print the character representation of the data as well as the hexadecimal form, it's necessary to have a little buffer to store up to 16 characters in. Since not all characters are printable and some will mess up the dump if we try, it's necessary to make some changes to them. Control characters are printed as periods (saves spurious line-feeds, character returns and alarms sounding), and the high-order bit is set to zero (makes WordStar files look like the text they really are).

C, PL/I and lots of other programmers will be familiar with the concept of separately-compiled modules. Turbo Pascal programmers mightn't since that language doesn't have a separate linker. Turbo Pascal does have vaguely similar facilities in its overlay files, though.

The idea is that you divide your program into separate source modules and compile them separately. You then link them together before you run them. That's why we have to link-edit our programs: if we only had one source module, our compiler or assembler could produce a .COM or .EXE file directly, as Turbo Pascal does.

This month I have ripped some of our internal procedures out and made separate source modules out of them. There are two major reasons for this: to reduce the size of individual source modules (improving Edit and Compilation times), and to separate out utility subroutines that we can use in several different programs.

High-level languages such as C and PL/I come with facilities to print data in hexadecimal, perform data conversions and so on. As

assembler programmers, we have to do it ourselves. If we develop (and document) a library of these routines, we begin to get some of the benefits of a higher-level language.

If we have a library of I/O routines, our chances of porting our programs from one environment to another are greatly enhanced. By using appropriate subroutines, I have had little difficulty transferring my assembler programs from CP/M-86 to MS-DOS. There was a little work in the operating system interfaces and that was all.

If we scatter DOS calls all through our programs, things will be much more difficult.

## FIO

So this month, we have a source module called FIO which contains routines to perform disk I/O using the various DOS calls. If we want to transfer to another environment, we rewrite FIO and all programs that use it are changed too.

It would be quite easy to use our dump program in, say, a printer adapter box or communications switch based on an 8088. If you were writing a program for such an environment, you may find it necessary to dump the data to help diagnose problems. Rewrite FGETC and FPUTC for the little box, provide dummy open/close routines and away you go.

To dump areas of memory, change FGETC to get data from wherever, and you have a memory dump program.

## Opening The File

To allow the program to read files and detect when end-of-file has been reached, we cannot depend on file redirection. We have already found out about various problems that arise when we try. We must open the file ourselves. FIO contains subroutines to do the various functions we need this month.

For these subroutines to be general-purpose, we have to give them some information about each request. To open a file, we must provide its name. To read and write to files, we need to identify which of our files we want read or written. If we want our file I/O to proceed reasonably quickly, it's a good idea to process it in fairly large pieces. That means we need our own buffers. It's also a good idea to do something sensible about the various errors that can occur.

Before we can use external subroutines, we have to do four things —

- 1) Decide how parameters are to be passed back and forth.
- 2) Decide how to define what we want done by the subroutine.
- 3) Declare in our subroutines those points that can be called (the PUBLIC declarative does this).
- 4) Declare in the calling program the nature of the external procedures (the EXTRN declarative does this).

## Some executive decisions

We will use a register (BX) to pass the address of a control-block of our own design to the file I/O routines. This control block will have all the information in it that we want for our I/O routines, and we'll reserve the right to add further fields for other things later.

We will define what we want done by calling by name the routine that does what we want: an alternative would be to use function numbers as DOS does. We will call FOPEN to open a file, FREAD to read a file, and so on.

We must define these routines in FIO (we will use PROCs for each one) and also have a PUBLIC declaration.

The calling program will define them as NEAR: this means that they must be in the same 64 kilobytes segment as the calling routine, and this will be consistent with the PROC declarations.

**This month's programs**

We now have three source programs. Let's see what has changed in the main program, our new all-singing alldancingdump program.

First, I have rearranged the order of our data declarations and code areas. All the data declarations now appear near the front of the source program. Many people like to have the data near the start: Pascal and Cobol programmers are required by their compilers to do it.

I have defined two parameter areas for calling the file access routines: we are calling these areas File Input Output areas (FIOs). All the access routines will use the same control block as the sole parameter. It contains all the information necessary to perform our file accesses: we will add more fields later for some other things I have in mind. Table 3 describes the control-block's format.

Each file access routine is given the address of the FIO in register BX. From this, the access routine can obtain the file name, file handle, buffer address, error routine address and so on as required. The routines also pass information back to the caller in this control block.

EX003's code section contains declarations for routines FGETC, PUTC, HEX, PUTS, FOPEN, and FCLOSE. Each of these names is followed by a colon, and the word NEAR. NEAR means that the corresponding symbol represents an area of code which will be in the same code segment at run-time. Since they will be in the same segment, MASM generates a three-byte CALL (or JMP, if that's what we want) instruction to pass control to them. If we coded FAR instead of NEAR, MASM would generate a five-byte call instruction: the two additional bytes are required for the segment address.

EX003 commences execution at the instruction labelled START. This is because I have coded the name START on the END instruction at the end of the program, to tell MASM that's what I want. It initialises the ES register to point to the segment called ERIC immediately, and then checks the DOS command-line area to see whether a parameter was entered with the command name. If one was, we copy the command line to our own work area. After that, we initialise the DS register.

The order of doing things here is important, because the 8086 MOVE STRING instruction can copy data from one segment to another. It uses the segment address in DS combined with the offset in SI to address the source operand. Similarly, ES and DI are combined to address the target area. Register CX contains the number of locations to be copied. Registers SI and DI are updated to reflect the instruction's action.

If this instruction is coupled with a special prefix instruction, it becomes a two-instruction loop. Register CX is decremented for each iteration, the two pointer registers (SI AND DI) are incremented, and the loop terminates when CX becomes zero. On completion, the two pointer registers point to the first byte following their respective operands.

This instruction-loop is capable of being interrupted between iterations: if this occurs, it is resumed correctly after the normal completion of the interrupt processing.

There are two varieties of MOVE STRING: the one we used here moves one byte at a time, the other moves a word at a time. The second is quicker on the CPUs with a 16-byte wide databus (those with a part number ending in 6) because both forms use the same number of clock cycles.

Having sorted that out, we then call an internal subroutine to extract the source file name from the command line. It's probably not bullet-proof, but it's sufficient for sensible folks like you.

If things are still going well, we open the file for input. If there were no command-line parameters, we skip copying the command line, extracting the file name, and opening the file.

We then go into the processing loop much as we did before. We use subroutine calls to read each character, and to write each character of the dump.

Note the careful way we initialised the input FIO. If the file is not opened (no file name), it calls the access routine with the FIO set up to read STDIN.

The procedure Copy—File—Name copies the string pointed to by registers DS:SI to the area pointed to by ES:DI, for a maximum length of 63. It terminates before the maximum count if one of the delimiters —

” ”, ”, ”, ”; ”, ”=”

OR

”/”

— is encountered. It then stores a null to mark the end of the file name. Leading blanks in the source area are skipped. Note that if the receiving area is less than 64 bytes long, following areas may be over-written.

Have a look at the instruction labelled CFN80. The expression

”es:byte ptr 1[di]”

— is the address of the first operand. In this occasion we have a segment override: this is the name of one of the segment registers. It tells the 8086 CPU to use the ES register, rather than the default (in this case, DS) in computing the memory address. It is represented in the object code by the value 26h prefixed to the standard instruction.

**A summary of the file I/O routine's entry-points.**

All these routines use the same control-block as their only parameter. This parameter is called the File Input-Output area (FIO). Its address is passed to the routines in the registers DS:BX. Its format is described in Table 2.

Offset	Field name	Type	Contents
00	FIO_CBLen	byte	i:control block length
01	FIO_Mode	byte	i:open mode
02	FIO_Name	word	i-> file name
04	FIO_FileNo	word	i:file handle
06	FIO_RecSize	word	i:size of record to transfer
08	FIO_BuffSize	word	i:size of buffer to use
10	FIO_BuffAdd	word	i:address of the buffer
12	FIO_Next	word	i:next character to take from the buffer
14	FIO_DataSize	word	i:amount of data read/written
16	FIO_Error_Code	word	i:the DOS error code
18	FIO_Error_Exit	word	i:where to go if something goes wrong
20	FIO_Access_Type	byte	i:a character to say what we did last
21			i:Reserved: we will add more later

**Table 2.** A description of control-block's format.

Various errors are reported to the program by jumping to the routine pointed to by FIO—Error—Exit. When this is done, the

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stack-pointer contains the same address it had immediately before the call to the access routine: the return address is removed from the stack.

Each routine stores a character in the field FIO—Access—Type to indicate the last type of access made to the file (read, write, open, close and so on). This may be used by the error routine as an aid to determining what recovery, if any, may be attempted, or in reporting the problem.

FOPEN validates the access-mode required, and issues the appropriate MS-DOS call to open the file. It uses the field FIO—Name to obtain the address of the file name.

If the access-mode is invalid, an error message is issued and the program terminates. If DOS reports an error, the error code is stored in the field FIO—Error—Code and control is passed to the routine pointed to by FIO—Error—Exit.

FCLOSE closes the file. DOS errors are reported in the same way as FOPEN. FREAD reads data from the disk file to a buffer provided by the caller. It obtains the buffer address from FIO—Buffadd and its length from FIO—Buffsize. It returns the length actually read in FIO—Data-size: this may be less than the length requested at the end of the file. DOS errors are reported in the same way as FOPEN. FREAD signals end-of-file by setting the carry flag.

PUTS:	Write a string of characters on the console.
Input:	Registers DS:SI point to the string. The string is terminated with a nul (a byte of 00h).
Output:	The string is displayed on the console.
Returns:	Nothing.
PUTC:	Write single character on the console.
Input:	Register AL contains the character.
Output:	The character is displayed on the console.
Returns:	Nothing.
GETC:	Write single character on the console.
Input:	Nothing
Returns:	The character is returned in AL. CY=1 if end-of-file (AZ, or 1Ah).

Table 3. Callable routines for the Console I/O routine.

FWRITE writes data from the caller's buffer to the output file. It obtains the buffer address from FIO—Buffadd and its length from FIO—Buffsize. It returns the length actually written in FIO—Data-size: this maybe less than the length requested if the disk fills up. DOS errors are reported in the same way as FOPEN.

FGETC returns the next character from the file, in AL. If necessary, it calls FREAD to replenish the buffer. FGETC signals end-of-file by setting the carry flag. FPUTC places the character in AL in the output buffer. If necessary, it calls FWRITE to write the buffer to the output file.

The Console I/O routine contains callable routines for applications to communicate with the computer user. By replacing these routines with others, we can alter programs to support different operating systems (Xenix, CP/M-86) or different devices (the RS232C ports, special hardware boxes). As implemented in Table 3, it has the capabilities to write single characters or strings of characters on the console, and to read a single character from the console. □

Listing 1. The program has been modified this month to include a character representation of the data being dumped. (Refer to the text for changes).

```

comment !
This is another way of adding comments to our program. The exclamation mark
is used to end the string of comments. We could, of course, use some other
character such as an asterisk.

This month, I have modified the program to include a character representation
of the data being dumped. We also have the makings of some useful tools
(subroutines) for use in future programs; so I have cut them out and put them
somewhere else.

But that's enough of these comments! go back to the article for a
full description!

= 0000      cr      equ      13
= 000A      lf      equ      10
           ; I moved FRED down the other end
           ; to avoid MASM's Phase Error messages
0000      Joe      segment stack
0000      80 [     db      128 dup(0)
           ]

0080      Joe      ends

0000      65 72 69 63 20 69      eric      segment public word
0000      73 20 68 65 72 65      db      'eric is here'

0000      comment .here is some more new code.

000C      22      IFD_CALEN      db      34
0000      49      IFD_Mode      db      'I'
000E      0000   IFD_Name      dw      0      ;-> file name
0010      0000   IFD_Fileno    dw      0      ;file handle
0012      0001   IFD_Recsize   dw      1      ;size of individual records
0014      0800   IFD_Buffsize  dw      2048   ;size of buffer to use
0016      0039 R  IFD_Buffadd   dw      1pt_Buff ;address of the buffer
0018      0800   IFD_Next      dw      2048   ;next character to take
           ; from the buffer
001A      0000   IFD_Data-size  dw      ;size of record just
           ; read/written
001C      0000   IFD_Error_Code dw      0      ;error code
001E      0128 R  IFD_ErrorExit dw      InputError ;address of routine
           ; to handle errors
0020      20      IFD_AccessType db      ' '    ;character indicating
           ; last call made
0021      0C [   IFD_Reserved   dw      dup(0) ;we will use some more
           ; another day

0000      ]

0039      0800 [   IPT_Buff      db      2048 dup(-1)
           FF
           ]

0839      0839 22      OFD_CALEN      db      34
083A      43      OFD_Mode      db      'C'
083B      0000   OFD_Name      dw      0      ;-> file name
083C      0001   OFD_Fileno    dw      1      ;file handle
083D      0001   OFD_Recsize   dw      1      ;size of individual
           ; records
0841      0800   OFD_Buffsize  dw      2048   ;size of buffer to use
0843      0866 R  OFD_Buffadd   dw      Opt_Buff ;address of the buffer
0845      0800   OFD_Next      dw      2048   ;next character to
           ; take from the buffer
0847      0000   OFD_Data-size  dw      0      ;size of record just
           ; read/written
0849      0000   OFD_Error_Code dw      0      ;error code
084B      0120 R  OFD_ErrorExit dw      OutputError ;address of routine
           ; to handle errors
084D      20      OFD_AccessType db      ' '    ;character indicating
           ; last call made
084E      0C [   OFD_Reserved   dw      12 dup(0) ;we will use some
           ; more another day

0000      ]

0866      0800 [   OPT_Buff      db      2048 dup(-1)
           FF
           ]

           ; end of new code
1066      0000   rbe      dw      0
1068      8888   flags      dw      8888h
106A      01     column     db      1
           ;these next few lines are new
106B      00     flag      db      0      ;eight bits usable for flags
           ; 0... We haven't printed the CHARS area yet
           ; 1... We have
106C      107D R  Chars_Ptr    dw      offset Chars
106E      20 2A   Chars_Message db      ' #'
1070      10 [   Chars      db      16 dup(' ') ;buffer to store
           ; chars for the dump

           ]

1080      2A 00   db      'M',0
1082      80 [   Command_Line db      128 dup(0)
           00
           ]
    
```

# INSTRUCTION SET • ASSEMBLY LANGUAGE

```

1102 40 [      Input_File_Name db      64 dup(0)
      00
      ]
1142 00 DA 2A 45 4F 46OneMsg db      crlf,'#EOF#';crlf,0
      2A 00 0A 00
114C 00 DA 2A 45 72 72ptErr  db      crlf,'#Error reading the
      6F 72 20 72 65 61          input file#';crlf,0
      64 69 6E 67 20 74
      68 65 20 69 6E 70
      75 74 20 66 69 6C
      65 2A 00 0A 00
116F 00 DA 2A 45 72 72ptErr  db      crlf,'#Error writing the
      6F 72 20 77 72 69          output file#';crlf,0
      74 69 6E 67 20 74
      68 65 20 6F 75 74
      70 75 74 20 66 69
      6C 65 2A 00 0A 00
      , End of new code
      Data areas
1193      eric      ends
0000      fred      segment
      assume  cs:fred,ds:eric,es:Joe,ss:eric
      extrn  fgetc:near,putc:near,hex:
      near,puts:near,topen:
      near,fclose:near
0000 BA ---- R      start:  mov     dx,seg eric
      ;thers are changes here to access the PSP
0003 8E C2          mov     es,dx      ;point to my data segment
0005 8E 0080       mov     si,80h     ;address command line in PSP
0008 8A 0C          mov     cl,[si]    ;load command line length
000A 32 E0          xor     ch,0        ;clear high byte
000C E3 08          jcxz   at10       ;
000E 51             push   cx          ;save the length for half a mo
000F 41             inc    cx
0010 BF 10B2 R      mov     di,offset command_line
0013 F3/ A4        rep     movsb      ;moves CX bytes from DS:SI to ES:DI
0015 59             pop    cx          ;set it back
0016 8E 0A          mov     si,0       ;point DS to my data area
      ;end of changes
0018 E3 1A          jcxz   again      ;again inc input file name; don't open it
001A 8E 10B3 R      mov     si,offset command_line+1
001D BF 1102 R      mov     di,offset Input_File_Name
0020 89 3E 00DE R   mov     iFO_Name,di ;store file-name address for
      FOPEN, F_CLOSE
0024 E8 00FA R      call   Copy_File_Name
0027 80 3E 1102 R   dd     cmp     Input_File_Name,0 ;if first character is nul
002C 74 04          jz     again      ;there was not file name
002E 8B 000C R      mov     bx,offset InputFileDefinition
0031 E8 0000 E      call   topen
0034 8B 000C R      again: mov     bx,offset InputFileDefinition
0037 E8 0000 E      call   fgetc
      ;Minor changes for four lines here
      ;'cos DONE's too far away for a very short Jump
003A 73 03          jnc    ag000
003C E9 0005 R      jmp     done      ;it is End-Of-File
003F 50             ag000: push   ax          ;save the character we
      ;just read
0040 FE 0E 106A R   dec    Column      ;count column down
0044 75 6D          jnz    ag011
      ; Column number became zero: start a new line
      ; comment .
      ; added a bit of code here to print
      ; the character representation.
0046 F6 06 106B R   rd     test   flag,80h     ;... been here before?
0048 74 17          jz     ag010
004D 50             ag010: push   ax          ;store the character a while
004E 8E 106E R      mov     si,offset chars_message
0051 E8 0000 E      call   puts        ;call a routine to print
      ; the string
0054 BF 107D R      mov     di,offset chars
0057 89 3E 106C R   mov     chars_ptr,di ;re-initialise my
      ; pointer 'to the
      ; chars area
0058 89 0008       mov     cx,8
005E 8B 2020       mov     ax,' '     ;two blanks in the quotes
0061 F3/ AB        rep     stosb      ;erase the area
0063 58             pop    ax          ;we have our character back
0064 80 0E 106B R   rd     ag010: or     flag,80h ;I have now some chars
      ; to print
      ; comment .
      ; That's all for there!
0069 80 00          mov     al,0cr     ;end-of-line
006B E8 0000 E      call   putc
006E 80 0A          mov     al,lf
0070 E8 0000 E      call   putc
0073 AD 1067 R      mov     si,byte ptr rbat1 ;high-order part of file offset
0076 E8 0000 E      call   hex        ;to hexadecimal
0079 50             push   ax          ;save for a moment
007A E8 0000 E      call   print_it   ;print it
007D 58             pop    ax          ;get it back
007E 86 E0          xchg   ah,al       ;swap bytes of AX
0080 E8 0000 E      call   print_it   ;print the other one
0083 AD 1066 R      mov     si,byte ptr rba ;low-order part of file offset
0086 E8 0000 E      call   hex        ;to hexadecimal
0089 50             push   ax          ;save for a moment
008A E8 0000 E      call   print_it   ;print it
008D 58             pop    ax          ;get it back
008E 86 E0          xchg   ah,al       ;swap bytes of AX
0090 E8 0000 E      call   print_it   ;print the other one
0093 80 30          mov     al,'0'
0095 E8 0000 E      call   putc
0098 80 20          mov     al,' '
009A E8 0000 E      call   putc
009D C6 06 106A R   10     mov     column,16 ;we print 16 bytes per line
00A2 FF 06 1066 R   inc    rba         ;add 1 to file's offset
      ; comment ? We have some more additions
      ; here to store the character for the
      ; character representation.
      ; Got it?
00A6 58          ag011: pop    ax          ;get the character back
00A7 50          push   ax          ;and save it again
      ; It's arguable just what we should do to bytes in the range 80h to ffh.
      ; they often represent junk, so it would be appropriate to print
      ; them as data or underscores or something. However:
      ; Some software uses the high-order bit to mark end-of-string.
      ; In text files MBASIC's internal table of commands is one example of
      ; the first; WordStar does the second.
      ; We will just turn the high-order bit off; and print it.
      ; MBASIC end WordStar files. Both will look better that way.
00AB 24 7F          and    al,7fh     ;clear high-order bit
00AA 3C 20          cmp    al,' '     ;is it a control character?
00AC 73 02          jae    ag015
00AE 80 2E          mov     al,'.'
00B0 8B 3E 106C R   ag015: mov     di,chars_ptr ;put the character here
00BA AA             stosb
00B5 89 3E 106C R   mov    Chars_Ptr,di ;update the pointer
      ; that's the end of the code added here
00B9 01 06 106B R   rol    flags,1    ;rotate my little bit-map
00BD 73 05          jnc    ag40
00BF 80 20          mov    al,' '
00C1 E8 0000 E      call   putc
00C4 58          pop    ax          ;ax ;this is the character
      ; we are supposed to print
00C5 E8 0000 E      call   hex
00C8 50          push   ax
00C9 E8 0000 E      call   print_it
00CC 58          pop    ax
00CD 86 C4          xchg   ah,al
00CF E8 0000 E      call   print_it   ;print the other half
00D2 E9 0034 R      jmp     again
      ; comment .
      ; There are some changes here; too
      ; When we get here; there could be something to print in the variable CHARS.
00D5 80 3E 106A R   10     done:  cmp     column,16 ;there could be
00DA 74 0C          jz     dn10        ;but there isn't
00DC 8E 106E R      mov     si,offset chars_message
00DF E8 0000 E      call   puts        ;call a routine
      ; to print the string
00E2 E8 1142 R      mov     si,offset OneMsg
00E5 E8 0000 E      call   puts        ;call a routine
      ; to print the string
00E8 83 3E 000E R   00     dn10:  cmp     iFO_Name,0 ;does the file have
      ; a name?
00ED 75 06          jne    dn20        ;no
      ; Note we only stored the address of the filename
      ; if one was given on the command line.
00EF 8B 000C R      mov     bx,offset InputFileDefinition
00F2 E8 0000 E      call   fclose
00F5 8B 4C00       dn20:  mov     ax,4c00h ;"I have finished,
      ; and the return code is 0"
00F8 C0 21          int    21h        ;call DOS
      ; DOS doesn't return
00FA          Copy_File_Name proc
      ; comment \
      ; Input:
      ; OS:SI points to source area
      ; ES:DI points to file name area
      ; CL contains source area length
      ; Note: if CX > 63, only 63 bytes will be used.
      ; output:
      ; File name area contains a nul-terminated file name
      ; NUL if there was no file name
      ; OS:SI points to the character after the delimiter
      ; ending the file name
      ; WARNINGS
      ; this routine can overflow the receiving area
      ; if it's too short.
      ; This routine does not syntax-check the file name:
      ; DOS will when OPEN is issued
      ; \
00FA 83 F9 3F          cmp     cx,63 ;Limit size of file name:
      ; limits damage if input
      ; length is too great
00FD 7E 03          jle    CFN10
00FF 89 003F          mov     cx,63
0102 AC          CFN10: lodsb
0103 3C 20          cmp    al,' '
0105 E1 F8          loop   CFN10
0107 74 19          jz     CFN80
0109 41             inc    cx
010A 3C 30          CFN20: cmp    al,'.'
010C 74 14          jz     CFN80
010E 3C 2C          cmp    al,'/'
0110 74 10          jz     CFN80
      ; The program's mainline
0112 3C 2F          cmp    al,'/'
0114 74 0C          jz     CFN80
0116 3C 20          cmp    al,'.'
0118 74 08          jz     CFN80
011A 3C 38          cmp    al,'/'
011C 74 04          jz     CFN10
011E AA             stosb
011F AC          lodsb
0120 E2 E8          loop  CFN20
0122 26 C6 45 01 DD CFN80: mov     es,byte ptr i[di],0
0127 C3             ret
0128          Copy_File_Name endp
      ; These error routines are new.
      ; InputError      proc near

```



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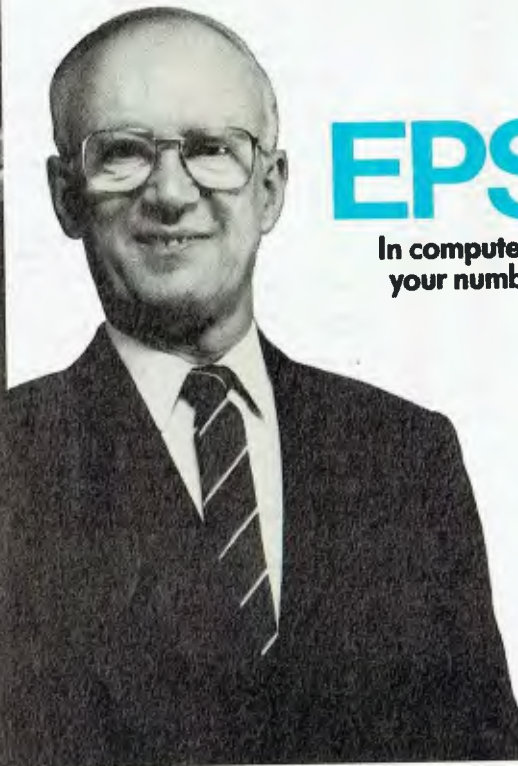
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# INSTRUCTION SET • ASSEMBLY LANGUAGE

```

0128 BE 114C R      mov     si,offset ipterr
0128 EB 05          jmp     short abort
012D                InputError endp

012D                OutputError proc near
012D BE 116F R      mov     si,offset opterr
0130 EB 00          jmp     short abort
0132                OutputError endp

0132                Abort proc near
0132 EB 0000 E      call    puts
0135 B8 4C04        mov     ax,4c04h
0138 CD 21          int     21h
013A                Abort endp

013A                fword ends
comment ., I added START to the end END statement to tell
MAGM and MSLINK where DOS is to start running my program.
end start
    
```

**Segments and groups:**

Symbol	Size	align	combine	class
ERIC	1193	WORD	PUBLIC	
FREQ	013A	PARA	NONE	
JOE	0080	PARA	STACK	

**Symbols:**

Symbol	Type	Value	Attr
ABORT	N PROC	0132	FREQ Length =0008
AG000	L NEAR	003F	FREQ
AG010	L NEAR	0044	FREQ
AG011	L NEAR	0046	FREQ
AG015	L NEAR	0080	FREQ
AG40	L NEAR	00C4	FREQ
AGA1N	L NEAR	0034	FREQ
CFN10	L NEAR	0102	FREQ
CFN20	L NEAR	010A	FREQ
CFN80	L NEAR	0122	FREQ
CHARS	L BYTE	1070	ERIC Length =0010
CHARS_MESSAGE	L BYTE	106E	ERIC
CHARS_PTR	L WORD	106C	ERIC
COLUMN	L BYTE	106A	ERIC
COMMAND_LINE	L BYTE	1082	ERIC Length =0080
COPY_FILE_NAME	N PROC	00FA	FREQ Length =002E
CR	Number	0000	
QN10	L NEAR	00E8	FREQ
QN20	L NEAR	00F5	FREQ
QONE	L NEAR	0005	FREQ
DONEMSG	L BYTE	1142	ERIC
FCLOSE	L NEAR	0000	FREQ External
FGETC	L NEAR	0000	FREQ External
FLAG	L BYTE	1068	ERIC
FLAGS	L WORD	1068	ERIC
FOPEN	L NEAR	0000	FREQ External
HEX	L NEAR	0000	FREQ External
IFD_ACCESSTYPE	L BYTE	0020	ERIC
IFD_BUFFADD	L WORD	0016	ERIC
IFD_BUFFSIZ	L WORD	0014	ERIC
IFD_CBLN	L BYTE	000C	ERIC
IFD_DATASIZE	L WORD	001A	ERIC
IFD_ERROREXIT	L WORD	001E	ERIC
IFD_ERROR_CODE	L WORD	001C	ERIC
IFD_FILENO	L WORD	0010	ERIC
IFD_MODE	L BYTE	0000	ERIC
IFD_NAME	L WORD	000E	ERIC
IFD_NEXT	L WORD	0018	ERIC
IFD_RECISIZE	L WORD	0012	ERIC
IFD_RESERVED	L WORD	0021	ERIC Length =000C
INPUTERROR	N PROC	0128	FREQ Length =0005
INPUTFILEDEFINITION	L WORD	000C	ERIC
INPUT_FILE_NAME	L BYTE	1102	ERIC Length =0040
IPTERR	L BYTE	114C	ERIC
IPT_BUFF	L BYTE	0039	ERIC Length =0800
LF	Number	000A	
OFD_ACCESSTYPE	L BYTE	0840	ERIC
OFD_BUFFADD	L WORD	0843	ERIC
OFD_BUFFSIZ	L WORD	0841	ERIC
OFD_CBLN	L BYTE	0839	ERIC
OFD_DATASIZE	L WORD	0847	ERIC
OFD_ERROREXIT	L WORD	0848	ERIC
OFD_ERROR_CODE	L WORD	0847	ERIC
OFD_FILENO	L WORD	0830	ERIC
OFD_MODE	L BYTE	083A	ERIC
OFD_NAME	L WORD	0838	ERIC
OFD_NEXT	L WORD	0845	ERIC
OFD_RECISIZE	L WORD	083F	ERIC
OFD_RESERVED	L WORD	084E	ERIC Length =000C
OPTERR	L BYTE	116F	ERIC
OPT_BUFF	L BYTE	0866	ERIC Length =0800
OUTPUTERROR	N PROC	012D	FREQ Length =0005
OUTPUTFILEDEFINITION	L WORD	0839	ERIC
PUTC	L NEAR	0000	FREQ External
PUTS	L NEAR	0000	FREQ External
RBA	L WORD	1066	ERIC
ST10	L NEAR	0016	FREQ
START	L NEAR	0000	FREQ

