

# Australian Personal Computer

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Two low cost  
PC-compatibles  
compared

AUSTRALIA'S TOP SELLING COMPUTER MAGAZINE



**SHARP GETS IT RIGHT**  
The 'flat screen' comes of age in a IBM PC-compatible



**NOW WITH  
80286 & Z80H**

# Universe

Security and speed of  
Software compatibility, andre

Forget conventional networking. Universe provides superior speed and security necessary in multiuser applications. Running the widest range of 8 and 16 bit software, it has the ability to network IBM PCs and workalikes in the fastest multiuser/networking microcomputer system in the world.

## Multiuser - efficiency

A single Universe runs up to 25 workstations, each with any combination of 8 and 16 bit programs. Advanced AED network technology allows expansion to 100's of users.

## Multitasking - productivity

Each operator can use any four 8 and 16 bit programs at the same time. Switching screens takes only a single keystroke.

## Networking - flexibility

Up to 255 MS-DOS machines. IBM PCs and workalikes can be linked into the Universe system using a high speed DR Net local area network.

IBM PCs and workalikes can run applications written for Concurrent PC DOS, CP/M-86 and PC-DOS, while having access to all the benefits of the network. PC users share files, records, printers and other network resources.

## Software - compatibility

Dual processor design, provides access to the world's largest software base via CP/M, MP/M and MS-DOS. With AED's new Concurrent DOS you have the best of all worlds.

DMA hard discs and the new high-speed 80286/Z80H dual processor CPU furnish performance necessary to handle multiple 8 and 16 bit programs.

### Tough

The Universe is built on a strong square tube frame.

### Stays Cool

No fancy operating environment needed. Every Universe is tested at 42 degrees C.

### Flexible

Universe accepts an extensive range of terminals, printers, modems, even electronic telex.

### Expandable

20 slot shielded S100 buss. Obsolescence proof using IEEE 696 S100 cards.



## Speed and Security - essential to your business

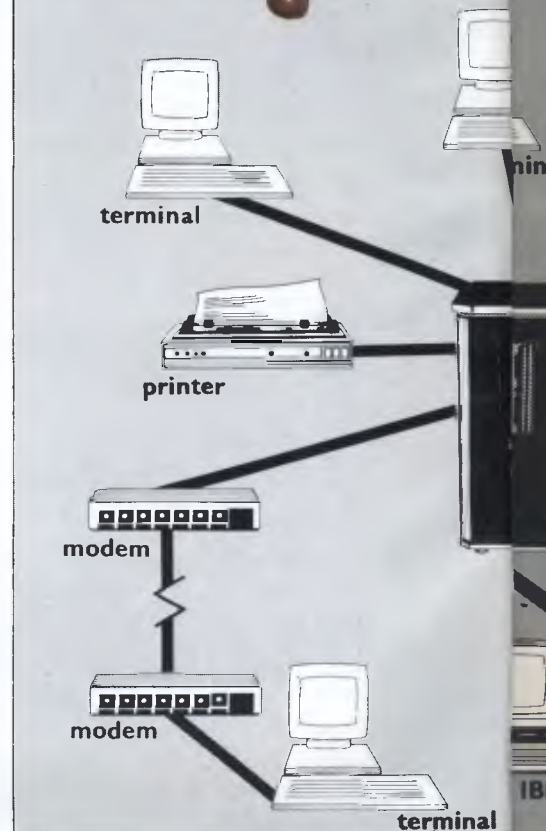
Most networks are slow and insecure. Universe shines here, with full multilevel security enhancements normally found on well engineered minicomputers. Universe is engineered from the ground up to provide facilities essential for the smooth running of a large multiuser system.

## Important Security features

Encrypted login passwords. Users are restricted to specific terminals, directory areas, programs and nodes on the network.

**File passwords.** File and record lockout and a full password hierarchy. Your System Manager can quickly and easily configure the system so that each terminal only has access to those facilities and data its operator needs. For example:

- Option to restrict any account to specific programs or workstations



# Multiuser

of a minicomputer.  
reliability of a supermicro.



#### Smart

Powerful file I/O processor makes Universe operation faster, leaving the CPU free of repetitive tasks.

#### Fast

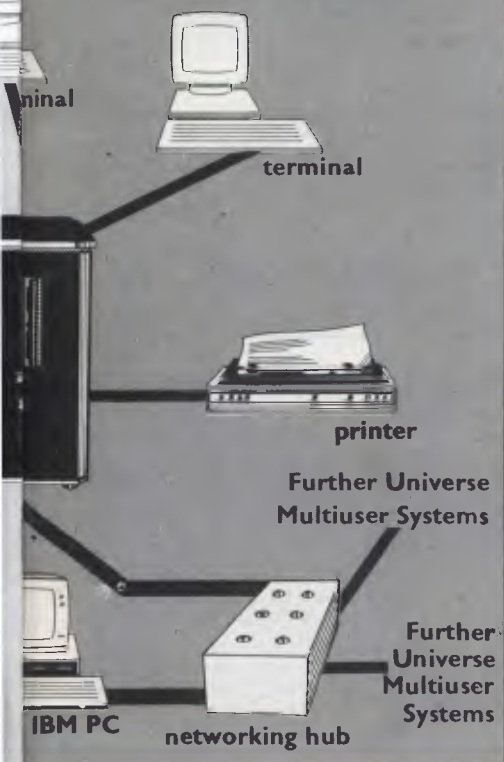
High speed (8MHz) dual processor design (80286 plus Z80H) with options for 68000, 16032 etc.

#### Durable

Ebony glass top and acrylic epoxy finish

#### Capacity

3 Winchester plus removeable cartridge totalling up to 300 Megabytes total storage.



- Files may be automatically dated for future reference. Optional timestamping shows both creation and last access.
- Optional passwords on computers within a local area network.

### Operating features

- Low cost serial terminals support both 16 bit (CP/M, Concurrent DOS, MP/M-86) and 8-bit (CP/M, MP/M II) software
- 200 character type-ahead buffer per terminal
- Fast 'hashed' directory searches
- A secure electronic mail facility. Optional electronic Telex.
- A multiuser appointment calendar
- Optional 8087 maths coprocessor
- Inter-terminal communication. Electronic mail is here!
- A programmable keys utility so users can redefine their keyboards
- Optional telecommunications with remote computers via modem

### Full Field Support

We were the first company in Australia to introduce full 12 month on-site maintenance (now extendable to 2 years at time of purchase). All service and engineering support is carried out by AED directly.

### Australia wide network

Field service is presently within 24 hours on the east coast and within 48 hours for country areas.

Our network is being aggressively expanded.

Inherent high reliability and modular construction minimize downtime and make service to the most remote locations feasible.

### Customer support

Our very first system buyer is still a valued customer. We take special pride in supporting every existing customer and in providing the highest standard of service at every stage. As part of this support, the Universe is continually being refined in response to the needs of existing customers and Australian business.



**NSW:** AED System Developments Ltd.  
Unit 3, Prospect Industrial Centre,  
2 Stoddart Road, Prospect NSW 2149.  
Ph: (02) 636 7677. Telex: AA 70664

The Computer Factory, 214 Harbord Road,  
Brookvale 2100. Ph: (02) 938 2522

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217 Northbourne Ave, Canberra 2601  
Ph: (062) 47 3403. Telex AA 62898

**VIC:** AED Computers (Melbourne).  
53 Waverley Rd., East Malvern 3145.  
Ph: (03) 211 5542 Telex AA 30624

**WA:** Computer Services of WA, 465 Canning  
Highway, Como 6152. PO Box 22 Como 6152.  
Ph: (09) 450 5888



# APC

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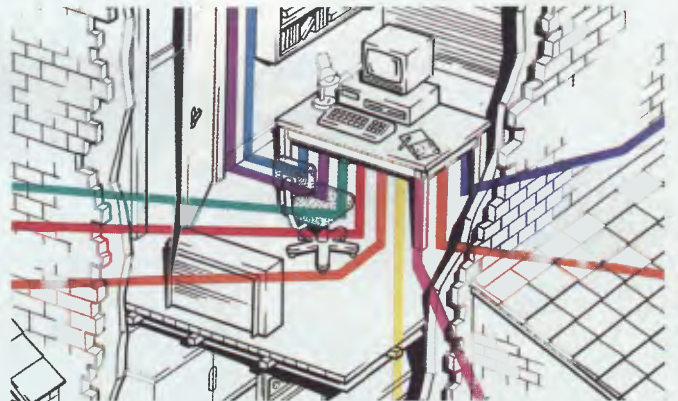
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At last! All those routines that programmers have just been failing to build into their software. Bryan Baker speaks for us all.







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**AWA COMPUTERS**

132 Arthur Street, North Sydney NSW 2060



All the news that's fit to print from APC's world-wide network of reporters.

## Mark II

Commodore has cleaned up its act and redesigned its PC. The new machine is due for relaunch in January, my sources say.

There were two main problems with the original model, I gather. Firstly, quality control on the machine was faulty; and, secondly, the system wouldn't accept add-in boards of the kind that much IBM software expects these days.

The good news is that the redesign is complete, with a new motherboard, and tried and tested compatibility with plug-ins. The bad news is that the relaunch was, at the time of writing, not entirely guaranteed.

The problem is simple: the Commodore PC was one of the cheapest imitations on the market when it was launched, and people queued up to buy it, especially in Germany. By the time the redesign is in full production, it will be unremarkable in price due to the flood of new machines coming onto the market.

As an example of how low it can go, take Dick Smith's Multitech starting at \$1395, or Tandy's Model 1000 at \$1,799, including monitor.

And there are lots of others, which a quick look at the ad pages will reveal.

Not all these new, ultra-cheap clones are worth buying.

For example, some of them, like the original Challenger, will turn out to have ROM chips with IBM copyright code in them. A good sign of this is their failure to print the copyright sign when they are switched on.

Others will be IBM computers without the IBM badge — a production run of boards which the sub-

contractor has diverted from IBM to the end-user market, and which may never be repeated. Go back for spares two years later, and not only may the 'manufacturer' prove untraceable, but the dealer may deny all knowledge of the 'former management' which 'used to sell' your computer.

Nonetheless, a good guide for the next three months, of a genuine attempt to give value for imitation IBM money, will be that a two-disk machine with display (mono) will cost \$2359, and a 10Mbyte hard disk version will cost \$3960; and that some money is being spent on advertising the things.

After that, I expect prices to collapse a bit further, as hard disks reach suppliers for well under \$200, and around May/June, when Amstrad launches a PC software machine (not a

clone, I don't expect), a single-disk system should be fetching around \$1,200, with display and 256k. *Guy Kewney*

## A rise in sight?

Bad news, I'm very much afraid, on memory prices for next winter — unless, of course, you are a semiconductor manufacturer trying to raise capital.

In brief, the American memory chip makers are about to give up and leave the field to the Japanese.

In March 1986, both Panasonic and Toshiba, according to my American source, are planning to release megabit chips, which means just eight chips to do the job that 32 do now, to provide 1Mbyte of RAM.

That release is in production volumes, not initial samples.

According to the *California Technology Stock Letter*, a resource that has never given me anything less than interesting information before, the news is good for American chip makers, because they can now 'stand and fight in other markets'.

The CTSL believes that end-user business is picking up in other markets, and that 'it seems pointless for any US company to try to compete in the RAM market with the Japanese.'

Well, perhaps, but from the micro user's point of view, it couldn't come at a worse time.

We need cheap memory. And in the past, the cost of the 64k bit memory chip has been forced down to virtually nothing by the arrival of the 256k bit chip, which in turn has had to come down to compete with its forbear.

If Japan isn't given tough competition from American memory chip makers, then there's no point in pricing the megabit chip very low.

At the same time, I see the demand for big memory increasing. It's true that current micros have tiny memories in terms of the number of chips, compared with five years ago.

But with the arrival of machines like the Amiga, that will change. Buyers of that machine will take one look at its 256k memory, burst into merry tears of laughter, and go out to buy another couple of megabytes. With today's 256k bit RAM prices, a couple of megabytes could cost as much as \$1,000, but what is that compared to the price of a business system?

And you can't squeeze more than two 68000-type applications into 256k. Even



*In espousing the virtues of its floppy disk transportation system, the distributor of this product had this to say about the hitherto previous method of disk despatch: "Opening a hand made mailer brings us face to face with the danger of bending the diskette. Even when you open the most rigid of commercial containers, the manufacturers have bent over backwards to make the thing so dustproof that it is nearly impossible to open. When it does open, the diskettes fly all over the room."*

*Anyone this strikes a chord with should call (03) 544 4000 for more details.*



512k is making it squeak rather, as any Switcher user on Macintoshes will tell you.

I'm expecting demand for memory, and shortages due to the Americans' decision to leave it out. National Semiconductor was the most recent to announce it was pulling out: others have mothballed plant or decided to build other chips.

The *Stock Letter*, by the way, is contactable through Venture Capital Management Inc, 155 Montgomery Street, Suite 1401, San Francisco, Ca 94104 USA, or on (415) 982 0125.

## Believe it or not

How can I ask you to believe the ridiculous facts of memory expansion business in the MS-DOS market, when even after careful

research, I have trouble believing it myself?

Answer: I hope you will agree that the obscurity hides two new IBM micros, to be launched next year. I'll try to explain, and don't blame me if it sounds silly, because it is.

Take the AST Ramage memory expansion board, designed for both PC and AT family machines.

Theoretically, using Ramage boards, you can now expand these systems up to 8Mbytes of internal RAM; that's roughly the same as that provided by the Lotus/Intel board.

The difference between Ramage and Lotus boards is simple: Lotus allows you to expand the data stored in the system, not the size of programs you can run.

Technically, the 8086 and family is incapable of counting memory locations beyond 65535, so it addresses blocks (of that

many bytes each) at a time. That's 64k each. To help, it keeps data in one 64k block, the program in another (it can be the same one) and the stack in another (again, it can be the same), and it has three registers to keep track of these memory blocks.

The Lotus/Intel board allows only the data register to look beyond 640k (the limit on the IBM PC). You can't put program instructions in the extra memory. Well, you can, but you have to go and get them before you can run them — and you have to transfer them into program-legal memory first, one byte at a time. It doesn't take long — less than one second per 64k byte block. In other words, in computer terms: forever.

The Ramage allows expansion of the data and stack pointers, too. And it also allows more than one 64k segment to be 'open' to the system.

Of course, it gets more amusing: on the AT, the chip inside can address 16Mbytes.

Under MS-DOS, as I've remarked, unbelievably, before, it doesn't matter if there can be 16Mbytes plugged in, and that the chip can address 16Mbytes; the limit is defined arbitrarily, and it's 640k, to be compatible with the PC.

Programs like Ashton-Tate's Framework II use the Ramage board (A-T helped design it). On an AT, you can have the Advantage board plugged in, working as a RAM disk, and the Ramage board acting as memory extension, but you can't get at the actual memory as if it were real memory, for running big programs. Which means, naturally, you can't have more than one or two large concurrent programs, either.

This is a vacuum into which Microsoft, IBM and

# What do all these magazines have in c



## They all applaud Framework.

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

AUSTRALIAN SOFTWARE GUIDE OCT 84.

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

YOUR COMPUTER DEC 84.

Framework is an excellent all-round product with few weaknesses. It offers true integration and tremendous versatility.

If you are looking for a good, flexible, all-round package, then it is hard to go past this one.

TODAY'S COMPUTERS MAY 85.

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

AUSTRALIAN BUSINESS APRIL 3, 1985.



Digital Research are all hoping to be sucked.

Don't believe analyses which line them up like boxers in a ring, with Digital Research on the side of AST/Ashton-Tate/Rampage, and Microsoft, Lotus and Intel on the other.

Microsoft has said it will support the Lotus/Intel board — but not to the exclusion of anything else. And Digital Research is not alone in believing that the Rampage standard makes more sense.

What makes analysis hard is the secrecy inside IBM.

Next year, Microsoft is going to launch DOS 5.0. Everyone says that this will sort out the memory problem with the 80286 chip — the one inside the PC/AT, the DeskPro 286, and so on. At last, we can have 16Mbytes.

So, since today we have DOS 3.1, what happened to DOS 4.0?

That is coming out in 1987, say my sources. It will extend memory to 1Mbyte, not just the 640k you get on a PC today.

Inside Microsoft, sources tell me that they don't yet know what DOS 5.0 is going to have. Ben Rosen (chairman of Compaq) on the other hand, seems to expect it by May 1986 or thereabouts.

By my sources inside Microsoft say that they really don't see how DOS 5.0 can be ready before January 87. It isn't even in test yet, they say — so how can it be ready in May?

And, more to the point, they hint that they won't know what's to be in those versions until, well, certain hardware criteria are settled.

That means, to my uneducated mind, that IBM is finalising a new machine for DOS 5.0 and another new machine for DOS 4.0.

It fits. Word is that IBM is

working on a machine with the 80186, and word is equally that IBM is working on a machine with the 80286, as central chips. It could be that there will be two machines: one a go-very-fast PC/XT, with the 186 and DOS 4.0; and the other a go-very-big multi-user machine, compatible with Xenix at program call level due to DOS 5.0.