Warning Severe  
Errors Errors  
0 0

**Listing 2. Console I/O routines.**

```

0000                title    Console I/O routines
0000                page    66,132
0000                segment 'code'
0000                public   puts,getc,putc
0000                assume  cs:console
    
```

```

0000                puts     proc
0000                comment , Write a string of characters on the console
0000                INPUT:
0000                DS:SI points to the null-terminated string
0000                OUTPUT:
0000                None.
0000                ps10:     lodsb
0000                0A C0     or     al,al
0000                75 01     jnz     ps20
0000                C3       ret
0000                ps20:     call    putc
0000                EB 0019 R  jmp     ps10
0000                EB F5     puts     endp
0000                comment
0000                Get a character from the console
0000                INPUT:
0000                None
0000                OUTPUT:
0000                AL contains the character
0000                CY = 1 if end-of-file.
0000                84 08     getc     proc
0000                mov     ah,8
0000                int     005 "Read a character from the console"
0000                CD 21     cmp     al,1ah
0000                3C 1A     jle     ah,1ah
0000                75 04     jnz     gc20
0000                F9       stc
0000                EB 02 90  jmp     GC30
0000                F8       ctc
0000                C3       ret
0000                C3       getc     endp
0000                comment
0000                Put a character on the console
0000                INPUT:
0000                AL contains the character
0000                OUTPUT:
0000                None.
0000                84 02     putc     proc
0000                mov     ah,2
0000                int     005 "write character on the console"
0000                8A DD     mov     di,al
0000                C0 21     int     21h
0000                C3       ret
0000                EB 02 90  jmp     GC30
0000                C3       putc     endp
0000                EB 02 90  jmp     GC30
0000                C3       contio endp
0000                C3       end

Segments and groups:
Size align combine class
CONIO . . . . . 00D20 PARA NONE 'CODE'

Symbols:
Type Value Attr
GC20 . . . . . L NEAR 0017 CONIO
GC30 . . . . . L NEAR 0018 CONIO
GETC . . . . . N PROC 0008 CONIO Global Length =000E
PS10 . . . . . L NEAR 0000 CONIO
PS20 . . . . . L NEAR 0006 CONIO
PUTC . . . . . N PROC 0019 CONIO Global Length =0007
PUTS . . . . . N PROC 0000 CONIO Global Length =0008

Warning Severe
Errors Errors
0 0
    
```

**Listing 3. File access routines.**

```

subttl             title    file access routines
                   data    definitions
                   page    60,132
= F10_CBLN         equ     byte ptr 00[bx] ;control block length
= F10_Mode         equ     byte ptr 01[bx] ;open mode
= F10_Name         equ     word ptr 02[bx] ;-> file name
= F10_FileNo      equ     word ptr 04[bx] ;file handle
= F10_RecSize     equ     word ptr 06[bx] ;size of record to transfer
= F10_BuffSize    equ     word ptr 08[bx] ;size of buffer to use
= F10_BuffAdd     equ     word ptr 10[bx] ;address of the buffer
= F10_Next        equ     word ptr 12[bx] ;next character to take from the buffer
= F10_DataSize    equ     word ptr 14[bx] ;amount of data read/written
= F10_Error_Code  equ     word ptr 16[bx] ;the DOS error code
= F10_Error_Exit  equ     word ptr 18[bx] ;where to go if something goes wrong
= F10_Access_Type equ     byte ptr 20[bx] ;a character to say what we did last
;
; F10_Reserved    equ     byte ptr 21[bx] ;we will use some more another day
;
0000                fildata segment byte 'Code'
0000                assume cs:fildata,ds:dataarea,es:dataarea
0000                public fopen,fclose,fread,fwrite,fgetc,putc
0000                COMMENT
0000                Input for all routines:
0000                DS:BX -> the F10 outlined above.
0000                fopen proc near
0000                C6 47 14 43 mov     dx,F10_Name ;it's a close operation
0000                8B 57 02 mov     dx,F10_Name ;address file's name
0000                84 3C     mov     ah,3Ch ;File Create
0000                33 C9     xor     cx,cx ;no attributes
    
```

# INSTRUCTION SET • ASSEMBLY LANGUAGE

```

00DB 80 7F D1 43    cmp     F10_Mode,'C' ;does the user want create?
00DF 74 1F            je      F10         ;yes
0011 8B 3000          mov     ax,3000h    ;file open for input
0014 80 7F D1 49    cmp     F10_Mode,'I' ;does the user want input?
0018 74 16          je      F10         ;yes
001A FE C0          inc     al          ;change to output
001C 80 7F D1 4F    cmp     F10_Mode,'O' ;does the user want output?
0020 74 DE          je      F10         ;yes
0022 FE C0          inc     al          ;try UPDATE
0024 80 7F D1 55    cmp     F10_Mode,'U' ;does the user want update?
0028 74 06          je      F10         ;at last
002A BE 0000 R      mov     si,offset msg1 ;telli him where to go
0020 E9 00C4 R      jmp     abort       ;abort
0030 C0 21          f010:  int     21h        ;do whatever was decided
0032 73 07          jnc     %o20        ;to20
0034 5A            pop     dx          ;discard return address
0035 89 47 10       mov     F10_Error_Code,ax ;error code
0038 FF 67 12       jmp     F10_Error_Exit ;error routine
003B 89 47 04       f020:  mov     F10_FileNo,ax ;store handle
003E C3            ret         ;return to the user
003F                fopen  endp

```

```

003F                fclose proc near
003F 84 3E          mov     ah,3Eh ;File Close
0041 C6 47 14 43    mov     F10_Access_Type,'C' ;it's a close operation
0045 53            push    bx          ;save parameter block address
0046 8B 5F 04       mov     bx,F10_FileNo
0049 C0 21          f010:  int     21h        ;do it
004B 5B            pop     bx
004C 73 07          jnc     %o20        ;discard return address
004E 5A            pop     dx          ;discard return address
004F 89 47 10       mov     F10_Error_Code,ax ;error code
0052 FF 67 12       jmp     F10_Error_Exit ;error routine
0055 C3            ret         ;return to the user
0056                fread endp
0056                fread proc near
0056 84 3F          mov     ah,3Fh
0058 C6 47 14 52    mov     F10_Access_Type,'R' ;a read operation
005C EB 07 90       jmp     fread endp

```

```

005F                fwrite proc near
005F 84 4D          mov     ah,4Dh
0061 C6 47 14 57    mov     F10_Access_Type,'W' ;it's a write
0065 53            f010:  push    bx          ;save parameter block address
0066 8B 5F 04       mov     bx,F10_Buffadd ;Buffer
0069 8B 4F 08       mov     cx,F10_Buffsize ;buffer length
006C 8B 5F 04       mov     bx,F10_FileNo ;file handle
006F C0 21          f010:  int     21h
0071 5B            pop     bx
0072 73 07          jnc     %o20        ;discard return address
0074 89 47 10       mov     F10_Error_Code,ax ;error code
0077 5A            pop     dx          ;discard return address
0078 FF 67 12       jmp     F10_Error_Exit ;error routine
007B 89 47 0E       f020:  mov     F10_DataSize,ax ;length of data read/written
007E C3            ret
007F                fwrite endp

```

```

007F                fgetc proc near
007F 83 7F DE 0D    cmp     F10_DataSize,D1q ;any data in the buffer
0083 75 0E          jne     %o20        ;no, yes
0085 EB 0056 R      fread call som
0088 33 C0          xor     ax,ax ;return zero if no data
008A 89 47 0C       mov     F10_Next,ax ;clear "next char" ptr to start at first
008D 39 47 0E       cmp     F10_DataSize,ax ;did we read anything
0090 F9            stc ;set carry flag if no data
0091 74 0A          je      %o20        ;no, must be EOF
0093 8B 7F 0A       f010:  mov     si,F10_Buffadd
0096 03 77 0C       add     si,F10_Next ;address next char to remove
0099 AC            lodsb ;this is it
009A FF 47 0C       inc     F10_Next ;ipoint to next
009D FF 4F 0E       dec     F10_DataSize ;count down
00A0 FB            cld ;clear carry flag if data
00A1 C3            f090:  ret
00A2                fgetc endp

```

```

00A2                fputc proc near
; data definitions
00A2 8B 77 0A       mov     si,F10_Buffadd
00A5 D3 77 DC       add     si,F10_Next
00A8 FF 47 0C       inc     F10_Next
00AB AA            stosb
00AC 8B 47 0E       mov     ax,F10_DataSize
00AF 40            inc     ax
00B0 39 47 0B       cmp     F10_BuffSize,ax
00B3 7E 0B          jle     %o20
00B5 89 47 0E       mov     F10_DataSize,ax
00B8 EB D05F R      call    fwrite
00BB 33 CD          xor     ax,ax
00BD 89 47 DC       mov     F10_Next,ax
00C0 B9 47 DE       f010:  mov     F10_DataSize,ax
00C3 C3            ret
00C4                fputc endp

```

```

00C4                abort proc near
00C4 84 4D          mov     ah,4Dh
00C6 AC            lodsb ;load the message length
00C7 8B 06          mov     dx,si ;msg address for DOS
00C9 8A C8          mov     cl,al ;bits length
00CB 32 0E          xor     ch,ch ;is less than 256
00CD 8B 0002       mov     bx,2 ;this is the handle for STOEERR
00D0 C0 21          int     21h
00D2 8B 4C04       mov     ax,4c04h ;terminate, RC=4
00D5 C0 21          int     21h

```

```

00D7                abort endp
00D7                ;endif
00D7                ;filedata ends
00D7                ;Dataarea
00D7                ;msg1 db segment 'DATA'
00D7                ;msg1-%,'Unrecognised open option'
00D7                ;use C, I, O, or U'
00D7                ;6F 67 6E 69 73 65
00D7                ;64 20 6F 70 65 6E
00D7                ;20 6F 70 74 69 6F
00D7                ;6E 3A 20 75 73 65
00D7                ;20 43 2C 2D 49 2C
00D7                ;20 4F 2C 20 6F 72
00D7                ;20 55
002C                ;msg1 label byte
002C                ;dataarea ends

```

Segments and groups:

Segment	Size	align	combine	class
DATAAREA	002C	PARA	NONE	'DATA'
FILEDATA	0007	BYTE	NONE	'CODE'

Symbols:

Symbol	Type	Value	Attr
ABORT	N PROC	00C4	FILEDATA Length =0013
FC10	L NEAR		0049 FILEDATA
FC20	L NEAR		0055 FILEDATA
FCLOSE	N PROC	003F	FILEDATA Global Length =0017
FG10	L NEAR		0093 FILEDATA
FG90	L NEAR		00A1 FILEDATA
FGETC	N PROC	007F	FILEDATA Global Length =0023
F10_ACCESS_TYPE	Text	byte ptr	20[bx]
F10_BUFFADD	Text	word ptr	10[bx]
F10_BUFFSIZE	Text	word ptr	08[bx]
F10_CBLLEN	Text	byte ptr	00[bx]
F10_DATASIZE	Text	word ptr	14[bx]
F10_ERROR_CODE	Text	word ptr	16[bx]
F10_ERROR_EXIT	Text	word ptr	18[bx]
F10_FILENO	Text	word ptr	D4[bx]
F10_MODE	Text	byte ptr	01[bx]
F10_NAME	Text	word ptr	02[bx]
F10_NEXT	Text	word ptr	12[bx]
F10_RECFSIZE	Text	word ptr	D6[bx]
F010	L NEAR		003D FILEDATA
F020	L NEAR		003B FILEDATA
FOPEN	N PROC	00DD	FILEDATA Global Length =003F
FP10	L NEAR		00C0 FILEDATA
FPUTC	N PROC	00A2	FILEDATA Global Length =0022
FREAD	N PROC	0056	FILEDATA Global Length =0009
FW10	L NEAR		0045 FILEDATA
FW20	L NEAR		0078 FILEDATA
FWRITE	N PROC	005F	FILEDATA Global Length =0020
MSG1	L BYTE		00DD DATAAREA
MSG1L	L BYTE		002C DATAAREA

Warning Severe  
Errors Errors  
0 0

## Listing 4. Converting a number to a printable hex.

```

DDDD                hexit  segment 'code'
                    page   60,132
                    title  Convert a number to printable hex
; INPUT:
; AL contains the character
; OUTPUT:
; AX contains the result, high-order byte in AL
; Destroys CX
public hex
assume cs:hexit
00DD                hex  proc
00DD 8A E0          mov     ah,al
00DE 25 0FF0       and     ax,0FF0h ;bitwise and operation
00DF B1 04          mov     mov     cl,4
00E0 02 E8          shr     al,cl ;shifts contents AL 4 bits to right
;adds zeros in high-order positions
00E1                or     ax,'00' ;convert numbers D-F to 3D-3F
00E2 3C 3A          cmp     al,3Ah
00E3 7C 02          jc      hex10
00E4                add     al,7 ;:3A-3F to 41-46
00E5                cmp     ah,3Ah
00E6                jc      hex20
00E7                add     ah,7 ;:3A-3F to 41-46
00E8                ret
00E9                hex  endp
00E9 D0 3D30       or     ax,'00'
00DC 3C 3A          cmp     al,3Ah
00DE 7C 02          jc      hex10
00DF 8D FC 3A       hex10:  cmp     ah,3Ah
00E1 7C 02          jc      hex20
00E2 8D C4 07       hex20:  add     ah,7
00E3 C3            ret
00E4                hex  endp
00E8                hexit ends

```

Segments and groups:

Segment	Size	align	combine	class
HEXIT	.001B	PARA	NONE	'CODE'

Symbols:

Symbol	Type	Value	Attr
HEX	N PROC	00DD	HEXIT Global Length =001B
HEX10	L NEAR	00E2	HEXIT
HEX20	L NEAR	00E4	HEXIT

Warning Severe  
Errors Errors  
0 0

## Part 4

# COMING TO GRIPS WITH NETWORKING

Broadband or baseband has been the choice in the past for a networking system — but now there's also Metropolitan Area Networks, Central Office LANs, fibre optic and infrared networks to come to grips with. Stewart Fist connects the possibilities . . .

ONLY A COUPLE of years ago the main argument in the networking world was between the competing camps of the broadband and baseband advocates. That's hard to imagine since there's little argument now: baseband has had a resounding victory. However the past popularity of broadband has left perhaps 25 per cent of total LANs around the world as broadband systems, and what's more, broadband could be making a comeback.

Broadband didn't die out: it found a niche in providing LANs 'spines' or 'backbone' links where it was not in direct competition to the baseband Ethernets, AppleTalks or IBM Token Rings.

It also became the LAN of choice for large scale networks where enormous amounts of data need to be transferred constantly. In the future it will possibly also establish itself in large scale manufacturing as the way to link assembly line robotics with the central controlling computers. This growth may parallel the boom in computer-aided design and parallel processing applications which typically require channel-widths of between 300 and 400 Mbps.

Broadband LANs use the same cable as the American cable television industry

(the so-called CATV — Community Antenna Television) wiring standard. This is a 75 ohm coaxial cable that can be divided into multiple channels for simultaneous video, data and voice transmissions — and here is the secret of a possible long term broadband revival.

## Connecting people

At present we view LANs as a way to connect computers, but this idea is evolving into the concept that LANs are a way to connect people. During this evolutionary phase we will gradually be introducing vision and sound communications into our networks along with the data. Baseband networks generally will not be able to make this change — most just don't have the capacity to go beyond systems that are mainly data with possibly some minor voice component.

Broadband signals are propagated by analogue techniques which are similar to the way modems and audio frequencies are used to send data down phone lines. These broadband coaxial links, however, transmit data at multi-megabit rates and use radio frequencies, not audio.

Existing analogue equipment and techniques can be applied to broadband LANs systems, which was the main reason why

broadband was very popular early in the development of networking. Many broadband LANs use slightly modified off-the-shelf equipment such as video amplifiers, video cable taps, splitters and a special piece of hardware called a signal translator which takes the analogue signal at one frequency and converts it to another on the same channel.

Most broadband systems use the 'mid-split' technique to allocate the radio frequency spectrum on the coax. With mid-split, approximately half the available bandwidth is reserved for data flowing 'downstream' and the other half for 'upstream' communications, with signal translators making the conversions at each end.

With mid-split you only need one cable, but Wang and a couple of smaller broadband LAN suppliers use a two-cable network where one cable is reserved for each data direction.

Either way, the cabling needs of broadband are costly and there is the additional expense of digital-to-analogue conversion equipment and multiplexers. Despite these costs, the sheer amount of data that can be carried by a broadband LANs usually justifies the expenditure.

Other factors favour broadband also. Analogue LAN equipment is tried and tested — it has been used for many years under adverse conditions in cable TV systems around the world and it has a very low failure rate.

Consultants also have personal reasons for advising companies to take the broadband route — they like to keep eating. Experience has shown that it is almost impossible to predict LANs usage in an office or factory environment for more than a year after introduction, so it makes sense to suggest a system which can take

two or three times the load estimated, rather than one that is close to limits. To paraphrase an old saying: 'No one ever got fired for buying a LAN with excess capacity.'

With any LAN, the bandwidth available decides the number of channels and the data rates (and therefore volume) that can be transmitted. Depending on the methods employed, broadband channels can have hundreds of kiloHertz (or even megaHertz) of bandwidth, so the overall systems can have data capacities beyond the wildest dreams of baseband LAN designers. Even a low capacity broadband network will carry perhaps ten times the traffic of Ethernet.

### New baseband LANs

**M**ind you, new baseband LANs are being developed to carry data at much higher rates, and the problems that bog down contention systems like Ethernet are being overcome by new network access techniques.

IBM scientists in Zurich are already showing a 16 Mbps Token Ring network, and exploratory work is in progress on still higher rates — in the order of 100 Mbps. At these speeds, voice and data signals can be mixed on the same line so that users can send, view and discuss information simultaneously through the same terminal.

But at best, it will be very restricted mixed-media capability — it's hard to envisage multiple video, voice and data channels for simultaneous video conferences or even voice discussions on any single baseband network.

Digitised speech data must be transmitted in a reasonably continuous stream with a guaranteed rate of about 32 Kbps for telephone-quality voice, if it is to preserve the inflections and tonalities of human conversation. IBM's Zurich experiment with Token Ring involves special circuitry in every node that provides priority to the speech component. Whenever speech prefix bits are detected, the LAN cuts off all data transmission for a few milliseconds and gives right of way to the speech data.

Data is interleaved progressively with the priority speech bits, but only at a rate that ensures speakers and listeners aren't aware of any interruption. Obviously this speech priority restricts the flow of data through the network, but the assumption is that voice will only occasionally be used.

There are further mixed-media problems with baseband contention systems like AppleTalk and Ethernet: speech (or video) can't be transmitted through networks which have random delay patterns — beyond the limits of the video or audio delay buffers, and the frustration level of the people communicating.

This limitation has faced scientists working on super-fast Ethernet systems because the IEEE standard uses 'probabilistic' rather than 'deterministic' controls on its communications. A voice transmitting node never knows for sure exactly when it will get access to the network.

There is a French variation of the Ethernet standard which is heading in the same direction as IBM's Token Ring. The French Government's INRIA research laboratory has come up with an algorithm for making Ethernet more responsive to heavy loads by adding deterministic controls to the communications. They've dubbed this the IEEE 802.3D (for deterministic) standard.

It changes the way Ethernet operates, but only at the cost of replacing one chip on the standard Ethernet PC boards. What INRIA have done is to replace the algorithm which defines the random time-out delay that each node must make after a data collision.

INRIA's algorithm limits each node's attempts at retransmission, since these constant collisions when fighting for network control are the cause of Ethernet's rapid drop in data throughput under load. Now after a collision, only half the nodes on a network are allowed to re-transmit (thereby halving the chance of a second collision). If another collision does occur, the network halves the number of active nodes again, and then again, if necessary.

The nodes drop in and out of contention themselves by counting the distance they are away from the transmitting node. They know how many are nodes are on the network, and so a simple calculation lets them decide whether they can contend or not. So this complex control procedure is done without the need for an overall net-

work controller — thus maintaining one of the strengths of the Ethernet system.

With this new approach, a worst-case message delivery time can be guaranteed within clearly defined limits, and this allows Ethernet to deliver voice, and also to be used for factory automation networks. But it doesn't increase capacity by much — it just introduces an automatic form of arbitration when Ethernet is reaching capacity.

Broadband LANs are obviously much better than baseband in carrying out both voice and video — and they can even piggyback baseband networks, if required. Ethernet, for instance, is quite often carried for long distances on one channel of a broadband network.

---

*Broadband didn't die out: it found a niche in providing LANs 'spines' or 'backbone' links where it was not in direct competition to the baseband Ethernets, AppleTalks or IBM Token Rings.*

---

Another factor in broadband's favour (and the one that makes it especially useful for large-scale manufacturing industries), is that analogue technologies suffer less from electrical interference than digital. Therefore, they are more effective in industrial plants and other areas where electrical noise is a factor. And, since the amount of noise on a line is generally proportional to distance, this also means that broadband LANs can stretch over longer distances.

In the US, cable television systems are usually city-wide, radiating out for distances up to 50 kilometres from the hub, and it is not uncommon to find a broadband LAN extending its reach the same order of distance. In many parts of the US, the local CATV system has taken on a new non-television role in the past few years.

### Interested in Networking?

IN THE first three parts of this series, Stewart Fist has covered basic network configurations, and the hardware and software requirements (Oct '87); Ethernet and CSMA/CD (Nov '87); and Token Ring networks (Feb '88). If you missed any of these issues, refer to the Services page to obtain back copies. □

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## MANs and CO-LANs

Cable operators now offer channels on their systems for broadband data distribution. The Americans have invented the term MAN (Metropolitan Area Network) to refer to this dual use of the cable network. We don't seem to be developing MANs in Australia, mainly because we don't have cable television, except in the Adelaide foothills and the coastal Sydney region, neither of which are noted industrial sites.

The American telephone companies are also getting in on the act by offering CO-LAN (Central Office LANs) through the telephone network — but they don't have the coaxial links that the CATV companies already have installed. AT&T are selling a 56 Kbps Dadata Virtual Circuit Switch CO-LAN package to the 22 Bell operating companies, and some smaller telephone equipment suppliers are developing CO-LAN packages of their own.

CO-LANs are generally data and/or voice and data network services which are based on switching equipment located at the telephone company's central office rather than on the customer's site. Ameritech is working on a CO-LAN which supports user data rates of up to 2 Mbps on existing twisted-pair telephone cables. They claim that their CO-LAN can handle Ethernet LANs, basic RS232C asynchronous interfaces, IBM 3270 synchronous terminals and X.25 packet-switching. They expect to add ISDN to this list in the near future.

## Fibre optics

There is also a growing interest in fibre optics for long-haul LAN applications, although only a very few percent of current networks in the world use this media — and then generally only as a backbone to connect baseband systems.

Optical fibre has the capacity to carry voice, video and data at gigaHertz rates, but most optical fibre backbones are used only to support a simple exchange of data between Ethernet systems chugging along at less than 1 Mbps — which is overkill by a factor of 50 or more.

Part of the problem in the acceptance of optical fibre as LANs media is a lack of international standards for optical fibre links. The IEEE's 802.8 technical advisory group is still wrestling with a standard specification which will include the core-diameter size, physical links and network topology.

Optical fibre offers low bit-error rates (1:10<sup>12</sup>), bandwidths in the Gigahertz

range (per fibre), zero electrical interference and complete electrical isolation. Security is also a consideration — it is hard to tap into optical fibres, and for this reason almost half the optical fibre LANs installations in the world are for defence uses.

The isolation from electrical currents and noise could well be the major factor in promoting optical fibre systems into industry — especially when coupled with MAP (Manufacturing Automation Protocols). Many people think that the use of glass media is essential in large manufacturing plants to take care of the electromagnetic interference problems that plague copper-wire systems.

The negative side of optical fibre is in the limited number of direct connections you can make to a length of fibre. Generally, 24 or so taps is as much as a simple system can handle because of dirt and scratches that create problems around each splice. It is easy to make good splices in a laboratory, but quite another thing to make them in a dirty office or down a manhole in the street.

## Infrared

Another relatively new development in LANs transmissions is in the use of infrared, which solves the problem of wiring systems by discarding wiring altogether. There are point-to-point infrared links which are used to replace cables between semi-adjacent buildings, and also broadcast systems that have application in work-group LANs.

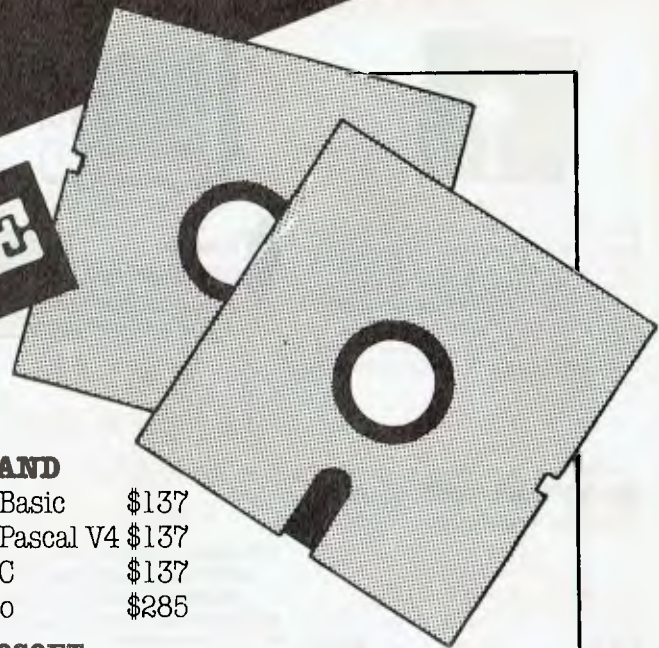
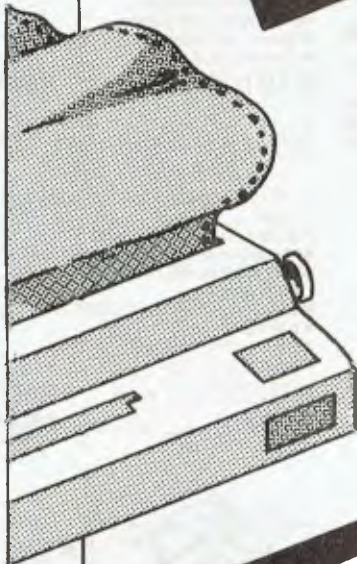
These techniques allow the whole of an office to be tied together by light beams and they avoid the cost of cabling — an important factor in some buildings, especially where changes are constantly made to the position of nodes.

The idea is to bounce a high-intensity modulated infrared beam off the ceiling of an office and allow it to scatter around the room. It can be received by any network node using a simple solid-state detector. This node, in turn, can bounce its own message against the ceiling through a solid-state infrared emitter and broadcast it to all others in the office.

Infrared seems to reflect around an average office space quite well, and you can cover quite an area with surprisingly little power. Collision detection systems seem to work best with infrared broadcast techniques since there is no physical sequence to the links for token-passing — although a limited form of token-passing is possible. □

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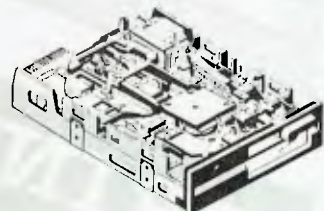
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- B0286-10 Microprocessor
- Hardware and software switchable
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This RS232 card supports 2 asynchronous communication ports. Programmable baud rate generator allows operation from 50 baud to 9600 baud. Fully buffered. Second serial port is optional.

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## MULTI I/O & DISK CONTROLLER CARD

This card will control 2 x double sided, double density drives, and features a serial port, a parallel port, and a joystick port or games port. It also has a clock/calendar generator with battery backup.

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## MULTI SERIAL CARD

- 4 RS232C asynchronous communication serial ports. One fitted 3 optional.
- NS16450 Asynchronous communication elements (ACE)
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- Drive support for PC\*/AT\*, XENIX\*
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## 16 BIT FLOPPY DISK DRIVE CONTROLLER CARD

These cards will control up to 2 or 4 double sided 360K IBM\* compatible disk drives.

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- 640K memory installed
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## 386 MAIN BOARD

- Intel 80386 CPU (16MHz)
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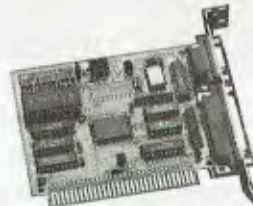


## COLOUR GRAPHICS CARD

This card plugs straight into I/O slot and gives RGB or composite video in monochrome to a monitor.

Colour graphics: 320 dots x 200 lines.  
Mono graphics: 640 dots x 200 lines.

Cat. X18002 ..... \$107



## GRAPHICS CARD

- Hercules compatible
- Interface to TTL monochrome monitor
- One Centronics parallel printer port
- 2K-Static RAM, 64K Dynamic RAM
- Display Mode: 720 dots x 348 lines

Cat. X18003 ..... \$139

## COLOUR GRAPHICS & PRINTER CARD

This combination card features printer and monitor interface. It has 1 parallel printer port, composite colour, RGB CTC outputs as well as composite monochrome video output with display buffer.

Colour:  
Text Mode: 40 columns x 25 rows.  
Graphics: 320 x 200

Monochrome:  
Text Mode: 80 columns x 25 rows.  
Graphics: 640 x 200

Cat. X18010 ..... \$124

## PRINTER CARD

This card features a parallel interface for Centronics printers such as the Epson RX-80, 100, and other similar printers. Included is printer data port, printer control port, and printer status port.

Cat. X18017 ..... \$35



## ENHANCED GRAPHICS ADAPTOR CARD

- 256K display RAM
- Handles monochrome, CGA Hercules and E.G.A.
- Paradise\* compatible
- Up to 16 colours
- Standards: 320 x 200, 640 x 200, 640 x 348, and 720 x 348.

X18070 ..... \$239

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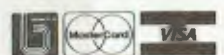
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for releasing yet  
another computer  
but this one is really  
different.

## Introducing the PC88 Computer

This PC of the future has everything a company computer should. With its three processing speeds at a 0 wait state, 640K RAM built-in, three different ports, and many optional enhancements to select from, the PC88 is the compact computer for all of today's personal, business, educational and technical applications.

At the heart of this intricate PC is the 16-bit 8088-10 microprocessor, offering operating speeds of 4.77, 7.15 and 9.54 Mhz. To condense the PC88, President's Engineers utilized Faraday's FE2010A IC chip to replace 71 devices, which include six peripheral controller IC's.



This low energy design computer consumes only half the power consumption and can operate on a 70 watt power supply.

## Specifications

- 16 - Bit 8088-10
- Microprocessor 4.77, 7.15, 9.54
- Zero wait state
- 8087 math co-processor optional
- 640K Ram 8K Rom Bios
- 1 x 360k 5 1/4 inch drive
- 1 x 720k 3 1/2 inch drive
- 4 x 8-Bit Slots
- 1 x Serial Port
- 1 x Game Port
- 1 x Parallel Port
- Programmeable speaker
- Real Time Clock
- MS-Dos 3.2

# GRAPHICS TECHNIQUES

Last month, Miroslav Kosteki was in animated orbit.  
Now he's moved into memory and interrupts . . .

**P**ICTURE THIS: You have finally completed a brilliant graphics program which is your one way ticket to wealth. But, of course there is just one last problem — the program runs too slow. After carefully examining the situation, you find that the movements of data around the screen memory are holding up the system. However, this computer cannot push data around any faster. It's already at top speed, it seems.

If this hasn't happened to you yet, it soon will. So, is there anything a programmer can do without using scissors and pliers on the wiring? Believe it or not, most computers already have inbuilt devices to solve this problem.

## Block movement

**H**owever, before we examine these devices, let's take a look at what a 'block movement' is. Put simply, a block movement is the transfer of a large number of data bytes or words. These transfers can be made within the main memory storage or between another device on the outside. This type of mass movement is made within your computer very often.

As an example, one common block movement is storage of the graphics screen memory onto a disk. This process lets you take your time to generate the graphics but allows quick access when it's needed. Your computer's instruction manual will contain the necessary commands. Of course, your screen memory may be stored in a different section of the main memory instead of the disk.

A more useful block movement saves only a small section of the screen at a time. These rectangular areas of the screen are customarily called graphics windows. Because much less data needs to be moved, each block move is much faster. Small graphics windows also permit you to store many more windows in your memory space.

## Graphic Techniques

IF YOU'VE missed any of the earlier parts of the Graphic Techniques series, refer to the Services page on how to obtain Back Issues. The first part (Nov '87) covered the practical basics of computer graphics; the second (Jan '87) introduced animation.

The remarkable versatility and speed of the graphics window system has made a big impact in animating computer graphics. Split second frames for animation are created and stored beforehand. Then the frames are recalled at high speed to create an animated scene — see Figure 1. Of course, the animation does not have to be recalled to the same place as it was generated. The location may even be made to move around while the animation is happening.

Great, now that we know what block moves are, what about our original problem? What can we do to speed up these transfers?

## DMA controllers

**T**he majority of computers have dedicated brute 'servants' to do their block transfers for them while they get on with the complicated calculations. These Direct Memory Access controllers (DMAs) really do have minds of their own but are much less intelligent than their master, the Central Processing Unit (CPU).

The CPU will leave messages telling the DMA which block moves to make along with other special instructions. It passes these commands by leaving messages in the DMAs registers. Registers are in effect, just message boxes.

A DMA will do the actual work of moving memory sections with little disturbance to the CPU. This means the CPU can be making calculations instead, so, overall, the program will run much faster. In

fact, on most systems, a DMA can transfer data a great many times faster than the CPU could anyway.

Recently developed computers have a device (Bit Blitter) similar to a small army of DMAs under the control of their own intelligent controller device. These Bit Blitters are on most occasions connected directly to the graphics screen memory for incredibly fast block movements. The Commodore Amiga and Atari Mega ST owe a large portion of their graphics power to the Bit Blitter chips.

Check if your computer has a DMA device or a Bit Blitter. To use the device you will need to find out about its register structure and the commands to use. The time you spend on research will be well worth it.

So far we have assumed that we must literally move the data from one position of the graphics screen to the next. In fact, what we really want is to display the block of data at a different position on the screen. If we could change the position of display, the graphics data can stay where it is. This leads us into examining the video display system more closely.

## The CRT controller

**A**t the heart of any video display system is a device called a CRT Controller. This is another 'slave' tool which is controlled by a register system, like the DMA units described above. However, this device has the job of converting the screen memory into video signals for the display monitor. And like most computer circuits today, these CRTCs are designed to be remarkably flexible.

The chip will construct its video signals in the way specified by its registers. Changing one of these registers will alter the display on your monitor without any of the screen memory being moved at all. Therefore, this change can happen within millionths of a second.

One or two of the registers will control the scrolling of the display, either up, down, left or right one pixel or character.

Another register may point to the screen memory area. When a second display is needed, all you need to do is change the pointer. In fact you might switch it between many screen memory areas.

Usually, when extra screens are set up, programs are working on a screen which is not actually being displayed at the time. A switch is made to this screen only when it is totally completed, giving the user an instantaneous, new display.

**Palette switching**

Recent video control systems, and sometimes CRT Controllers themselves, contain something which deserves a section of its own — a Palette Switching system.

The range of available colours on most computer systems is much greater than the number that can be displayed at any one time. This complete range of colours is called the 'Colour Palette'. You must assign a colour from this palette to each of your 'pens'.

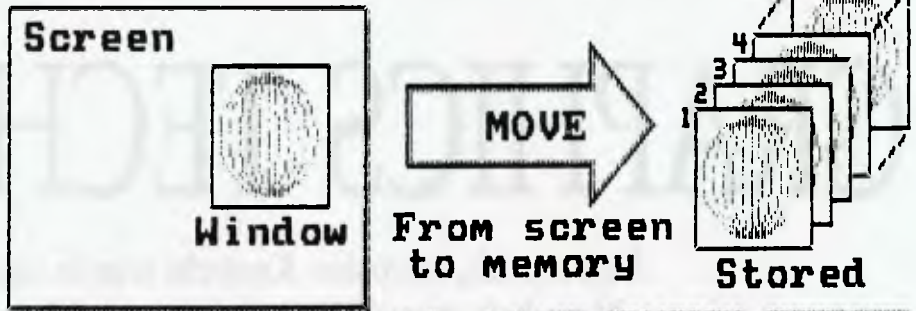
For example, the palette may contain 512 colours, while the video display can handle only 4 at a time. So each of the 4 pens is given one of 512 colours from the palette. The next stage involves the storing of the 4 colours by the Graphics Display System so that the pens appear on the screen in their selected colours.

The real power of this system is that by simply changing the colour selection, all of a particular pen on display will change colour instantly. At first, the usefulness of changing colours seems to be limited to just flashing between different colours. However, some interesting changes happen when you start to select the same colour for different pens.

As an example, take a look at the UFO program in Listing 1. First, an oval is drawn at 45 degrees on the screen. Spokes are then drawn through the center of the oval in 13 different pens, each a different colour. The screen has now been set up for palette switching.

All 13 pens are now set to the background colour, thus turning them invisible. Pen 1 is then set to white, causing it to be the only visible spoke in the oval wheel. To create the appearance of the spoke transferring to the next position is quite easy. We simply return the pen to the background colour and set pen 2 to white. This redirection of colour is almost instantaneous. Note, though, that none of the pixels on the screen have actually

**Step 1. Generating the frames.**



**Step 2. Animating the frames.**

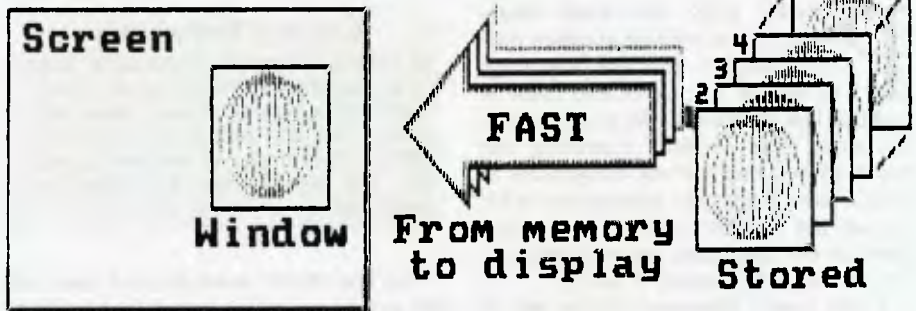
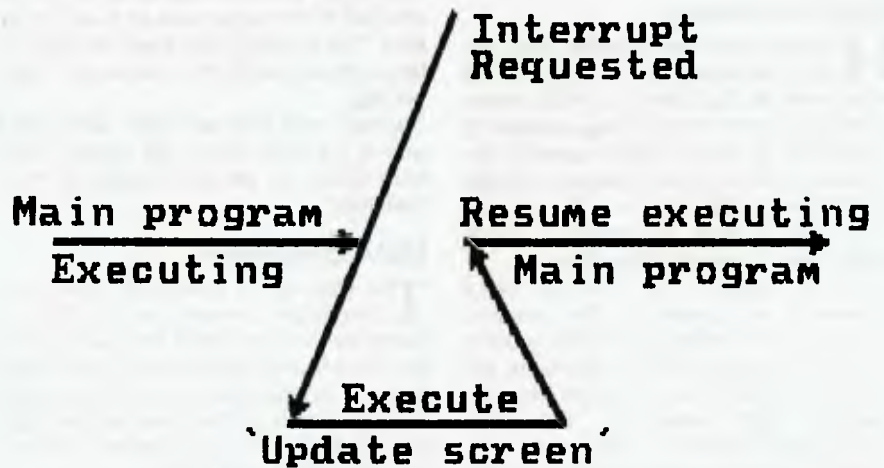


Figure 1. Split second frames for animation are generated and then moved to memory; the image is animated by recalling the frames from memory at high speed.



The purpose of any interrupt is to tell the computer that it must for a certain reason, temporarily suspend what it is doing.

Figure 2. The purpose of the interrupt might be to make another scan of the keyboard, bring about an update of the screen or just to tell the CPU that the video has finished a screen frame. After dealing with this interruption, the central processor will continue where it left off.

moved, only the colours have changed. By repeatedly moving from one spoke to the next in this way the line can be forced to rotate at fantastic speeds. Try the program yourself and increase the delay to study the effect more closely.

```

10 ' EEEE UFO EEEE
20 ' Palette switching demonstration
30 ' Miroslav Kostecki. August 1987.
40 '
50 ' setup 16 colours
60 ' out of 27 on 640x400 screen
70 MODE 0
80 DIM s(210), c(210)
90 s1=300: s2=s1/2
100 e=360/13/16
110 ' precalculate points along oval
120 k=1: DEG
130 FOR a=0 TO 360+e+e STEP e
140 c(k)=s1*COS(a)+320
150 s(k)=s2*SIN(a)+c(k)/4+120
160 k=k+1
170 NEXT a
180 GOSUB 400
190 MOVE 320,200: FILL 15
200 INK 15,10: INK 14,18
210 FOR a=1 TO 104
220 GRAPHICS PEN (a MOD 13)+1
230 MOVE c(a),s(a)
240 DRAW c(a+104),s(a+104)
250 NEXT a
260 GOSUB 400
    
```

```

270 INK 0,0: BORDER 0
280 '
290 ' rotate the bright colour
300 delay=40
310 FOR i=2 TO 13
320 INK i-1,10: INK i,26
330 FOR d=1 TO delay: NEXT d
340 NEXT i
350 INK 13,10: INK 1,26
360 FOR d=1 TO delay: NEXT d
370 GOTO 310
380 '
390 ' draw outside of oval
400 GRAPHICS PEN 14
410 FOR a=1 TO 208
420 MOVE c(a),s(a)
430 DRAW c(a+1),s(a+1)
440 NEXT a
450 RETURN
    
```

*Listing 1. The UFO program.*

A similar method uses groups of pens which are turned on at the same time. By 'turning off' the last pen and switching on the next one in the row, the whole group will seem to move slightly forwards. This might leave half the pens 'on' and half 'off'. Notice, though, how much smoother the movements are when small parts are changed.

Animation using palette switching doesn't end here. Think of the even more incredible animations that can be created by utilizing shapes instead of lines. However, beware! The speed of palette switching is much too fast for most computers. So fast in fact, that delay loops will become almost a necessity in the majority of your programs.

Normally, a computer reads each portion of memory by accessing its own unique address, like a different telephone number for each house on your street. A few years ago, most 8-bit computers ran out of any new addresses when they reached the 64 kilobyte mark. This is accounted for by the fact that the total number of combinations is 65,536 for these machines.

Most new computers bypass this limit, or the new 640 Kbyte limit set by an IBM PC, by using Bank Switching. The idea is similar to having an STD area code in front of a telephone number. Imagine having, not one, but four 64 Kbyte 'banks' of memory on your 8-bit computer. Each of these banks can be accessed by changing

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the bank number (1-4) first. This gives a total 256 Kbyte of usable memory.

Of course, the obvious advantage is that more graphics screens and windows can be stored. However, the addresses stay the same for each bank, so most video control systems will display the same area within a different bank. This means that one screen memory block can be transferred to the next by simply changing the bank.

This system is simple, but gives you headaches when you try writing programs for the system. The programs tend to switch around with the banks. If possible, manipulate the CRT controller instead, as described above.

Check the memory map on your computer to make sure it does switch banks. Then, if you plan to use the system, get as much information as you can about the switching and how it affects your video controller.

Now that our graphics is switching and moving fast enough, how do we control them efficiently?

## Interrupts

While the CPU in your computer is at work, a timer or a similar device will periodically send an emergency line to the processor. Usually, the type of emergency is also sent. Immediately, the processor will temporarily leave its current program and attend to the interrupt. The purpose of the interrupt might be to make another scan of the keyboard, bring about an update of the screen or just to tell the CPU that the video has finished a screen frame. After dealing with this interruption, the central processor will continue where it left off — see Figure 2.

These interrupts remain among the most powerful instruments in computer programming. One reason is that, on the whole, a computer will run faster because routine checking is done automatically. Another reason is that programs tend to be much simpler and thus, less prone to errors.

For example, an interrupt may alert a program that a graphics character has reached the edge of the screen. This

means that the main procedure can continue moving the character without continually testing for the edges. Another use is to interrupt a program when a 'blank' occurs in the video signal. The screen can then be updated with no visible flicker or tearing.

Most computer programming languages support the use of interrupts. Newer strains of Basic even allow timed interrupts and interrupts to control the sound system. Check the index of your programming manual.

However, a word of warning, the massive use of interrupts will restrict the speed of the main program. If no care is taken, you might find that the computer is only processing interrupts, with no time left for the main procedure. Your computer will then 'hang' and never finish its program.

By now your graphics are zooming around the screen. What you need is some techniques to produce better graphics. Next time I will show you some acrobatics with line graphics as they reflect, enlarge and rotate. □

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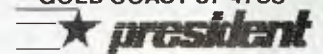
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# TURBO TIPS

## A logical solution . . .

---

Peter Hill explores a powerful PATH and then shows how to search for non-executable files in a logical fashion.

---

PC-DOS and MS-DOS have a powerful feature called PATH which permits a user to specify the disk drives and directories for DOS to search when a requested command cannot readily be found in the current default directory. An example of this is that if you have established a path of C:\C:\DOS\BIN;C:\TURBO; and you type TURBO when logged in to the C:\LOTUS directory, DOS will probably find Turbo Pascal in the C:\TURBO directory and fire it up. Unfortunately, this facility is limited to .COM, .EXE and .BAT files, in other words, those which are directly executable.

With versions of DOS later than 3.xx, it is also possible to run a program which is neither in the current default directory nor in the PATH specification simply by typing its path name. In the above example, typing WORD\WS might start WordStar if it exists in the WORD directory; again this is only relevant to executable files.

---

*'Be comforted. You would not be seeking Me if you had not found Me.'*  
Blaise Pascal, *Pensees*.

---

In the latter example, whilst WordStar will operate, it will not be able to find its overlay files since it searches for them only on the default directory. Similarly, if you attempt to start Lotus 1-2-3 Release 2.01 from other than its own directory, it fails since the (non-executable) file 123.CMP cannot be found.

The code presented here allows searching for these non-executable files in a logical fashion. Firstly we determine whether we have previously found the relevant file. If this is not the case, we then proceed to check the following likely areas: the default drive/directory, each of the paths specified in the DOS PATH environment and the path (if any) which preceded the execution of the currently executing program.

Naturally, we would not wish to repeat this each time we called

a commonly used data file. A frequent example is to open a help file, which might occur quite often during a single session.

The solution to this problem is to both store the path of a successful search and set a flag to note that a successful search has been made, and this is the purpose of the two global typed constant arrays.

All identifiers have been preceded with H\_ to avoid possible naming conflicts with your source code; together with the fact that Turbo Pascal allows global CONST and TYPE declarations at any part of the code makes it possible to treat the whole of the code as a 'package' for inclusion in your own source.

### Variables

The other notable feature is the use of the environment variables which DOS stores in memory. The location of the environment in memory is variable, but at Hex 2C, a pointer to the location of the environment is stored. The environment itself is stored in ASCII code, with each element of the environment terminated by ASCII# 0. The environment ends with another ASCII# 0, and just past this point is stored the command line which invoked the program.

The result of the search can be examined in the values of the two global typed constants H\_Found and H\_Path. Typical user code to utilise this package is presented at the end of the code. I have allowed for three separate non-executable files to be found on the basis that your code might include a data file, an overlay and a help file which you wish to find; this can be tailored by changing the array index in the global constant declarations.

The PATH which I have set on my hard disk is as follows:

---

```
COMSPEC=C:\COMMAND.COM
PATH=D:\;C:\;C:\DOS;C:\NEW;C:\TP3;
PTOOLS=blaise
PROMPT=$p$g
```

---

Running the example code on this system from my WS subdirectory on disk C: gives the following result:

---

```
Running
Searching #AUTOEXEC.BAT
Searching #D:\AUTOEXEC.BAT
Searching #C:\AUTOEXEC.BAT
Found at : \AUTOEXEC.BAT
Found at : C:\AUTOEXEC.BAT
Searching #TURBO.MSG
Searching #D:\TURBO.MSG
Searching #C:\TURBO.MSG
Searching #C:\DOS\TURBO.MSG
Searching #C:\NEW\TURBO.MSG
Searching #C:\TP3\TURBO.MSG
Found at : C:\TP3\TURBO.MSG
Found at : C:\AUTOEXEC.BAT.
```

---

Listing 1. Routines to retrieve non-executable files.

Routines to retrieve non-executable files.

BY :Peter Hill  
 DATE :15/6/87  
 LIMITS :Requires MS-PC/DOS 2.xx or 3.xx, IBM PC or near offer.  
 REVISED :20/6/87  
 REVISION: Demonstration routines added.

STRATEGY:

Easy to Hard approach:

0. Look to see if already found,
- Failing that,
1. Look for the non-exec file on the default disk/path,
- Failing that,
2. Let's try the path set in the environment,
- Failing that,
2. Look on the same path as that which was used to call the programme,
3. If found set found flag and save the path,
4. Otherwise, surrender.

If we can find it once, then this strategy minimises the find time for subsequent calls of the file.

(Global CONST and TYPE declarations)

TYPE  
 H\_String = STRING[128]; (describe environment etc.)

CONST  
 H\_Found : ARRAY[1..3] OF BOOLEAN = (FALSE, FALSE, FALSE);  
 (have we done this before?)  
 H\_Path : ARRAY[1..3] OF STRING[128] = ('', '', ''); (if so, where was it?)

PROCEDURE H\_Get\_Non\_Exec  
 (H\_Whatsit : H\_String; H\_Number : INTEGER);  
 (passed the file name and number)

VAR  
 H\_N\_E\_File : H\_String; (the full path plus file name)  
 H\_Pos, (a position counter)  
 H\_CharCount, (which character of the env.?)  
 H\_DosEnvSeg : INTEGER; (where does the env. start?)  
 H\_DosEnvOfs : INTEGER;  
 H\_ProgName,  
 H\_Env : H\_String;

(you may already have an UPPER CASE routine)  
 (but just in case.....)

FUNCTION H\_UC(H\_Passed : H\_String) : H\_String;  
 VAR  
 H\_Step : INTEGER;  
 BEGIN  
 FOR H\_Step := 1 TO Ord(H\_Passed[0]) DO  
 H\_Passed[H\_Step] := UpCase(H\_Passed[H\_Step]);  
 H\_UC := H\_Passed;  
 END;

(you may already have an EXIST routine)  
 (but just in case.....)

FUNCTION H\_Exist(H\_Passed : H\_String) : BOOLEAN;  
 VAR

H\_Fil : FILE;  
 BEGIN  
 (next line is included for demonstration only)  
 WriteLn('Searching #', H\_Passed);  
 (\$i-)  
 Assign(H\_Fil, H\_Passed);  
 Reset(H\_Fil);  
 Close(H\_Fil);  
 (\$i+)  
 IF IOResult <> 0 THEN  
 H\_Exist := FALSE ELSE H\_Exist := TRUE;  
 END;

BEGIN  
 (If we already know where it is .....)  
 IF H\_Found[H\_Number] THEN H\_N\_E\_File := H\_Path[H\_Number]+  
 H\_Whatsit; (no change)  
 IF NOT H\_Found[H\_Number] THEN (not yet)  
 BEGIN (try default disk/path)  
 IF H\_Exist(H\_Whatsit) THEN  
 BEGIN  
 H\_N\_E\_File := H\_Whatsit;  
 H\_Found[H\_Number] := TRUE;  
 END;

END;  
 IF NOT H\_Found[H\_Number] THEN (not yet)  
 BEGIN (search the env. for path)  
 H\_DosEnvSeg := MemW[Cseg:\$2C]; (address of env.)  
 H\_Env := '';  
 H\_DosEnvOfs := 0;  
 (#0#0 signifies the end of the environment)  
 WHILE MemW[H\_DosEnvSeg:H\_DosEnvOfs] <> 0 DO  
 BEGIN  
 H\_Env := H\_Env+Chr(MemW[H\_DosEnvSeg:  
 H\_DosEnvOfs]);  
 H\_DosEnvOfs := H\_DosEnvOfs+1;  
 END;  
 H\_Pos := Pos('PATH=', H\_UC(H\_Env)); (does env.  
 include a path?)  
 IF H\_Pos <> 0 THEN (yep)  
 BEGIN  
 (get the info. after the = sign)  
 H\_Env := Copy(H\_Env, H\_Pos+5, Ord(H\_Env[0])-  
 H\_Pos);  
 (find the end of the path statement)  
 H\_Pos := Pos(Chr(0), H\_Env);  
 IF H\_Pos <> 0 THEN H\_Env := Copy(H\_Env, 1,  
 H\_Pos-1);  
 (by now we ought to have only a list of paths)  
 H\_CharCount := 0;  
 REPEAT (until we find it)  
 H\_Path[H\_Number] := '';  
 REPEAT  
 H\_CharCount := H\_CharCount+1;  
 IF H\_Env[H\_CharCount] <> ';' THEN  
 H\_Path[H\_Number] := H\_Path[H\_Number]  
 +H\_Env[H\_CharCount];  
 UNTIL (H\_CharCount >= Ord(H\_Env[0])) OR  
 (H\_Env[H\_CharCount] = ';');  
 IF H\_Path[H\_Number][Ord(H\_Path[H\_Number][0  
 ])] <> '\' THEN  
 H\_Path[H\_Number] := H\_Path[H\_Number]+  
 '\';  
 IF H\_Exist(H\_Path[H\_Number]+H\_Whatsit)  
 THEN  
 H\_Found[H\_Number] := TRUE;  
 UNTIL H\_Found[H\_Number] OR (H\_CharCount > Ord  
 (H\_Env[0]))  
 );  
 END;  
 END;  
 IF NOT H\_Found[H\_Number] THEN (still not found)  
 (last chance, try the calling path, located past env.)  
 BEGIN  
 WHILE MemW[H\_DosEnvSeg:H\_DosEnvOfs] <> 0 DO  
 BEGIN  
 H\_ProgName := H\_ProgName+  
 Chr(Mem[H\_DosEnvSeg:H\_DosEnvOfs]);  
 H\_DosEnvOfs := H\_DosEnvOfs+1;  
 END;  
 H\_DosEnvOfs := H\_DosEnvOfs+4;  
 H\_ProgName := '';  
 WHILE Mem[H\_DosEnvSeg:H\_DosEnvOfs] <> 0 DO  
 BEGIN  
 H\_ProgName := \_ProgName+  
 Chr(Mem[H\_DosEnvSeg:H\_DosEnvOfs]);  
 H\_DosEnvOfs := H\_DosEnvOfs+1;  
 END;  
 (strip off prog. name)  
 WHILE ((H\_ProgName[Ord(H\_ProgName[0])] <> '\') AND  
 (Ord(H\_ProgName[0]) <> 1)) DO  
 BEGIN  
 H\_ProgName[0] := Chr(Ord(H\_ProgName[0])-1);  
 END;  
 IF H\_Exist(H\_ProgName+H\_Whatsit) THEN  
 BEGIN  
 H\_Found[H\_Number] := TRUE;  
 H\_Path[H\_Number] := H\_ProgName;  
 END;  
 END;  
 (next line is included for demonstration only)  
 (gotcha)  
 IF H\_Found[H\_Number] THEN WriteLn('Found at ', H\_Path[  
 H\_Number]+H\_Whatsit);  
 END;  
 BEGIN  
 (next lines are included for demonstration only)  
 H\_Get\_Non\_Exec('AUTOEXEC.BAT', 1); (first attempt to find)  
 (H\_Path[1] now contains the path to AUTOEXEC.BAT)  
 H\_Get\_Non\_Exec('AUTOEXEC.BAT', 1); (easily found)  
 H\_Get\_Non\_Exec('TURBO.MSG', 2); (first attempt to find)  
 H\_Get\_Non\_Exec('AUTOEXEC.BAT', 1); (still able to find?)  
 END.

# NEW PRODUCTS

## Software



### Amiga Power Pack

#### Questor

Phone: (02) 662 7944

Price: \$59 taxed

The Amiga Power Pack is a games package from Questor. It has six games including two arcade games: Persecutor and Shooting Star. Persecutor is a shooting game with 68 levels. You are in a highly manoeuvrable ship which is equipped with a fast firing gun. It is your mission to explore the planet. Shooting Star is a multi level shooting game.