That is the only other thing we know about DOS 5.0, by the way — that it will be Xenix V compatible.

That may be all cuckoo spit, but the alternative is that Microsoft and IBM have taken leave of all their senses, and intend the Rampage/Above board farce to continue. That's possible, too.

Guy Kewney

## Mac-Copy

Three US companies,

Osborne Computer Corp, Colby Computer and Sona Computer, have agreed to join forces to market a range of CP/M, MS-DOS and Macintosh products.

The most interesting result of this is the imminent release of one of these products — a Mac-copy — in Australia from Pacific Data Corp. Never heard of PDC? Well, it's the newly formed group title of Osborne Australia.

As well as the Macintosh work-alike, a range of other Mac products are also set to be released by PDC over the next few months. Call (02) 290 1122 for more details.

## PC compatibles slashed

The \$1,000 price barrier has been broken in the IBM PC-compatible stakes. Dick Smith, in clearing out its

## common?



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

AFR MAGAZINE SEPT 4, 1985

## Framework is now even better.

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

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

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

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

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

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

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

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remaining stocks of the Challenger (Benchtested May '84 APC), has offered the machines for sale at \$999. No monitor is included in the price, but you do get two floppy disk drives, either 128k or 256k of RAM (apparently it's a bit like a lucky dip) and the Perfect integrated package as well as Basic.

This is to make way for its new Multitech, another PC-compatible, which is priced at \$1395 including a word-processor and integrated (spreadsheet, database and wordprocessor) package, but excluding monitor.

Tandy and Commodore have also dropped their asking prices. Tandy now sells the Model 1000 for \$1,799 including monitor but no packaged software and Commodore's PC (Benchtested May '85 APC) has been dropped to \$1,999 excluding both monitor and software.

This gap between the cost of home and small business machine is narrowing quickly.

## Living in the past

Two slightly greying men called round to see me last month with two databases. One was Ben Rosen, immensely famous in the States as the chairman of Compaq, the launcher of Lotus, and a venture capitalist who used to write the best-read newsletter in the business, the *Morgan Stanley Electronics Newsletter*.

The other was a lesser light, whose name I have to keep secret until he says I can talk about it. He's American too, as it happens.

Both products impressed me enormously, and simultaneously depressed me.

The Rosen database is called Paradox. There is no question in my mind but that it's revolutionary in giving database power to the all-by-myself user. It's

designed for the Lotus 1-2-3 user, who will instantly recognise its tables, rows and columns. And even for a non-spreadsheet person like me, it looks full of ripe, easy data for the plucking.

Datafit, by contrast, looks like a professional's tool. How nice it would be, after one more call from the chief assistant to the assistant chief accountant to 'just help me sort out this little dBaseIII program I've been writing, 'to be able to sit down with Datafit, and, smiling shyly, say: 'Let's talk a bit about what sort of data you're holding,' and draw a little diagram. And after 10 minutes or so, you read the names off the diagram into the program, and have almost solved the problem.

Both programs go a good

long way towards solving one of the biggest database problems — how to get the data in there in the first place.

The trouble is that both assume that data is organised, structured, the way it is when you get data from a Lotus 1-2-3 file, or a dBase file, or something like that. Yet most data that appears on the screen of a computer isn't structured like that at all, and what would be nice would be a background solution.

The problem is simple: most computer users aren't free to spend time copying data into their databases from their text files. It's all there, of course — notes, phone numbers, addresses, references — but while the relationship between factors may be obvious when you

type a letter, six months later, it can get a bit obscure, looking through a list of eight-character file names.

The idea would be that, while you are typing away on the word processor, or receiving data from Minerva, you can mark bits of information for storage. A background program could be written on a modern micro, which would monitor the flow of information, receive marked items for the foreground job, and occasionally interrupt to expose ambiguity.

The trouble is that most micros in use today aren't modern micros, but Apple IIs and IBM PCs.

The market has slowed down because these machines are holding it back. People want more powerful machines this year than last year. Last year's micro, as you can quickly see from adverts in this magazine, is an IBM PC with an 8088 and 256k of RAM and two disks. You can get it for well under \$2,000 these days, including display.

Perhaps you doubt that things are that bad? Try counting chips.

When CP/M was first accepted as the standard of its day, home micros had around 1k to 16k of memory. CP/M, being a 'business' system, assumed 64k. You couldn't put more in because the chip wouldn't handle it.

We used chips with 4k bits in those days. Eight chips gave 4k. To get 64k you had a memory board with 16 rows of eight. That's 128 chips.

Today, we have chips with 256k bits for the same price as those 4k bit RAMs. Eight chips is 256k (well, nine, for parity). A megabyte takes 32 chips. Plug in 128 chips, and you'd have four megabytes.

No IBM PC can handle more than 640k. The processor chip is out of data, and runs out of numbers at one megabyte, with PC-DOS ignoring the last 360k. The



*This magazine's initials seem to be the 'in thing' when it comes to naming PCs. First NEC, and now Wang has produced an 'APC'.*

*Wang's 'Advanced Personal Computer' is an IBM PC/XT/AT compatible based on the 80286 processor and running either MS-DOS or Xenix. Existing Wang Professional Computer owners can upgrade by exchanging the main system board.*

*Of course Wang claims (as do virtually all PC/AT compatible manufacturers) that its APC "outperforms its PC rivals in speed, information handling capability, storage capacity and power"; but the company's main angle would appear to be its intention to port multi-user business software currently running on its 2200 range of computers to the multi-user (up to four) Xenix-equipped APC.*

*Obviously there are many APC configurations and prices, but to give you an idea of one configuration: \$10,500 will buy a 512k RAM machine with screen, a 1.2Mb floppy drive and 20Mb hard disk.*



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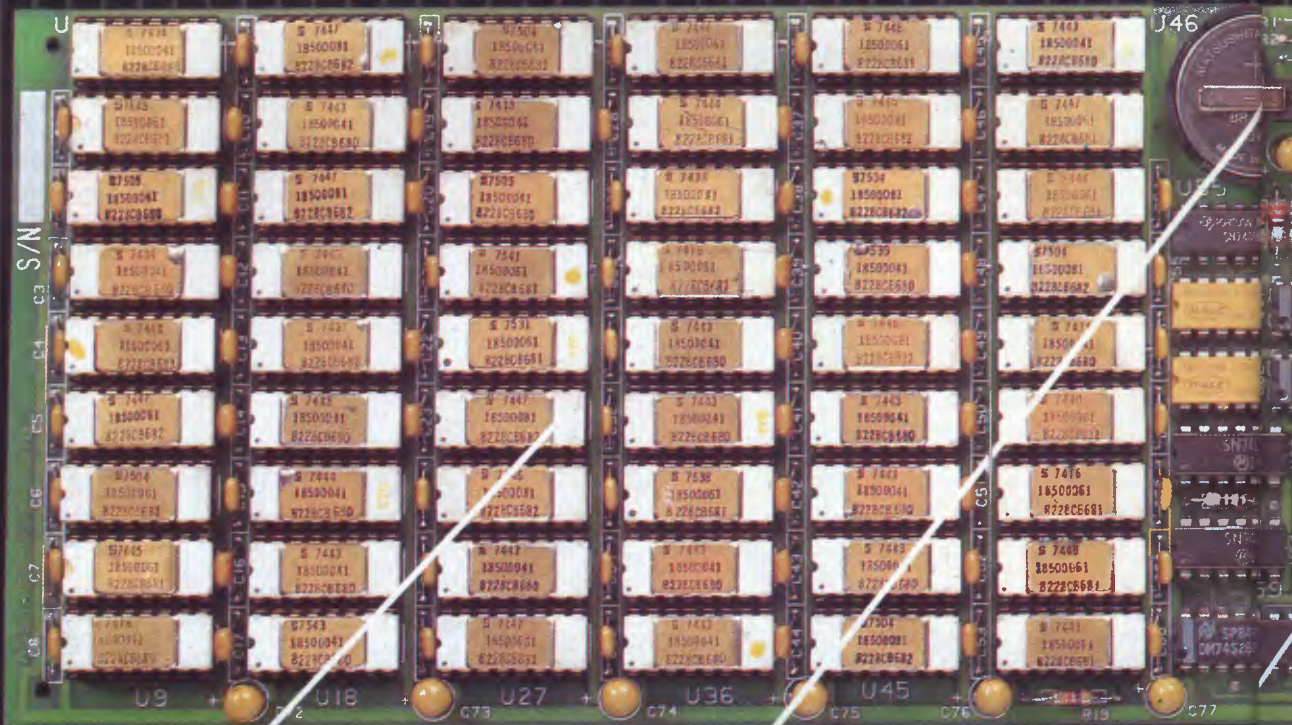
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ACTUAL SIZE



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Interface the PC to most printers or  
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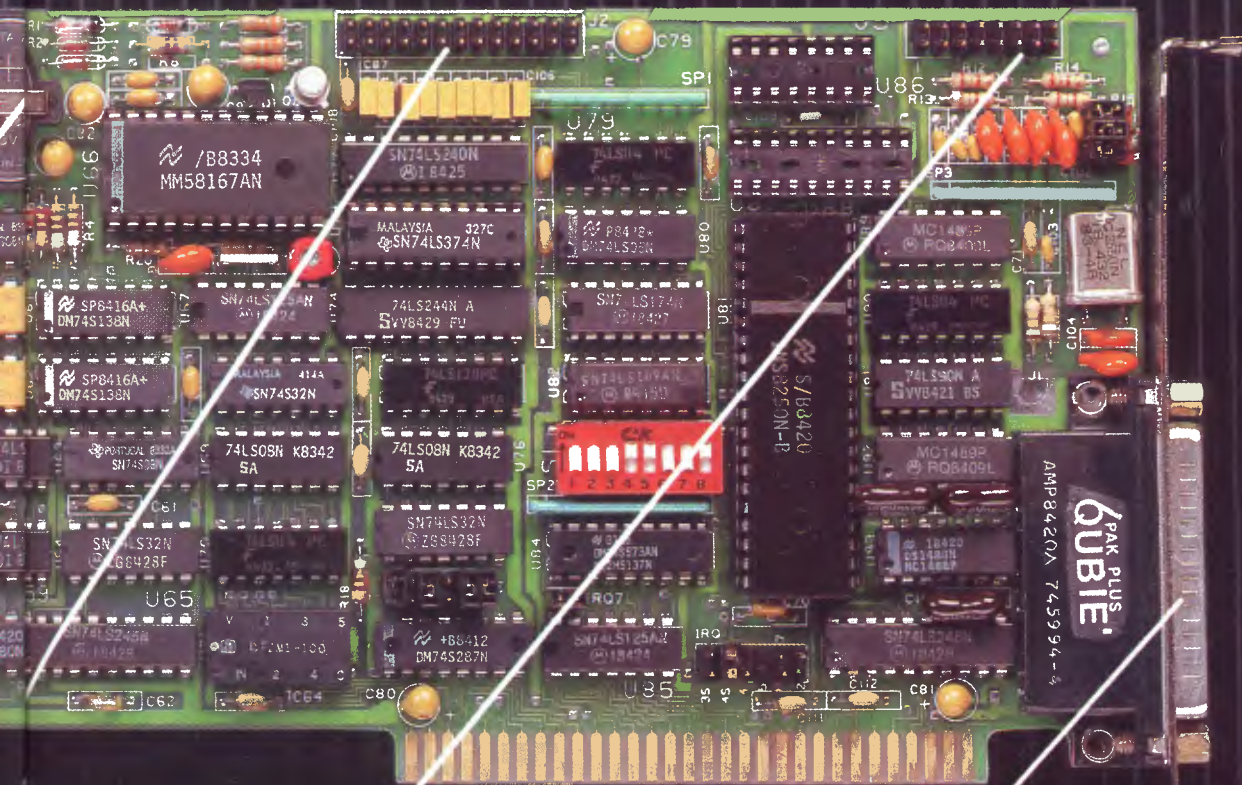
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## Take APC III



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more modern 80286 chip can, theoretically, handle 16Mbytes. By mid-1986, when the megabit RAM chip is in production, that would take up our 128 chips almost exactly — but what would be the use? PC-DOS still can't count that far.

I had lunch recently with a senior Apple executive and I was talking about my 'wish list' for the Macintosh. He hinted broadly that an enormous Mac would be on the cards for 1986 — 'perhaps a megabyte — but I'm telling them to think big and go for a 2Mbyte Mac.' Wow!

Software evolves clumsily at first. Typically, someone takes advantage of a new, big machine, to produce something enormous, slow and unreliable — but something never tried before. For instance, windows, icons, mouse; for instance, 'pop-up' software; for instance, 'integrated' software; or CAD graphics. And then clever software people try (to prove their own brilliance) to cram a similar idea into smaller, older machines. And then, the same space-cramming tricks are used on the bigger machines, and we end up with something really new.

With the hardware industry complacently milking the IBM PC for more than it's worth (see IBM's end-of-year clearance sales for evidence) it's really no wonder that the software of the future remains unwritten.

Guy Kewney

## Dick Smith's Flying Duck

Commodore has accused Dick Smith Electronics of selling "flying duck super specials". That's the description of Taiwanese products offered by Commodore in announcing price cuts to its German-made PC. But there's still \$600 difference between the competitors'

prices (in DSE's favour, and excluding any account of DSE's bundled software), so we reckon the comment is probably a result of sour grapes.

## Briefs

Microsoft will sponsor a compact disk — ROM conference from March 3 to 6 in Seattle. Chairman of Microsoft, Bill Gates, said it was time for Microsoft to bring together the leaders in this rapidly emerging field of technology. "This conference will serve as a catalyst for integrating CD-ROM technology into personal computers," he said.

Conference attendance cost is seven hundred and ninety nine tax deductible US dollars. Call Lee McLean on (02) 27 3571 for more details... Technology Corporation of Australia (formerly known as Interfaceware) is the latest in a long list of micro companies offering themselves to the public. Stock market approval for the flotation has been received for 2.8 million shares at fifty cents each. This represents just under half of the company... Users wanting to run Cobol on a PC network should call (03) 699 4511 for details of 'Austec's Commercial Environment'. It has recently been ported from Unix to MS-DOS, Xenix and IBM's Networking DOS 3.1... "As one part of a plan to further revitalise its business, ICL Australia today announced it is retrenching 75 staff" began ICL's statement on the sackings. Watch for a test of the (now trimmer) company's new multi-user micro next issue... The first automated bulletin board on Viatel is causing its operators some concern. A core of trouble-makers is taking delight in outwitting the built-in 'dirty words editor'. Quite why such a trivial task is providing such stimulation is beyond us. Tune in to Microtex on page 666, if

you'd like to know who they are... Barson Computers and Centrelease have entered into a joint venture to provide a rental scheme for Barson's products. It is expected most trade will come from the education and business markets... Melbourne PC dealer

Computers Galore has admitted selling pirated copies of AutoCad software. It has agreed to pay an undisclosed amount to Autodesk Inc. (a Californian-based firm and copyright holder of AutoCad) and Entercom, AutoCad's Australian distributor...

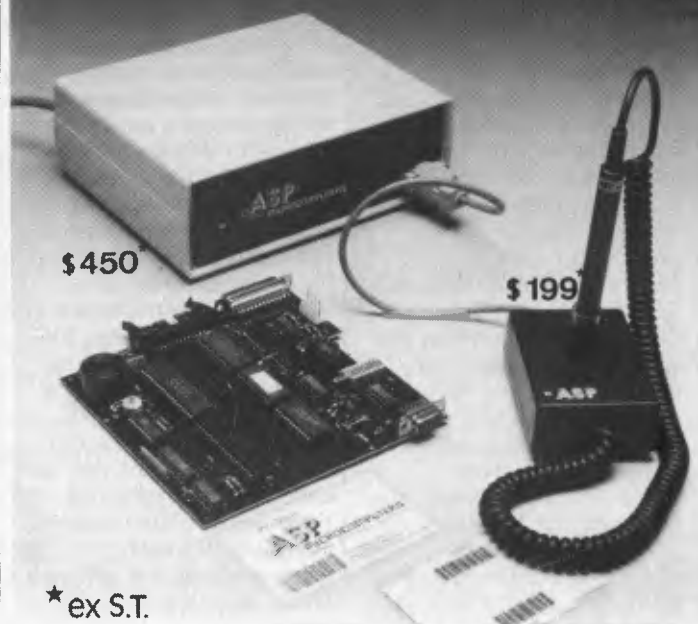


'I've been replaced by a floppy disk!'

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# Report from Comdex, Las Vegas November 1985

*Loss of confidence in the micro industry cast a shadow over the seventh annual Computer Dealers' Exposition and Conference — Comdex/Fall 85 — when it opened its doors in Las Vegas on 20 November. The number of exhibitors was down from last year's record, the number of visitors was down, and the main conference speech was called 'Surviving the Industry Downturn'. But there were still 1200 stands, 80,000 attendees, and hundreds of new products. Peter Jackson picks out the big stories, with a full report to come next month.*

## **Ashton-Tate sets the network trend**

On the opening day, Ashton-Tate set a trend with the launch of dBaseIII Plus; not with the enhancements to the existing database, but by offering local area network support.