Picture Puzzle is a puzzle game, with the objective being to place all the pieces of the puzzle back into one piece. You are required to remember the position of particular pictures you see on the board and to guess or remember where on the board the identical picture may be. Also included in the Pack are Backgammon and One Check, two board games.

### Cambridge Spreadsheet Analyst

#### Imagineering

Phone: (02) 697 8666

Price: \$179 taxed

The Cambridge Spreadsheet Analyst, available from Imagineering, searches for 25 types of potential errors in your spreadsheet. Developed for Turner Hall Publishing, the Analyst will pick up mistakes like typing or copying a number over a formula, or accidentally changing the spreadsheet.

It also includes the spreadsheet Comparator and the macro analyzer as extra modules. The Comparator compares different versions of a spreadsheet and notes the differences. The macro analyzer module graphically maps the operation and interaction of all your macros and helps in setting up large macros.

## RAKON

### Informix-SQL

#### Rakon

Phone: (02) 437 6777

Price: \$1000 untaxed

Rakon has announced the first completed port of a SQL-based relational database management software for the Apple Unix based Macintosh II A/UX. Informix-SQL is compatible with the feature beta version of the Mac II A/UX.

### For Comment

#### Imagineering

Phone: (02) 697 8666

Price: \$310 taxed

For Comment is a program from Broderbund which allows a user to read a document, such as a memo, directly from the screen and enter comments in a text file without changing the original. To write the document, the author can use one of a number of standard wordprocessors. A split screen is used that has the document in the top half and up to 60 lines of comment in the bottom. It is designed for IBM compatibles and requires 256 kilobytes of RAM, DOS 2.0 or later and two floppy disk drives.

### KnowledgeMan/2

#### Intelligent Nexus Corporation

Phone: (03) 598 7411

Price: See below

Knowledgeman/2 fuses a powerful relational database management system with business computing applications such as spreadsheet, graphics, text processing, report generation and communications. It is for single user micros, PC based local area networks and the DEC VAX range.

According to Intelligent Nexus, seven options are available for Knowledgeman/2, ranging in price from \$271 to \$980.

### Mactape Backup Software Version 2.0

Wollongong Computing Sciences

Phone: (042) 27 0777

Price: See below

Wollongong Computing Sciences has released version 2.0 of its Mactape Backup Software which drives the Mactape Backup System. Version 2.0 handles any make of hard or soft disk drive that can be connected to the Macintosh; it also works with the Apple Share Network with or without file protection between users.

The new software release works on all of the currently available Macintosh models. An upgrade to version 2.0 is available to owners of previous versions for \$39.50.

### Mast Information Systems

#### Australian Computer Endeavours

Phone: (07) 865 1455

Price: \$840 untaxed

Written to ANSI and FIP standards, the Mast Information System provides migratable programs and data from computers as small as the IBM PC XT to mini and mainframe systems. Mast provides multi tasking and multi user facilities to MS-DOS based machines.

The product allows a user to keep all existing applications in a single user environment when the multi user capabilities are not in use. Mast incorporates standard accounting modules such as: general ledger, debtors, creditors, job cost, inventory, and order entry. In addition, fully integrated telex, mail management, wordprocessing, spreadsheets and office automation modules are available.



### Movie Manager

#### Nalco Industries

Phone: (02) 638 2980

Price: Not supplied

The latest software from Nalco is the Movie Manager, a management system for video libraries and mixed business type operations. It features extensive use of artificial intelligence and pop-up help windows.

Movie manager is written in the US database language Tas+ which allows the user full manipulation of data by external means. Data access is by code number or description and there is complete automatic reversal of void transactions. A screen save facility allows for instant recall. Movie Manager has fully interactive memo and alarm facilities. It is available for colour or mono systems and runs in PC-DOS and MS-DOS (version 2.1 or later) environments.



IMAGINEERING

### Note-It Plus

#### Imagineering

Phone: (02) 697 8666

Price: \$149 taxed

Note-It Plus is a reminder utility for Lotus 1-2-3. From Turner Hall Publishing and distributed by Imagineering, Note-It Plus lets the user create instant reminders inside Lotus 1-2-3. The user can 'stick' notes on cells or file names, or speed up the search for specific words or numbers and get to them quickly, cutting and pasting between notes, cells and spreadsheets.

### Protec

#### IDS Corporation

Phone: (08) 42 7757

Price: Not supplied

The Protec data security package has been adapted to full compatibility with DOS 3.3 which is the new version of PC-DOS and MS-DOS developed for IBM's PS/2 range. Protec is a security package for the IBM PC and PS/2 families of computers and for IBM compatibles. Protec offers access control, copy protection and data encryption facilities.

### Print Managers

#### Logo Computer Centre

Phone: (02) 819 6811

Price: See below

Logo has introduced the range of

**RealWorld 4.0**

IMBS

Phone: (02) 819 7488

Price: Not supplied

The latest version of RealWorld distributive accounting incorporates a full serial number history inquiry. This enables the user to locate customer transaction history through serial numbers of products sold.

RealWorld is best suited to a multi-user environment supporting from 2 to 20 workstations. It runs on IBM PCs and compatibles and uses the Novell network. Modules include accounts receivable, accounts payable, general ledger, payroll, inventory control, and job cost.

Symphony. Spellin! checks every label, column and row of a spreadsheet — whether it is on the screen or not.

It has a 90,000 word dictionary. The user can ask for spelling suggestions, edit the word and look it up again, or ignore it. Words may be added to the dictionary for future reference. Spellin! also picks up double words and incorrect capitalisation.

**Snow Report Writer**

Scientia-Whitehorse

Phone: (02) 436 0644

Price: \$999 taxed

The Snow Report Writer, from Snow International Corporation in the US, will read and write to almost all popular languages and applications, including dBase, MS Word, Lotus 1-2-3, Multiplan, Informix and C. The Report Writer can create simple quick query reports or involved reports requiring complex mathematical calculations.

Report Writer features Fourth Generation Language capability.

**Spellin!**

Imagineering

Phone: (02) 697 8666

Price: \$149 taxed

Imagineering is distributing Turner-Hall Publishing's Spellin!, the full featured spelling checker designed for Lotus 1-2-3 and



Print Managers which manage the printed output of several workstations and enable effective use of all printers in an office. Some models are designed for several computers to share

one printer. Others can handle two or more printers. All managers have 256 kilobyte memory buffers fitted, storing around 120 typed pages. Pricing starts at \$906 taxed.  $\Delta$

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**EDD 4** version which doesn't include any hardware is available, and can be used on Apple IIc and III (using emulations mode) and is priced at \$125.00.



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ities. It uses windows to save hours of data entry and has a context sensitive help command. By using entries already in data files Report Writer enables the user to simply make mailing lists, letters, labels, form layouts, statements and vouchers. It runs on the IBM PC, XT, AT or true compatible with a minimum of 384 kilobytes of memory.

### VP/Saddle, VP/Tabs, VP/Font

Megavision  
Phone: (02) 957 5797  
Price: See below

VP/Saddle, VP/Tabs and VP/Font are three new utility programs to improve the desktop publishing output of Ventura Publisher.

VP/Saddle is used with Ventura publisher and Postscript

printers and provides three new printing forms for books and booklets: two-up, which prints two copies of the same page; side by side on one sheet of paper and two different page images side by side on the same sheet of paper (the pages are paired so they will come out in the proper order when the sheets are folded to form a booklet).

VP/Tabs eliminates the need for extensive editing after loading Lotus worksheets into Ventura Publisher. It is used to process Lotus worksheet print files before loading them into Ventura.

VP/Fonts completely automates the process of installing HP Laserjet soft fonts for use with Ventura Publisher.

VP/Saddle is priced at \$135, VP/Tabs is \$150, while VP/Font costs \$135.



### New Machines

**Kookaburra** △  
Quasar Data Systems  
Phone: (02) 624 8488  
Price: \$2146 taxed

The Kookaburra is an IBM compatible portable computer from Time Office. It has 96 kilobytes of memory that can be incremented in 8 Kbyte modules to a maximum of 256 Kbyte.

The Kookaburra has either one or two 5¼ inch floppy drives; one 3½ inch floppy drive may be added to provide access to

standard MS-DOS software and/or additional data storage. Either parallel or serial printers may be connected to the Kookaburra via the two serial ports and one parallel port that are provided as standard. The display is either 8, 16 or 25 lines. All versions have as standard the ability to connect via an external high resolution video monitor.

The Kookaburra includes MS-DOS operating system, communications software, wordprocessing and spreadsheet software, personal planner, phone/address manager and an inbuilt battery power pack.

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<b>Interface</b>	CCITT V24 (RS232)
<b>Data Format</b>	Asynchronous
<b>Power Consumption</b>	<2 watts
<b>Size</b>	27(H) x 120(W) x 157(D)mm
<b>Indicators</b>	8 LEDs
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**Jaeger 220**  
 Quartz Australia  
 Phone: (03) 663 6509  
 Price: \$7000

Chendai, through Australian distributor Quartz, has released the Jaeger 220 laptop computer. It operates on an Intel 80286, 10MHz CPU, with an optional 808287 co-processor.

The Jaeger has a 20 megabyte internal hard disk drive, a 1.2 Mbyte 3 1/2 inch floppy disk drive and 640 kilobytes of RAM. It also interfaces with an external 5 1/4 inch floppy disk drive. The laptop measures 32 cm x 32 cm x 9 cm and weighs 6.4 kilos. It has a gas plasma screen, EGA and CGA graphics, Centronics parallel printer and dual RS232 serial ports and a real time clock with battery backup.

The keyboard is a an 82 key ASCII keyboard which has an IBM AT compatible layout and LED status indicators. The Jaeger 220 has an optional file transfer kit and optional 2 Mbyte RAM board.



**Lap 5**  
 Quartz Australia  
 Phone: (03) 663 6509  
 Price: \$7000 taxed

A dedicated laptop computer has been released in Australia by Chendai through its distributor, Quartz Australia. Known as the Chendai Lap 5, it is built around the Intel 80286-10 with hard switchable 6, 8 or 10 MHz clock frequency. It weighs 9.5 kilos and is 42 cm x 34 cm in measurement.

The Lap 5 has a 2 megabyte hard disk drive expandable to 8 Mbytes. It has a 5 1/2 inch 1.2 Mbyte floppy disk drive. Standard features include AT and XT expansion slots, with space for one full size expansion board or two half height boards. Also, it has a a Centronics parallel printer port, a RS232C serial port

# Borland speaks your language



**Turbo Pascal**  
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Available in versions for the IBM PC and compatible range and Apple Macintosh,

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**TURBO PASCAL's** smart linking allows the removal of un-used code from your programs; separate compilation units;

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**Turbo Basic**  
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For BASIC programmers, **TURBO BASIC** roars along at a speed of up to 12,000 lines-per-minute with the IBM PC and compatibles range, and the new PS/2 systems.

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## NEW PRODUCTS

for a plotter or mouse, external floppy disk/tape, external hard disk drive port and external keyboard port. There is also an external monitor port for CGA, EGA, MDA and HGC video modes and automatic mode switching according to software used.

The Lap 5 can be plugged into an expansion box if required, making provision for an extra four expansion slots, second hard disk and tape back-up unit or second floppy disk drive. The keyboard is a 88 key IBM XT compatible.

### PC 4502

Sharp Corporation  
Phone: (02) 831 9111  
Price: \$2950 taxed

Sharp has released the PC 4502, a laptop computer with a backlit screen and a 88 key keyboard. It is IBM compatible and will run all popular programs. The PC 4502 offers full battery operated portability.

The screen is a backlit, super-



# guage and compiles it fast

ility. Compatible with both Advanced C and GW BASIC, it includes a Calc spreadsheet with source code.

ble for the novice programmer and TURBO BASIC's integrated design quick program turnaround without ng the powerful features ced programmers demand.



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Capable of compiling more than 7,000 lines-per-minute, TURBO C provides optimized code generation; automatic error tracking; an easy-to-use full-screen editor; fully integrated Linker and Make utilities; and it is ANSI C compatible.

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twist liquid crystal display. The super-twist crystals give a high degree of contrast, whilst the backlight provides a uniform light source for viewing under a range of different lighting conditions.

The PC 4502 has a separate numeric keypad and separate cursor keys, as well as the 88 key keyboard. A rechargeable battery provides independence from power points for up to seven hours use. The computer can also be used with the 240 volt adaptor supplied, even when the battery is recharging. Two 3 1/2 inch disk drives are provided as standard with 720 kilobyte capacity per disk. If required, an optional external 5 1/4 inch disk drive can also be connected. The PC 4502 has 384 KBytes of AM expandable to 640 Kbyte. An additional 1 megabyte of memory conforming to the Lotus/Intel/Microsoft EMS standard can be used, for use with selected software.

Standard interfaces provided are a parallel printer port (Cen-

tronics standard), an RS232 port for communications and an interface for the 5 1/4 inch disk drive. An optional RGB port for connection of an external colour or monochrome monitor is available. The PC 4502 weighs in 4.8 kilograms.

**MS386i**

Microscience  
Phone: (02) 261 4024  
Price: \$12,000 taxed

Microscience has released its '386 based machine, the MS386i.

The MS386i is capable of running at 16 or 20 MHz; hard disk storage space can be extended to one gigabyte. The system has 2 megabytes of resident memory and is best suited to run multi-user operating systems such as PC/MOS, Unix and Concurrent. It will operate all MS-DOS software. The MS386i has a parallel printer interface and a RS 232c serial interface. It uses static memory which supports all programs which use paged memory.

Peripherals and Extensions



**SENDATA** PTY LTD

**DG Modem**

Sendata  
Phone: (03) 568 6299  
Price: \$750 untaxed

Sendata has released a CCITT internal multispeed modem for the Data General/One model 2 port-

able computer. By using advanced surface mount techniques and CMOS circuitry, Sendata has designed a full featured modem that will fit entirely inside the Data General/One's case. It can be run on batteries. The modem is fully Hayes compatible and runs at 1200, 1200/75 and 300 baud.



**dataplex**

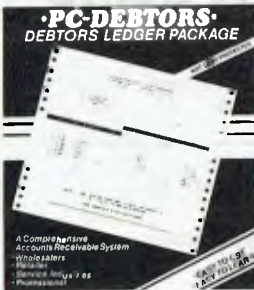
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The DPX-830 Digital Data Splitter allows system users to implement multi terminal operation on one host link. It is for use in polled or multi drop networks, both synchronous and asynchronous. At speeds of up to 76.8 bits per second, as many as 16 users can be supported on one DDS, Datel or private modem link. System installation is simplified through a built-in trunk timing buffer. Long polling delays are eliminated by a data inactivity timer. It can be installed by the user.

There are two models; the 4 channel 830-11 costs \$934.80, while the 15 channel 830-24 costs \$2798.69. Both prices are taxed.



**Dysan data tape cartridges**

Xidex  
Phone: (02) 816 3222  
Price: Not supplied

Xidex has announced two new Dysan 1/4 inch data tape cartridges for the PC: the Dysan model 600 and Dysan model D2000.

The 600 allows you to store from 60 to 125 megabytes of data, with higher 12,500 FTPI certification and from 15 to 24 tracks packed on the tape. The 600 is for use on Tandberg 3230/3323, 3630/3640 and Wangtek 5125 drives. The D2000 stores up to 40 Mbyte of data in a new micro size cartridge. It is designed for use on Apple 405C, Archive XL3240, Compaq 38L, Irwin 120XT and Wangtek Fad 3200-25 drives.

**Flexscan 8060 series monitor**

Megavision  
Phone: (02) 957 5797  
Price: See below

Megavision has announced that it is distributing the EIZO Professional Series Flexscan 8060 series monitors in Australia.

The EIZO comes in two models, one with .31 mm dot pitch, known as the 86A, and the other, known as the 865, with .28 mm dot pitch. The monitor has a wide range of horizontal and vertical scan frequencies. It

can be ordered with either PC DB9 video cables, PS DB15 connectors, Apple DB15 connectors or Olivetti DB25 cable as standard cable. The EIZO monitor is an upgraded version of the EGA monitors.

The 86A costs \$1495 while the 865 costs \$1695; both prices are taxed.

**Interlink IQ-1234 modem**

Interlink  
Phone: (03) 525 3388  
Price: Not supplied

The Interlink IQ-1234 modem is an Hayes compatible modem that has 1200/2400 bps full duplex asynchronous communications. It also has 1200/75 and

75/1200 videotex. The IQ-1234 has dial back security with password access. The telephone directory and setup memory are battery backed.

It features auto dialing, auto disconnect and auto answer as well as an RS 232 interface. It is configured to CCITT standards V21, V22 bis, 1200/75 & 75/1200.



*Fast & Foremost in Laser Printers.*

- Exclusive Pyramid TM font systems for flexible bitmap fonts.
- RS-232 and Centronics Interface.
- 8-15 pages per minute.

From

\$2495

Plus Tax if applicable

For further information or to arrange a free demonstration phone Kenelec today.

KENELEC

- VIC (03) 560 1011
- NSW (02) 439 5500
- QLD (07) 393 0311
- SA (08) 223 2055
- WA (09) 322 4542

LaserPro offers a complete family of high quality Laser printers for fast, high resolution documentation with text, graphics, bar codes, custom fonts and much more.

Simple to learn EXPRESS TM commands, and compatibility with thousands of software programs make LaserPro printers the easiest to operate and most versatile around.

- Up to 7 popular printer emulations.
- 300 x 300 d.p.i.

**TA**

**TRIUMPH-ADLER**

**MicroFAX card**

Triumph-Adler

Phone: (02) 888 7644

Price: Not supplied

The MicroFAX card allows a PC to communicate text and graphics with any facsimile machine. It automatically sends and receives fax transmissions 24 hours a day while spreadsheets, wordprocessing or other software is being utilised on the PC.

It communicates from the PC without putting any computing operations on hold. The MicroFAX is CCITT Group III compatible, has a modem speed of 9600 bps with automatic back up to 7200, 4800 and 2400 bps. It also incorporates an asynchronous, full or half duplex modem with 300 to 1200 baud. Hayes compatible handshake protocol, touch tone or pulse dialling, 40 character command buffer, modular telephone jack and I/O connector.

Miscellaneous



**Calendars Computer Graphics**

Image Products Phone: (02) 969 8385 Price: \$19.95



A range of 1988 calendars with a computer theme are available from Image Products. The calendars feature computer generated graphics.

Mac Daydreams is a computer generated wall calendar produced entirely on an Apple Macintosh. Digital Daydreams features full colour images produced on IBM PC ATs, DEC PDPs, Amiga and Symbolics 3670 workstations. Both calendars are computer typeset at 2400 dots per inch. They also feature computer trivia. Special offer available for PC user group members.

**Guru Bonus Offer**

Intelligent Nexus Corporation

Phone: (03) 598 7411

Price: \$175

The Guru Bonus Offer is an opportunity to learn more about Expert Systems. Included in the offer is the Guru Tutor which has an online tutorial and sample applications and the *Manager's Guide To Expert Systems using Guru*.

**Events**

PC '88, Office '88 and Communications '88 have been rescheduled from February 7 to 10 and will now take place from March 20 to 23. The venue is unchanged and the conferences will remain at the Sydney Exhibition Centre, Darling Harbour.

**Computer Pals Across The World** will be held from April 7 to 8 at the Sheraton, Alice Springs. Papers are being sought on the theme Sharing in a Global Classroom. Contact Ralph Czerniejewski on (089) 525 044.

The EDP Auditors Association will be holding an international conference at Jupiters Hotel from April 27 to 29. Contact Lex Page or Tony Muston on (02) 250 0500.

**Fourth Australian Conference on Applications of Engineering.** Papers are being called for this conference by the Sydney Expert Systems Group. The conference will be held in Sydney from 11 to 13 May. Contact Marie Thill on (02) 218 9427.

**Forth Symposium.** A two day

seminar on the Forth language will be held on May 19 and 20 at the NSW Institute of Technology. Keynote speaker will be Charles Moore who invented the language. Contact Jose Alfonso or Paul Walker on (02) 20 930 or Roy Hill on (02) 217 3828.

**Ausgraph '88** organisers are calling for unpublished papers on Cadcam, animation, image processing and scene simulation. The exhibition and conference will be held in Melbourne from July 4 to 8 at the Hyatt on Collins. Enquiries (03) 387 9955.

**The Fourth National Space Engineering Symposium** will be held in Adelaide July 12 to 14. Papers dealing with any space engineering are invited. Contact (062) 73 3633.

Papers are being called for **Forum '88**, organized by the Honeywell Bull Users' Association. It will be held at the Sydney Hilton Hotel from July 21 to 23. Contact (02) 218 9578.

**Comdex Australia '88** will be held at the Darling Harbour Conference and Exhibition Centre in Sydney from July 26 to 28. Contact (02) 959 5555.

**Infotex '88** is a computer and communications show especially for government. It will be held from November 8 to 10 at the National Exhibition Centre, Canberra. Contact (02) 959 5555.

**CLUES**, the C Language Users and Enthusiasts Society, is now holding regular meetings at Microsoft, 1/17 Rodborough Road, Frenchs Forest on the first Tuesday of every month.

**Special Interest Groups for PC Users.**: CONSIG meets on the first Wednesday of each month in Sydney; contact (02) 290 2655. The DTP Graphics SIG meets on the first Tuesday of the month in Sydney; contact Mark Richards on (02) 929 5855. PCWEST meets on the first Monday of the month in Sydney; phone Bill McEwen (02) 627 2488.

**Overseas Exhibitions**

**The EDP Auditors Foundation Conference** is to be held in Atlanta, Georgia USA from 10 to 15 April. Write to The Program Chairman, The EDP Auditors Foundation, Box 88180, Carol Stream, IL 60188-0180 or telephone (312) 653 0950.

**The Hong Kong Computer Expo '88** will be held from April 12 to 15 at the Hong Kong Exhibition Centre. Incorporates Cadcam '88. Contact Richard May from ATEK on (062) 91 7801. □

**The Enterprising Network Event '88** International conference is to be conducted from June 5 to 9, with the exposition running from June 6 to 8. Both events will be held at the Baltimore Maryland Convention Centre USA. The conference will be focusing on an OSI communications solution for anything from automation protocol through to banking, education and federal and state government sectors.

# THE PROPHET

## Registry News

Well, we now have a data file for those people who want to format their own lists. One of the Prophet Users has already given me a 'first cut' copy of a Dataflex system that will allow people with the Dataflex database program to load in the file each month and then search by whatever they want — neat!

We are also looking at creating dialing directories for Telex and Qmodem with each release, still only in the planning stages but we will get there eventually. People who develop terminal programs (lets see .. Supercom and whoever) should provide us with a freebie program and the specifications of their dialing directory so we can build a file for their users (bet this falls on deaf ears!).

*Any requests for hard copy listings will be filed in my paper bin for the cleaner to process.*

It seems that some of the people who make use of the Registry have a conceptual problem. In the last few months the number of requests for us to send printed lists from the Registry has increased to the stage where it is a real pain. Especially when all you get is a self addressed envelope (generally twenty sizes too small).

The lists are available all around Australia (see the list of State Co-ordinators who have it hot from the Registry computer each month) for downloading. I can not see the need for the Registry to provide a printing service, starting this month at the end of the column I will always list the primary Registry points, if you have no listing at all you can get onto the State Registry and get the current file from there. No modem (why do you want the list?)? Then turn to the Services page (near the back of the magazine) and order a back copy for the last list printed in the magazine. Any requests for hard copy listings will be filed in my paper bin for the cleaner to process.

It is always interesting to hear the complaints that are thrown at the Registry. A good one recently was when the Sysop of a board started raving about how he had his system running for months and months and another board that was set up

much later was listed, and his wasn't! 'What sort of Registry are you running?!!' was the cry from the obviously wronged Sysop. Well, it just so happens that the other (later) operator had bothered to register his board and supply all the information we needed to put him in the list. At this point I could be glib and say that the Registry has some bright people but we haven't worked out how to do ESP yet.

Each Sysop has an obligation to ensure his or her details are correct — the Registry is just that: a place where you supply the information so that a list (or register) can be produced. Enough of my waffle, the list of Co-ordinators, the date of the last full publication of the Registry and this months news follows

## Primary electronic collection points

The last full listing was given in the October 1987 issue; refer to the Services page on how to obtain Back issues.

ACT — PC Exchange RIBM  
(062) 58 1406

NSW — Prophet TBBS  
(02) 628 5222

Vic. — The National  
(03) 25-6904

Qld. — AMPAK RCP/M  
(07) 263-7070

SA — The Electronic Oracle  
(08) 260-6222

WA — Nemo Multiple BBS RAPL  
(09) 370-1855

```

Type: New System / Change
System Name: _____
Board Telephone number: (____) _____
Online Sysop Name: _____
Machine: _____
Operating System: _____
BBS Software: _____
Hours of operation: 24hours / _____
Modem Type: _____ [V21/23 etc]
User Access: Member/Registered User/Public/Visitor/Limited Visitor
              [Delete as required]
Other _____
Online Info _____
Fido Address: [____/____]

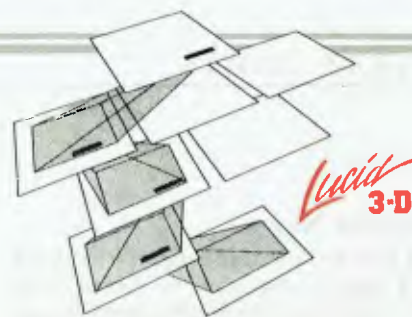
Confidential Information

Sysop Name: _____
Telephone BH: (____) _____ AH: (____) _____
Address: _____
Postcode: _____
Your Computer Subscription Required: YES / NO [Delete as applicable]
Please report changes or new listings to:
Australian PAMS Co-ordinator PO Box E41, Emerton NSW 2770
Electronic: Prophet TBBS (02) 628-5222 V21.V22.V22bis.V23
FidoNet [713/606]

```

Everyone says "It's the best there is."

# Any cell can contain a complete other spreadsheet that you can access with a single key.



Don't take our word for it. Use Lucid 3-D for 60 days. Return it for a full refund if not completely satisfied. Plus, instead of the \$299 list price, an introductory spread-the-word price of \$199

"The Best idea I've seen for a spreadsheet in years"

Jim Seymour, Columnist, PC Magazine, PC Week

Lucid is as simple as the pictures show. And you don't have to write formulas to do that. All you do is look at the other file, navigating through easy, point and shoot directories. When you come back up (with one key) the link is made automatically for you.

Everything about Lucid works that way. Users say "It is so intuitive that I really don't need a manual." That's because we use something we call a visual command menu. Jim Seymour, the noted PC columnist, talking about Lucid in a recent article said, "If there ever was an interface idea so good it ought to be stolen and widely used, this is it."

## Memory Resident

You can pop Lucid up instantly while working in your word processor or any other program. You can cut anything on the screen and paste it right into Lucid, or cut anything from a Lucid worksheet and paste into the application below. You can even run Lucid on top of 1-2-3 if you like, and cut and paste information from one to the other, including formulas.

## Notepad Behind Every Cell

Another 3-D feature is that any cell can also contain a multiple page note window that you instantly access with a single keystroke. You can write notes, memos or letters that relate to your work, save them as individual files and even print them separately or with your spreadsheet.

## Other Features

Lucid has over 100 innovations that cause users to say it is the best of all the spreadsheet offerings! Things like: **Speed** - background, minimal and visible recalc. **Macros** - learning macros, autoexecute macros, macros work between spreadsheets, user defined macro menus. **Mouseability** - total Mac-like mouse access, but easy keyboard control as well. **Color or Mono** - 17 user controlled color displays. **Audit** - six displays and printouts. **Windows** - multiple sheets on screen at

same time. Multiple views of the same sheet. Pop-up windows of function formulas, range names, favorite labels, macro names, file-names, even a calculator. All let you select and insert right

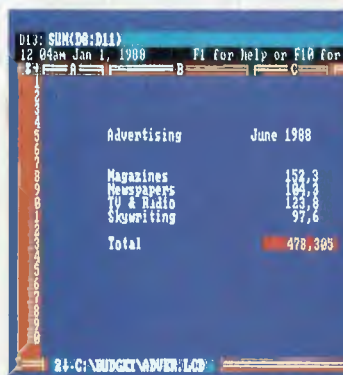


Fig. 2. Here we are instantly. Notice the lower left corner showing we are on level 2. Grey - takes you back. There is no limit to the levels you can go. Move right down to transaction level if you like.

into your spreadsheet. All windows (even notes) resize and move where you want them. **Cut and Copy** - between spreadsheets, documents and between sessions. **Help** - press F1 anywhere, you get help specific to what you are doing.

## Masterwork

Lucid is more than a bag of features. It is a masterwork. The overall feel is tight and polished. In fact, Paul Somerson, executive editor of PC Magazine, used one word to describe it, "Slick".

PCSG has built an excellent reputation as a developmental laboratory. Now those who have worked with Lucid 3-D tell us "you have done it again. This is software everyone should have."

Even if you don't plan to abandon 1-2-3, Lucid makes sense. Files are converted between them with ease so there's not

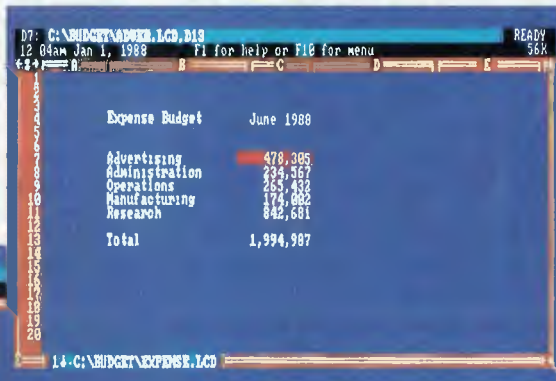


Fig. 1. Let's get the detail on those ad costs, just move the widebar to that cell and press one key (grey +).

Co-Winner of the 1987 PC Magazine Award for Technical Excellence  
The other winner: Microsoft's Excel

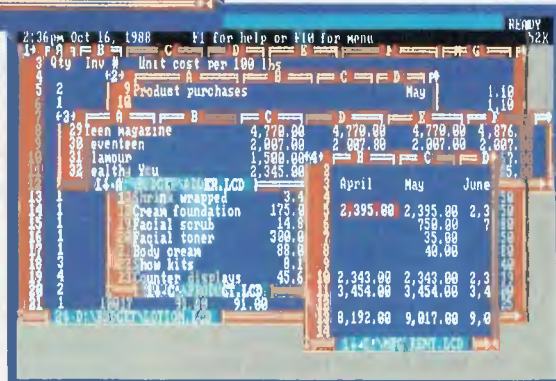


Fig. 3. Of course, Lucid does multiple windows. Notice, you can simultaneously open windows in different directories, different drives, even down as many 3-D levels as you like. No one else can do that.

an interoffice compatibility problem. This means you can have the power and fun of Lucid 3-D, without having to upset your present systems.

Peripheral Systems

Enquiries Welcome.

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Ph: (02) 437 6255 Fax: (02) 439 1773



Exceptional spreadsheet for the IBM PC, PS and Compatibles.



NEW SOUTH WALES

\*\*\* Online \*\*\*  
**Apple Users Group BBS**  
*Sysop:* Matthew Barnes & Andrew Riley  
*Phone:* (02) 498-7084  
*Baud:* V21  
*Access:* Mem VA  
 \*\*\* NEW System \*\*\*  
**Aquarius**  
*Sysop:* Glen Harvy  
*Phone:* (02) 686-2798  
*Baud:* V21 V22 V22bis V23 B103 B212  
*Computer:* Commodore PC10  
*DOS:* MS-DOS  
*BBSSoftware:* Opus  
 \*\*\* Offline \*\*\*  
**Arknet**  
 \*\*\* Name Changed \*\*\*  
**Ausborne (Osborne) RCPM**  
*Info:* Now Called  
**Moebius Trip**  
 \*\*\* NEW System \*\*\*  
**Coastal Opus BBS**  
*Sysop:* Kevin Mann  
*Phone:* (043) 23-2275  
*FIDONet:* 711/430  
*Baud:* V21 V22 V22bis V23  
*Access:* Reg VA  
*Computer:* IBM AT Clone  
*DOS:* MS-DOS  
*BBSSoftware:* Opus  
 \*\*\* Unknown \*\*\*  
**Computer Connection**  
 \*\*\* Offline \*\*\*  
**First Nice MIDILine**  
 \*\*\* Amended \*\*\*  
**Matrix (Maitland) BBS**  
*Sysop:* Andrew Pike  
*Phone:* (049) 38-5057  
*Baud:* V21 V22  
*Access:* Mem Reg LVA  
*Computer:* C-64  
*BBSSoftware:* BBS-64  
 \*\*\* NEW System \*\*\*  
**Matrix (Newcastle) BBS**  
*Sysop:* Andrew Pike  
*Phone:* (049) 29-5279  
*Baud:* V21 V22  
*Access:* Mem Reg LVA  
*Computer:* C-64  
*BBSSoftware:* BBS-64  
 \*\*\* NEW System \*\*\*  
**Milliway's**  
*Sysop:* David Coucke  
*Phone:* (02) 358-6272  
*Baud:* V21 V22  
*Access:* Reg VA  
*Hours:* 2130 — 0730 Daily  
*Computer:* Amiga 1000  
*BBSSoftware:* BBS-PC!  
 \*\*\* Amended \*\*\*  
**Mudgee Connection**  
*Sysop:* George Rhedey  
*Phone:* (063) 72-1898  
*FIDONet:* 711/630  
*Baud:* V21 V22 V22bis V23  
*Access:* Public  
*Hours:* 2100 — 0700  
*Computer:* XT Clone  
*DOS:* PC-DOS  
*BBSSoftware:* Opus  
 \*\*\* NEW System \*\*\*

**Night Shift BBS**  
*Sysop:* Matthew Perkins  
*Phone:* (02) 635-8175  
*Baud:* V21 V22 V23 B103 B212  
*Access:* Public  
*Hours:* 2130 — 0700 Daily  
*Computer:* TRS-80  
*DOS:* OS-9 Level II  
*BBSSoftware:* Hacker/Com  
 \*\*\* Amended \*\*\*  
**Playground BeeBS**  
*Sysop:* Brett Selwood  
*Phone:* (02) 53-9688  
*FIDONet:* 712/504  
*Baud:* V21 V22 V23  
*Access:* Mem Reg LVA  
*Computer:* AT Compatible  
*DOS:* MSDOS  
*BBSSoftware:* Opus  
 \*\*\* NEW System \*\*\*  
**Poet's Dilemma**  
*Sysop:* John Della-Torre  
*Phone:* (02) 804-6412  
*Baud:* V21 V22 V22bis V23  
*Access:* Public  
*Computer:* IBM-PC  
*DOS:* PC-DOS  
*BBSSoftware:* GTPower  
 \*\*\* NEW System \*\*\*  
**Program Paradise**  
*Sysop:* Matthew Wood & Andrew Avery  
*Phone:* (02) 969-5861  
*Baud:* V21 V22 V22bis V23  
*Access:* Reg  
*Hours:* 1900 — 0700 Daily  
*Computer:* XT Clone  
*DOS:* MS-DOS  
*BBSSoftware:* PC Board  
 \*\*\* NEW System \*\*\*  
**Scorpio BBS**  
*Sysop:* Russ Morrison  
*Phone:* (02) 621-7487  
*FIDONet:* 713/604  
*Baud:* V21 V22 V22bis V23  
*Access:* Public  
*Computer:* AT  
*DOS:* MS-DOS  
*BBSSoftware:* Opus  
 \*\*\* NEW System \*\*\*  
**The Library**  
*Sysop:* Chris Ruwoldt  
*Phone:* (049) 62-2931  
*FIDONet:* 711/490  
*Baud:* V21 V22 V22bis V23  
*Access:* Public  
*Computer:* IBM-AT Clone  
*DOS:* MS-DOS  
*BBSSoftware:* Opus  
 \*\*\* NEW System \*\*\*  
**The Lost Tavern**  
*Sysop:* Sean Murphy  
*Phone:* (02) 938-6836  
*Baud:* V21 V22  
 \*\*\* Amended \*\*\*  
**TNT Shuttle**  
*Sysop:* Paul Birch  
*Phone:* (02) 319-3112  
*Baud:* V21 V22 V22bis V23 B103 B212  
*Access:* Reg LVA  
*Computer:* IBM System/2  
*DOS:* OS2 (???)  
*BBSSoftware:* RBBS V151a

QUEENSLAND

\*\*\* NEW System \*\*\*  
**Access North Queensland**  
*Sysop:* Access NQ  
*Phone:* (070) 51-0566  
*Baud:* V21 V22 V23  
*Access:* Reg LVA  
*Computer:* IBM Clone  
*DOS:* MS-DO  
*BBSSoftware:* Videotex-Multi User  
 \*\*\* Online \*\*\*  
**Midnight Express**  
*Sysop:* Lloyd Ernst  
*Phone:* (07) 350-2174  
*Baud:* V21 V22 V23  
*Info:* Userworks Node #8  
 \*\*\* NEW System \*\*\*  
**Missing Link BBS**  
*Sysop:* Mike Barber & Gernot Rosche  
*Phone:* (07) 808-3094  
*Baud:* V21 V22 V23  
*BBSSoftware:* Punter  
*Info:* Userworks Node #3  
 \*\*\* Amended \*\*\*  
**Tommorrowland RMSD**  
*Sysop:* Dave Drummond  
*Phone:* (07) 371-0944  
*Baud:* V21 V22 V23

SOUTH AUSTRALIA

\*\*\* NEW System \*\*\*  
**Adam Link BBS**  
*Sysop:* Greg Hicks  
*Phone:* (08) 270-2713  
*Baud:* V21 V22 V22bis V23  
*Access:* Reg LVA  
*Computer:* Amiga  
 \*\*\* Offline \*\*\*  
**Adelaide Micro User Group BBS**  
 \*\*\* Offline \*\*\*  
**Omen V**  
 \*\*\* Amended \*\*\*  
**The Electronic Oracle TBBS**  
*Sysop:* Don Crago & Grayham Smith  
*Phone:* (08) 260-6222  
*FIDONet:* 680/804  
*Baud:* V21 V22 V22bis V23  
*Access:* Mem LVA  
*Computer:* IBM Clone  
*DOS:* PC-DOS  
*BBSSoftware:* TBBS

TASMANIA

\*\*\* NEW System \*\*\*  
**Hobart Users Bulletin Board**  
*Sysop:* Alan Hughes  
*Phone:* (002) 43-5041  
*FIDONet:* 631/331  
*Baud:* V21 V22 V23  
*Access:* Reg VA  
*Computer:* PC/XT Clone  
*DOS:* PC-DOS  
*BBSSoftware:* Opus

VICTORIA

\*\*\* NEW System \*\*\*  
**Crystal Symphony BBS**  
*Sysop:* Greg Jones  
*Phone:* (03) 874-4176  
*Hours:* 2300 — 0600 Daily  
 \*\*\* Amended \*\*\*

East Suburb Eighty User Group

*Sysop:* Martin Axford  
*Phone:* (03) 819-4246  
*Baud:* V21 V22 V23 V23ORG  
 \*\*\* Name Changed \*\*\*  
**East Suburb User Group**  
*Info:* Now Called  
**East Suburb Eighty User Group**  
 \*\*\* NEW System \*\*\*  
**Melbourne PIE**  
*Sysop:* Len Gould  
*Phone:* (03) 877-5568  
*Baud:* V21 V22 V22bis V23  
 \*\*\* Amended \*\*\*  
**Omegatex Videotex Service**  
*Sysop:* Mark Gregson  
*Phone:* (052) 22-1670  
*Baud:* V23  
*Computer:* IBM AT Clone  
 \*\*\* NEW System \*\*\*  
**Pegasus**  
*Sysop:* Lee Gordon-Brown  
*Phone:* (03) 725-4948  
*FIDONet:* 630/309  
 \*\*\* Amended \*\*\*  
**Sotec BBS**  
*Sysop:* Jim Tzorlinis  
*Phone:* (03) 890-8166  
*Baud:* V22  
*Access:* Reg VA  
*Hours:* Weekdays: 1700 — 0900  
 Weekends: 24 Hours  
*Computer:* IBM-XT  
*BBSSoftware:* Opus  
 \*\*\* Offline \*\*\*  
**The Village Idiot**  
 \*\*\* NEW System \*\*\*  
**Thongheads Welfare BBS**  
*Sysop:* Thongers  
*Phone:* (03) 419-9256  
*Baud:* V21 V22 V22bis  
*Hours:* Weekdays: 1800 — 0900  
 Weekends: 24 Hours  
 \*\*\* NEW System \*\*\*  
**Yarra Valley BBS**  
*Sysop:* Grahame Mitchell  
*Phone:* (03) 736-1814  
*Baud:* V21 V22 V23  
*Access:* Mem VA  
*Hours:* Daily 00:01 — 06:00  
*Computer:* Amstrad  
*BBSSoftware:* Opus

WESTERN AUSTRALIA

\*\*\* NEW System \*\*\*  
**Meeting Place BBS**  
*Sysop:* Martyn Bate  
*Phone:* (09) 310-3998  
*Hours:* 2030 — 0800 Daily  
*Computer:* Amiga 1000

NEW ZEALAND

\*\*\* Amended \*\*\*  
**Southern Express!**  
*Sysop:* Phil Walding  
*Phone:* (024) 877-440  
*Baud:* V21 V22 V23  
*Access:* Reg LVA  
*Computer:* Atari 130 XE  
*DOS:* Sparta Dos  
*BBSSoftware:* BBS Express!  
*Info:* Logon either ASCII or ATASCII

# In modems, you'll find NetComm stacks up better than the rest.

When it comes to ours or theirs, only NetComm has a modem to suit every communications need.



NE5387PC

## NetComm

### Total Solutions for Data Communications

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 Telex: AA27488MODEMS Minerva: 07:DNC002 Viatell: 288855330  
 Vic. 94 River Street South Yarra 3141 Tel: (03) 241 0534  
 Qld. Suite 6 Level 11 AMP Place 10 Eagle Street Brisbane 4000 Tel: (07) 229 7376  
 WA. St Martin's Tower 44 Georges Tce Perth Tel: (09) 220 3407

MODEL	DESCRIPTION	FEATURES	BAUD RATES
CM400	Modem 64/128 <sup>®</sup>	AD, PD, TD, AX, OA, SW, ASY, Commodore <sup>®</sup> Compatible	300 FDX, 1200/75 FDX (CCITT V21, V23)
SM8501	Modem 3+12 <sup>®</sup> NCP	MD, PD, MA, OA, SW, ASY, IBM PC <sup>®</sup> Compatible	300 FDX, 1200/75 FDX, 75/1200 FDX (CCITT V21, V23, Bell 103)
SM8502	Modem 3+12 <sup>®</sup> A	MD, PD, MA, OA, SW, ASY, Apple, II/e/c Compatible	300 FDX, 1200/75 FDX, 75/1200 FDX (CCITT V21, V23, Bell 103)
AM100	AutoModem <sup>®</sup> 21/23	AD, PD, TD, AA, AX, OA, AT, ASY	300 FDX, 1200/75 FDX, 75/1200 FDX (CCITT V21, V23, Bell 103)
AM120	AutoModem <sup>®</sup> 12/12	AD, PD, TD, AA, AX, OA, AT, ASY	1200 FDX (CCITT V22, Bell 103, 212A)
AM140	AutoModem <sup>®</sup> 24/24	AD, PD, TD, AA, AX, OA, AT, ASY	1200 FDX, 2400 FDX, (CCITT V22, V22bis, Bell 103, 212A)
AM160	AutoModem <sup>®</sup> 123	AD, PD, TD, AA, AX, OA, AT, ASY	300 FDX, 1200/75 FDX, 75/1200 FDX, 1200 FDX (CCITT V21, V23, V22, Bell 103, 212A)
AM180	AutoModem <sup>®</sup> 1234	AD, PD, TD, AA, AX, OA, AT, ASY	300 FDX, 1200/75 FDX, 75/1200 FDX, 1200 FDX, 2400 FDX (CCITT V21, V23, V22, V22bis, Bell 103, 212A)
SM8911	SmartModem <sup>®</sup> 21/23SA	AD, PD, TD, AR, AA, AX, OA, AT, ASY, SY, SW	300 FDX, 1200/75 FDX, 75/1200 FDX, 1200 HDX (CCITT V21, V23, Bell 103)
SM8721	SmartModem <sup>®</sup> 1200SA	AD, PD, TD, AR, AA, AX, OA, AT, ASY, SY, SW	1200 FDX, (CCITT V22, Bell 103, 212A)
SM8821	SmartModem <sup>®</sup> 2400SA	AD, PD, TD, AR, AA, AX, OA, AT, ASY, SY, SW	1200 FDX, 2400 FDX (CCITT V22, V22bis, Bell 103, 212A)
SM8421	SmartModem <sup>®</sup> 1235A	AD, PD, TD, AR, AA, AX, OA, AT, ASY, SY, SW	300 FDX, 1200/75 FDX, 75/1200 FDX, 1200 HDX, 1200 FDX (CCITT V21, V23, V22, Bell 103, 212A)
SM8471	SmartModem <sup>®</sup> 1234SA	AD, PD, TD, AR, AA, AX, OA, AT, ASY, SY, SW	300 FDX, 1200/75 FDX, 75/1200 FDX, 1200 HDX, 1200 FDX, 2400 FDX (CCITT V21, V23, V22, V22bis, Bell 103, 212A)
DL842	DataLock <sup>®</sup> 1235A	AD, PD, TD, AR, AA, AX, OA, AT, SW, EP, DE, PW, ASY, SY	300 FDX, 1200/75 FDX, 75/1200 FDX, 1200 HDX, 1200 FDX (CCITT V21, V23, V22, Bell 103, 212A)
DL847	DataLock <sup>®</sup> 1234SA	AD, PD, TD, AR, AA, AX, OA, AT, SW, EP, DE, PW, ASY, SY	300 FDX, 1200/75 FDX, 75/1200 FDX, 1200 HDX, 1200 FDX, 2400 FDX (CCITT V21, V23, V22, V22bis, Bell 103, 212A)
IN600	PC In/Modem <sup>®</sup>	AD, PD, TD, AR, AA, AX, OA, AT, SW, ASY, FI (Half Cord Size)	300 FDX, 1200/75 FDX, 75/1200 FDX, CCITT V21, V23, Bell 103
IN610	1200 In/Modem <sup>®</sup>	AD, PD, TD, AR, AA, AX, OA, AT, SW, ASY, FI (1/4 Cord Size)	1200 FDX (CCITT V22, Bell 103, 212A)
IN615	2400 In/Modem <sup>®</sup>	AD, PD, TD, AR, AA, AX, OA, AT, SW, ASY, FI (1/4 Cord Size)	1200 FDX, 2400 FDX (CCITT V22, V22bis, Bell 103, 212A)
IN620	123 In/Modem <sup>®</sup>	AD, PD, TD, AR, AA, AX, OA, AT, SW, ASY, FI (1/4 Cord Size)	300 FDX, 1200/75 FDX, 75/1200 FDX, 1200 FDX (CCITT V21, V23, V22, Bell 103, 212A)
IN625	1234 In/Modem <sup>®</sup>	AD, PD, TD, AR, AA, AX, OA, AT, SW, ASY, FI (1/4 Cord Size)	300 FDX, 1200/75 FDX, 75/1200 FDX, 1200 FDX, 2400 FDX (CCITT V21, V23, V22, V22bis, Bell 103, 212A)
TR100	TrailBlazer <sup>®</sup>	18,000 bps High Speed Modem, AD, PD, TD, AR, AA, AX, OA, AT, EP, ASY	300 FDX, 1200 FDX, 2400 FDX, 18,000 Adaptive Duplex (CCITT V22, V22bis, Bell 103, 212A)
TR200	TrailBlazer PC <sup>®</sup>	18,000 bps High Speed Modem, AD, PD, TD, AR, AA, AX, OA, AT, EP, ASY, SW, FI	300 FDX, 1200 FDX, 2400 FDX, 18,000 Adaptive Duplex (CCITT V22, V22bis, Bell 103, 212A)
SM2000	SmartModem <sup>®</sup> 964BFT	AD, PD, AA, AX, SY	2400, 4800, 7200, 9600 HDX 2-Wire and FDX 4-Wire (CCITT V27, V29)
SM2010	SmartModem <sup>®</sup> 964BDP	AD, PD, AA, AX, SY	2400, 4800, 7200, 9600 HDX 2-Wire and FDX 4-Wire (CCITT V27, V29)
SM2020	SmartModem <sup>®</sup> 964BHD	AD, PD, AA, AX, SY	2400, 4800, 7200, 9600 HDX 2-Wire Only (CCITT V27, V29)

#### LEGEND:

AD - Auto Dial	FDX - Full Duplex	DE - Data Encryption
MD - Manual Dial	HDX - Half Duplex	PW - Password/Dial-Back
PD - Pulse Dial	AX - Auto Disconnect	SY - Synchronous
TD - Tone Dial	OA - Originate & Answer	ASY - Asynchronous
AR - Auto Ranging	AT - "AT" Command Set	FI - Fully internal for IBM PC and compatibles
AA - Auto Answer	SW - Software Included	
MA - Manual Answer	EP - Error Protection	

# YOUR C64

## Getting into Assembler

I'm always surprised by the number of incompetent Basic programmers who haven't taken the extra step to venture into Assembler or Machine language. People seem to forget that that's what it is — a language, and once you have learnt one computer language (even Basic) it's not that difficult to learn another. The conceptual logic pretty well remains the same no matter which language you are using.

The thing about machine code is the sense of power it gives you. You can do things with it that simply cannot be done in any other way, and everything is blisteringly *fast*. I was hooked from the moment I wrote a few bytes of code that could fill the screen in an instant (even if only with the letter A). If you are interested in graphics or sound, or want to access some of the hidden memory inside your computer, you'll find the time and energy spent on learning Machine language extremely rewarding. You'll also find that there is now a great deal of very helpful information about. You no longer have to learn it through painstaking trial and error.

## Getting started

The most important tool for the beginner is a monitor. This is a special program which enables you to read and alter the memory inside your computer. Most monitors have what is called a one-line assembler/disassembler. This is the means by which you can enter your code. Strictly speaking, machine code is pure numbers and numbers are a little hard for humans to relate to. The assembler/disassembler interprets the numbers into op-codes; mnemonics that are easier to remember. Most of these suggest what they mean. For example: LDA means Load Accumulator, STA means Store in the Accumulator and so on. You will also find the monitor extremely useful when you are debugging your programs.

If you have a C128 you are lucky as your computer already has an inbuilt monitor and a reset switch. The reset switch is useful because it is very easy for bugs in your code to lock up the computer. Without it, you would be forced to turn off the computer. The C64 doesn't have a reset switch, but it's not difficult to have one fitted, usually for about \$20. The C64 doesn't have a monitor either, but it is essential that you get one. You can get monitors in cartridge form, or ones that come on disk.



There are several Public Domain ones around, and one of them would be the cheapest way to start.

With a monitor you will be able to write and debug short Machine language programs and save them to disk or tape, but as you become more adept you will encounter certain limitations. In Basic you can label variables. You don't have to worry about where the computer stores them — simply refer to the label and Basic takes care of locating it. With Machine language it's different. You have to specify a specific memory location for every variable used by your code. The problems arise when you want to change this location. You have to hunt through your code to find every reference to that variable and change it. This can be fiddly

and time consuming; what you really need is some kind of search and replace function like on a word processor, but monitors don't lend themselves to this. A more sophisticated tool is needed. That's where assemblers come in.

You don't really need one to begin with, but as your programs become longer you will find life so much easier. They allow you to write your code in a symbolic form. You can give names to subroutines, label variables, and annotate your code (like Basic's REM statement helps you remember what that bit does). Assemblers also make it very easy to edit, mix and match and to recombine various routines.

Assemblers free you from memory specific locations. You can edit or modify any routine without having to adjust other

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parts of your program that call it or subsequent routines. When the assembler is run it converts all labels into absolute addresses and produces object code which is true Machine language. This additional step of assembling usually has checks for everything except logic errors. One great advantage of this freedom from memory location dependence is that it makes it much easier to port a program from one CBM machine to another, for example,

My favourite assembler is Pal, but it's quite expensive and doesn't have an Australian distributor. My copy came direct from Canada, courtesy of Mastercard and the telephone. Another good assembler is Lads. This was developed by *Compute Magazine* and most clubs will have a copy — as far as I know it's Public Domain. The assembler to avoid is the Commodore one. While it, too, is Public Domain, it's more trouble than it is worth. You write your code on an editor, save it. Load the assembler, run it, and then reset the computer and load the object code produced. That's just in order to test it. A simple mistake and you have to re-load the editor and so on. Both Pal and Lads allow you to assemble and test your code while the assembler and source code are still in memory. This makes modifications very quick and easy to perform.

**Reading material**

One of the painful realities of the computer world is that just about any book on computers costs at least \$30. To make matters worse, there is a good deal of inconsistency in quality, as well. Be wary of books that have overly large appendices containing standard information available from the user's manual. Also be wary of books that expect you to type in a very long assembler program if you are to be able to follow their examples. There is nothing worse than learning to use an 'orphan' assembler, only to find that all of the examples you read in magazines are written in a different format.

I've always found the *Compute* series of books to be exceptional value. *Compute* is one of the older and better established US computer magazines, and it seems to have a pool of writers who not only understand computers, but can also write! *Compute* and *Compute's Gazette* are quite expensive in Australia, costing anything up to \$10 an issue, but the books are a good buy. *128 Machine Code for Beginners* is a book I would recommend to both C64 and C128 Machine language aspirants. The C128 uses a different processor to the C64, but

the opcodes are identical. Also, Commodore has preserved the 'jump table' to the kernal routines, so code that uses those routines will work equally well on the 64 as the 128. (The 128 jump table is slightly larger as it has some additional routines, but these are noted in the book.)

*Machine Code for Beginners* contains a very gentle introduction to the world of hexadecimal and the various opcodes and what you would use them for. It also has a section showing the Machine language equivalent of various Basic statements — a nice touch which also serves to illustrate that the fundamentals of both languages are very similar. It also contains a section at the back with a library of short subroutines to perform common mathematical tasks, including one that multiplies by 10. The book does have a complete listing of a 128 version of the Lads assembler which you can type in if you are so inclined, but you'd save yourself a lot of effort if you found a copy in a club.

The only real weakness in the book is that it doesn't contain a great deal about the memory configurations of the 128. If you have a C64, I recommend that you consider the purchase of another *Compute* book called *Mapping the 64* by Sheldon Leeman. It has become the standard reference for that computer and has full details of the functions and mechanics of just about every feature. A similar *Compute* book is available for the 128 called *Mapping the 128*. I haven't had a chance to have a good look at it, but if it matches the 64 version it should be excellent value.

**Join a club**

Finally, if you are not in a club or user group, it is well worth your while finding one to join. They usually cost about \$25 per year for membership, but you will find that most of them have large Public Domain libraries with a choice of probably several monitors and assemblers. You will also find that other club members can help you with advice and hints. If there is no club in your area you might like to consider using a modem to access one of the bulletin boards about. Again you will find a wide variety of Public Domain software, and people who can give you immediate advice.

The only real way to learn Machine language is to do it. If you always remember that Machine language works best at short repetitive tasks and that you easily combine it with Basic programs by means of a SYS statement, you will have no difficulty exploiting the best of both languages.

# YOUR MAC



## The New Dimension

If you are number two in the marketing stakes and seem destined to always trail the leader, it becomes rather hard to keep the punters interested.

In the computer world, the big punters are the software publishing houses who need to invest a lot of time and money in creating programs. And if they create them for a computer that doesn't sell all that well, they have big problems. If you're interested in 'primacy of causes' this is probably the major reason for the reduction in the number of PC standards.

Microsoft, Lotus, Ashton-Tate and all the other major software publishers have thrown most of their weight behind IBM and MS-DOS. The Apple Macintosh tends only to get whatever time they have to spare. Naturally their interest in programs

for any machine will be defined by the anticipated profits — and here MS-DOS is a clear winner.

This IBM advantage tends to upset Apple more than a little, and so over the years it's retaliated by dabbling in software itself. Apple is, after all, a hardware company — yet it's published some enormously successful software also.

But the world keeps changing — and marketing realities change faster than most. The larger software publishers now have at least an equal economic clout to the hardware makers, so Apple can no longer afford to raise the ire of the majors by challenging them on their own software turf. Apple needs the Microsofts and Ashton-Tates to survive.

It's for this reason that Apple has laughingly labelled Hypercard 'system software' and tried to pretend that it's not an DBMS

application in competition with the other database managers.

And it's for the same reason that Apple have recently sloughed off Claris as an independent software house supposedly quite separate from Apple itself (although it is completely owned by it at the present time). These two ploys are a genuine attempt by the company to have its cake and eat it too.

Claris was hastily put in place to deflect open hostility from the major software developers arising from Apple's purchase of the new database program Fourth Dimension. The program was written in France and has become one of the major sellers in the Macintosh in that country.

Apple saw the program as a major step in its development of a LANs market, and so it purchased the program and spent a lot of time and money in upgrading it at

Cupertino. Just as Apple were about to release it on the world market Microsoft, Ashton-Tate and a few others, descended from a great height with threats to withdraw completely from the Macintosh system if Apple directly involved itself as a software competitor.