Suddenly networks are fashionable again, following IBM's statements of what it intends to do with basaband, broadband, and token rings, and Ashton-Tate intends to keep in fashion.

Although dBaseIII Plus and the associated LAN Pack product currently support networks running under PC-DOS 3.1, Ashton-Tate president Ed Esber says that his company will support any and all networking systems including token ring and star configurations, as long as the users want them.

The \$US695 dBaseIII Plus succeeds the original version, and network support is built-in, even in its single-user form. When a

network is installed, users can take advantage of it by buying more copies of dBaseIII Plus for each node, or by paying \$US995 for a LAN Pack that lets three more users share the original copy over the net.

A new menu-driven front-end called The Assistant now shields new users from dBase's notorious dot prompt, while a screen-building utility called Screen Painter and 50 enhancements to the dBase programming language help to set up custom applications. Ashton-Tate also claims that the Plus version needs less memory (256k minimum), sorts up to twice as fast, can import data from more applications, and is fully compatible with dBaseIII.

But if Ashton-Tate delivered the first blow, other major software publishers were also giving debuts to networking applications. Old-stager Micro-Pro launched an enhanced Release 2 of WordStar 2000 at the show, capable of running on three networks including 3Com's Ethernet, while Microsoft demonstrated a networking version of Word on its stand. And Kansas City-based Innovative Software also chose the show to preview a network version of its highly-rated Smart suite. According to Innovative's president Mike Brown, his word processing, database and spreadsheet packages will be running on all PC-DOS 3.1 networks by the first quarter of next year and cost \$US1795 all-in for three users. Extra users will cost \$US595 each.

Lower down the software levels, all of this is good

news for Novell. Its NetWare networking system for PC-DOS 3.1 has just been bought in by IBM as a stop-gap to cover acknowledged problems with IBM's own PC Network product. All the new networking applications will run happily on top of NetWare.

## **Pick a card, any card**

If there were a Comdex trend in adds-ons — apart from the obvious one that all roads lead to the IBM PC — it was disk cards.

Plus Development started the trend with the HardCard, a 10Mbyte, 3½in Winchester disk drive built onto a standard PC add-on board and announced some months back. But by the time Comdex opened for business, the bandwagon was rolling.

Western Digital, noted hitherto only for making high-performance disk controller chips and boards, chose to enter the retail market at the show with FileCard, a 10Mbyte drive mounted — you guessed it — on a plug-in PC card. But like all successful workalike companies, Western Digital had enhanced the original idea by adding a piggy-back board, adding an extra 512k RAM to the FileCard. According to the company's marketing director Bruce Friesen, FileCard will sell for \$US1095 including the depopulated piggy-back board. 'We will be announcing additional solutions in 1986,' he said, refusing to be drawn on what the extras might be.

Mountain Computer also enhanced Plus' original, launching the DriveCard with a 20Mbyte Winchester onboard for \$US1195, while Tandon chipped in with a similar 20Mbyte version called Diskcard.

All these manufacturers were pushing ease of installation in IBM PCs and compatibles, and easy removal for data transfer from one machine to another. But for competitive

edges they were reduced to vying with each other over the number of slots the boards take up — either one or one-and-a-half — and over power consumption in overburdened machines.

## **Las Vegas' top strip act**

One new product that will, paradoxically, be visible in Australia before it can be used is Cauzin's Softstrip. The Softstrip is a kind of super-bar code for transferring programs and data on paper rather than magnetic media, and inventor Cauzin Systems has signed up major US computer magazines and textbook publishers who will be publishing programs in Softstrip format.

From January onwards, open a copy of *Byte*, *A+*, *PC*, *Nibble* or *Family Computing*, or a textbook from Addison-Wesley or John Wiley, and each program listing will be accompanied by a Softstrip.

To read the strips you need a \$290 Cauzin reader and the appropriate software for your machine. The reader drives its own infrared sensing head along the strip and absorbs the data, whatever it is. Cauzin was demonstrating the reader data directly into Lotus 1-2-3, and also reading Basic games programs into an Apple IIe.

Copy protection? Just stamp or write across the strip in red ink. The reader looks straight through red, but on a photocopy that shows up black.

Cauzin is backed financially by Eastman Kodak and Xerox, among others. And Kodak has linked with Cauzin to form a joint venture called Softstrip International, which will market the reader as well as Softstrip programs — called Stip Ware — outside the US and Canada.

END





# The Prince of PCs stages another coup...

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We are now able to offer unmatched low pricing on hard disk versions of the APC-III. Plus a new high speed 20 Meg hard disk. All hard disks are manufactured by NEC. They offer superior speed and reliability. Do not compare them with brands being fitted on other PCs!

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For colour add \$700.00

## Memory Expansion to 640K

We now have a brilliant new 512K

memory board. Expand the APC-III to its full 640K with just one card.

**512K memory card \$695.00**

## High speed networking for APC-III

The Novell Netware/O system is now available for the APC-III.

- Up to 16 APC-III's can be networked together, with one machine acting as a file server and print sharer for all machines.
- A high speed common bus allows sharing of files and peripherals.
- Printers may be connected to workstations or accessed via the file server. Two printers may be connected to the file sharer. Sophisticated print queuing is provided.
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## In Melbourne:

**Bayside Computer Systems**  
Suite 1, Cnr. Skye Road and Farrell St.  
Frankston. Phone (03) 781 4011

# NEC

# APC III

ADVANCED PERSONAL COMPUTER III



## VCR data storage

If you think your videocassette recorder is good only for watching classics from the silver screen or taping less-than-classics from TV, think again. Alpha Microsystems of California has developed a way for VCRs to make backup copies of data stored on a PC's hard disk.

Alpha Micro's solution is an \$1,100 printed circuit board that fits into any IBM or IBM-compatible PC and can feed data to any standard VHS or Beta format machine. Standard videocassettes can be used to hold up to 80Mb — about four times what most PC hard disks hold. Best of all, the VCR can be set to record data automatically — the same as it does with a TV show.



## China's 'Great Wall' enters the PC competition

Visitors at Comdex, the huge computer-industry trade show staged in Las Vegas in November, may not have given a second glance to the out-of-the-way booth exhibiting yet another IBM PC-clone. But this new model was different. Called the Great Wall Personal Computer, it is China's first foray into U.S. computer capitalism.

Designed and built in Beijing out of Japanese, South Korean, and U.S. components, the machine is expected to be available in the U.S. next year. Sales are already brisk in Singapore and Hong Kong, where customers like the special software that enables it to work in both Mandarin Chinese and English. Its U.S. importer, China United Trading Corp. of New York, expects the dual-language feature to be popular at Chinese newspapers. China United also cites some very familiar features: Benyuan Qian, general manager of its electronics division, says the machine is "more powerful" than IBM's PC-XT, "and will cost less, too."

## Why Ed Farris loves computer funerals

Edward Farris, president and founder of EF Industries, loves to read about computer companies in trouble. That's because his Hawthorne (California) computer-services firm has entered a lucrative market niche: servicing computer gear bought from manufacturers that either abandoned their products or went out of business. "We're an orphanage," says Farris. Since 1980 he's been acquiring entire companies or discontinued product lines from the likes of Cipher Data Products and Caelus. Last year he earned \$1.2 million on sales of \$12 million.

EF is one of the few havens around for customers stuck with discontinued computer products. And they must pay dearly for the service. Thorn EMI Screen Entertainment Inc., a Los Angeles movie company, pays EF some \$8,000 a year to maintain three small computer systems abandoned by Scientific Data Systems. Thorn's only other options were to replace its \$85,000 investment or hire an

independent technician. Of course, Ferris knows that discontinued products eventually become obsolete. As a result, he's assembled a \$20 million kitty and is always on the prowl for new lines to service. Given the current shakeout, he shouldn't lack for new opportunities.

## Xerox has an idea for selling ideas

Xerox's 15-year-old Palo Alto Research Center (PARC) has come up with some of Silicon Valley's hottest technological innovations. But many never saw the light of day, while others just bombed as Xerox products. The easy-to-use Star workstation, for example, was a marketplace loser because of its high cost and slow speed. It took Apple to make the Star's technology a commercial success — in its Macintosh.

Now, after bearing endless criticism for squandering its technological wealth, Xerox may have found a better way to profit from its research. Its in-house Technology Innovation Board, headed by William J. Spencer, former head of PARC and now Xerox senior vice-president for research, has recommended that Xerox back startups that will bring PARC innovations to market more effectively. In exchange for technology licenses and some financing, Xerox will get an equity position. The first such venture: Astra Communications Inc, which will develop ways to make Xerox's Ethernet network more versatile.



## 'Crashless' supercomputers

Tomorrow's supercomputers will consist of several processing units, perhaps even thousands. Almost everyone agrees on that. But there is little agreement on how to prevent these systems from "crashing" when two or more processors battle to use the same section of memory at the same time. A small band at Sullivan Computer Corp. are rushing to put the finishing touches on a new supercomputer, slated for unveiling in about 12 months, that is engineered to avoid such internal conflicts.

The new supercomputer will leapfrog the fastest machine now available by at least 10 times, claims President Herbert Sullivan. In some applications it could be 100 times faster. The key is a unique memory "architecture" developed at Columbia University and Chopp Computer Corp. It is totally random. Data are not stored in specified memory locations. Instead, they get slapped into the first available spot the computer finds, along with a tag that describes the contents. So, if there is a traffic jam in one part of the memory, the computer simply skips to someplace else. The fundamentals of this approach are also being incorporated into the Ultracomputer that New York University is now building.



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# Sharp PC-7000

*Sharp's reputation for building well-produced but rather quirky machines seemed to be recurring, but the PC-7000, an IBM PC compatible luggable, is definitely a step in the direction of compact engineering and speed. Peter Bright conveys his impressions.*

When the Sharp PC-7000 arrived in the APC office, it was greeted by almost total apathy from the staff. Badly hidden yawns were the order of the day.

It's true things didn't look good. Sharp has always had a reputation for building technically sound but rather strange micros. The company has been quite content to go along in its own sweet way, happily ignoring 'industry standards'.

The fact that the PC-7000 is an IBM PC compatible and is said to represent a new awakening at Sharp, didn't help my colleagues' attitudes towards the little machine. We've got IBM compatibles coming out of our ears.

However, when I unwrapped the machine and switched it on, people became interested; it looks neat, it has the world's first backlit LCD, and it's fast.

## Hardware

The PC-7000 is certainly one of the neatest IBM PC lookalike luggables I've come across so far. The system consists of three main parts: system unit, keyboard and printer (the CE-700P printer is optional). All three units are finished in cream and light grey plastic casings.

When the system is rigged for carrying, both the printer and the keyboard



clip onto the main unit. This combination can then be placed in the custom-designed carrying case, or carried by the handle built into the top of the main unit.

Together, the main unit and the keyboard measure 41 cms wide by 16 cms deep by 21 cms high, and weigh just over 8 kg. Considering what is packed inside, this is reasonable and makes the PC-7000 very easy to carry around. Adding the printer increases the depth of the system by just under 8.4 cms. More significantly, it adds an extra 5.25 kg to the weight, making the unit considerably more difficult to carry. One nice touch is that the hinge of the built-in carrying handle can be moved to compensate for the change in the centre of gravity when the printer is clipped on.

Like most machines of this type, the keyboard clips onto the front of the main casing to protect the screen. In this case, the keyboard is held in place by a couple of lugs and two catches. When the catches are released, you can remove the keyboard and access the main workings of the unit.

Most of the system unit's front panel is occupied by the LCD. To its right is a system status display with LEDs, showing whether the power is on and which disk drive is in use, as well as a backlight message which comes on when the display times out. Under this is a thumbwheel to alter screen contrast, and a concealed lever to alter the screen tilt.



*Considering what is packed inside, the PC-7000 is easy to carry.*

Running along the base of the front panel is a recess which is designed to hold the keyboard cable when the system is in transit. This has a spring-loaded lid which swings into place whenever you remove the cable.

The front panel looks very good indeed. Everyone who saw the machine commented on how neat it is and the

layout of the status lights, especially, reminded me more of a modern photocopier than a computer. The overall effect is definitely of a piece of office equipment rather than a micro.

Working around the rest of the machine, the right-hand side panel houses twin 5.25 in disk drives and a socket for the keyboard. The left-hand



*The 84-key keyboard is closer to the layout of the IBM PC/AT rather than the PC, but it still isn't truly compatible.*



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## BENCHTEST

side panel holds the on/off switch.

The rear panel is generally neat and uncluttered. As well as a power socket, it accommodates an RS232 serial port and an IBM-style Centronics parallel printer port. The review machine also had the optional colour monitor adaptor fitted, so the rear panel has an IBM RGB monitor socket. The remaining space on the back panel is for the telephone connections for a built-in modem. According to Sharp this will be an Australian manufactured unit, but negotiations with several companies hadn't been completed at press time.

One thing which is missing from the rear panel is any sign of IBM expansion ports. If you want to fit an IBM card, you will have to use the optional expansion box which sits under the main unit. This also holds a custom-designed 3.5in hard disk to make the PC-7000 into a PC/XT lookalike.

Unlike some luggables and most portables, getting inside the PC-7000 is straightforward. Indeed, users are encouraged to fit their own expansion units aided by comprehensive instructions in the manual.

The first step is to remove three Phillips screws on the top of the back panel: the panel then lifts up to reveal the

main PCB and any extras that may have been fitted. Removing an additional three screws allows you to slide the main chassis out of the casing and get at the power supply and disk drives.

The first thing that struck me when I removed the rear cover was how superbly engineered both electronically and mechanically the PC-7000 is. The main PCB measures a miniscule seven inches by eight inches, but manages to achieve more than the IBM PC with its apparent acre of space.

The main PCB is one of the most densely-packed units I can remember seeing; there literally isn't room for another chip on the board. The main processor is an Intel 8086 running at 7.3MHz, and can be slowed by software to 4.7MHz for IBM compatibility. Butting onto the 8086 is a socket for an optional 8087 maths co-processor.

To the left of the main processor is the main RAM. The entry-level machine is supplied with 384k of RAM, of which 64k is reserved for system use; the remaining 320k is available to DOS. Sockets are provided on the main board to take the total RAM up to 704k, giving a usable 640k which is the DOS maximum. All the RAM chips are 256kbit devices arranged in banks of four, giving



*The one-unit disk drives*

128k per set. To the right of the RAM is 16k of ROM which provides the IBM-compatible BIOS, as well as self-check and the set-up routines.

In its compact dimension, the main PCB also houses the disk controller and RS232 and Centronics drivers. Much of the space-saving is accounted for by two massive surface-soldered square-gate array chips in the top left-hand corner of the PCB.

The review machine was supplied with the optional IBM RGB colour graphics adaptor. The main LCD screen is already colour graphics compatible, so the add-on board just has to drive the IBM CRT screen.

Behind the main PCB, hidden away inside the main chassis, are the power supply unit and the disk drives. The power supply also incorporates a small but incredibly noisy fan. Judging by the sound of the fan, the power supply is only just up to the job, as each time the screen backlight was turned on or the disk drive was accessed, the fan slowed audibly.

The disk drives are of a very compact size. Externally they resemble two half-height 5.25in 360k IBM PC compatible drives, but closer examination showed that instead of being two disk drives bolted together, they are all one unit. Although there are two drive mechanisms, they are both bolted onto the one chassis and are both controlled by one controller board. This is the first time I've seen this, but it certainly makes sense in terms of space saving. (The drives, incidentally, are made by Canon.)

The main display on the PC-7000 is an 80-column by 25-line IBM colour graphics adaptor compatible LCD,



*All ports for all sorts, but no IBM expansion ports*



*The optional CE-700P thermal printer clips onto the back of the main unit*

# INTRODUCING IBM Compatible Hi-Res Monitors from **QUBIE'**

The HR 39 and HR 134 Monochrome Monitors are direct replacements for the IBM Model 5151 Monochrome Display. The HR 39 features a GREEN phosphor screen, while the HR 134 an AMBER screen. Both monitors plug into the IBM Monochrome Display and Printer Adaptor (or compatible) card.

The HR31 200 Colour Monitor is a direct replacement for the IBM Colour Display. It plugs into the IBM Colour/Graphics Adaptor (or compatible) card. The HR31 200 features **0.31mm dot pitch and a black matrix picture tube**. This special tube reduces glare and enhances RGB colour to ensure superb picture quality.

All three monitors include a tilt and swivel base. Use your Qubie' monitor as you would the IBM ; it will in no way affect the normal use or function of your Personal Computer.