Claris was the result — a PR inspired attempt to proclaim 'Apple is out of software'. As it happens, Claris didn't get Fourth Dimension, it was re-sold to a subsidiary of its French originators and two of the key software staff at Apple (Guy Kawasaki and Scott Knaster) left to head up the US company Acius which is the distributor and main promoter. But Apple has a hand in distributing and supporting it outside the US, and by coincidence Acius' office is right next door to Apple's Sales office in Cupertino!

At the moment, however, there seems to be enough fact behind the fiction that Fourth Dimension is independent of Apple to satisfy the major software developers. They are publicly quiet for the time, at least.

But the fact that Ashton-Tate, Lotus and Microsoft reacted so strongly against Apple's promotion of Fourth Dimension is a pretty good indication that its worth having a look at the program seriously. I was over-hasty in my comments about it a couple of months ago.

## Fourth Dimension

When you've got a widely used language like dBase, which is accepted both by the business community and the custom application writers, a new database program has to have very substantial advantages to supercede the old standard. Apple is obviously betting that it will — and feel that these bets are worth the risk.

For the past couple of weeks I have been struggling with Fourth Dimension, trying to learn its procedural language and find its limits. So here are some early impressions.

If you like statistics, Fourth Dimension can handle up to 16 million records in a database. It can hold 511 fields per file and one record (or the whole database) can occupy 4 gigabytes. You can link up to 99 fields together within a database and there can be an unlimited number of links between them.

What makes Fourth Dimension really interesting is that it bridges a number of gaps into large systems and large networks. At the same time it can be used by the small lone user. In this, it is like dBase; you can set it up and use it without any programming. At this level it is ade-

quate for a small business, however as your business develops you can have suites of procedures written to automate even a very large organisation.

Creating files, fields, links, layouts or reports is almost intuitive. The structure is first mapped out, then the fields and layouts are defined. The structure is virtually unlimited, and you can modify most fields and relations without losing data. In difficult cases, there is a utility to reorganise links and to transfer data via a procedure, but it is only necessary if fundamental changes are made to the links.

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*If you like statistics,  
Fourth Dimension can  
handle up to 16 million  
records in a database.*

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The Fourth Dimension package already on release is both a single user and a multi user version — and for software developers there's a run-time package on the way. This will allow the end user to enter and delete data but not change the structure of the database. The standard version of Fourth Dimension allows multi-users, and the provision of a run-time version keeps the cost down on a LAN.

For LANs all you need is a file-server that is fully compatible with Apple's HFS hierarchical file system, then multiple users can access multiple files. If one person is modifying a record, others on the network can only read it; there are complex password hierarchies to control access to different levels of user.

There is also provision within Fourth Dimension to allow access through the Mac to CD-ROM, mainframes or a SQL database on a DEC Vax.

The program can also make use of routines written in other languages like C, Pascal and Assembler, so there are almost no limits to what can be done. Fourth Dimension is actually a complete development system with which you can create applications almost indistinguishable from those you would normally need to write in a professional programming language.

There are substantial file import/export and communications capabilities with access to these external procedures. You can import and export SYLK, DIF, PICT and ASCII text, and make use of colour, the

maths co-processing and the external monitor capabilities of the Mac II. C or Pascal code is imported by a tool much like Font/DA mover.

## Procedural language

The procedural language is richer and easier to use than any we've seen before for the Mac or MS-DOS; and it's much quicker to learn at a working level than Helix, dBase LAN or Omnis 3+. Programming can be done either in text or flow chart form. A single button click opens a procedure which lets you to write programs as flow charts.

The procedural language has over 200 commands which make it appear complex — but it is fairly straightforward and with the best programming tools yet. You can do things like type into a window which automatically puts reserved words in boldface and indents your IF-THEN loops. Your custom applications can have menu bars with pull-downs, scroll-bars, dialog boxes and so on. Anything you create can be used by single or multiple users.

There are three modes: design (to create an application), custom (virtually equivalent to the run-time version) and user (which also tests procedures). The program provides multiple windows to allow you to swap between environments quickly, and as you program, the editor's window shows all possible algebraic operators, field names, functions and procedures usable in the program.

Through the editing window you can set breakpoints and trace the execution of a trial program. You can watch the step by step interpretation if you like.

Fourth Dimension fully utilises the Mac's toolbox, giving total control over menus, dialog boxes and other resources. Plus there's a MacDraw-like editor that lets you layout any kind of display you wish and integrate it with MacPaint, PostScript and PICT files.

It also supports the large-size Mac screens and can hold display up to 4 metres square for architectural plans and so on.

If this all sounds a bit much — it probably is! As I said at the beginning, this is still early days with the program, and I could learn to hate it — but after a few weeks the euphoria is still there. It is certainly slow on anything below the Mac SE, and it should really be run on a Mac II — but Apple say that the new version will be sped up considerably.

This is really a program to watch. You'll be hearing a lot more about Fourth Dimension. □

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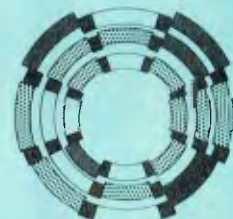
**PROBLEM THREE: POWER.** Static electricity, turning power on-and-off, brownouts, surges, spikes and static electricity all can cause the heads to write meaningless "garbage" into whatever tracks they happen to be located over. Although hard disks and computers are designed to minimize accidental head writes, they still occur and cause devastating damage — often wiping out an entire disk. Disk Technician takes a new approach to cure these problems.

When Disk Technician is run, it automatically installs SafePark™ memory resident software program and creates a "safe zone" on your hard disk, safely relocating any data in this area. Then, whenever you boot from your hard disk, SafePark becomes memory resident and operates with all of your programs all of the time. When there is no disk activity for approximately 7 seconds (user adjustable), SafePark automatically moves the heads to the safe zone. Once the heads have been moved — which will almost always be the case — and there is static electricity or a power glitch, any damage will be confined to the safe zone: protecting your valuable data and programs.

**WHY SUFFER AND TORTURE YOURSELF WITH HARD DISK GRIEF?** Disk Technician virtually eliminates all your problems! It is so easy to use — absolutely no technical skill is needed — and takes less than 60 seconds of operator time daily. **BUY NOW! HEAD-OFF HARD DISK DISASTERS BEFORE THEY COST YOU TIME AND MONEY!**

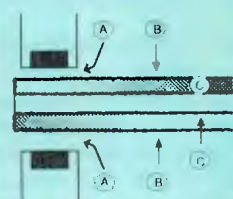


**Figure 1\*** Perfectly aligned tracks. The black areas are "read only." These store critical track and sector ID information. The white areas are data sectors and store your system, programs and data.



□ Good    ■ Bad  
▨ Marginal    ■ Clash!

**Figure 2\*** Sectors out of alignment with the track. The most frequent cause of lost or unreadable data. See Problem One.



**Figure 3\*** Heads, media and platter. A: The distance from the heads to the media continually changes. B: The magnetic coating varies in thickness and smoothness. C: Magnetic retentivity varies and decays. See Problem Two.

\*Magnified and simplified for clarity.



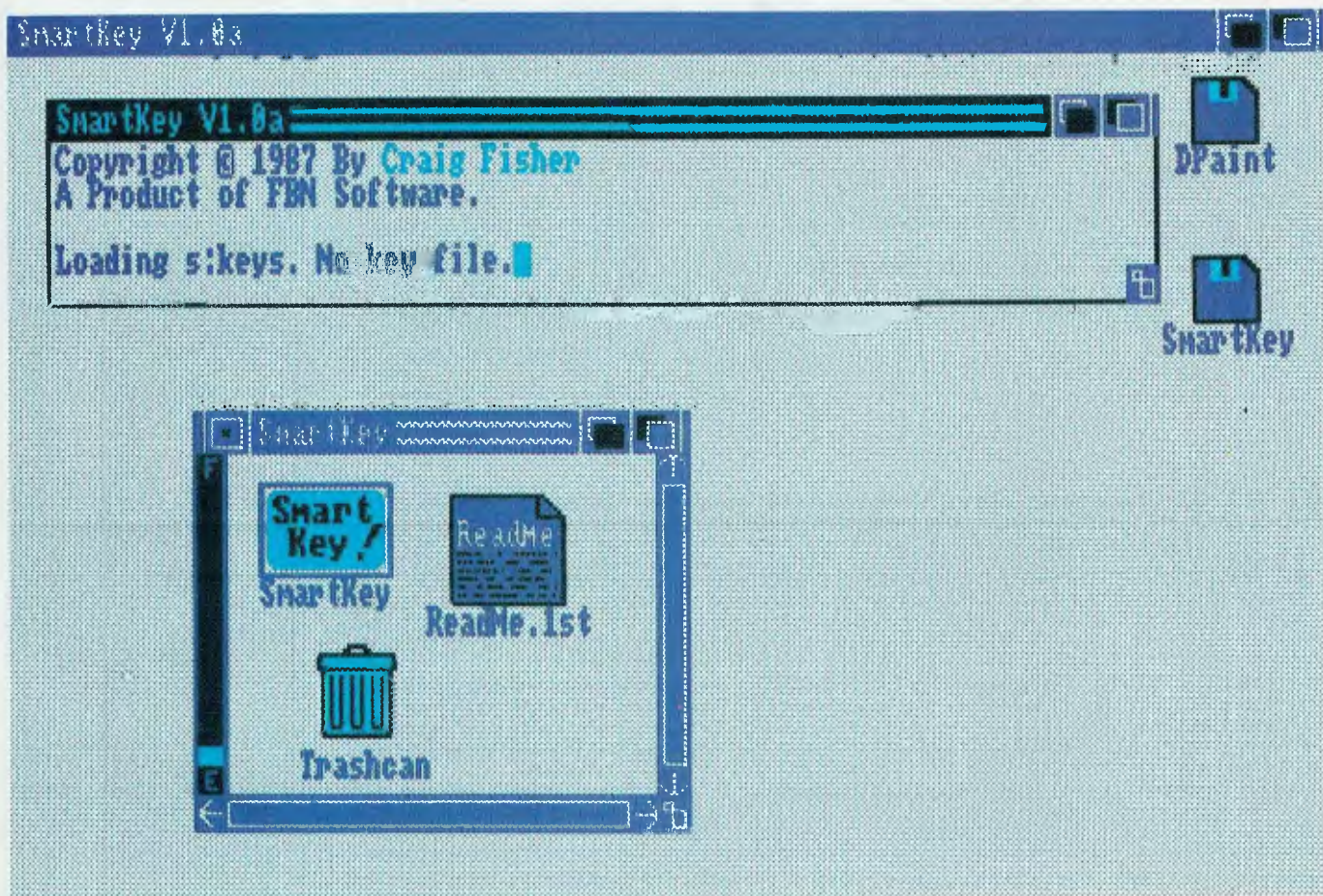
#### TECHNICAL SPECIFICATIONS

- Works on a single system of any IBM PC, XT, AT, derivative, COMPAQ or true IBM clone.
- Works on both physical C and D hard disk drives up to 32 megabytes and A and B floppy drives that conform to the IBM standard. On drives larger than 32 megabytes, it will work on the first DOS partition only. Disk Technician 2.0 will work on drives greater than 32 megabytes and on multiple DOS partitions provided the drive is partitioned using the IBM-DOS 3.3 standard.
- Can selectively test and repair any and all cylinders, heads and sectors in the DOS partition.
- Requires PC or MD-DOS version 2.1 to 3.3 with 256K of RAM.
- Requires a single 5 1/4" floppy drive.

# DISCWARE

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# YOUR AMIGA



It's been a fun filled month for me at my day job (as opposed to my night job which involves writing about Amigas). In my capacity as a senior training officer for a Commonwealth government department, which will remain unidentified other than to say it possesses a very large Information Technology division, I have been producing a comprehensive training package for our new programmers.

To produce our course booklets we have traditionally used either the normal office Wang wordprocessing facilities, or the Document Creation Facility (DCF) on the Department's mainframe. Neither was really up to the job I had in mind, which was the production of 'scan and zoom' type workbooks, heavily endowed with diagrams and digitised images. After much battling I finally managed to convince the management that we had a genuine need for good desktop publishing (DTP) facilities.

We were already in possession of an

IBM PS/2 Model 50 micro, served by an Epson EX-1000 dot matrix printer. What we needed was the capability to capture and output very high quality text and image material. We evaluated a few DTP packages and finally settled on Aldus PageMaker, which is powerful, flexible and very easy to learn and use. After more evaluation we selected a Oume ScripTen, PostScript compatible laser printer. This solved our text problems but still left us lacking in the image area.

Those of you who have read this column before will be amazed that I've gone three paragraphs with only a single mention of Amiga! Well, stand by, it's coming up. We already have a poor overworked Amiga 1000, connected to a Tektronix 4696 colour ink jet printer, which is the Training Branch's workhorse for production of graphics and video material. The very positive reaction to the Amiga 1000 supported an order for two Amiga 2000s, each with 3 megabytes of RAM, a 20 Mbyte hard

disk, and a Bridgeboard for IBM compatibility.

This is where the problems started. We've been waiting weeks now for delivery of the Amiga 2000s and still there's none in sight. It seems that Commodore has been stuck with a bad batch of Bridgeboards and have no backups available. I've been told that their 'technicians are investigating the problem', but that's hardly a satisfactory response from a company which is trying to establish credibility as a supplier of business machines. I'll follow up this saga in a future column.

## Public Domain

Judging from the response to my announcement, in the January 1988 issue, of my 'Faulk's Fast Utilities' disk, there are a lot of Amiga owners out there without access to Public Domain material. This is a real pity as there is a huge amount of quality software in the form of games, utilities, images, and productivity pro-

grams available for the Amiga in the Public Domain. These are programs which have been written by Amiga enthusiasts and released to be used freely by all and sundry. Public Domain material is generally good quality and often superior to comparable software which *costs*.

We Australians are still stuck in the middle of a 'chicken and egg' situation where new software products are concerned. There seems an inordinate delay between the release of a product in the US or Europe and its release here; and when it is finally released here the price is frequently astronomical.

This situation stimulates pirating of material from overseas sources. The Australian agents then decide that it is not worth their while to import a product which has circulated on the 'software underground', and the end result is that Australians miss out on the opportunity to obtain the latest goodies. Otherwise the agents and retailers boost the price, justifying the boost with the claim that they have to protect themselves against rampant pirating.

There are two obvious solutions to this dilemma. The first is to release new software in Australia simultaneously with its release overseas. In these days of high speed international transport I can't see why this should not be possible. Secondly, the distributor's and retailer's margins must be rationalised in order to keep the cost down to a reasonable level. No one can deny the need for a premium attached to the cost of software requiring extensive distributor support, but generally this is not the case with Amiga software.

Interesting to note that Perfect Vision, a video digitiser which captures images in real-time (unlike Digi-View which requires about thirty or sixty seconds to capture an image) was advertised in the December issue of *Amiga World* in the USA. At the time of writing this article in mid January this product, and a similar one called Live, were still unheard of in Australia. Similarly, I still haven't been able to find anyone selling the A/C Basic compiler produced by Absoft . . . very sad.

### That noise . . .

On a happier note, I've managed to solve the continually irritating noise emanating from the fan in my Amiga 1000. It appears that the fan blade assembly is able to slip along its shaft due to a slightly loose hub fitting. After slipping a short distance the blades come into very light contact with the machine casing and produce a distinctly non-musical, arrhythmic, not-so-

pleasant buzzing sound. A quick bit of exploratory surgery and the application of a drop of super glue seems to have brought the irritation to an end . . . sheer bliss!

A hint which may save you some annoyance. Many Amiga owners, and myself included, like to rename frequently used files in the C directory or System directory. For example, renaming the file Disk-copy to DD makes typing in the command DD df0: to df1: a bit easier and quicker. Similarly, other files can be renamed; for example, Disk-doctor becomes DR, Assign becomes AS, and so on. The danger with this

Type, List, Dir, CD, Copy and so on. You can then insert the lines Copy K to RAM: and CD RAM: into the S/Startup-Sequence file of your disk. Each time you boot up on the disk you will then be able immediately to remove the disk and operate from RAM:. Only a small thing, but handy.

Any programs obtained from Public Domain disks, or similar, which are executable object files, can be added to the C directory. The programs can thereafter be executed simply by typing the program name from CLI. I like to add things like the many terrific graphics hacks called Sand,



process is Workbench functions frequently call C or System directory files by name. If you rename the files and Workbench can't find them then you're headed for a Guru.

One answer to this is to have two copies of the files in the directory, one under the original name, and the other under the abbreviated name. The only reasonable alternative is to carefully avoid abbreviating the files used by Workbench.

Another trick which can make life a little easier is to make a reduced version of the C directory and call it K. Into the new K directory you might like to copy such files as

Scat and so on into the C directory. Then I can waste time, usually while I should be writing this column, by playing with the hacks without changing disks.

Sorry about the disorganised lack of structure of this month's column, but it's a very disorganised time. If I ever manage to take delivery of the 2000s, I'll be able to tell you about my adventures getting various software loaded onto the hard disks. In the meantime, if you would like a copy of the Faulk's Fast Utilities disk, send \$10 to Compliteracy, PO Box 74, Weston 2611 ACT. Catch you next month. □



# YOUR ATARI

I have just seen the neatest hardware add-on for a computer ever! The Atari ST does not have any bus slots like an IBM, so hardware addons usually take up the ROM cartridge port, or consist of circuit boards which must be shoehorned into the case, and somehow attached to the main board.

But this neat hardware — the Tech-Soft ROM Clock — is something else gain. The clock consists of a tiny 16-pin IC mounted in a 28-pin holder not much bigger than an ordinary ROM chip. The holder plugs into one of the ROM chip sockets, and the ROM chip piggybacks onto the holder.

In addition to the clock chip, the holder contains a tiny Lithium battery which is claimed to be good for eight years. To prolong the shelf life of the unit, the battery does not begin supplying power to the chip until the first 'read clock' instruction is received.

The whole unit is a miniature masterpiece of design and execution. Price is \$69.99 from Tech-Soft Computer Wholesale in Perth, (09) 385 1885, or write to 37/406 Stirling Highway, Cottesloe 6011 WA.

## PC-Ditto

Tech-Soft is also the distributor of PC-Ditto, the program which allows that Atari ST to think it's an IBM PC. PC-Ditto is a software emulation program — there is no need for any additional hardware. However, the program can be obtained bundled with a 13 cm floppy disk drive, for a total price of around \$600. The drive will operate as a standard 360 kilobyte IBM standard drive under MS-DOS, or as a 720 Kbyte double-sided Atari drive under TOS. On its own, PC-Ditto costs \$199.

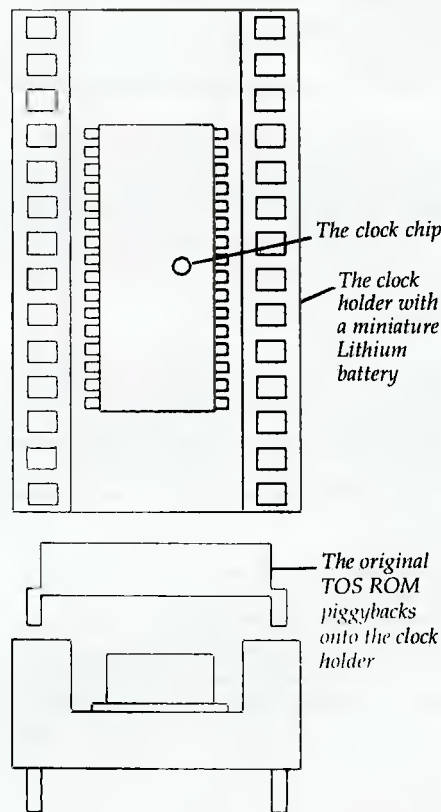
Given the current super cheap prices for STs it is now possible to obtain an IBM compatible with 13 cm and 9 cm disk drives, high resolution monitor and a 'free' Atari 520ST for around \$1600. This really must be the best computer value ever.

PC-Ditto is simplicity itself to operate. Boot up the PC-Ditto disk under TOS and insert your MS-DOS system disk when prompted. From then on it's just like driving a fairly slow IBM. With TOS in ROM, the memory available for MS-DOS applications programs is 364 Kbyte on the 520ST and a full 640 Kbyte on the 1040ST.

A couple of the keys do unusual things, but these are well enough documented. The program also has facilities to custo-

mise the appearance of the screen, and to map the various IBM display characteristics onto the Atari screen.

About the only problem with emulation is the fairly slow speed which can cause some communications programs to play up, and make processor intensive applications such as some graphics or number-crunching programs painfully slow (and most games are out of the question).



**Figure 1.** The Tech-Soft ROM Clock module — a tiny 16-pin IC mounted in a 28-pin holder not much bigger than an ordinary ROM chip.

However, I would expect that the main market for this product will be people who have IBMs or compatibles at the office and wish to bring data home for after hours work. If, as I expect, this type of work is mainly wordprocessing and spreadsheeting, then PC-Ditto will be the ideal choice for these ambitious executives, and for anyone else who needs some low-powered IBM style computing ability.

In this context, it is worth quoting a comment in a recent issue of the WA Atari Club newsletter —

*What a machine the ST is —*

1. runs 16-bit software
2. runs CP/M via an emulator
3. runs IBM via an emulator
4. runs Apple Mac via an emulator and hardware
5. runs Apple II via an emulator
6. runs Commodore 64 via an emulator (may be rumor only)
7. runs Atari 8 bit via an emulator (don't know how well)
8. is IBM text compatible without an emulator.

Thanks to Ron Ireland of WAACC for that. One operating system not mentioned is BOS, the Business Operating System which is virtually unknown here, but has a tremendous amount of support in Europe and parts of the US.

## Cheap software

One of the strange things about the Atari is that 'serious' applications programs are almost ridiculously cheap (in general), while the games have tended to be expensive.

I recently reviewed two games which will be retailed under \$30, and look just as good as their more expensive counterparts.

Ninja Mission is one of those martial arts games where little Asian looking people beat each other to death in front of extraordinarily beautiful scenery. Although the notes on the box state that a joystick is required, it is possible to play Ninja Mission from the keyboard.

The action is fast and furious, the scenery really is beautiful, and the sound track is catchy, if inappropriate considering the way the corpses pile up. If you are as bloodthirsty as my nine year old daughter, this is well worth thirty bucks!

The other cheapie I looked at is Outcast. This one really does require the joystick, which I don't have, so I can only offer a very superficial comment. The program looks like a daylight version of Starglider, though it is not as impressive visually. (Then, very few games are as impressive as Starglider). If the playability is as good as Ninja, this could well be a viable and more economical alternative.

Both games are distributed by I.S.D. of Sydney. Review copies were from Computer Oasis in Perth.

## Complaints department

Now it's gripe time — For too long now the Atari has been badly supported in this country. There were great hopes that with the establishment of Atari Australia this situation would change. However, as I write this a few days before Christmas, it seems that once again Atari has missed the boat.

Its 65 XE/GS home computer and games machine would have wiped the floor with the Commodore 64 home packs, but just did not appear. (In fairness, a 130-XE home pack was marketed through Dick Smith stores).

The new PC-1 would have blown all the clones away, but did not appear. Neither did the Mega ST-2 and ST-4.

The new laser printer did appear, but one retailer I spoke to couldn't get a manual for his own printer, and he certainly wasn't about to sell any without manuals.

I had the sorry experience a week before Christmas of seeing a retailer turn away customers who wanted to purchase a 1040-ST, because Atari couldn't guarantee delivery. The customers were last seen heading for an Amiga dealer.

With the advent of the Megs and PCs, Atari now has one of the widest ranges of computer hardware in the country. Although this column concentrates mainly on the ST machines, try this list for size: the 2600 video game system, three 8-bit home computers, four STs, including the two Mega models and two PCs, with another in the works.

In addition to the computers, Atari market printers (including a laser), disk drives and other peripherals, an enormous range of software, the forthcoming CD-ROM and the amazing new ABAQ transputer, which will run 12 times faster than an IBM AT, with 4 times the resolution.

But all of these tremendous products will convince no one unless Atari can get stock onto its dealers' shelves and really start marketing the products.

End of sermon.

## GEM tricks

Whenever an application under GEM needs to load, save or delete a file, a pop-up window called the Item Selector appears. The appearance of this window is always exactly the same, regardless of the task to be performed, so it is quite possible (in fact, common) for users to delete a file thinking they were loading it.

The Item Selector has a number of features in common with most GEM windows, but these don't necessarily work in

## *The whole unit is a miniature masterpiece of design and execution.*

a consistent manner, and need a bit of explanation. There are three main fields — the directory line, the list of files, and the file selection line.

The directory line will contain the path and filespec of all the files to be listed. This may look something like —

```
A:\*\*.DOC
```

This line may be modified by placing the cursor at the end of the line with the mouse, then backspacing, inserting the new filespec and deleting the old. To select the new filespec, press Return or click on OK. The Item Selector will disappear, but when you call it up again, the new filespec will be in place.

To clarify this, say you are using 1st Word to edit some Basic programs. You want to change the default filespec —

```
*.DOC
```

```
to
```

```
*.BAS.
```

Place the cursor on the directory line, backspace three times to delete the DOC extension, then type in BAS. Press Return, or click on the OK button, and the Item Selector will disappear. However, if you now call up File Open from the menu bar, the Item Selector window will display your .BAS files.

In theory, it should be possible to change the filespec, then click on the title bar of the list window. However, I have found that this causes the filespec to change to

```
*.*
```

What you can do, however, is to click on either of the arrows at the ends of the scroll bar. The filespec will then change instantaneously, without the Item Selector disappearing.

It is possible to make the whole filespec disappear by placing the cursor on the di-

rectory line and pressing Escape. You can then type in a whole new path and filespec.

Similarly with the selection line. If there is already a file named on that line (for example, from the last operation you performed) delete it by pressing Escape.

Making a selection is performed by typing the name of the desired file on the selection line, or by clicking once on the file name in the list window. The file name is then echoed on the selection line, and the actual selection takes place by pressing Return or clicking on OK. Alternatively, you can just double-click on the appropriate filename in the list window.

If there are more files than will fit in the list window, you can scroll through the list by using the scroll bars as in an ordinary GEM window. However, the arrows at the top and bottom of the scroll bar are auto-repeating. By clicking on an arrow and holding the mouse button down, the whole list will scroll through the window. As far as I know, this is the only GEM window with this facility.

The close box on the title bar has a specific function in the Item Selector — it allows you to change directories up the tree with a single mouse click. For example, if your current filespec was —

```
A:\PROGS\*\*.BAS
```

— clicking on the close button would change directories —

```
A:\*\*.BAS.
```

This only works when going up the tree towards the root directory. (Remember, binary trees have their roots at the top). To go down the tree, just click on the appropriate folder name in the list window. To go from

```
A:\*\*.BAS
```

```
to
```

```
A:\PROGS\*\*.BAS,
```

just click on the PROGS folder.

If it all seems confusing, don't worry — it is. However, like most things on the Atari, all is revealed with a few minutes experimenting.

Next month I hope to do some experimenting with polymarkers. No, they're not felt tipped pens, but could be just as useful in your graphics programs! □



# YOUR AMSTRAD



Dr Ronald Yorston, an Amstrad owner in the UK, has released a new screen editor he has written into the Public Domain — but with one condition. Those copying it are asked to donate \$25 to the charity War on Want. In addition, Dr Yorston has banned the military from using his program, which is a full-screen editor for the PCW. It implements many of the features found in the Unix based VI editor, including global search and replace functions, and a 'repeat last editing command' feature.

## Fascinating fractals

Some of the astounding computer graphics used in recent science fiction movies were generated by a US company called Fractals Incorporated. The name comes from 'fractal geometry', which is a concept introduced by Benoit Mandelbrot to describe hierarchies with the property that the successive levels are geometrically similar. That is, if you had a fractal 'cross' shape, and you examined it under a microscope, you'd see each of the edges was made up of small cross shapes, and each of these was made from still smaller crosses and so on, theoretically to infinity.

Many of nature's shapes, like coastlines, manifest the same level of irregularity over a smaller and smaller area as you come closer to them. This is true of coastlines, blood vessels, and even the hier-

archies of clusters and superclusters of galaxies. Mandelbrot said that Euclidean geometry was inappropriate for the description of these shapes.

---

*I would, of course, be pleased to hear from any Australian suppliers of Amstrad software, no matter which machine it is for, so I can publicise the addresses.*

---

You can see fractal-like patterns in action on the 464 and 6128 with this short program written by Martin Thomas, who sent the program to me for this column:

```

10 REM FRACTALS
20 MODE 1
30 FOR x=1 TO 40
40 PLOT x*10,0
50 FOR y=1 TO 40
60 DRAW(x+y/2)*10,(INT
  (2*LOG(x*y))+y/2)*10
70 NEXT y
80 NEXT x

```

Martin says the program produces a three dimensional graph of a log function. If the expression —

```
INT(2*LOG(x*y))
```

in the middle part of line 60 is replaced, another view is seen. Once you've run the program as it is listed above, try it with —

```
INT(2*LOG(x+y))
```

or

```
INT(2*TAN(x*y/1000))
```

or

```
(2*ATN(B*SIN(x*y))/1100)
```

and you'll see other examples of the views which can be generated. Then you can fiddle with other formulae to see the result they have.

If you're interested, true fractals for the Amstrad PC can be seen with the Public Domain disk Mandelbrot Set Images (APDL-88) available from me, along with some other Amstrad programs, for \$10.

## Communication breakdown

Kevin Mclean from Mackay in Queensland has passed on some useful hints for communication between different kinds of Amstrad computers.

He writes: 'It is possible to transfer ASCII files from the 8-bit 6128 to the 16-bit 1512 using a null modem cable. The 8-bit can send a file to the RS232 and the 1512 can receive a file from the RS232 using PIP in CP/M and PIP in DOSPLUS. The only snag is the Control-Zs at the end of some files.

'Having a communications program at either end of the transfer is a better method than just using a cable. Kermit or any Xmodem protocol program (available from Public Domain collections) should do the trick. I did mine with PIP as I had a comms program for the 1512.

'Getting a modem to run on the Amstrad may seem difficult at first, but compared to other brands of computers it seems we are lucky. The problem lies not with the modem but with the software. It seems that Amstrad, in retaining compatibility with the IBM, also inherited some of their faults. In order to connect to Viatel, the split baud rate of 1200/75 must be achieved.'

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**Software for the PCW**

Many people have written to ask about sources of software for the Amstrad PCW, the wordprocessor. The only ready source of software for this is in Britain, where the machine came from. A number of UK Amstrad magazines (including *Putting Your Amstrad to Work* and *Amstrad Professional Computing*) are available in Australia, and I can only suggest you buy directly from the UK. Most UK merchants accept Visa cards, and buying this way is a lot simpler than fiddling around trying to get cheques in sterling. I would, of course, be pleased to hear from any Australian suppliers of Amstrad software, no matter which machine it is for, so I can publicise the addresses.

Terry Sexton, of Werribee South in Victoria, has told me that he can transfer files (but not copy whole disks in one move) from 6128 software to the PCW. He said he copies a 6128 disk to the PCW file by file, using the PIP utility. This way, he has managed to get some software (such as a spreadsheet) for his PCW that would not otherwise be available.

**Simultaneous equations in action**

Our program for the Amstrad PC this month shows how two simultaneous equations interact. They represent two opposing life forms, such as dogs and cats, pigeons and cats, or pigeons and worms, and the like. You enter the starting number of each form of life, and the results of their interactions are shown on the screen. You have to try to get starting numbers which will keep the lifeforms alive for as long as possible.

**New compatible printer**

Finally this month, I'd like to look at a new PC compatible dot matrix printer from Amstrad. One of the main features of this printer, the Amstrad DMP 4000, is that it can handle a wide range of paper sizes, from 2 to 15½ inches wide for single cut sheet or roll paper, and between 3 and 16½ inches wide for continuous tractor feed paper or labels.

The DMP 4000 runs at (absolute top) around 200 characters per second, and will print some 233 characters across on the widest paper, which could be very useful for spreadsheets. It accepts standard Epson control codes, and prints all the normal IBM graphics characters. This means that there are more than 100 different typeface combinations available, including the slightly inaccurately labelled NLO (Near Letter Quality), when the speed drops to around a quarter of its

high speed maximum.

The DMP 4000 — which costs around \$750 — operates with (of course) the Amstrad PC, or any other IBM PC compatible computer which incorporates a standard parallel printer interface.

We'll be including Your Amstrad in future issues of the magazine. I'd be more

than happy to share any of your discoveries, hints, tips, comments and programs with other users. I'll supply a free disk of Amstrad PC specific software to anyone supplying hints which are used in this column. Please write to Your Amstrad, Tim Hartnell, Your Computer, Box 227, Waterloo, 2015, NSW. □

```

REM SIMULTANEOUS EQUATIONS
CLS
RANDOMIZE VAL(RIGHT$(TIME$,2))
hs=0
df=RND
LABEL start_again
cp=D:ep=D
PRINT:PRINT "DECAY FACTOR IS"df
GOSUB delay
CLS
PRINT:PRINT
PRINT "ENTER NUMBER OF LIFE FORM X TO"
PRINT "START (LESS THAN 40)"
WHILE cp<1 OR cp>39:INPUT cp:WEND
PRINT:PRINT
PRINT "WE HAVE"cp"X ENTITIES"
PRINT:PRINT
PRINT "ENTER NUMBER OF LIFE FORM Y TO"
PRINT "START (LESS THAN 40)"
WHILE ep<1 OR ep>39:INPUT ep:WEND
CLS:PRINT:PRINT "PLEASE STAND BY..."
GOSUB delay:CLS
da=1
PRINT "-----"
PRINT "TIME ELAPSED:"da
PRINT INT(cp)"LIFE X"
PRINT INT(ep)"LIFE Y"
REM *****
LABEL major_cycle
WHILE NOT finished
GOSUB delay
da=da+1
PRINT "-----"
PRINT "TIME ELAPSED:"da
IF cp>ep/df THEN cp=ep/df
REM EQUATIONS FOLLOW; MODIFY PARTS
'OF THEM TO SEE WHAT HAPPENS
cp=ABS(cp+((8*cp-cp*ep/3)*df))
ep=ABS(ep+((4*ep-ep*cp)*.D1))
PRINT INT(cp)"LIFE X"
PRINT INT(ep)"LIFE Y"
IF ep<2 OR cp<2 THEN GOTO end_of_run
WEND
REM *****
LABEL end_of_run
IF da>hs THEN hs=da
PRINT:PRINT
PRINT "YOUR LIFE FORM CLASH SURVIVED"
PRINT "FOR"da"TIME PERIODS."
PRINT "-----"
PRINT "THE BEST SURVIVAL TIME SO FAR IS"hs
GOSUB delay
PRINT "-----"
PRINT "DO YOU WANT A NEW RUN (Y OR N)?"
a$=""
WHILE a$<>"Y" AND a$<>"y" AND a$<>"N" AND a$<>"n":a$=INKEY$:WEND
IF a$="Y" OR a$="y" THEN CLS:GOTO start_again
PRINT "OK":PRINT:PRINT:END
REM *****
LABEL delay
FOR j=1 TO 2000:NEXT j
RETURN
    
```

**Listing 1.** Simultaneous equations in action!

# IBM UNDERGROUND

Jim Button is most famous for his excellent database program PC-File+, a truly professional flat file distributed via the shareware channels from his company Buttonware. But PC-File+ is not his only product, and not all are big systems. All computer users come up against little irritations from time to time, and tend to hack out a little program to solve the problem. Now Jim has collected 13 little programs like these and distributes them under the title Baker's Dozen. As with all programmers' 'hacks,' they all have room for polishing, but solve many problems for users at a very realistic price.

## The files

On the disk are many executable files. BTTNCALC.EXE is a very small spreadsheet. DISKUTIL.EXE uneraser files, and changes file dates and times. FILECOMP.EXE compares two files line by line.

---

## *Ever need information on the characters a PC can display?*

---

GKEY.EXE reads a key as it is struck and displays its values. LOCATE.EXE locates files in any directory where the filename either matches a user defined 'mask' or the file contains a user defined string. P90.EXE prints out files on Epsom compatible printers, but rotated 90 degrees from normal so that the lines run up and down the page instead of across the page. PC\_SORT.EXE sorts files, using up to four sort keys at a time. PRN\_FILE.EXE intercepts output from a program aimed at the printer and diverts it to a disk file. RDIR.EXE deletes directories and all files they contain. SET\_SCRN.EXE resets the default screen colours. CALENDAR.COM is a programmable calendar and time reminder. SNAPSHOT.COM allows screens to be captured to disk. SWCOM12.COM swaps the COM1 and COM2 ports, while SWLPT12.COM does the same for the LPT1 and LPT2 parallel ports.

On the distribution disk is a little menu program to tie them all together and allow them to be run from a menu. This program is BAKERS12.EXE, and the menu is defined in an ASCII file DOZEN.TBL. The

menu system would typically only be used when initially exploring the Baker's Dozen, and the individual programs would subsequently be invoked either from the command line or from a batch file. Now let's look at the individual programs and see how well they function.

## Button Calc

ButtonCalc, with only six columns and 20 rows will never outsell Lotus, but for many people it will be a boon. Just the thing for simple home financial calculations and similar matters which will fit into the screen. While no details of commands are provided in the brief READ.ME file on the disk, there are a wealth of help screens and a good range of functions.

## Calendar

Calendar is a programmable date calendar, which can be made resident in the fashion of SideKick. It reads appointments, public holidays and so on from a data file called CAL.DAT. The current month is displayed when invoked, with all appointments appearing on the calendar as highlighted dates, and with full details shown beside the numeric calendar.

## Diskutil

This program was the sole disappointment — it purports to be a disk utility program able to unerase files, and to change file dates and times. This it could do, but only on some disks. Unfortunately, it is can only handle bootable disks, which have the system files and command.com on them. For this reason I found it of little use on floppies and was reluctant to try it on a hard disk.

## Filecomp

This program compares two ASCII text files. Options include the display of unique lines and display of line numbers of unique lines. Matching lines can be mapped, and output redirected to a file.

## Gkey

Ever need information on the characters a PC can display? Gkey does it for you, and displays the characters in two separate tables, using hex and decimal. It can also display the scan codes and keyboard values sent to the processor of characters struck by the user. Very useful for all programmers.

Exit with X or Esc - AltB=Save screen

The Baker's Dozen	
A	Bttncalc mini-spreadsheet
B	Look at Calendar
C	Locate a file
D	Find a text string in a file
E	Compare two text files
F	Sort a file
G	Print a file at 90 degrees
H	Capture printer output to disk
I	Take a Snapshot of the screen
J	Disk Utility
K	Remove a subdirectory
L	Keyboard information
M	Swap COM1 and COM2
N	Swap LPT1 and LPT2
O	Go to DOS temporarily
X	Exit the Baker's Dozen

Select with letter or ↑ ↓ and Enter

*Figure 1. The Baker's Dozen menu is useful for exploring the programs; normally they would be run from the command line or invoked with a batch file.*

## Locate

Locate looks in the current directory, and in the directories beneath it, for files which match a mask, and lists those files on the screen. It is also possible to specify a string, and Locate looks within files which match the mask and lists only those which both match the mask and contain the specified string. The string search can be case sensitive or case insensitive at the user's discretion. It is possible to define the directory at which the search starts, and this can be any directory.

## P90

Everyone has had the problem from time to time of needing to print out something which is too wide for the printer. The classic solution is to print it to a disk file and then use a utility program to print it to paper, but turned 90 degrees so that it prints sideways down the page. P90 does just that, on Epson compatible printers including those which, like my Toshiba, are compatible with the IBM Graphics Printer.

## PC\_Sort

The Sort filter which comes with DOS is all very well, but it can only sort on one characteristic or 'key' at a time. Sorting on more than one key requires tedious repetition with a significant chance of error. PC\_Sort solves this problem by allowing

*Just experiment with  
your own system,  
software and some  
expendable files to be  
sure before trusting  
it to a vital file.*

sorting on up to four keys. Sorting can be case sensitive or case insensitive, and can be on a selected number of characters at any position on the line.

**Prn\_File**

Often users have a program which only sends formatted output to a printer, and won't send it to a disk file. This can make it hard to transfer information to another application. Prn\_File redirects all information normally sent to your printer to a disk file of your choice. It only works where programs are well behaved when sending output to the printer. Where a program makes calls direct to the hardware, the results can be erratic or cause lockups, but where it works it is very valuable. Just experiment with your own system, software and some expendable files to be sure before trusting it to a vital file.

**Rdir**

Removing subdirectories can be a chore. First one must go into the directory and remove all its files, and then delete the directory. Rdir can delete a directory and all its files and lower level directories. Very powerful, and requiring some care as does all such software.

**Set\_Scrn**

When the ansi.sys device driver is invoked from the config.sys file when the system is booted, the user has great control of screen background, border and text colours. But any such changes are transient, and often have to be reset when a program is exited. This program resets the default colours, in conjunction with ansi.sys.

Change as above, except ---- in top line is left and right arrows, and, in second line, right and left arrows -

April 1990						
Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

**My Calendar**

- 1 All Fools' Day
- 1 Beginning of Passion Week
- 8 Palm Sunday
- 10 Passover
- 12 Maundy Thursday
- 13 Thomas Jefferson's Birthday
- 13 Good Friday
- 14 Pan American Day
- 15 Easter Sunday
- 16 Patriot's Day
- 27 Arbor Day
- 30 Confederate Memorial Day (Ala & Miss)

Press ← → to change month  
Press ↑ ↓ to change year

The Year of the Horse  
The Jewish Year: 5750

*Figure 2. The Calendar can be made memory resident and invoked with Alt-7 — while you may have use for all those American holiday dates, they can be customised.*

**Snapshot**

Often you will want to take a snapshot of a screen, and save it to a file. Imagine you are writing a manual for your new program and need to include a screen image. You could photograph the screen, and put the photo in the manual, or manually type the screen into the text. Better would be to 'grab' copies of the screen and save them to disk, and then merge them with the text of the document. This can be done by running Snapshot and then running a second program from within Snapshot. When a desired screen appears, Ctrl-Alt-P saves the screens to disk, one screen per file.

**Swcom12 and Swlpt12**

One little, but significant, problem for users is software which insists on output to COM1 or LPT1, while their peripherals are connected to COM2 or LPT2. Swcom12 diverts output for COM1 to COM2 and output for COM2 to COM1. Likewise, Swlpt12 logically swaps the two parallel ports. They work with most software which properly uses DOS to send output, but where software directly accesses ports, results could be unpredictable, so personal testing with one's own machine, operating system, software and expendable files is essential.

**Availability**

Baker's Dozen is User Supported software. Copies are available from Buttonware in the US for \$US59.95, but you are encouraged to try it first and send that amount if satisfied. The donation includes the latest version, plus a printed manual. Users are encouraged to give copies to friends, workmates and so on, and software libraries can also make it available provided only a nominal disk copying fee is charged.

My copy of Baker's Dozen came from PC-SIG on PC-SIG disk 800 via Manacomm, the official Australian Distributor for PC-SIG, at PO Box 509, Kenmore, Qld 4069; (07) 374-1311. Individual disks can be ordered from them at \$A13 plus \$A5 freight per order. In addition they offer membership of PC-SIG at \$A28 per annum. Membership includes a fantastic 424 page directory to the entire PC-SIG collection of 900 disks and includes brief reviews and comments of every disk. As a member you receive a 64 page magazine with news, reviews and new releases six times a year, and a hot sheet with new releases again 6 times a year. Members qualify for special discounts on bulk orders. The subscription is worth every penny, just for the directory. Add in the magazines and discounts and it is unbeatable. □

# YOUR MICROBEE

## Enhancing your Microbee

Some time back I talked about Peter Broughton's Enhanced Bios for 128K Microbees and Chooks (Computer in a Book). I said they were great but only gave skimpy details, so this month I have gone more in depth.

If you want to permanently run both 5¼ inch drives and 3½ inch drives, or swop between the various configurations of 3½ inch drives for the Microbee, you need a program like SETSYS.COM. If you want to temporarily change the nature of a drive (without changing the disk size), then a program like SETDISK.COM is useful.

I acquired Setsys from Peter Broughton at the time my Microbee had a memory transplant to give it a RAM disk (or M:drive) of 414 kilobytes. These memory transplants are available via the Microbee user groups in Melbourne, Adelaide, Perth and perhaps user groups in other states. They bring a 128K up to 512 Kbyte. Kits, software and documentation are sold that allow the adept to do it themselves. The software sold with this included SETSYS.COM, RAMDISK.COM and FORMAT.COM.

Setsys is an enhanced version of Microbee's INIT.COM. It allows you to load and save various different systems to system tracks or a disk file on any drive. Thus, you could reconfigure your computer as an old 56K or put in your own system.

It also allows you, though its simple menu system in the Microbee tradition, to set either premium or standard colours, a longer initial boot command and more. But it is especially invaluable when you want to add a disk drive to your system for it allows you to change your disk drive configurations around from various 3½ inch and 5¼ inch types and save the new setting to your system files. Microbee's INIT.COM does not have this flexibility.

I can thus set my 3½ inch disk at any time to be a Dreamdisk, a Microbee single sided, a Microbee double sided, or the slightly larger capacity (8 Kbyte) modified format. Each time I change I have to save it back to the system tracks.

You will also require from your friendly local Microbee shop a copy of the appropriate INIT.COM. I call it INIT3.COM. You will need this to format the 3½ inch drive in the standard Microbee formats (SS and DS) if you bought a 3¼ inch machine. Peter Broughton provides with his en-

*It's easy to get power  
crazy with computers —  
and to lust after more  
and more megabytes  
of memory.*

hanced system a program to format the 3½ inch to his own larger formula.

The 512K upgrades cannot automatically distinguish between single and double sided 3½ inch disks as can the 128K system.

You can temporarily change a disk drive to a different type of Microbee drive or to about 90 other computers' drives by using the Public Domain program Setdisk. I haven't found this necessary for Microbee disks. I just use Setsys and save each time to system tracks.

RAMDISK.COM makes the memory drive the A:drive and the old A:drive becomes the M:drive. This fools software that needs to be in the A:drive but works faster in the Memory drive. FORMAT.COM totally erases the M:drive contents.

## The enhanced Shell system

Peter's latest enhancement to the Microbee system, the enhanced Shell, can be obtained via the Melbourne User Groups for about \$20 and is highly recommended.

Its first brilliant feature is accessed with a Ctrl-9. This opens up a neatly drawn window in the upper center of your screen in which a menu of options are presented. Esc will make this window vanish.

The window can be opened in the middle of the Shell, at any time in WordStar and in the midst of many other programs. It doesn't work with Microsoft Basic nor with some games.

Six options are given. W is for Warmboot which allows for a full warmboot with a reloading of the system files into the spare page of memory secreted away on the 512K system, or, alternatively, a straight reboot to the Shell or to CCP (CPM). It also allows you to edit the unrun part of a batch command line if you are currently in the midst of a pre-set sequence of operations.

F is for Function Keys. Most number keys plus the Ctrl key and Shift can have permanently accessible functions set to

them (14 are possible in all). I've found this very useful. A special control (N) assigns the numbers 1 to 8 to Function Keys 1 to 8 when needed. This allows you to retain the function keys while allowing Simply Write or other programs to use the Ctrl Number commands.

Control codes and text can be set and command lines can be linked together so they can run in sequence. You can edit the commands you set with the WordStar Ctrl-A, -S, -D, -F cursor commands and Ctrl-G for delete.

I have Ctrl 1 set to A:~M, Ctrl 2 to B:~M, Ctrl Shift 2 to C:~M, Ctrl 3 to M~M. These commands allow for quick logging in of different drives.

As 5 is the ikon for INIT.COM, I have Ctrl-5 as Setsys and Ctrl-Shift-5 as INIT3.COM. I have another key as \*,\*, and yet another which loads files into the memory drive and starts up programs. Pick your own favourite commands and load them. WordStar commands can be set, too. The cursor keys on the Premium can also have other functions assigned to them.

K stands for key click, which can be set to varying degrees of loudness. I have a quiet click set — I find it useful as it establishes that I have made contact. I changed key click right in the middle of writing this without having to reboot. This is a most adaptable system.

T stands for Clock Functions. To use this you have to have a clock added to the computer. You can set Time and Date using WordStar controls, and you can time and date stamp documents.

Also, you can readjust the position of the screen and change colours both for the background and foreground of the window, as well as for the rest of the screen. You can toggle the status line and the function keys on and off. Yes, you have a status line which is the 25th line on the bottom of the screen. This line tells you if the function keys are active, if you have Cap Lock on and the time (if you have a clock fitted).

The chosen commands can be permanently saved by running a program called FKEY.COM. This is a little clumsy. It would be better if they could be directly saved from the window. They are saved into a file called DEFAULT.FK. It is a pity that several different sets of commands could not be saved under different names. But this is an extremely useful addition to the Microbee's capabilities for a very modest price.

These enhancements to the Microbee System bring CP/M a long way. With the Microbee Shell, the Premium graphics, ramdisks of various sizes and more — MS-DOS looks positively clumsy!

### Drive A:

One feature of the standard Microbee that I have come to really appreciate is its ability to always check on the A: drive as well as the logged drive if you call up a program — no matter what drive is logged on. This allows you to effectively use a program disk in drive A: as a permanent part of computer memory.

The more I use other computers without this facility, the more I appreciate this Microbee feature. It certainly goes a long way to compensate for the limited memory addressing of a Z80 chip.

### The Future

I have noticed that the price of AT clones over the past year has tumbled down and down. At the time of writing they are nearly down to \$2000 from some outlets. The old standard IBM clone is now well and truly dying if not buried (unless heavily enhanced with add-on cards). This means machines with a megabyte and more of RAM are rapidly becoming the norm.

It is this kind of memory that is needed for reasonably quick desktop publishing, fine graphics, speech controls and plain language artificial intelligence instructions — all of which will soon be standard abilities. New machines with Reduced Instruction Sets are now on the way and will be able to run rings around any AT.

But despite all this, Microbee's standard machines still hold their own as they are friendly, low cost and easy to use, with good local support from the company and user groups. They are an excellent introduction machine — and sound word processor and telecommunications machines.

Their enhanced operating systems are a far cry from the older CP/M machines — and can do many things easier than high-flying programs like Gem and Windows which, for a start, have nothing like `USR.COM` allowing easy operations of batch commands.

It's easy to get power crazy with computers — and to lust after more and more megabytes of memory. But it is the tailoring of systems to specific needs that is all important. I think Microbee's system does still meet many needs. It is crazy to say that such a neat piece of engineering as the Z80 chip at the heart of each Microbee has had its day simply because it is over

four years old! New uses are still being found for it every day.

This is not to say that the basic Microbee cannot still be improved. How about a battery backed one Mbyte ramdisk and a removable flat portable screen? At least one of the new generation laptops has these abilities.

### Function key program for Microbee Basic

`KWIKKEY.MWB` has now become available on bulletin boards (at least on Melbourne's `MBUG`, (03) 882 1571). It has also graduated onto my own packed three disk collection.

---

*The window can be opened in the middle of the Shell, at any time in WordStar and in the midst of many other programs.*

---

This works like Qwikkey but inside Basic. Just think of the time it can save you with repetitive commands assigned to one key! You can change your choices on the run or store sets of commands for particular occasions.

`BASEMENU.MWB` should always be loaded when you load basic — just set both to load on the same key with Qwikkey or the Broughton Function keys or `USR.COM`. Also set it up to load with a Qwikkey command, as you will find that, unlike the Shell, it does not reload after you rerun a program. It gives you a screen of basic file names around which you can move with the cursor keys.

There's a mini word processor with much power now available on bulletin boards (and my new set of disks). It is called `VDM` and `VDE`. The `VDM` version has the better (memory mapped) screen. It only takes up a tiny amount of memory — just 10 Kbyte — and I have found myself calling it up when I wanted to modify documents I had previously written with `WordStar`.

In addition to the most common `WordStar` commands, it also has `Undelete` to restore accidental erasures; `Macros`, which stores nine macros on the number keys, and a limited but very useful form of win-

dowing. You can freeze the bottom half of the screen with the information in it and scroll and edit the rest of the document in the upper half of the screen.

Its documentation demonstrates the power of the `Macros` by showing you how you can use them to move all bracketed sentences to the end of the document. You can even set conditional values to control its operation. When you exit from a document, it automatically saves.

Its installation program allows much doctoring to including the use or nonuse of `BAK` files, turn on or off the error bell, set print codes for underline (and so on), and setting default macros.

These are all facilities that would be wonderful to find in `WordStar` — although `WordStar` is superior for me in its block movements, online help files and dot commands.

### Real time clock upgrade

The July '87 issue of 'Sting' from the West Australian User group had a very helpful article about the clock that you can add to your 128K machine with the appropriate kit.

It seems this kit gives you a calendar clock with a daily alarm. You can set the time down to seconds and the date. It can tell the time in a 12 hour or 24 hour format and can even support daylight saving!

I'll see if I can get it fitted to my computer and report back to you on how well it works. I wouldn't mind having the time in the bottom line of the screen (using the Broughton system) while editing.

### Public Domain disks

The programs I mentioned above can be obtained from most user groups or from myself. I have packed two disks full of useful utilities with over 700 Kbyte of programs with full documentation — some of which I've written or rewritten to make it easier to understand. There is a third disk, too, with `Colossal Caves` and 16 other fun games on it. I'll be adding a hints disk for adventure game addicts who don't mind cheating a bit. (*Does anyone know how to cross the volcano? I know it can be done.*)

This is a new selection — if you previously purchased a set you can now get an update disk with the new programs on it. The two utility disks can be purchased as a set for \$25 (5 1/4 inch), \$29 (DS 3 1/2 inch) or \$34 (SS 3 1/2 inch). The games and new disks are \$14 (5 1/4 inch) or \$18 (3 1/2 inch) each. Postage and packing is included but please allow a month for deliveries as this is a strictly a spare time activity for me. Write to Impact Media, PO Box 234, Fairfield 3078 Vic. □

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# MICROBEE FILE

## WordStar's latest evolution

WordStar, the perennial wordprocessing program, is now available in a new guise — Professional Release 4. Many of us have seen programs for the Microbee come and go, but WordStar has always been there. However, once the people from MicroPro struck on the enormity of the MS-DOS world, it seemed that all of the releases for our beloved program were going the way of many a good program — into the disk boxes of IBM end users. Certainly for the Microbee, there was never a whisper of the Micropro releases of Easy or Wordstar 2000. The Gods (and MicroPro) however, are now smiling on us, because their latest and greatest, WordStar Professional Release 4, is ours!

Picture this for your Microbee —

- onscreen bold face, italics and underlining in Wordstar,
- the ability to calculate simple equations and place both the equation and answer into the text,
- the facility to protect files from accidental erasure,
- upper to lower case conversion (and vice versa),
- a wonderful shorthand procedure which allows you to insert pre-typed words or lines (boilerplates) into your document.

These are just some of the features that are immediately apparent as being added improvements to WordStar *a la* 3.3. There are many other inclusions which are a lot more subtle, for example: extra speed, 'go to' page and line commands, cleaner menus and so on.

But let's not spoil the review by simply stating the bleeding obvious (this and that is better or quicker or prettier), the program in this new configuration can do so much more for you. I do not intend to go through each and every new command, but instead have picked out ones that are of most use to me as an editor and writer. For simplicity's sake, I will present these in the order in which they appear in the WordStar Release 4 'What's New' section, and examine how the overall program performs, particularly in comparison to the earlier version, sold in conjunction with all disk based Microbees. The new features were checked out using a 256TC, however, most enhancements will work on both Standard and Premium Microbees.



## Unerase (⌘U)

At last, salvation for 'Oops', 'Darn it' and other expletive users. I need not ask the rhetorical question . . . we have all done it at one stage or another . . . pressing ⌘Y instead of ⌘T and then having to resort to amazing wordprocessing contortions (like reading in the whole .BAK file and deleting everything save the one sentence). It is a horrible feeling, destroying a line that you have spent ponderous moments crafting. Fear the slip of the finger no more, as ⌘U replaces what you have just obliterated in a no-nonsense, hey-presto fashion.

As the manual explains, it can be used to restore text deleted with ⌘Y, ⌘T, ⌘KY, ⌘Q Del, ⌘QT and ⌘OY. There is a limit to its capacity however, and this is made apparent when you try to block delete a chunk of copy. You are warned that what you are about to delete is too large to restore. You are then given the option of continuing or aborting the deletion. If you do delete and then try to restore the copy, you will find approximately the first 19 lines returned intact — a handy thing to know when you are using this command.

As an added bonus, ⌘U can be utilised as a cut and paste function. Simply delete what you want to transfer and then 'undo' it in its new location.

## Shorthand (Esc sequences)

Simply put, these are keystroke macros which can speed things up in two ways. Firstly they can be used to insert words or lines into whatever you are preparing. For example, if you are planning on doing a lot of correspondence on one day, the date may be stored under the letter D. Therefore, whenever the date needed to be inserted, you would only have to press Esc and D for it to be slotted into place.