#### Technical Data - HR31 200

**CRT Size:** 14" Diagonal (34cm)  
**Tube:** Black Matrix  
**Sync-H. Scan Frequency:** 15.7kHz  
**V. Scan Frequency:** 60Hz  
**Signal Type:** RGB I. TTL Level Positive  
 Sync H/V. TTL Level Positive  
**Display Size (H x V):** 245mm x 170mm  
**Retrace Time (H x V):** 0.5Ms x 0.4msec  
**Resolution:** 640 x 200 lines  
**Input Terminals:** 9 pin "D" type connector  
**Dimensions:** 11"(H) x 15"(W) x 13"(D)  
 266(H) x 367(W) x 318(D)mm  
**Shipping Weight:** 15.9kg



Model HR31 200

#### Technical Data - HR 39 & HR 134

**CRT Size:** 12" Diagonal (29cm)  
**Phosphor:** HR 39 (Green); HR 134 (Amber)  
**Sync-H. Scan Frequency:** 18.432kHz  
**V. Scan Frequency:** 50/60Hz  
**Signal Input:** Video - TTL Level Positive  
 Sync. H - TTL Level Positive  
 Sync. V - TTL Level Negative  
 20MHz  
**Video Response:** 203mm x 135mm  
**Display Size (H x V):** 44Ms x 18.99msec  
**Display Time (H x V):** Centre 1,000 lines  
 Corner 800 lines  
**Display Formats:** 9 x 14 matrix, 2000 characters in  
 80 x 25 format  
**Input Terminals:** 9 pin "D" type connector  
**Dimensions:** 10.5"(H) x 15"(W) x 12"(D)  
 257(H) x 367(W) x 294(D)mm  
**Shipping Weight:** 11.36kg  
**All models:** 240V AC/50Hz



Models HR 39 & HR 134

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mounted in the front panel of the main unit. By pressing a lever on the front panel, the display hinges forward on a smooth-running, silicon-dampened mechanism, which allows you to alter the angle of the display to suit yourself. The contrast of the LCD can also be altered by turning a thumbwheel on the front panel.

The main trouble with LCD displays in the past has been that they can be very difficult to read. The main reason for this is that unlike conventional CRT devices, LCDs simply reflect light, they don't glow like a conventional screen.

The PC-7000 is the first production machine I have seen that overcomes this

lighter while bright is good for light rooms. In order to save the backlighter, it automatically switches off after a preset time. As if this wasn't obvious, a 'Screen Standby' message lights up on the front panel to tell you that the screen is off, rather than faulty. Hitting any key switches on the backlight again.

One interesting point is that when the backlight is removed, you can see all the custom screen de-code controllers lurking behind the screen. It always amazes me how much logic is needed to drive these large LCD displays.

Overall, I found the PC-7000 display to be much the most usable LCD display I have worked with. As well as being easy

Shift, keys and a truly enormous Enter key. The \ has also been moved from between the Z and Shift keys at the top of the section to the left of the 1.

To the right of the qwerty section is an IBM-style combined numeric keypad and editing keys. Most of the keys in this section serve a dual function, and these functions are selected by the Num Lock key.

Along the top of the qwerty keys are 10 programmable function keys arranged in two banks of five. On IBM keyboards these are usually to the left of the qwerty section rather than above it, but the PC-7000's keyboard isn't wide enough to accommodate this arrangement. Sharp does, however, provide a key legend strip on which you can write the key functions if you are confused by the layout.

I like the keyboard layout: it makes the best use of the limited space available while still being easy to use. The Caps Lock, Num Lock and Scroll Lock keys all have built-in green LEDs to indicate when they are engaged. The one oddity is a key marked 'Set-up', which I'll look at in the 'System software' section.

The only problem with the keyboard layout is that as it doesn't slavishly follow the IBM PC format, keyboard overlays for certain PC software packages won't fit, but this shouldn't be too much of a problem if you use the legend strip which is provided with the machine.

I wasn't all that keen on the feel of the unit. It has the cheap feel of keytronic units on other PC compatibles that I have never liked, but by the same token, I know people who really like this type of keyboard feel.

The review machine was supplied with the optional CE-700P printer, which was designed specifically for the PC-7000 and clips onto the back of the main unit. The driver software in the PC-7000 was designed to take advantage of some of the advanced printing features offered by the CE-700P.

The printer is a thermal unit rather than a conventional dot-matrix unit. I've never been a fan of this type of printer. Its advantage is that it is virtually silent, but to achieve good results you have to use special thermal paper. You can use a thermal transfer ribbon, but you still have to be careful about the grade of paper you use.

Having said that in general I don't like thermal printers, I must admit that this printer is capable of very high-quality printing. It works in three modes: Draft, Near Letter Quality (NLQ) and Very Near Letter Quality (VNLQ). Only the Japanese could have thought of the last description.

In addition to the three printing

## 'One thing is certain — there is hardly a lack of competition for this machine.'

problem by backlighting the display. The Sharp backlighter works by using an electro-luminescent panel which shines out through the LCD and makes the display glow. The problem with backlighters in the past has been their short life, but Sharp has made the backlight user-replaceable.

The length of time that the backlight lasts depends on how it is used. Sharp claims an average of around 3000 hours, although the manual quotes a worst-case length of around 1000 hours.

To change the backlight, you simply remove an endcap at the side of the screen, unclip the power to the backlight and slide it out. Close up it looks like a piece of pink plastic: it's the same size and width as the screen, but it's less than 1 mm thick. To put in a new backlighter, you slide it in, plug in the power and replace the endcap.

One of the nice things about using backlighters is that you can change the screen colour simply by changing the backlighter. The light in the review machine was white and gave a black on white display, but if I had wanted, say, a green screen, all I had to do was slide out the white backlight and slide in a green one and — hey presto! — a green screen. Fiendishly cunning, these Japanese.

In terms of usability, I was impressed by the backlit display. It puts an end once and for all to the traditional LCD screen practice of trying to position the screen so that it reflects enough light for you to read. When you switch on the machine, the screen goes dark and then flicks into life, giving off a healthy glow. The brightness of the backlighter can be set under software control to either off, normal or bright.

Normal increases the life of the back-

to read, the display is fast and is perfectly capable of running moving graphics programs such as Digital Research's GEM. The only disadvantage of the backlight is that it uses a lot of power. This means that for the moment, the backlight is not suitable for battery-powered portable machines, which is part of the reason why the PC-7000 is a mains-only machine.

The keyboard is the same width as the main unit and contains 84 keys. Considering the restricted space available, it does a good job. The keyboard is connected to the main unit via a coiled cable and a couple of plugs and sockets.

The base of the keyboard has two feet which can be hinged down to alter the typing angle; you can either have the keyboard down, slightly raised or fully raised. Although the rest of the machine is IBM PC compatible, the keyboard doesn't follow the PC's keyboard layout. In effect, it is closer to the IBM PC/AT layout, although it doesn't exactly match even this.

The main qwerty typing section takes up most of the space, and features large

### Benchmarks

BM1	1.1
BM2	3.8
BM3	7.9
BM4	8.2
BM5	9.0
BM6	15.5
BM7	24.6
BM8	26.7
Average	12.1

All timings in seconds. For a full listing of the Benchmark programs, see 'End Zone'.

modes, the CE-700P can print in two built-in fonts: Elite 12-point or Courier 10. You can add two extra fonts by plugging extra ROM packs into the printer.

Font selection and print quality selection can be done under software control from the PC-7000 using the Set-up utility, although it is sometimes necessary to set a DIP switch inside the printer to select Draft-mode printing. It also supports Epson printer control codes, so it is easy to install into applications programs which need some degree of control over the printer.

As supplied, the machine is designed to print single-sheet or roll paper only. One unusual feature is that it is capable of printing up to 10 inches wide, so you can feed paper through sideways if you need the extra width.

If you use the right paper, the CE-700P is capable of very high-quality output indeed. In its Very Near Letter Quality mode, it beats some daisywheel printers I've seen — there is no trace of the dots that make up the character. The main problem is that although print quality using thermal is very good, the paper tends to look shiny and flimsy and generally tacky; if you use better paper,

you lose print quality. It's a case of swings and roundabouts.

## System software

As you would expect from an IBM PC compatible machine, the PC-7000 runs MS-DOS version 2.11. What is more surprising is that a machine from one of Japan's largest electronics companies should have to go elsewhere for its IBM-compatible ROM BIOS routines. According to the message display on start-up, the ROM routines are by Vadem Inc, late of Osborne Computers fame. It certainly is an incestuous business.

When the system boots up, it automatically takes the date and time from the internal clock. The system will happily boot from an IBM PC PC-DOS 2 disk although it won't take the system date and time.

The problem with the driver centres around the use of the Set-up key. Whenever you press this key, a ROM-based screen is displayed which allows you to change the system settings. You can do this at any time — at the DOS A> prompt, in an applications program, even

in Lotus 1-2-3. The only program in which I couldn't access the Set-up screen was in Microsoft's Flight Simulator, which isn't really surprising.

Using the Set-up menu, you can change settings for the clock, display, RS232, logical devices and printer.

The general mode of use is to use the cursor keys to highlight the setting you wish to change, and then to use the space bar to scroll through the options. For example, if you want to change the time, you select the hour or minute and hit the space bar continually until you arrive at the required time.

Using the Set-up menu to control the display settings, you can set the cursor to block, underline or underbar, and set its blink time to zero, one, two, or four seconds. You can also set the speed at which characters blink.

On the display, you can set the whole screen to normal or inverse (everything is displayed white on black instead of black on white). You can set the display controller to emulate either the IBM colour graphics adaptor or the IBM monochrome adaptor.

The backlight can be set to off, in which case the display is virtually unreadable, or to dim, normal or bright. Generally, I found normal and bright the easiest to use. Backlight timeout can be set to two minutes, five minutes, 10 minutes or permanently on.

One particularly useful feature of the set-up menu is that you can set the baud rate, data bits, stop bits and parity on the RS232 serial port as you go along. The baud rate can be set at anything from 150 to 9600 baud. If you have more than one serial I/O device fitted, the two logical I/O devices COM 1 and COM 2 can also be set.

As far as printer control is concerned, you can route printer output from the machine to the RS232 printer port or the Centronics printer port. You can also use the Set-up menu to control the CE-700P printer characteristics without any involvement from the applications program you are running. For example, if you are in WordStar and want to print in Courier rather than Elite, you hit the Set-up key and select the font. You can also use Set-up in conjunction with a DIP switch in the printer to select print quality from Draft, NLQ or VNLQ.

You can use the set-up menu to set the speaker volume and the main processor speed. The 8086 in the PC-7000 usually runs at 7.37MHz, but a few IBM applications programs rely on the IBM PC's clock speed of 4.7MHz for timing purposes. If you are running such a program, you can slow the PC-7000's processor to cope.

## Technical specifications

Processor:	Intel 8086 running at 7.37MHz
ROM:	16k
RAM:	384k expandable to 704k onboard
Keyboard:	84-key IBM PC/AT style
Display:	80-column by 25-line backlit LCD
Size:	41cms (w) x 24.4 (d) x 21.5 (h) including printer
Weight:	13.5kg including printer
I/O:	RS232, Centronics
DOS:	MS-DOS 2.11

## In perspective

One thing is certain — there is hardly a lack of competition for this machine. Most PC-compatible manufacturers have been in the luggable/desk-top market for years, and at first sight there doesn't seem to be any necessity for another contender.

This machine is important to Sharp for psychological reasons. Like Commodore and Apple, Sharp has always prided itself on going its own sweet way in terms of compatibility. This has led to a succession of machines which have been technically good, but which have been about as successful as the Coleco Adam.

Like Commodore before it, Sharp has now decided that perhaps it would be a good idea if its machine had a decent software base available, and this in turn means that the machines have to be IBM PC compatible. But unlike Commodore, Sharp has pitched in with a well-designed, technically advanced machine that would look good on anyone's desk, and which offers a significant performance advantage over the IBM PC.

The problem remains, however, that the only companies which have fared well in the IBM-compatible market in Australia are Compaq and Olivetti. Everyone else has been doing nickle-and-dime business.

Sharp has a nice machine which deserves to succeed, but I can't help thinking that the company is labouring behind the game.



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## Applications software

As you would expect from a modern, reputable IBM PC compatible machine, the PC-7000 runs the vast majority of popular IBM PC programs. Lotus 1-2-3, Flight Simulator and GEM all ran significantly faster than they do on the IBM PC, thanks to the PC-7000's updated processor and faster clock speed.

The only problem with graphics-based programs is that they look distorted on the LCD screen, as 80-column by 25-line LCD screens tend to be more than twice as wide as they are high. This means that although the pixel resolution is the same as the IBM screen, graphics have a habit of looking squashed.

## Documentation

The PC-7000 was supplied with three pre-release photocopied and bound manuals. The first was a general-purpose operations manual, the second an internal options manual, and the third is a general-purpose MS-DOS manual.

Of the three, I found the internal options manual the most helpful as it instructed me how to take the machine

apart, and had a useful technical specifications section. The operations manual also looks useful to purchasers of the PC-7000. Although my copy was a photocopy of the proof, it contained lots of useful pictures and the text was easier to understand than the usual Japanese-style English.

## Prices

The PC-7000 retails for \$3,600, including tax; the CE-700P thermal printer sells for \$800; and the expansion unit, including a 3½in 10Mb hard disk costs \$3,500. A carrying case is available for an additional \$150.

Other bits and pieces are a 128k RAM upgrade which sells for \$100; an LCD back-lighter panel (\$95); and a colour adaptor for RGB output (\$400).

## Conclusion

It's amazing how, after some time spent in this business, first impressions count for a lot. When I first saw the machine, I liked it. It looks neat and tidy; it's small and well put together, but I still think that it looks more like a photocopier than a micro.

In terms of engineering, the Sharp is

also very good. The main PCB is truly minute considering that it contains everything including the disk controller, the RS232 port and the Centronics port. The only disadvantage of the compact design is that you can't fit IBM PC boards into the basic machine — you have to buy the expansion box, but this shouldn't be a problem for most users as the parallel and serial ports, and all the memory required, are all contained on the main keyboard.

As far as I know, the backlight LCD screen represents a production first for Sharp. It certainly works considerably better than unlit LCDs, and being able to change the colour of the display at will is fun if a little trivial.

I don't know if I would buy the printer. It's nice that it is designed to fit with the rest of the system and clips onto the main unit, and the print quality is also excellent if you use the correct paper, but I can't overcome my dislike of thermal printers — even good ones.

I liked the Sharp PC-7000 a great deal. It's faster than the IBM PC, it runs the popular PC programs, and it looked ten times better. Not bad at all.

END

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# Voice Master

**Make smalltalk — or even sweet music — with your Commodore 64 with the aid of the Voice Master speech digitiser. Stephen Applebaum conducts the conversation.**

The trouble with many of today's speech synthesisers is that the time and effort required to make them say even the simplest words is extravagantly disproportionate to the result. Even some of the more expensive systems produce a voice that speaks with all the verve and clarity of a punch-drunk boxer with a glove in his mouth.

It was with some anticipation, therefore, that I awaited the arrival of Voice Master, a \$149 speech digitiser for the Commodore 64 that's claimed to reproduce sounds with almost absolute fidelity.

## In use

To use Voice Master you need a disk drive (or data recorder), and a thick skin to counteract the sardonic remarks that are bound to be hurled your way by amused onlookers. The object of their hilarity is the ridiculous Captain Scarlet-like headset that you're required to wear to input sounds to Voice Master.

To get going with the system takes little more effort than plugging a small silver box containing the encoding circuitry into the Commodore 64's joystick port two, and attaching the headset to the top of the box via a small jack plug. A program is then loaded from a utilities disk.

Prior to recording, it's necessary to calibrate Voice Master by adjusting a potentiometer in the box itself. The hardware manual suggests using a screwdriver to perform this operation, but I was lucky enough to have been supplied with a special designer tool — a thin piece of metal meticulously shaped to fit into a small hole on the front of the Voice Master.

Although there is no need to open Voice Master, it's worth it just to see the simplicity of its design. Inside the case is a printed circuit board (PCB) peppered with transistors. In between these transistors are several capacitors, a poten-

tiometer, and three chips. Towards the outer edges are three jack sockets comprising two ear-outs and one mic-in.

Voice Master's *piece de resistance* is the digitisation of sounds input through the microphone. It can also respond to spoken words, albeit rather crudely. There is also an interesting little oddity called a voice harp, but more of that later.

Familiarisation with Voice Master's capabilities is best achieved with a small demo program found on the utilities disk. Short but sweet, this program gives easy access to the hardware's recording and playback functions, as well as allowing you to slow down, speed up or add echo to your recordings.

Although effective as an introduction, 'demo' is extremely limited, and ambitious users will want to move on to more complex activities such as adding speech to their own programs. To this end, a small machine code utility called VM2.1 has been provided.

There are several ways of loading VM2.1, but the simplest is to type:  
LOAD "VM2.1",8,1 (RETURN)  
SYS 49152 (RETURN)  
NEW (RETURN)

These few lines load the VM2.1 code into memory at location 49152 (C000 hex), somewhere between the computer's random access memory (RAM) and Basic read-only memory (ROM). However, this method should not be used if there is already data in the Basic work area, as it will all be erased by New. But don't despair — VM2.1 can be loaded from within a Basic program, although the method for doing so is rather more complicated than that shown.

## Recording

To record a word, put on the headset, type LEARN n (where n is a number in the range 0 to 63) and talk into the microphone. As you speak, the Com-

modore's display goes blank, indicating that Voice Master is recording your utterance for posterity.

Playing back a recording involves using the command Speak. Similar in syntax to Learn, Speak also needs a number after it, to tell Voice Master the word that you want to hear. If, for example, you've recorded the word 'hello' as Learn 6, you'd type Speak 6 to hear it spoken.

Both Learn and Speak are recognised as legitimate Basic commands, and, therefore, can be included within a user program. The following two short listings give examples of how Learn and Speak can be incorporated into your own programs. The first is a routine to produce a screen prompt, asking the user to input a word; the second simply runs through the vocals recorded in the first.

### Program 1

```
10 FOR M=0 TO 63
20 PRINT "SPEAK WORD NO.:"; M
30 LEARN M
40 NEXT M
```

### Program 2

```
10 RESTORE
20 READ N
30 SPEAK N
40 GOTO 20
50 DATA 0,1,2,3,4,5,6,7 ..... 63
```

The speed at which Voice Master speaks is defined on a scale between 0 and 10. Normally, a word will be spoken with the default value of 6, but this can be altered to either speed up or slow down the intonation, using the command Speed.

Unlike Speed, which operates on pre-recorded speech, Rate alters the speed at which a word is recorded. Usually a word will be recorded at 7100 bits per second, but can be changed, along with Speed, to play back a phrase faster and with natural pitch.

The command New, as mentioned earlier, leaves digitised words in memory



but erases all your Basic statements. Clear, on the other hand, is rather more drastic, wiping out both. Space-conscious programmers will find Clear useful though, as it can set aside chunks of memory for the storage of words.

Like all the Voice Master commands, Clear must be followed by a number, this time in the range 16 to 160; this number signifies the memory location for the new text. For example, if you were to execute the command Clear 160, you would actually be telling Voice Master to start loading a new vocabulary at memory location  $160 \times 256 = 40960$  (which, incidentally, is the Basic workspace, giving the user maximum room for Basic programs).

One of Voice Master's major advantages is that words recorded with it can be played back on any Commodore 64, as long as VM2.1 is present in memory. In other words, even users who do not own the digitising hardware can utilise the speech in their programs.

Apart from recording straight speech, Voice Master, aided by a neat utility called Voice Harp, can turn your senseless verbiage into music. Not only that, it

can even reproduce your musical score on hard copy.

### Sub-programs

Voice Master comprises three sub-programs, the first of which is called Hum-Along. On loading, Hum-Along presents the user with a menu made up of 19 options. The first eight are pre-set sounds which can be manipulated to represent different instruments, and are then saved to disk. By selecting one of the sounds and humming into the microphone, you can create a simple melody using one instrument. In the main, Hum-Along does little more than allow you to perfect the sounds of an instrument or become accustomed to the system.

Far more interesting than Hum-Along is a program called Composer. This has an advantage over the previous utility in that it allows users to construct whole songs and save their efforts onto disk. In addition, a Write mode gives a visual representation of the tune being constructed, in full musical notation.

Writing a song means humming, whistling or dah-dah-dahing into the

microphone, a process which is best performed in a quiet, and preferably empty room. During your — hopefully unwitting — performance, a musical staff slides across the screen with the appropriate notes appearing along its length. When you've finished, mistakes can be corrected in Edit mode and your full score printed out on a dot-matrix printer.

### Conclusion

At \$149, Voice Master is an affordable leap forward for speech reproduction on the Commodore 64. Unlike phoneme-type devices, which always seem to babble away in a monotonous and neutral tone, Voice Master is able to differentiate between male and female voices, as well as capture the speaker's accent.

Voice Master is an excellent peripheral for both the serious user and those who merely want to dabble.

For more details contact: Pactionics, 404 Church Street, Parramatta, NSW, 2150. Tel: (02) 630 8555.

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# Apricot XEN

*Apricot has had its fair share of problems, but, undaunted, is retaliating with the XEN — a fast, powerful competitor to the IBM PC/AT. Peter Bright puts Apricot's 'great white hope' through its paces.*





Lately, Apricot has been going through something of a bad patch, with a write-off for its portable machine and a declining share price. However, when IBM launched its PC/AT business micro with its powerful Intel 80286 processor, it was only a matter of time before ACT would respond with its own 286 machine.

Now it has done so with a machine which is claimed to be significantly faster than the AT, and which comes with either 512k or 1Mbyte of RAM as standard, Microsoft Windows, and bundled applications software at an entry-level price of \$6,000.

## Hardware

Visually, the Apricot XEN is a very striking machine. The main system box is a split-level unit with a low-profile front panel. In fact, it looks suspiciously like two Apricot F1s stuck side by side. The monochrome monitor unit is very large and of a strangely angular design; it is so large, it completely dominates the machine's appearance. Like the monitor, the keyboard has a distinctly angular look, with the top left-hand chopped off. All three units are finished in cream and made of injection-moulded plastic.

In addition to the three main units, the XEN also comes with a large black external power supply box which should be placed somewhere out of the way. Usually, business micros house their power transformers inside the main system unit, but it wouldn't have fitted inside the XEN without increasing the height of the main box. Initially, I found the idea of an external power supply annoying, but once the machine was set up on my desk I must admit I forgot it was there.

One of the first things to worry me was the lack of rigidity in the XEN's plastic casings. Although the review machine came with pre-production plastics, they look and feel similar to those on the Apricot F1, which has always been a flimsy machine. The result is that the monitor wobbles alarmingly when placed on top of the main system unit; this isn't what I would expect of a \$6000 plus machine.

The main system box is a commendably small unit measuring just 8cms high by 38cms wide by 37cms deep. The height rises to just under 10.5cms at the back. Much of the space-saving is achieved by using the external power supply.

The front panel houses either one or two 3.5in disk drives depending on the model you choose, as well as four LEDs



*The Apricot XEN system box*

marked 'FD', 'HD', 'VOICE' and 'POWER'. If you have a hard disk fitted, it lives behind the front panel and isn't visible from the outside.

The left-hand side panel houses the keyboard socket, while the right-hand panel houses removable covers to allow the connection of the optional IBM PC expansion card box.

The rear panel is relatively uncluttered and houses an on/off switch, a 15-way D socket for the power supply input, a Centronics printer port, an RS232 serial port, and a regulated low-voltage output port. In addition there are covers for six Apricot expansion cards, of which one was used for the display card.

If you want to add or remove an expansion card, the top cover on the system box contains a removable lid so that you can get at the slots without opening up

the rest of the system box. Assuming that you want to get right inside the main system box, you simply remove two screws and slide off the top cover and back panel.

The main PCB is large and occupies all of the available floor space within the system box. It contains all the necessary circuitry except for the display driver, which uses up one of the expansion slots.

The front of the machine is dominated by the cages for the disk drives. Three bays are provided, allowing you to add an extra hard disk. The main PCB houses all the driving circuitry for the I/O ports as well as the main processor RAM and ROM. The six expansion slots are Apricot PC compatible, so you can plug in a variety of standard Apricot cards.

The main processor in the XEN is an



*The XEN's imposing hybrid keyboard*



Intel 80286 running at 7.5MHz. A socket is also provided for the 80287 maths co-processor for maths-intensive applications. Standard RAM for the twin-floppy machine is 512k, while the hard disk machine comes with 1Mbyte as standard. RAM boards stack on top of each other out from the main PCB, giving a Tower of Babel effect. Total RAM can be extended to a maximum of 5Mbytes. The ROM contains what ACT claims is the final version of its BIOS, version 3.1.

One of the interesting features of the XEN is that it uses fast, no wait state RAM. The 80286 pipelines its instructions by loading more than one machine code instruction from RAM at a time. While it is processing one instruction, it can be preparing the next.

On machines with slower RAM access times such as the IBM PC/AT, the processor often has to wait for the RAM to get its act together. The fast RAM on the XEN means that the pipelining is not interrupted by wait states, so the processor throughput and performance is correspondingly higher.

driver software, the XEN could be a useful voice and data communications tool. Unfortunately, these add-ons were not available at the time of writing.

The second major add-on for the XEN is an optional external box which allows you to plug in two IBM PC expansion boards. ACT maintains that the main demand for these will be in vertical market applications where the cost of converting existing IBM PC expansion cards to the Apricot format would be too high.

One of the XEN's advantages is that it is available with a wide range of displays. The trouble is that each monitor needs a different display adaptor card.

Four monitors are available. At the bottom you could use the existing green screens from the Apricot PC range. Next up is a high-quality 800x400 pixel paper-white P4 phosphor screen for high-quality monochrome displays. As far as colour is concerned, you can either have a medium-resolution 640x200 pixel four-colour display or a high-resolution 640x350 pixel 16-colour display.

scanning flicker could become noticeable. The Mac and the XEN get around this by using a 60Hz scan rate instead of the usual 50Hz.

The result is that the XEN achieves an impressive display: word processing, for example, benefits enormously from the black-on-white display. The only slight niggle is that icons and letters on the white monitor can look slightly elongated, as if they were originally designed for a display with a different vertical/horizontal pixel arrangement to the 800x400 pixel XEN screen.

The only other problem with the review monitor was that the display was slightly ragged along its edges. I assume that this was an adjustment problem on the pre-production monitor on the review machine, and that production units won't suffer similarly.

The keyboard on the XEN is an imposing unit. In fact it is something of a hybrid, incorporating features from both the Apricot PC and the IBM PC/AT keyboards.

The keyboard connects to the main unit via a short coiled cable and a clip-in plug. The cable is so short that using the keyboard contains two connection ports, one for the Apricot mouse and one for a microphone to allow for the addition of speech recognition at a later date (let's hope that when it comes, it performs better than that on the Apricot Portable!).

It's good to see that Apricot has ditched the infra-red keyboard link used on the Apricot F range, and returned to the old-fashioned coiled cable for the XEN. Invariably the only way I could use the F keyboards was with the light pipe, which was like having a cable anyway.

The keyboard contains 102 keys arranged in five functional groups. The main qwerty typing section takes up about three-quarters of the width; to its right are the editing and cursor keys, and to their right is the numeric keypad.

Running along the top of the keyboard are two groups of function keys. To the left there are 10 function keys which give some degree of compatibility with the IBM PC/AT. To the right are six more function keys, and an LCD microscreen to keep compatibility with the Apricot PC keyboard. The microscreen on the XEN has the advantage of being backlit, so the screen glows blue at night.

To give the IBM function keys something to do when they are not required for IBM-style applications, they are also marked 'Help', 'Undo', 'Repeat', 'Calc', 'Voice', 'Print', 'Intr', 'Menu' and 'Finish'. This allows them to be used with some of the bundled Windows applications programs.

Although the keyboard has some IBM touches, the overriding influence is

*The 80286 pipelines its instructions by loading more than one machine code instruction from RAM at a time. While it is processing one instruction, it can be preparing the next.*

Initially, the XEN will be sold in two configurations. The entry-level machine comes with twin 720k 3.5in microfloppy disk drives. The more expensive version will have one 3.5in microfloppy and one 3.5in 20Mbytes hard disk. An optional second 20Mbytes hard disk can also be added, bringing the total to 40Mbytes. In addition, an optional external 5.25in IBM PC compatible disk drive is available to allow data interchange with IBM PCs.

In use, both the floppy disks and the hard disks are very fast indeed. In some cases, the XEN floppy disk is actually faster than the hard disk on an IBM PC/XT. The only complaint with the hard disk is that it is rather noisy in use; however, this has to weigh against the fact that the XEN hard disk is easily the fastest hard disk installation I have come across.

One novel feature of the XEN is that it will shortly be available with an optional telephone handset and communications hardware and software. The handset is designed to blend in with the rest of the system, and clips to the left-hand end of the keyboard. When this is combined with the optional modem and special

The review machine was supplied with the 800x400 pixel white P4 phosphor screen, which is the unit most likely to be supplied with the majority of machines.

The XEN white monitor is one of the largest 12in monochrome displays I have seen. The tube is angled upwards slightly from the rest of the unit, which gives it a strange banana-shaped look. The whole thing rests on a puny tilt/swivel stand which is too small to give the unit any stability. Brightness control is provided in the shape of a rotary knob on the left-hand side of the unit.

In use, the quality of the display is very high indeed. The purpose of using a paper-white display is to give the machine a Macintosh-style look when it is running with Microsoft Windows, so instead of displaying white characters on a black background like most business micros, text and graphics are displayed as black on white — just like a piece of paper.

The problem with doing this successfully is that you need a high-quality monitor. The danger is that with so many white pixels switched on at once, the

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from the Apricot PC. The primary nods towards IBM are the welcome addition of a large Return key and the addition of 'ALT', 'PGUP', 'PGDN', 'END', 'SYSREQ' and 'PRTSCR' keys.

The overall feel of the keyboard is slightly strange. The keys have a 'switchy' light feel. The F and J keys in the qwerty section and the 5 key in the numeric pad all have raised centres, so touch-typists can easily find them.

I wasn't greatly impressed with the feel of the keys — actually typing on the keyboard can be very noisy, but it did make for fast typing, even if it weren't to my personal taste.

Given that the XEN is bundled with Microsoft's Windows, it follows that a mouse is a necessary part of the system. The review machine was supplied with a XEN version of the standard Apricot mouse/trackball.

Originally the Apricot mouse was designed for use with the F range, which uses an infra-red light link rather than a cable to link the mouse and the main unit. The XEN doesn't use this infra-red system, so Apricot has removed the infra-red part of the mouse and replaced it with a cable which plugs into the keyboard.

The Apricot mouse has never been one of my favourite pieces of equipment. It is designed to be used either as a trackball or as a mouse, and to run around the table-top. I have never successfully used it as a mouse, and I find the trackball arrangement cumbersome and difficult to use. An additional problem with the infra-red version is that the signal was occasionally interrupted, and the cursor on the screen developed a will of its own.

By using a cable rather than infra-red, the XEN gets around the signal problems, but I still found that the unit some-

times failed to register in the vertical plane. Apricot still maintains that it likes its mouse and finds it easier to use than a traditional mouse; all I can say is that I don't.

Luckily, the Windows driver in the XEN supports a Microsoft mouse as well as the Apricot mouse. I quickly ditched the Apricot unit and plugged a Microsoft mouse into the RS232 port in the back of the system unit. This was a vast improvement, but it did mean that I couldn't use the RS232 port for anything else. I hope it won't be too long before an enterprising third party makes a proper mouse to plug into the keyboard to replace the Apricot unit.

## System software

At the time of its launch, the XEN will be supplied with MS-DOS 3.1 and Microsoft's Windows user-friendly interface. In the coming months, a version of the Xenix multi-user operating system will be made available to allow up to 16 users to be hooked into the main unit.

Xenix is Microsoft's version of Bell Labs' Unix operating system. It is also the multi-user operating system which was scheduled for the IBM PC/AT, but which IBM has so far failed to release. The XEN implementation of Xenix will take advantage of the processor modes and RAM capability which can't at the moment be accessed by MS-DOS.

MS-DOS version 3.1 is the standard 80286 version of the operating system as used in the IBM PC/AT. In fact, it's a disappointing version of the operating system, and can't take advantage of the more powerful processor commands or the extended RAM available on 286 machines.

The review machine was supplied with MS-DOS 3.1 and Windows. When the



Four monitors are available

machine is switched on, it displays the Apricot logo, the ROM version number and the amount of free RAM. It then tries to boot off a floppy and if it can't, it loads from hard disk.

To get into Windows, you can either set it up to Autoexec or call it from MS-DOS. The choice of Windows as the operating environment for the XEN rather than Digital Research's GEM is an interesting one. Apricot computers have the ability to run both GEM and Windows; indeed, Apricot bundles GEM with the F series.

While both GEM and Windows set out to make micros friendlier and easier to use, they tackle the problem in different ways. GEM uses a graphical approach, which sits on top of the operating system and provides a user interface which looks very similar to that on the Apple Macintosh.

The Windows approach is very different. In terms of the graphical user interface, it isn't as easy to use as GEM. The window size is automatically set by the system, and windows can't be dynamically resized as in GEM. Information is generally presented as text, rather than as graphics.

However, the one overriding advantage of Windows is that it is concurrent and has the ability to run more than one program at the same time. This is no small achievement when you consider that it is sitting on top of a distinctly single-tasking operating system.

On less powerful machines such as the IBM PC, the ability to run more than one program at a time is no great advantage: the IBM PC has enough trouble running one program at a time — let alone two or three. But on a powerful machine like the XEN, this concurrent ability is perfectly usable and extremely useful.

To take advantage of the no wait state architecture of the XEN, Microsoft has rewritten parts of Windows with the result that the XEN implementation is



The 'relatively uncluttered' rear panel features six Apricot expansion cards



claimed to be the fastest anywhere. This certainly held true on the review machine, when I could run three or four programs with no noticeable degradation in performance. The ability to run more than one program simultaneously is especially important if you opt for the optional communications hardware and software. In this kind of application, it is important that the system is monitoring the phone lines at all times, even when you are doing something else.