Similarly, commands are supported so that you may store often used sequences to be executed with two keystrokes. An example which is provided on the WordStar disk illustrates the idea rather well. Esc P will perform the following string: ⌘A (cursor left one word), ⌘OH (search backwards for a character, in this case, what follows), ⌘M (a hard carriage return) and then ⌘F (move right one word). Simply put, it finds the beginning of the previous paragraph.

With a bit of imagination and indeed the need to offload some of the tedium of

your wordprocessing application, this facility could prove to be extremely useful. And, one of the best things about it is that the macros are easy to install and easy to erase.

### Onscreen display (^PY, ^PB, ^PS, ^PV, ^PT)

For those not too familiar with WordStar, the gibberish in the brackets above are print control commands and are italics, bold, underline, subscript and superscript respectively. There are two or three more of these, however, this is not the revelation. The great (and I mean *great*) thing about WordStar 4 is that these nasty little caret bedecked controls do not appear in your text, and in their place are what they represent — actual italics, bold face, super and subscripts . . . the lot. If you have ever fiddled around trying to get earlier versions of WordStar to do fancy things like scientific formulae, you would have gone mad trying to distinguish the control characters from the actual equation. Now that it is all on screen this is a thing of the past. For example, a chemical reaction *a la* WordStar 3.n —

---

```
A chemical reaction a la WS3.n
ZH^V2^VO (11 <-) H^V3^VO^T^T + OH^T-^T
```

---

in WordStar 4 converts to a much easier to read:

---

```
ZH2O (1) <-> H3O+ + OH-
```

---

Of course, the control characters are still there and can be turned on by simply typing ^OD. This is useful if you get lost in a maze of ^PTs and ^PVs.

### Go To Page/Line (^QI)

This is a nice little command, for those who want to get to a specific part of a document. Imagine a 20 page essay or article (a treatise, perhaps) and you need to get to material which is around about page 18. In the old days you would have to labouriously use ^C to scroll down through the pages in a most imprecise manner, usually overshooting your target. With ^QI, you can locate a nominated page (in document mode) and a specific line (in non-document mode). Simple as that.

### Math (^QM, ^KM)

I cannot recall the number of times I have been caught without a calculator when I needed it for quick summations and calculations. WordStar 4 has the answer to my dilemma with an inbuilt simple maths package. For example, if I wanted to check that a rate of payment for an article was what I had expected, I would call the Maths unit down with a ^QM, enter the figures and calculate the answer. If I needed to include the equation and result in correspondence, I would simply use the Esc# and Esc= controls to produce the following —

---

```
(1180*100.00)/1000 = 118
```

---

This is not a sophisticated program and will not recalculate formulae when different values are inserted (like Multiplan), but that was never its intended use. With the 256TC both the numerals on the QWERTY board and the numeric keypad are supported.

### Delete and Backspace

These two keys (functions?) now conform with the word processing industry standard. That is, Backspace is now a destructive back space and Delete removes the character under the cursor, rather than the one to the left. If you dabble with a number of other word processors, whatever the circumstance, it is nice to have the same standards on all.

### Installation and customisation

Each of these areas, at first glance, could be considered a Pandora's box. However, they are manageable, and once you get a bit more familiar with the program and develop your own tastes for the way things are run (you don't like automatic hyphenation, say, or you prefer ragged right text and so on), you can customise WordStar 4 by primarily using WSCCHANGE. (Note that WordStar, when supplied for the Microbee by Microbee Systems, has already been installed.) Many of us accept that the way we buy a program is the way that it will stay forever. It is surprising, therefore, to discover the many variables which may be changed using the customisation program.

### Cleaner menus

I must say that the feel of WordStar 4 is all together different; almost more sophisticated. Instead of being presented with a great wad of inverse text at the top of the screen, and a relatively undefined area to work in, Release 4 uses its new bold text and italics fonts in the menus, and the work area is bordered by a square. It is very neat and somehow gives a feeling of direction and professionalism.

All menus are not only better presented, they are more instructive.

After using WordStar 4 for a short time, one accepts the new layout and menus without question, making it quite a struggle to take the reins of the earlier version again. The menus are so logical and well presented, it is hard to understand why they weren't like this in the first place (but that is an unfair comment, as time and user feedback will inevitably help programmers and their programs approximate perfection).

### Column replace mode (^KI)

I often squirmed at the thought of having to prepare small budget statements and documents that needed numerical information in tabulated form. Instead of dusting off the old Multiplan books and persevering with conventional spreadsheets, I would try to get the job done in document mode in WordStar. At the end of it, after countless changes and insertions and deletions, turning column and insert modes on and off, the job was complete — but I was frazzled. There had to be a better way. And . . . along came WordStar 4 with column replace mode.

With this procedure, the problems of having to realign misaligned tables are gone. It is now possible to overwrite a column of figures if necessary, and indeed it is possible (in column mode, of course) to overwrite a mess with a block of spaces (or null characters). And, as with most of the new implementations, the functions you elect to use are displayed in the command line across the top of the screen. You no longer need to refer to the help menus in question to see if the function is activated or not. Therefore the command line when replace and column mode are activated looks like this —

### Convert characters to lowercase/uppercase (^K' and ^K')

Although the Caps Lock key is more sensibly situated on the 256TC (nowhere near the Control and left hand Shift keys), it is still possible to end up with a block of text that is in the opposite case to the one that you wanted. By block marking the offending text (using ^KB and ^KK) convert the highlighted text to lowercase with ^K' or uppercase with ^K'. It is a wondrous thing to behold, but, it does not convert each letter to its opposite. That is, AbC when zapped with ^K' becomes abc, and not aBc as I had hoped. However, having this facility is better than not having it at all. When a paragraph is typed in with CAPS LOCK down, correction will only entail changing the whole lot into lower case and then quickly converting the letters which begin sentences back into caps (which is much better than having to re-type the whole thing!).

### Cursor to next character (^QG and ^QH)

This is like a shorthand version of the more detailed find command (^QF). With ^QG, however, you do not have any options of where and how to find the character, and you are restricted to just that, a character, and not a string as in the more detailed ^QF command. Its most obvious advantage is that it is fast.

### Delete to the next character (^QT)

Again this is a shorthand implementation of existing commands and is a rather clever way around having to move up and down and mark blocks in order to delete unwanted text. It is very quick and precise and when the command is paired with a full stop or a Return, it will delete the following line or paragraph, respectively. This is, for me, one of the handier commands implemented in this new version of WordStar.

### Protect files

From the Opening Menu, selecting C will enable you to protect any file you wish. This is particularly handy if you are in a habit of quickly tidying your files up, and inadvertently destroying wanted documents or editing 'final' final copies. It is a simple mechanism and is reversible through the main menu. The protected

files come complete with special 'non-edit' menus, although it is possible to block mark parts of the document to be written out to another file.

### Background printing

This is not listed in the 'What's New' guide because it is what's old, and in fact no longer available. Background printing allows you to set the printer off in one direction with a file, while you edit the same or another file. It is a very convenient, albeit sometimes slow, feature of the earlier WordStars. I was surprised to see it go in WordStar 4, but some sacrifices had to be made, according to MicroPro, to bring you the new enhancements. It is suggested that users who require this function, use a hardware printer buffer. *C'est la vie.*

That about does it for what I find to be immediately different and useful for WordStar for my particular application. There are doubtless other things that I have not touched on here — for example printer support and dot commands. Perhaps they may rate a mention a little later on. Nevertheless, this review of WordStar 4 would not be complete without making some reference, however brief, of the spelling program on board — The Word Plus.

### The Word Plus

I cannot tell a lie, I have used The Word Plus for some time now, instead of what was standard issue with earlier versions of WordStar — SpellStar. From all reports there is no comparison between the two. The Word Plus (from Oasis Systems) actually goes into the file and corrects words which are misspelt (this is of course after it confirms with you).

In a nutshell, it reads your text file, checks all of the words against its massive dictionary, and then writes all of these to a file. It then systematically goes through each of the words it has defined as being a misspelling and asks you to perform one of ten operations on it. You are able to view the words in context, check them against the dictionary, add new words to the main dictionary or to your own special dictionary, mark words with a pre-defined character and, of course, correct words, then and there. It sounds a bit confusing, but it is really very simple.

At the end of the list, The Word Plus calls one of its sideline programs into play — Markfix — which busily goes through the corrections and places them into your

file along with any characters you ordered to mark spurious words. The buzz of more disk activity, and Markfix announces how many words have been corrected, how many marked and so on. It even tells you when a paragraph needs to be reformed because a word, now corrected, is shorter or longer, thus putting the alignment of the paragraph out.

And, for the Wordsmiths and crossword fanatics, there is a real treat. The sub-programs of this suite, Lookup, Find, Anagram and Word Count will keep you entertained for days (well, hours perhaps). Accessed outside WordStar (from the Shell) you simply type in the program's name and then the letters or words you want to work on. For example, ANAGRAM MEANS will produce AMENS, MANES, MANSE, MEANS and NAMES.

Wildcard characters (? and \*) add another dimension to using these tools and when utilised with FIND, give new meaning to cheating on crossword puzzles.

The Word Plus and its associated programs are thoroughly worthwhile and a welcome part to WordStar's latest update.

### Prices, and availability

This is ever the big question with things from Microbee Systems. At the time of writing (January) the program was still being installed for the Microbee by the R&D boffins. The manual was also at the printers. I checked with a few people and the consensus is that the program will be available in March.

WordStar 4 will run on all Microbees, Premium or Standard (and 256TC of course) however, some of the features mentioned will not be apparent on the older Bees (on screen printing options like italics and so on, because of the PCG). I have not tested this out for myself, but am assured it is the case. It follows, therefore, that the new and old versions are compatible, so that if you have been using WordStar 3.n for donkey's years and want WordStar 4, all of your files can still be read and accessed (this is a real plus for people who want to keep up with new evolutions in software, without having to sacrifice mounds of useful material).

The price (and don't quote me) will probably be an upgrade for existing users, of around \$150. I have no price structure for buying it off the shelf, installed for the Microbee, and assume that WordStar 4 will be bundled with suitable hardware come March (coinciding with the release of the new 256TC bios). □

# YOUR IBM

Underlying MS-DOS and PC-DOS is the concept that hardware devices can be considered to be logical files. These hardware devices include the keyboard, screen, parallel and serial ports. At the DOS command line many commands can be used with devices as if they are files. As just one example, Copy can take input from the keyboard and send it to the printer with the command —

---

```
A> COPY CON PRN
```

---

The characters entered at the keyboard are sent to the printer, and the command is terminated by pressing F6 and then Enter to add an end-of-file-marker character and quit. At DOS level the logical devices are —

CON — keyboard when receiving input; screen when sending output,  
 AUX - first serial port,  
 COM1 — same as AUX,  
 COM2 — second serial port,  
 COM3 — third serial port,  
 COM4 — fourth serial port,  
 PRN - first parallel port,  
 LPT1 — same as PRN,  
 LPT2 — second parallel port,  
 LPT3 — third parallel port, and  
 NUL - a non-existent (dummy) device.

## Not just DOS

Basic, C and Turbo Pascal can (or must) talk to the various devices as files. In the case of Basic, one can send characters to the screen with Print and to the printer with Lprint, but all other I/O must be done by first defining, and then using, the various hardware devices as files. In the case of Turbo Pascal and Turbo C, all I/O is via files, with the screen and keyboard being the default files for many functions and procedures. Device names in the high level languages are not identical to those used by DOS, but there are enough resemblances to make it easy to recognise the parentage.

Using these device names makes it easy to select an output device at one point in a program, and then send the output to it anywhere in the program. Imagine writing a program which sends its output to the parallel port but a user needs a version for a serial printer. You could do a massive rewrite to send output to the serial and not parallel port, but it would be far easier if the program had been written to use the

parallel port as a logical device, and sent output to it as a file. In such a case all that would have been necessary would have been to define the output as the serial port in one line at the top of the program.

When using devices such as logical files one has to, in all three languages, open the file, send and/or receive characters, and close the file. Closing the file is very important, as otherwise a disk directory will not be updated, some data may remain in a buffer in memory, and output may be lost.

I have included a very simple example written in three languages showing how the classic 'Output to Printer, Monitor or Disk' message could be implemented,

with only one routine being used for actual character output but with the device being defined according to the user's desires. In Basic, the ability to write to the serial port is added. While it is possible to read/write to the serial port in all three languages, only Basic makes it easy to set the communications parameters from a builtin statement. In Turbo Pascal it is more difficult and in Turbo C near impossible, unless you have access to a library of prewritten communications functions. In none of the sample programs is any provision made for conversion of lower case input to upper case or rejection of invalid choices, and such would be essential in any working program.

---

```
10 'sample basic program
20 '
30 PRINT "Select output"
40 PRINT "      (P)arallel printer"
50 PRINT "      (S)erial printer"
60 PRINT "      (D)isk"
70 INPUT "      (M)onitor":A$
80 '
90 IF A$ = "P" THEN OUTFILE$="LPT1:"
100 IF A$ = "S" THEN OUTFILE$="COM1:300,N,8,1"
110 IF A$ = "D" THEN OUTFILE$="TEST-B.DOC"
120 IF A$ = "M" THEN OUTFILE$="SCRN:"
130 '
140 OPEN OUTFILE$ FOR OUTPUT AS #1
150 PRINT #1, "Hello World"
160 PRINT
170 '
180 CLOSE:SYSTEM
```

---

*Listing 1. A very simple example written in Basic showing how the classic 'Output to Printer, Monitor or Disk' message could be implemented.*

---

```
Program FileTest;
var
  OutPutFile      : text;
  SelectedOutput  : string[100];
  Choice          : Char;

begin { program FileTest }

  WriteLn('Output to (P)rinter (M)onitor or (D)isk?');
  ReadLn(Choice);

  If Choice = 'P' then SelectedOutput := 'Lst: ';
  If Choice = 'M' then SelectedOutput := 'Con: ';
  If Choice = 'D' then SelectedOutput := 'TEST-P.DOC';

  Assign(OutPutFile, SelectedOutput);
  Rewrite(OutPutFile);
  WriteLn(OutPutFile, 'Hello World');
  Close(OutPutFile);

end.
```

---

*Listing 2. The example program written in Turbo Pascal 3.0.*

## Basic

In Basic, COM3, COM4, PRN and AUX disappear. While CON still works, it is 'undocumented' and KYBD: is preferred for input from the keyboard and SCRNL: preferred for output to the screen. LPT1:, LPT2:, LPT3:, COM1: and COM2: remain.

The user nominates output to a printer, the monitor or a disk file. Line 110 assigns a fixed disk file name, and in a real program this would be replaced by a subroutine that allowed the user to select a filename. Next, the name of a logical device or disk file is assigned to a string variable.

Now the file is opened for output. Opening an existing disk file for output erases all its contents. If a file exists, and its contents are still wanted, either an error trapping routine should reject the selected filename, or the file should be Opened for Append, in which case the contents of the file are retained and the new data is merely added to the end. When a file is opened it is given a file number. The Basic default allows files numbered 1, 2 and 3, but can be increased by using the /F switch on the command line when starting Basic.

Line 150 prints to whichever file was opened as number 1, and could have been to files with other numbers. Print Using can also send its output to a file numbered by this method. Line 180 closes the files and rewrites the directory information so that the data is not lost.

## Turbo Pascal

Turbo Pascal 3.0 uses logical devices, which must be opened as files with Rewrite, have data sent to them with Writeln and closed by Close. Remember that if you want to open an existing disk file, Rewrite will erase the existing file contents and Reset should be used instead if the contents are still required. Turbo Pascal also has standard files which don't need to be opened or closed.

The logical devices are CON: (buffered input from keyboard, output to screen), TRM: (single character input from keyboard, output to screen), KBD: (input from keyboard without echo — deleted in Turbo Pascal 4), LST: (output to parallel port), AUX: (input to or output from the first serial port), and USR: (user defined I/O routine). The equivalent standard files are Con, Trm, Kbd, Lst, Aux and Usr. Two more standard files are Input and Output, which are the defaults for input from the keyboard and output to the screen for commands like Readln and Writeln if no file has been specified.

```

/* TEST-C.C */
/* Sample variable output program in C */

#include <stdio.h>

FILE *output_stream;
char filename[20];
char choice;

main()
{
    printf("Output to (P)rinter, (M)onitor or (D)isk\n");
    scanf("%s",&choice);

    if (choice == 'P') {
        strcpy(filename, "LPT1");
    }
    if (choice == 'M') {
        strcpy(filename, "CON");
    }
    if (choice == 'D') {
        strcpy(filename, "TEST-C.DOC");
    }

    output_stream = fopen(filename, "w");
    fprintf(output_stream, "Hello World\n");
    fclose(output_stream);
}

```

*Listing 3. The example program Turbo C.*

## Turbo C

Similar methods may be used with Turbo C using FOPEN() to open a logical device as a stream (an abstraction of a file) and then printing a formatted string via the stream using FPRINTF().

Let's look at this brief, and relatively useless program. Before I hear the howls from C purists, I must state that a ladder of IF statements is neither recommended nor elegant, but is used here so that the underlying logic is more accessible to those unfamiliar with C.

After the initial comments, bracketted with /\* and \*/, come the lines which include the stdio.h header file which makes I/O library routines available, and the variables are declared. C uses streams for output to and from files, and we define a pointer to a variable called output\_stream in the line starting with File.

We then define a character array 20 characters long for the filename, and strings can be stored in this array. Beware! C carries out no bounds checking on arrays, and a careless programmer could store a 200 character string in a 10 character array, with unknown, and probably disastrous, consequences. If you change the file name for output to disk to include path descriptions, make very sure that the array is big enough and that there is some form of range checking and input valida-

tion to stop users entering a path and filename bigger than your array. We now define a character variable as 'choice', for the process of reading and storing the users choice.

In the line starting printf() we display a message on the screen, and use backslash-n to start a newline. The line starting scanf() reads a character from the keyboard and puts it into memory at the address of the variable called 'choice'. The three 'if' statements compare 'choice' to three possibilities, and use the strcpy() function to assign LPT1, CON or TEST-C.DOC to the string 'filename'. In C, 'filename == "LPT1"' does not store 'LPT1' in the 'filename' array, whereas a similar construct is valid for integers.

We now use fopen() to open 'output\_stream' for writing to the chosen device or file, fprintf() to send a formatted string to a file, and fclose() to close it. The backslash-n in the fprintf() statement is a newline character, and adds a carriage return/linefeed pair after the string as, unlike Basic, C does not default to adding a CR-LF pair.

Have fun with any of these languages — but just remember that these little programs, while able to stand alone, are merely fragments showing a concept, which can be expanded enormously by with imaginative programming. □

# SERVICES PAGE

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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 (r 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. □

## AD INDEX

Advance Peripherals .....	122,123	Computer Trader .....	9,41,154	Kenelec .....	127	Netcomm .....	132
Anitech .....	66	CTC .....	50	Mace .....	IBC,120	New .....	112
Ann Court Computer Services .....	88	Dick Smith Electronics .....	6,24	Maestro .....	75	Perfect Interface .....	147,155
Autodesk .....	OBC	Discware .....	58,59,138,139	Manacomm .....	71	Peripheral Systems .....	130
Autodesk .....	28	Dr Graphic .....	18	Megadisk .....	134	President .....	52,57,60,108
Avtech .....	121	Electronic Solutions .....	20,21	Micro Educational .....	94,95	Program Plus .....	83
Babani Books .....	145	EME .....	137	Micro General .....	43	Ribbon .....	112
		Epson .....	98,99	Micro Mart .....	53	Ritronics .....	106,107
		Federal Marketing .....	114,115	Micro-Dos .....	12	Select Software .....	38,39
		Federal Publishing .....	19,75,142	Micromart .....	105	Strobeck .....	154
		Free Soft .....	49	Microsales .....	10,11,36	Suburban Bookkeeping .....	126
		Interface Publications .....	88	Microsoft .....	IFC,3	Tech Pacific .....	111,124,125
		KCM .....	153	Mike Bourne Electronics .....	104	Utilico .....	119

## CURSORY GLANCE

I still find it amazing the number of software packages which come with a clause saying it always remains the property of the supplier. The so-called owner only has the right to use the software. What are the legal responsibilities of the supplier to the user who has taken out a licence to use the software? Given the high prices of some software and the fact that it is only a licence, I wonder what will be the result of a failure of that software when it gets into the courts.

Quite often, the software agreement is not clearly spelt out before you open the package (the opening allegedly commits you to the agreement). Also, it is standard practice with many skilled users to open their software, copy it to their hard disk, and start using the software before they even read the *manual*, let alone the fine print.

■ The Department of Communications is looking at the possibility of a giant dial-up computerised television service. Users would have access through a specialised terminal to digital images and sounds which they could have delivered to their home. The delivery would be by cable, and the batch you would order would be a film or concert. The digital recordings would mean superb quality, the difference between it and existing videotape would be like the difference between music cassettes and compact disks. The film would be sharp and colours brilliant. The sound would be full and rich with no attendant noise.

Programs such as the Australian Opera or the Ballet which are seen by relatively small audiences would be readily available to us all at realistic prices. It wouldn't be the same as being there, but it would be a lot better than what is available now. It would also mean that rock concerts could be enjoyed at better quality than if you were actually there because you wouldn't be deafened and you'd be able to bop in the aisles without being bopped by security guards.

If this comes to pass, it will take at least three years, but more probably five, because it will be delivered by fibre optic cables, and they will take a few years on current predictions. But within 10 years, we can expect to see large amounts of the metropolitan areas linked to superb entertainment. The entertainment centre which controls this will be a cross between your present computer, although more power-

ful, your present television, although much clearer and your present hi-fi. Plus you will be able to select what you want and drop what you don't, thus solving one of the biggest problems with Australian TV and radio.

■ MTBF stands for Mean Time Between Failures (about one term when I was in high school) and means how long before you have a problem. It's calculated by the manufacturer, some of whom are reliable on the subject of reliability, others aren't. Similarly, MTTR stands for Mean Time To Repair. This means the average time it takes to perform a repair on this piece of equipment. This is the time you can expect a service person to spend fixing the machine if you have a problem. It takes into account MTTA — Meant Time To Arrive, MTTWAC — Mean Time to Chat With All Concerned, MTTTCOTB — Mean Time To Respond To Calls On The Beeper and MTTDTTIBRASBRWOLHM — Mean Time To Discover That This Is Beyond Repair And Should Be Replaced With Our Latest Hi-tech Model.

■ One of the problems for auditors of companies using open-architecture machines such as the IBM-compatible computers and the Macintosh II is that a graphics card, disk drive or tape drive is not necessarily where the stocklist or inventory says it is. As a result, many companies are bar-coding their cards and disk drives and other removable items, printers, computers, screens, and so on.

■ Now you can buy a dashboard television which plays music cassettes, FM and AM radio and UHF/VHF TV programs. The screen is often very small — some are just a 5 cm black-and-white, which is not what you'd call great fidelity. Most (because of transport regulations) will operate only when the engine is stopped. The televisions have a builtin safety device which, if you try to override the ignition cut-out will destroy the chip which controls the television. Also available is a video cassette player, which allows you to have your own drive-in. Just toddle off in the car to some appropriate spot, turn on the video, and away you go. Ah, the youth of today won't know the beauty spots which made up so much of the courting rituals of the youth of the 60s and 70s. (Most of them didn't either, too busy concentrating on other spots.) The modern ones will be too busy watching Rambo Meets Bambi while Hot

Sex For Two plays on the front or back seat. Besides, the people who hang around the parking areas won't know what to watch, the couple or the screen.

I could even put one of these units on my motorbike or pushbike handlebars. I don't think I will. I can't stand screen-based entertainment at the best of times. Yes folks, you're reading a Luddite's column. My computer is a tool, my television is non-existent.

### Bootstrap

Modern historians in the USA (and probably elsewhere) occasionally come up against the problem that a lot of statistical data from the 1940s through to the mid 1970s is stored on punched cards. This makes it difficult to get at, particularly if you don't have a card reader.

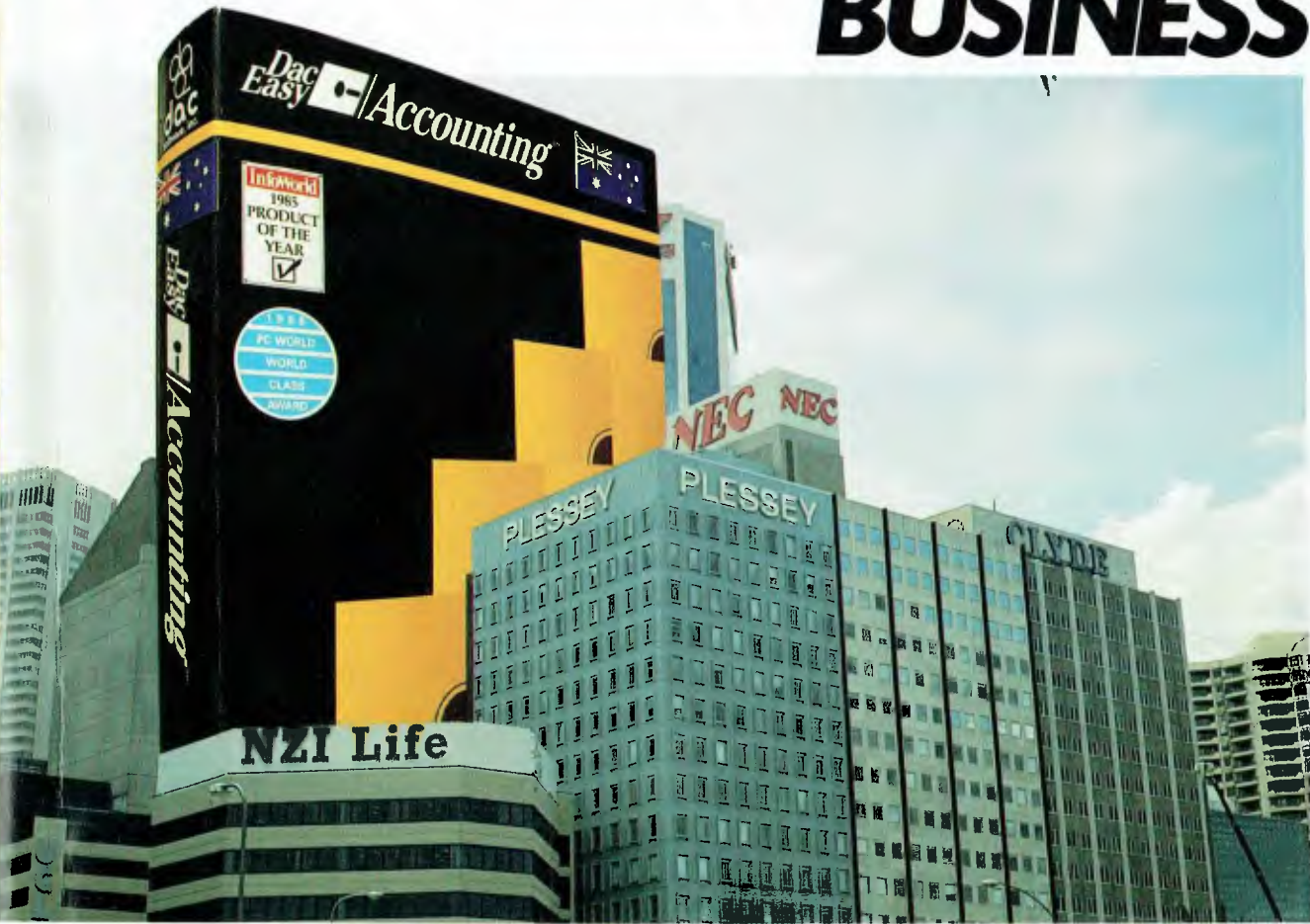
They are known as Hollerith cards after Herman Hollerith who invented the binary code used on them. The code and punched cards were first used in the US census of 1890 where they cut the processing time by two-thirds. This was a staggering saving, particularly given that the population had increased by about 25 per cent since the previous census. Hollerith received a great deal of praise for his tabulating machine. The *Electrical Engineer* magazine said: 'The apparatus works as unerringly as the mills of the Gods, but beats them hollow as to speed.'

The father of Hollerith's future wife had come up with the idea and it took ten years to develop it to a usable state. Hollerith's company went through a series of mergers and name changes, eventually forming part of International Business Machines, now known just as IBM. One of the problems with the cards was that few companies could produce a good card punch or reader. I worked for Honeywell in the mid 70s and the huge computer room had three mainframe computers and stacks of peripherals. The mainframes and peripherals were made by Honeywell, but Honeywell had to put up with an IBM punch and IBM card reader in its prestige computer room.

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Steve Panazzo, our Cursory Glance cartoonist, is on holidays and will return next month. □

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