At one stage, just to be spiteful, I had 41 tasks running on the machine. The XEN handled it OK, but it was pitiful watching the poor machine trying to work out what to do next.

In general, the XEN implementation of Windows is impressive. The white display does a great deal to help make the implementation look better, but it was the speed of the system that impressed me the most. With a fast processor coupled to a fast hard disk, you can forget just how much work the machine is really having to do.

## Applications software

The XEN is also supplied with a range of applications programs, written by Microsoft, to take advantage of the Windows environment.

The full list of applications included with the machine is: Write, Paint, Terminal, Cardfile, Calendar, Notepad, Calc, Clock, Clipboard and Reversi. The great thing about most of the applications is that they are integrated in much the same way as applications on the Macintosh: for example, you can copy a picture from Paint into the clipboard and then paste it into a Write document. Consequently, the XEN is a very powerful and productive tool from the outset.

The most impressive of the bundled applications programs is Write, which is a graphics-based word processor with heavy MacWrite overtones. You can display text in a number of fonts and point sizes, and they are displayed on-screen as they will appear on the printed page. All the usual word processing functions are contained in pulldown menus at the top of the screen, and you can paste in information from other applications.

A feature of Microsoft Windows is that it supports a wide range of fonts and printers. The XEN was supplied with a long list of printer drivers which can be assigned to the I/O ports at will, using the utilities supplied with the machine.

All printing from Windows on the XEN is done via a print spooler, so different programs can queue their print and then get on with something else. The spooler

can be displayed in a window, so you can see how many print jobs are in the queue and determine what to do with them if they go wrong.

The Paint program is fairly standard sub-MacPaint program, with the advantage that it does work in colour if you have a colour display. Font point sizes are selectable up to 96-point, and you can perform the usual drawing and filling associated with this type of program.

Terminal is a standard VT100 emulation program which is useful for connecting the machine to remote systems. Although it can save incoming text to disk, it doesn't have any sophisticated file transfer protocols such as Xmodem.

Cardfile is a simple and extremely easy-to-use graphical database. In formation is presented graphically as a set of cards stacked on top of each other. Each card has a name at the top which is the index. Underneath, you can have free-form text or a picture, or both overlaying each other. Data can be retrieved by either clicking on the card you want, or by selecting 'Goto' and the name of the card. If all else fails, you can do a string search through the text of the cards.

Calendar is a simple time management package with which you can view your calendar, either by month broken into days or by day broken into hours. The graphical interface is used well, with scroll bars and arrows being used to move you from day to day or hour to hour.

In terms of applications programs which were not written specifically for the machine or for Windows, the XEN is meant to be totally compatible with programs written for the Apricot PC. It is

also meant to be moderately compatible with programs written for the IBM PC if you use the IBM emulator provided with the machine.

I then tried Microsoft Word, which ran fine once I had installed the GSX drivers into the machine. All the generic MS-DOS applications I tried such as SuperCalc 1 and Superwriter worked fine too, as did GW-Basic which is bundled with the machine.

My main problem running non-Windows applications programs under Windows was that it wasn't possible to have a non-Windows application running in the background as an icon. Neither could I make the Windows PIF editor work, so I couldn't customise the PIF files relating to these programs. Apricot says that it is aware of these problems and the release versions will be OK.

## Documentation

As is often the case with reviews, the

## Benchmarks

BM1	0.3
BM2	1.1
BM3	2.7
BM4	2.7
BM5	2.9
BM6	5.2
BM7	7.9
BM8	8.3
Average	3.89

*All timings in seconds. For a full listing of the Benchmark programs, see 'End Zone'.*

## In perspective

This machine is a significant product for Apricot. Over the past year, the company has been drifting down-market into the areas where margins are lower and where competition is more fierce.

The Apricot range has grown large and confusing. Software is being used to differentiate the individual models, and there is a marked lack of software compatibility across the range. Apricot took advantage of the machine's launch to cut the number of Apricot Xi models, and the XEN marks a return to Apricot's traditional higher-value, business desk-top markets.

In terms of specification and performance, the obvious competitor for the XEN is the IBM PC/AT. They both have 80286 processors, both run MS-DOS 3.1, and both claim that they will run Xenix. However, Apricot is at pains to point out that in terms of its pricing, the XEN is competing with the lesser IBM PC/XT rather than the more expensive AT. By pitching the machine in this way, Apricot can emphasise both the performance advantage over the PC/XT and the price advantage over the PC/AT.

Apricot has a lot riding on this machine; the Apricot PC and Xi are getting old, the F range doesn't have the kind of margins the more expensive machines have, and the Apricot Portable hasn't sold. In terms of performance and value for money, the machine deserves to succeed; let's just hope it doesn't have the same niggling problems that have beset Apricot computers in the past.

## Technical specifications

Processor:	Intel 80286 running at 7.5MHz with no wait states.
RAM:	512k or 1Mbyte, depending on model. Expandable to 5Mbytes
ROM:	16k
Keyboard:	102-key hybrid Apricot Xi and IBM PC/AT layout with microscreen
Display:	Optional 800x400 black on white; 800x400 green on black; 640x200 four-colour; or 640x350 16-colour
Mass storage:	Twin 720k 3.5in microfloppies or one 720k and one 20Mbytes 3.5in hard disk
I/O:	RS232, Centronics, six Apricot expansion slots
Operating system:	MS-DOS 3.1 with Windows or Xenix
Bundled software:	Write, Paint, Terminal, Cardfile, Calendar, Notepad, Calc, Clock, Clipboard and Reversi

documentation for the XEN wasn't available at the time of writing so I don't know how good or bad it is. Judging by past experiences with Apricot, it will probably be glossy, colourful and have lots of pictures.

### Prices

As this issue went to press Barson Com-

puters hadn't finalised prices, but those below are fairly accurate approximations.

Initially, the XEN will be available in two configurations. The 720k dual-floppy machine with 512k of RAM will sell for around \$6,000, and the machine with one 720k floppy, one 20Mbyte hard disk and 1Mbyte of RAM will sell for \$10,000.

As far as monitors are concerned, the paper-white 800x400 pixel screen and adaptor cost \$1,100, and the green screen and adaptor cost \$700. For the colour monitors, the medium-resolution 640x200 monitor and card cost \$1,400, and the high-resolution (640x350 in 16 colours) monitor and card cost \$1,995.

### Conclusion

I can't come to terms with the casings. If I were to pay \$6,000 for a machine, I would expect it to look and feel solid and dependable. With the XEN, I was worried that the monitor would disappear through the top cover.

Apricot swears that the casings are as good, if not better, than those on the Apricot Xi. All I can say is that it doesn't feel like it. The main unit could definitely do with an internal metal brace to support the monitor.

At the end of the day, I have to rate the XEN as very good simply due to the way in which the fast hardware and the concurrent software are combined in one box at such a competitive price.

END

# APRICOT XEN

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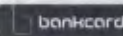


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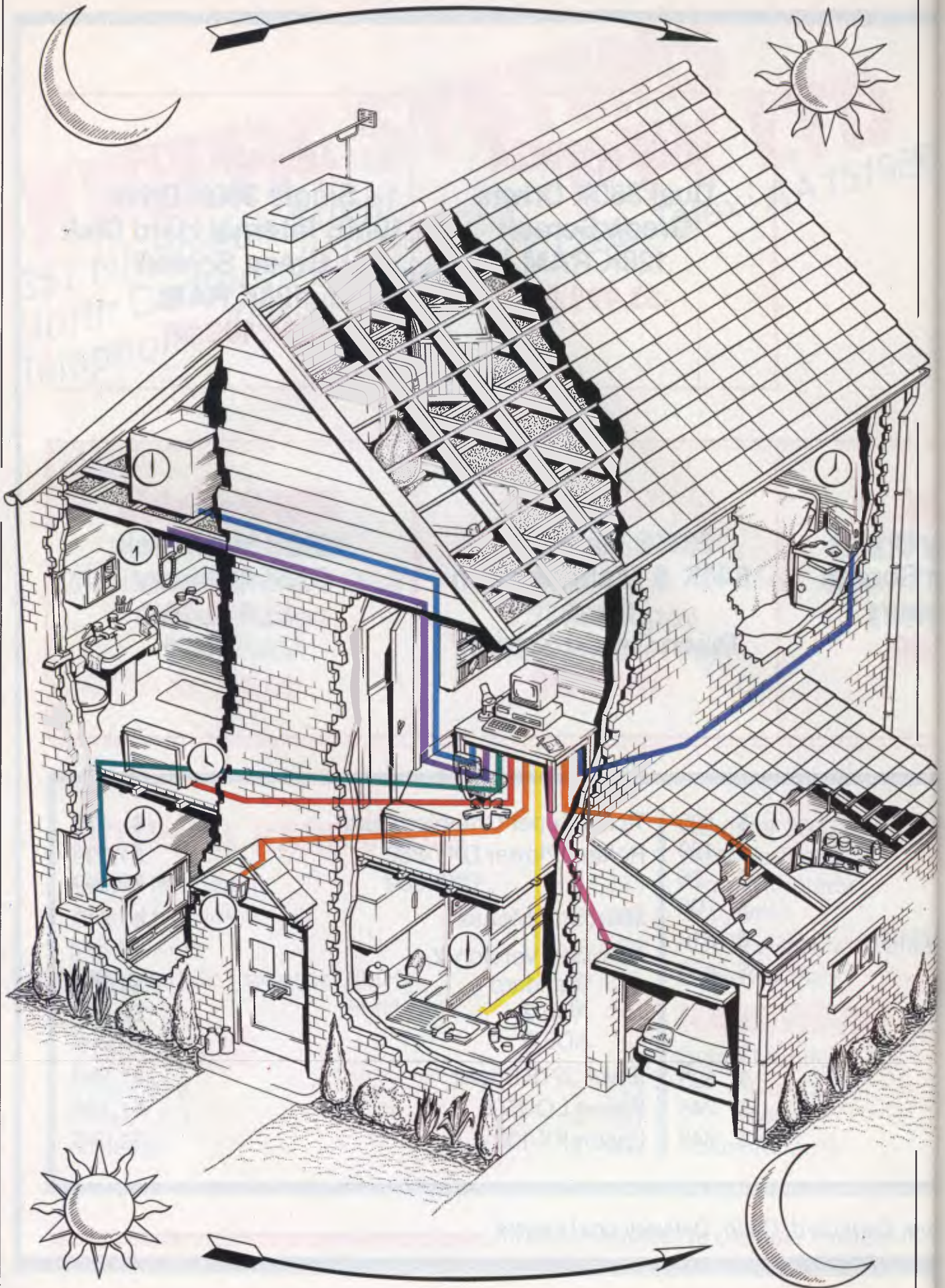


Illustration by Mark Franklin



# Real time

**Brian Heywood takes you step-by-step through the design techniques of a real-time operating system in C, which can provide a reliable and stable environment for programming codes.**

For some time, there has been an old micro lying around my house doing nothing, left over when I upgraded to my present personal computer. What could I use it for?

The obvious thing would be to use it to control something, for example the central heating, but to limit it to controlling one system was silly as I was bound to think of other ways of implementing it in the future. I decided to write a simple real-time operating system (RTOS), so that in the future it could be expanded to meet my varying requirements.

The system would be coded in C, as C was originally developed for writing the Unix operating system and would give a suitable level of control over the system while retaining a degree of portability across any future computer systems.

## Real-time systems

A real-time system can be described as any program which is designed to run *continuously* for long periods of time. This is the type of program which controls anything from a washing machine to an oil refinery, from a car control system to the NASA Space Shuttle's flight computers. In short, this type of program has to operate without anyone watching it. It therefore has to be reliable, and should be maintainable: that is, it must be adaptable to changes in the hardware it controls.

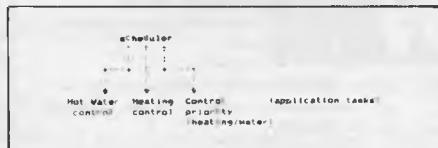
A real-time operating system is a program which is an attempt to achieve the twin goals of reliability and maintainability. A real-time operating system is a program which is designed to act as an environment for the code which does the work handling whatever it is that needs to be controlled. If you separate the tasks of running the computer and that of controlling 'whatever', and then need to change the 'whatever', you can concentrate on the section of code involved with that, without being side-tracked by the more mundane problem of controlling the computer environment.

The main feature of a real-time operating system is that it doesn't determine the function of the control task(s) running under it. Further, when you have split off the function of controlling the computer environment from the application tasks you can control more than one task, allowing the program to control more than one device. However, it will probably affect the structure of the application task's code and some of its operating characteristics, such as response time. As always there is a trade-off, in this case between speed and adaptability.

## Structure

Any real-time operating system can be broken down into two basic sections, comprising the scheduler and the application tasks. The scheduler is a program which executes other programs or procedures according to a simple set of rules; these rules may relate to things such as task priority, external events or timing considerations. The application tasks are the programs or procedures which the scheduler executes, and are the part of the system which do the actual work.

The scheduler is necessary to overcome the restriction that the CPU can only ever execute one piece of program code at any particular instant. With a scheduler, a computer can simulate the execution of more than one program at a time by swapping between programs. Several programs can apparently run simultaneously, the cost of this being



**Fig 1 A simple multi-task control program (central heating)**

that the programs will take longer to execute.

The application tasks are essentially

the same as the equivalent programs would have been if they were operating on separate computers in a single-tasking system. The difference is that the programs must periodically release execution control to the scheduler so that it can decide which task should be running according to its set of internal rules. The frequency with which the scheduler is run will determine the response of the system to changing conditions, so if response time isn't important, each program can run through to completion before releasing control to the system.

A further constraint on the application tasks is that they shouldn't interfere with each other's memory, although the compiler will usually handle this.

## Communications

One possible source of complexity in this type of system is the provision of inter-task communications. If the tasks are dependent on each other in any way, they must be provided with a means of talking to each other. There are two types of communication required between tasks, normally called 'pools' and 'channels'.

A pool is usually used for synchronisation purposes, and, as such, is implemented as a bit field or a Boolean variable. A channel is used for the transfer of data and can be a first in/first out (FIFO) buffer, a stack, or an area of RAM set aside for this purpose. For my simple system, I implemented only pools as part of the system. If I ever needed channel type communication, I could implement it outside the operating system.

Another feature usually found in real-time operating systems is the provision of some kind of clock. This is useful as it allows tasks to be run at particular time intervals or times of day. In its simplest form, this clock is implemented as a 'sleep' function. A task can put itself to sleep for a certain length of time by loading its sleep counter with a number,



which is decremented each time the scheduler is run (that is, when a task has finished execution). While the count is non-zero the scheduler will ignore this task, but when the count reaches zero, the scheduler will execute the task according to its priority as before.

## Error-handling

An important aspect of real-time systems is that they run continuously for long periods of time, so any faults in the software or hardware can (and probably will) accumulate. If the system is to be reliable you should provide a mechanism to detect the operating software going haywire, and take appropriate measures to recover from the fault.

There are two common ways of ensuring that the system will recover from fatal errors; one which involves a piece of hardware, the other solely software. The first is called a 'watchdog timer', a monostable timer, which is connected to the computer's reset line and can be triggered by software. The scheduler must periodically restart the timer. If a task goes wrong and stops the scheduler from running, the watchdog will 'bite' or time-out, resetting the computer and restarting the operating system. Obviously the timer period needs to be longer than it takes to run the longest task, and the system needs to load automatically on a hardware reset.

The other common method is sometimes called 'sanity checking'. This involves having a task which checks certain aspects of the system for consistency, and if it finds a fault, it will cause a

```

struct task_data {
    char state;
    char init;
    int sleep;
    int call;
    char task_state;
    char pool(?) ;
};
    
```

Fig 2 A task control data structure in C

software reset to restart the system from scratch. Two common types of sanity checks are checking that the stack doesn't overwrite code or workspace RAM, and monitoring selected 'guard' locations in RAM to ensure that a task hasn't run amuck and altered RAM not 'belonging' to it. This method is not as effective as the hardware 'watchdog', as the monitoring software itself could go 'insane'.

## Implementation

In any RTOS, the scheduler controls the various tasks by maintaining for each task a data area in which it stores various pieces of pertinent data as to the state of

the task with respect to the operating system. The most important piece of information is the state of each task. The task could be running, sleeping or inactive. Other data could relate to statistics for each task, such as whether the task has been initialised, the task sleep count, how many times it has run, and also data which is used by the tasks, such as the aforementioned communication 'pool' and possibly a task state variable (Fig 2).

The core of the scheduler could be a series of IF/ELSE statements, stepping through each task\_data block in turn

```

/* define external data */
struct task_data task[N]; /* N=number of tasks */
main() /* Yet Another Real Time Operating System */
{
    /* define local variables */
    int run_task, status;
    initialise_system(); /* set data areas etc */
    /* start of scheduler */
    while (TRUE) /* do forever */
    {
        update_sleep_counters();
        /* find out which task is to run */
        run_task = select_run_task();
        /* now execute task */
        switch (run_task) {
            case 1: status = task[run_task]; break;
            case 2: status = task2[run_task]; break;
            ...
            etc
        }
        /* if no task active then do background */
        default: status = background(); break;
    }
    /* if any task returns an error restart the system */
    if (status == NO_ERROR) reset_system();
} /* end of do forever loop */
} /* end of main body of program */
    
```

Fig 3 The basic scheduler design

and executing the first task it comes to with its state set to 'running'. In this scheme, the priority of each task is determined by its position among the IF statements, and when the task returns control to the scheduler the sequence starts over, ensuring that the highest-priority task is always executed.

A slightly more general way of implementing the scheduler would be to use a case construct in C to call the various tasks, making it easier to add new tasks as the need arises. Also, by splitting the scheduler into a system maintenance section and a task execution section, you can use a more complicated set of rules for determining the priority of the tasks and therefore which task will run first.

```

task(index) /* Application task frame */
{
    int index; /* task number for data reference */
    /* initialise task */
    if (task(index).init == TRUE)
    {
        /* code to initialise data/hardware for this task */
        task(index).init = FALSE; /* reset init flag */
    }
    /* --- main body of task --- */
    /* the code of the application task --- */
    return (NO_ERROR); /* we could return an error condition here if something goes seriously wrong */
} /* end of the application task code */
    
```

Fig 4 An application task structure

In Fig 3, 'update\_sleep\_counters()' maintains the sleep counter for each task and 'wakes up' any tasks that have timed out; 'select\_run\_task()' contains the set of rules which determines which task is going to run; and 'task1()', 'task2()' and

```

int select_run_task() /* select the next task to run */
{
    int rtask;
    rtask = 0;
    for (i=1; i<=N; i++)
        if (task[i].state==RUN && rtask==0) rtask=i;
    return(rtask);
} /* end of select_task */
    
```

Fig 5 The scheduler structure

so on, are the application tasks. To add another task, increase N by 1, insert another case statement, and recompile and link the system.

Each task has the basic structure as shown in Fig 4. The initialisation section is only executed once, and is used to set up any hardware and/or data areas. The main body of the task consists of the code needed to perform the function required by the application task.

The task execution code in this case

```

update_sleep_counters() /* maintains the sleep counter for each task */
{
    int i;
    for (i=1; i<=TASKS; i++)
        if (task[i].sleep == 0) task[i].sleep--;
        else if (task[i].state == ASLEEP) task[i].state=RUN;
} /* end of update_sleep */
    
```

Fig 6 Sleep counter code

just steps through each task data area and finds the first task with its state variable set to RUN. The individual task's priorities are determined by the position of their call in the main case statement, making it very simple to change a task's priority by moving it about within the case statement. This of course means that the priority of each task is fixed when you create the system (that is, compile the code), but you could easily make the priority dynamic by allocating one of the pool variables to 'task priority' and have 'select\_run\_task()' check this variable when it selects the next task.

```

goto_sleep(index, time) /* goto sleep for specified time (measured in clock ticks) */
{
    int index;
    int time;
    task(index).state = ASLEEP;
    task(index).sleep = time;
    return(NO_ERROR);
} /* end of goto sleep */
    
```

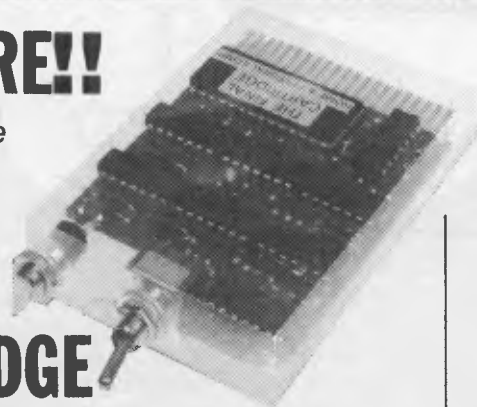
Fig 7 A simple sleep function

The sleep feature is implemented by 'update\_sleep\_counters()' which decrements any of the tasks which have non-zero 'sleep' counters, and sets any tasks in the SLEEP state with zero in their sleep counters to the RUN state. If the system had a built-in clock you could measure absolute time to update the

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## PROGRAMMING



sleep counters, but in this case you just decrement the sleep counters each time the scheduler is called.

To simplify the process of the task going to sleep, the code in the 'goto\_sleep()' loads the appropriate sleep counter with the desired sleep period. An advantage of making this a function is that in the future, you could easily install a new version of 'goto\_sleep()', secure in the knowledge that all cases had been accounted for (that is, rather than going through all the application tasks and altering each one in turn).

The error-recovery function is covered by 'reset\_system()' and is so dependent on the system in which it's running that I haven't included any code. This function should reload the system from permanent storage (for example, disk) otherwise you can jump to the load address for the operating system

### Conclusion

I have presented here a brief description of real-time operating systems, with some generic C code, as an example of one particular implementation of such a

system. The basic concepts can be (and have been) implemented in many different languages and computer systems, and there is no reason why anyone can't take advantage of the techniques.

END



*'I fed all your symptoms into the computer, Mr Bilkins, and it died.'*

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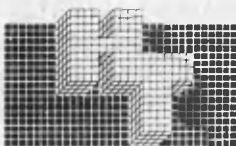
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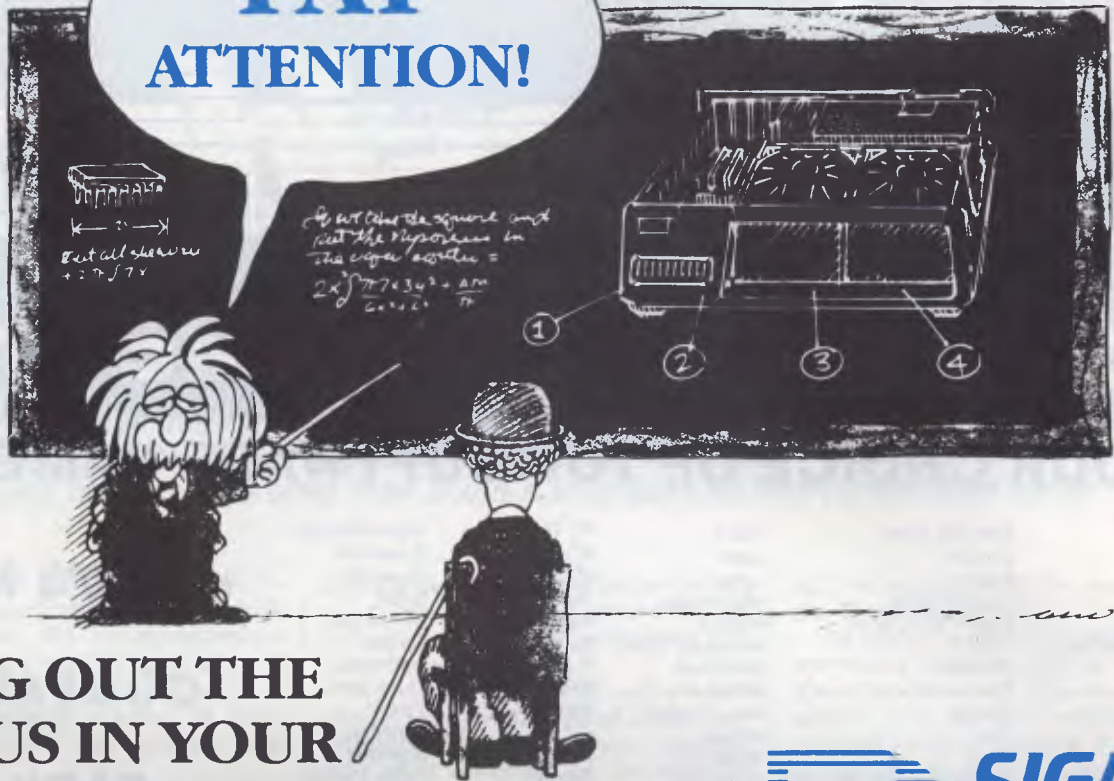
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# Voice Commander

*You must have seen many new devices to control a microcomputer. Keyboards, joysticks, trackballs and rodents have all had their day — the new craze in user access is voice. We sent Ron Dunn a microphone and turned him loose . . .*

Imagine never having to touch the keyboard of your computer, with all commands carried out in conversational English. To run your favourite program merely by whispering its name, or to ask for assistance with a shriek of 'help' would surely be the ultimate user interface.

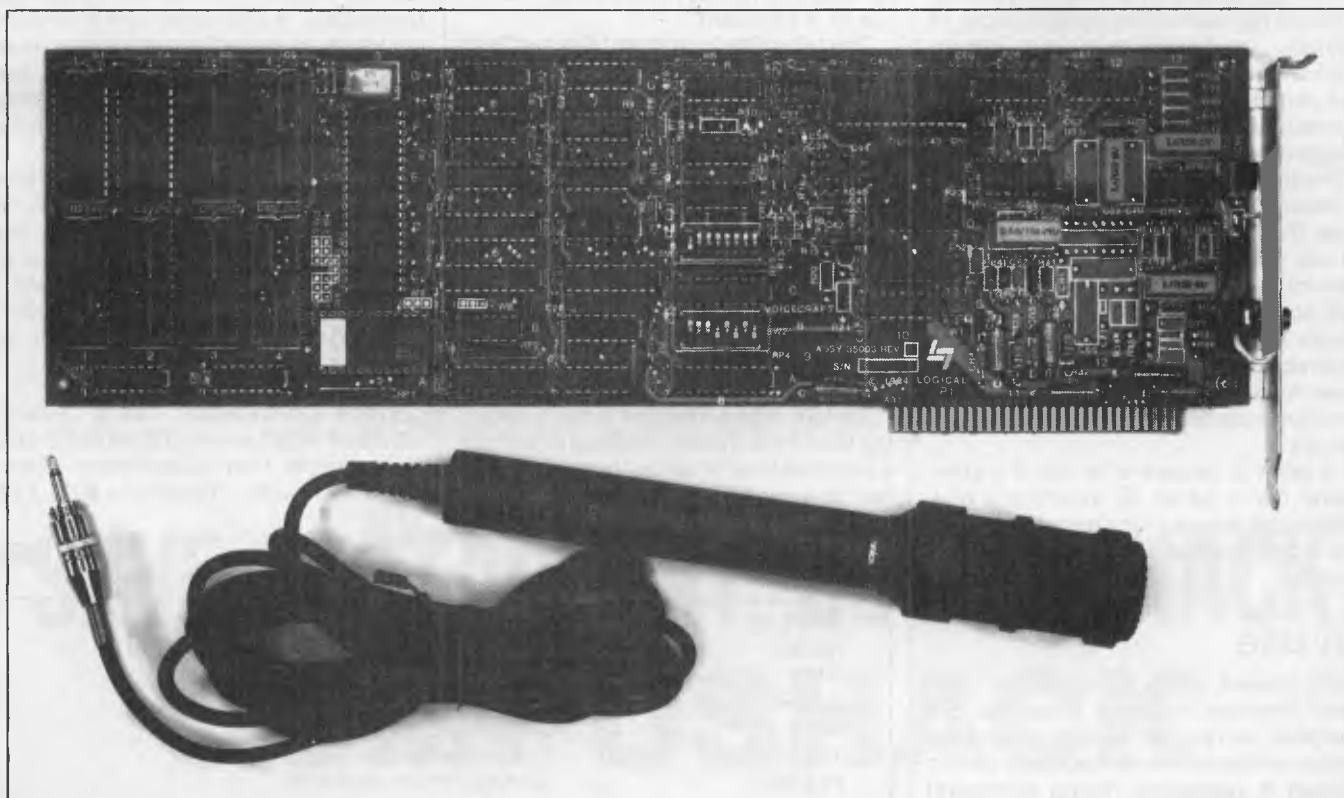
While this level of control exists only in the over-fertile imaginations of television and film script writers, I recently had the occasion to examine a voice interface for the IBM Personal Computer. The Voice

Commander voice control system allows you to perform simple control functions through a microphone connected to a board in the computer.

The Voice Commander system consists of a full length printed circuit card, software and a microphone. Installing the card is as simple as removing the cover of the PC, finding a vacant expansion slot and plugging in the card. The microphone plugs into a 1/4 inch jack on the rear of the expansion card. As my PC lost its cover screws at least two months

ago, the entire installation process took less than five minutes.

The system supplied for review was a pre-release version, and as such the documentation was atrocious. I am assured that the final version of the manuals will be supplied in a much better format. However, the documentation as supplied was sufficient to allow me to test and learn to use the system in a short period of time. This consisted of a short period of voice training (more later), then the operation of basic PC functions.



Voice Commander = full length board, microphone and software



## Training

The basis of the Voice Commander's operation is a command file which consists of the commands to be executed when a given word is received. Commands are organized in groups of menus, which may be linked together in a tree structure. Each command file may contain up to 200 menus, each with up to 500 commands. There is an overall restriction of 32,000 commands per file.

Each command consists of two parts: the word or phrase to be spoken; and the keystroke sequence performed on receipt of that phrase. For example, the word 'Basic' may cause the keystrokes B,A,S,I,C,<CR> to be passed to the computer. Special keystrokes (function keys, cursor control keys and so on) are entered by first pressing the F1 key, then the keystroke to be recorded. Another option is to specify that another command menu will be displayed on receipt of the command. Command phrases may be up to 36 characters in length.

Now comes the tedious step — the training of the computer to recognize particular voice patterns in response to each command. The voice training program displays each command phrase once in turn, at which point you must speak the phrase into the microphone. There is no means (and no likelihood) of actually validating that the phrase spoken accurately represents the text on the screen. I confused the heck out of some users by speaking GET LOST in response to the command BYE for one software package.

Voice training must be repeated at least three times for each user planning to use the system, with a recommendation for six passes. This means that for a full command file you would have to speak 192,000 phrases — a not inconsiderable effort. Individual users create their own voice recognition files, with recommended identification by user initials.

A point to beware of is that if a command file is edited by inserting a new command phrase in the menu structure, the entire command file will require voice training.

## In use

Once trained, using the system is easy. Two memory resident programs are installed, and you are ready to go with the initial command menu displayed on the screen if requested during command entry. The microphone is activated by pressing the NUM-LOCK key on the

numeric keypad, which acts as a toggle switch.

Both the keyboard and the microphone may be used in conjunction. For example, to move to another cell in Lotus 1-2-3 spreadsheet and enter a label, you may say 'up', 'up', 'left', 'left', then type the string 'Test Spreadsheet' at the keyboard. Function keys and cursor movement keys will not operate correctly while the NUM-LOCK key is pressed. Voice control must be toggled off to use all keyboard options.

With the system installed and working, I set about assessing its usefulness in a business environment. To impress potential users I wrote some small Basic programs to demonstrate voice operation. One of the most successful was a program that carried on an abusive conversation with the person performing the demonstration.

Having determined that the system operated as described, I began using it with different software packages. I set up command menus for Lotus 1-2-3, WordStar, and dBASE II, containing simple command structures to use for testing purposes.

The 1-2-3 command file was not considered a general success. Due to the nature of spreadsheet activities (a high degree of cursor movement and numerical data entry) most users preferred the use of a keyboard.

The WordStar command file met with immediate success with novice users. I programmed most of the common WordStar control sequences, and gave them meaningful phrases. O S became 'Underline', and K D became 'Save'. Using a simple list of words, users were immediately proficient with this package. More advanced users and speed typists found, however, that the pause for voice recognition in the midst of typing was inconvenient, and they tended to return to conventional operation of WordStar.

dBASE II provided the most interesting test of the system. I set out to provide a primitive level of natural language interface to a database system. The database structure, along with a selected set of dBASE interactive commands, was pro-

grammed into a command file. Users were then able to interrogate the database by voice. For example, it was possible to say 'Display name and address and telephone please' and have the computer list these details from a mailing list file. This was done using the commands and corresponding interpretations listed in table 1.

This type of work represents possibly the best use for this sort of system. With some effort, and a good natural language database system, it would be possible to program some quite effective information systems. By the end of the review, in fact, I was working on ways of interfacing the Voice Command to the Intellect system on a mainframe computer. Intellect offers a very powerful command parser, allowing users to type commands such as 'Who works for department x and earns more than \$50,000'. A voice controller connected to this software would be an incredibly powerful tool. Only lack of time prevented the completion of this interface in the review period.

## Conclusion

When the time came to actually write this review, I had mixed feelings about the future of products such as these. It is almost as if the voice technology is a little too advanced for personal computing technology, in that some user interfaces are totally incompatible with this style of operation. The best packages for use with this system are those with a limited command vocabulary, used to control a command-line style of operation.

Given these limitations I was impressed by Voice Commander. It functioned transparently to our applications, and provided a degree of isolation from the computer keyboard. I await with interest commercial applications designed around this type of hardware.

*Voice Commander has a recommended retail price of \$1900.00 and is available from Brainstorm Computer Products. Telephone (02) 212 1622.*

END

DISPLAY	...	Display command in dBASE
NAME	...	Name field in database
AND	...	' ' separator character
ADDRESS	...	Address field in database
AND	...	' ' separator character
TELEPHONE	...	Telephone field in database
PLEASE	...	Carriage return character

Table 1

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# SCREENTEST TAS

***A multi-user data base management system for MS-DOS, TURBO-DOS, CP/M, MP/M systems with a high level language for well under \$300. In fact, TAS is claimed by its developers to be a major breakthrough in application development tools that is complete, affordable and sophisticated, yet easy to use. Well, TAS is affordable; TAS is complete enough to build applications (more on this point later); and TAS could be used to build sophisticated applications. But don't jump to any conclusions before reading Robin Ellis test.***

TAS is available in three levels. The first, Level 1 (reviewed here) is comprised of a data dictionary manager, a database manager and a language. Level 2 provides, in addition to the components of Level 1, packages written in TAS: a general ledger and accounts receivable and payable modules. Level 3 also includes payroll, inventory control, sales order entry and purchase order entry modules.

## Data dictionary manager

Is the TAS data manager a data dictionary? Not in the true sense. It is essentially a schema or record layout generator for use by the language to know where fields are within a record, in a file.

A complete data dictionary of course would allow definition of field-entity (loosely table) relationships, fields descriptions, attributes and so on at a conceptual or system wide level, and then allow integration into physical file designs at a later stage. The source code (in TAS) of the data dictionary does come with the product so it could be expanded if desired, although I doubt whether this would be a cost effective exercise.

One advantage with the TAS schema is the ability to generate a schema that can be used for more than one physical file at the one time. This means that while two files could share the same schema, (ie record or table definitions could be the same in both files) the data itself could be different. However if the same field is required to be defined in more

than one schema definition, then the field definition will have to be entered again under a new name within the new schema. This redefinition of the same field can lead to inconsistencies within the logical database structure of an application and is not a desirable feature.

Schema maintenance is done by entering the data dictionary manager option from the TAS main menu then using the following commands to manipulate the field definitions within the schema:

I for insert, D for delete, C for change, E to add at end of schema, H to print hard copy, N to move the line pointer to next line, P to move the pointer to the previous line and Q to quit schema maintenance. Simple but effective.

Unfortunately, there are no options or utilities to copy dictionary structures or to provide any cross reference reports about where different fields may be

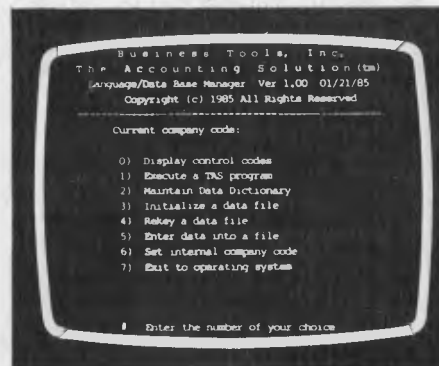
used, only a hard copy report of an actual schema is available.

When defining a schema a number of attributes are requested by the system.

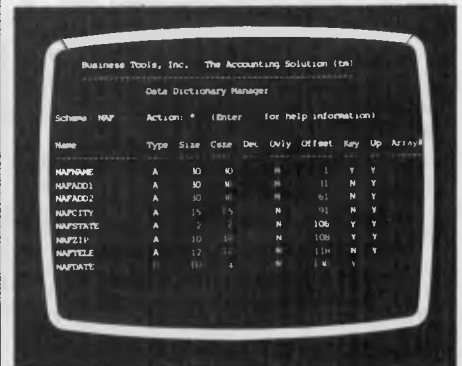
A schema name of up to eight characters is a unique label for each schema; then a field name of up to 15 characters is required.

Note again the restriction that within the one dictionary no two fields can have the same name. Therefore if you wish to define two related schemas in the same dictionary such as Transactions, containing a data item called Transaction-type, and a look-up table called Transaction-type table, the field in question would have to be called a different name in each schema.

The data type of each field (alphanumeric, numeric or date) and the size of each field (numbers up to 20 characters, alphanumeric up to 255 characters and dates are automatically 10 characters)



*Schema entry, showing fields and field attributes.*



*The main menu of 'The Accounting Solution'.*





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**W.A.** John Mills Agency, PO Box 278, Greenwood, W.A., 6024. Ph: (09) 448 1137.

**Tas.** Tasmanian Record Company, 10 Cameron St, Launceston, Tasmania, 7250.  
Ph: (003) 31 5588.



are somewhat sparse, in fact some run time errors did not appear in the manual. Even so, the message could be used successfully to find the offending code as a line number is given in the error message.

Performance is always a difficult area to judge especially in a multi-user environment. TAS seemed to perform

and fill strings, print a box and also print one of up to 20 character strings that may be set up during installation. These strings may be used to control certain screen attributes or print enhanced formats. Traps may be set to catch the system defined control sequences, such as save, delete and quit including up to two user defined traps. Certainly

duced a 16 page help system available with TAS and is looking at improving the manual itself. The manual is basically a tutorial with a couple of simple examples followed by a list of statements and their syntax. The manual does not even have an index.

TAS is written in assembler and runs under MS-DOS, PC-DOS, MP/M, TURBO-DOS (8- and 16-bit), CP/M-86, CP/M, the Nouvelle networking system, MMMOST (Televideo machines) and Oasis. A Unix version is due in the first quarter of 1986. TAS is distributed and supported by Fletcher DP Services in Australia and New Zealand and is priced at under \$300 for both the single and multi-user version. Developer prices are available at even less than this. At present no training is offered by Fletcher but the company will probably introduce two or three day courses for programmers early in 1986.

TAS has been developed by Business Tools of America, a company run and owned by Phil Mickelson, ex-Vice President of software development at O'Hanlon Computer systems, the developers of the Sensible Solution (tested in APC, September 1985).

TAS is cheap. It can be used to develop complex applications and already has an established user base (claimed to be 28 in Australia and 1500 worldwide) but offers no productivity tools such as editors or interactive debuggers, to package the environment.

This database system is essentially weak and the language offers little other than the basic procedural verbs to attract serious users of the product. TAS is affordable but at present has a long way to go to compare with other products on the market. It is still new, so no doubt some development will follow. For now, TAS is interesting and usable but needs more work to make it competitive in the market.

END

## *TAS seemed to perform adequately in the single user environment during an I/O intensive job but took an inordinate amount of time during a CPU intensive job.*

adequately in the single user environment during an I/O intensive job but took an inordinate amount of time during a CPU intensive job as the following tests show. Normally most jobs would be I/O bound anyway so the high CPU usage may not be a problem.

**I/O intensive job 1 TAS** — 55 seconds (loading 500 single key records)

Compiled Basic — 1 minute 30 seconds (proprietary ISAM system)

**I/O intensive job 2 TAS** — 25 seconds (reading 500 single key records sequentially by key)

Compiled Basic — 6 seconds (proprietary ISAM system)

Microsoft Basic interpreter — 2 minutes

**CPU intensive job TAS** — 6 seconds (loop 500 times and add an amount to running total)

Compiled Basic — less than 1 second

Microsoft Basic interpreter — 3.5 seconds

Even the Basic interpreter outperformed TAS in this last test.

While these tests are not meant to be conclusive, they do show that while TAS performs well from an I/O point of view its performance in a multi-user situation will need a powerful CPU to give adequate response.

The language allows screen inputs and report layouts to be designed using an editor in a full screen manner. (That is, field positions are marked on a line and when the line is printed or output to the screen, the fields will appear at the marked position). This type of interaction with screen or report is desirable but the reporting features in the language are virtually non-existent. Routines still have to be written to handle headings, control breaks, totalling, sorting and data calculations, and no graphics capability is offered. It is essential these days for productivity to have a powerful report writer which TAS lacks at present. Commands are provided to sound the bell, clear the screen, open and close files, justify, trim

a reasonable amount of control over screen and print formats is available.

## Conclusion

TAS should be considered an application tool for the system builder and certainly not for end-users as it really offers no end-user facilities at all, unless an end-user were to learn the TAS language. This is an important point, even for application builders, as while an original packaged application is built by experienced programmers who would be able to understand the TAS language, an end-user is going to use the product and will want to have an adhoc query facility even if it is fairly simple.

TAS does not provide a relational, or even relational-like database system, and as this type of architecture is proving ever more popular this fact cannot be overlooked. Bearing in mind that TAS is only a fairly new product, it's possible that its authors will provide more relational capabilities in the future.

The manual that comes with TAS Level 1 is insufficient. In apparent recognition of this, the Australian distributor, Fletcher DP Services, has already pro-



*'He's trying to get the computer to malfunction, so we can start the war.'*

# Final version

*Colin Cohen provides a cost-effective guide on turning the output from your word processor/database into polished typeset copy.*

If, as a user of a micro with a word processing or database program, you ever need to have the results printed — say, as a newsletter, price list, or specialised directory — you might wish it could be typeset in a 'real' typeface without having to have all the data re-keyed by an expensive typesetter. However, not all micros use the same format of floppy disk: indeed, if you know anything about disk formats this will appear a gross understatement.

## Problems

Ever since IBM laid down a standard for the 8in diskette, other manufacturers have realised just what a good idea the floppy disk was. On the other hand, for a variety of commercial reasons, almost every micro manufacturer has seen fit to place the data on the disk in different ways. These variations in disk format have two different sources: the disk drive itself and the Disk Operating System (DOS) of the micro.

First of all, the drive: clearly an 8in diskette will not fit a 5.25in drive any more than one of the newer 3in-plus micro-diskettes, which also come in several shapes and sizes. And, while a double-sided floppy will fit quite neatly into a single-sided drive of the same size, you will not be able to read the second side. Then if, for example, there are only 40 'steps' available on the drive, it will not read an 80-track disk — although this problem is not totally insoluble.

From the DOS point of view there is a degree of flexibility in the number of tracks on a disk, but the real problem is the number of wedge-shaped sectors in each track and how the information is laid down within them. With the majority of disks being 'soft-sectored' — that is, controlled by the software — there is almost no limit to the number of sectors that can be laid down on a disk. Even hard-sectored disks, on which the sectors are marked out by a series of holes near the spindle, are by no means uniform. The 3in disk can be laid out to emulate the 5.25in disk, although the latter is usually completely different from the original 8in model; and then you can

unplug a 5.25in drive and substitute a 3in+.

Finally, as far as the DOS is concerned, some micros, like The Victor 9000/Sirius and Apple's Macintosh, pack more information into their disks by the nightmare solution of varying the speed of the drive, dependent on the position of the track being read. The only good news in this department is that the popularity of operating systems such as CP/M and PC-DOS/MS-DOS families has introduced a degree of standardisation, so that once a specialised disk reader has cracked one format in a family the others are less difficult.

But the bad news is not over. To be able to read a disk is not only to make sense of it, but then to be able to set type from it — economically. So, before you give up the whole idea of typesetting from disk, let me say that a sound understanding of the problems involved is the best basis for making the operation a success.

For example, I have a database program that writes the data back-to-front on the disk! If I try to read the database data disk back within my word processor program, what I get is the data back-to-front on the screen, with the blank spaces in each field padded out with what look like random control codes. You don't have to be a genius to see that unless the database were huge it would not be economic, as opposed to possible, to write a conversion program to strip out the garbage. Indeed, as the whole rationale of this exercise is to save money, the cost of any extra work involved in conversion, such as laborious writing of programs and conversion tables, has to be set against the cost of re-keying at perhaps 20,000 keystrokes per hour for ordinary copy.

Other problems can come from academic word processors, which have a character set which cannot be accommodated within the normal seven-bit ASCII standard. These extra characters may well clash with the receiving system's software and cause some form of crash.

Another aspect to be considered is how to handle the codes generated by

your word processor or database. The most obvious of these codes are the printer control characters to change fonts, start underlining, and control other functions.

Leaving out the specialised laser printers, the dot-matrix or daisywheel printers found in homes and offices are unlikely to have more than a handful of fonts available — each of which will only be in one size. The typesetter, on the other hand, may have as many as 1200 fonts available online, each available in a large number of point sizes. Even 'starter' systems can offer over 1000 online combinations of font and size. If you then consider that each one of the 128 or so characters in a font is of a different width, you will begin to appreciate the complexity of the problems facing typesetters.

## Agreement

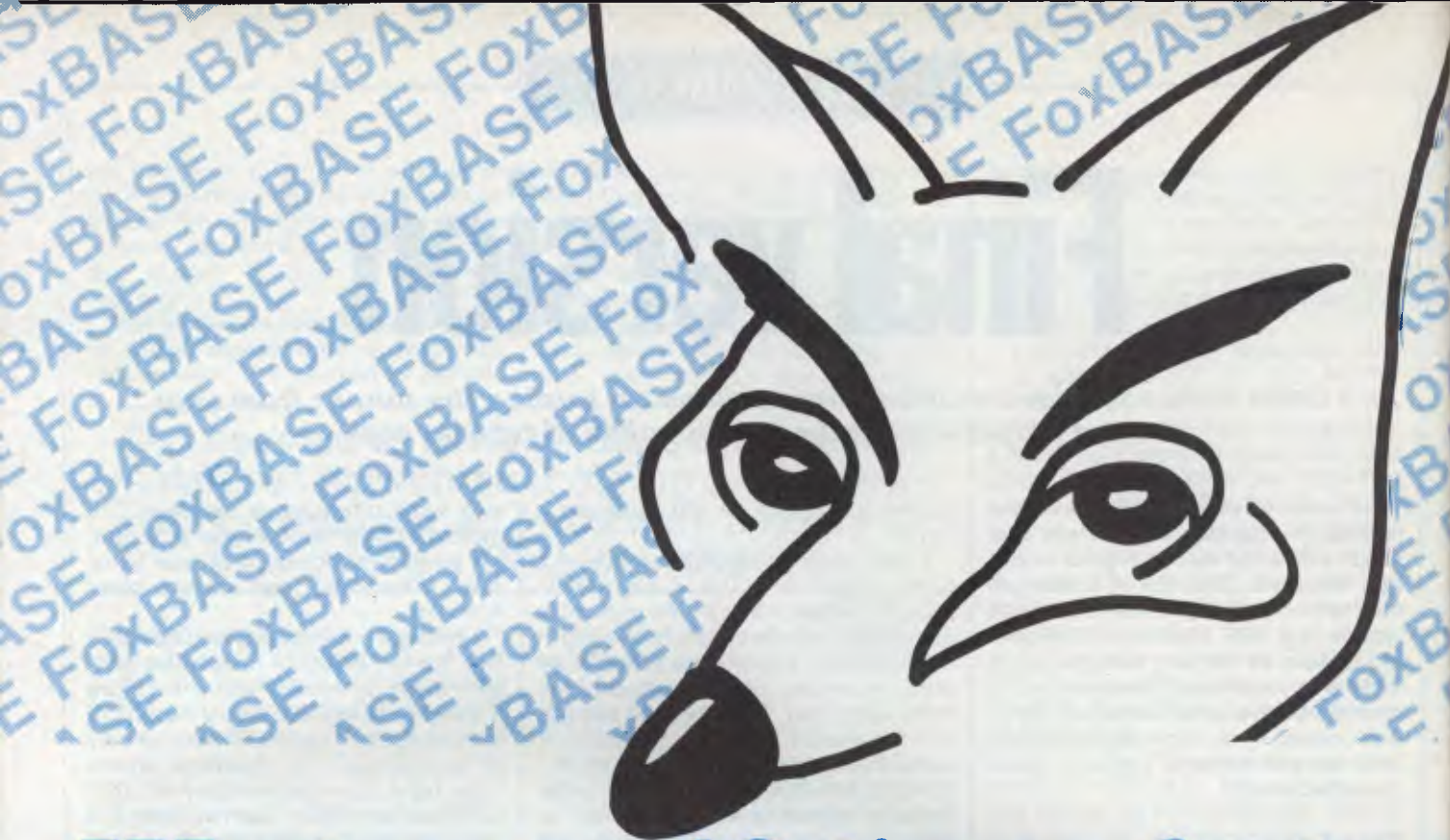
Typesetters and their clients naturally approach the conversion of computer files on a variety of different levels. Their approach will depend on the sophistication of their decoding equipment, their relationship with trade unions and the original typist's grasp of the problem.

At the lowest level, you have to find a typesetter who is both prepared and physically able to accept your data.

There are four ways in which your word processing or database can be transferred for setting. Firstly, you can send the typesetter a disk which he can read in a suitable multi-format reader. These readers are specialised devices with slots for 8in, 5.25in and 3in disks, and sometimes tape, and they cost in the region of \$20,000. They are widely used both in typesetting and in the software business when programs need to be prepared for different systems — one system is said to be able to read over 60,000 disk formats! The reader will either read your disk and write a new disk in the typesetting computer's format, or read it and transfer it to the typesetter by way of a serial RS232C interface.

Alternatively, if the typesetter has the same computer as you, or a good look-alike, you can send him a disk for him to read in the usual way and transfer to his





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typesetter via the ubiquitous RS232C. Provided that your word processor or database saves a standard ASCII file, the typesetter should be able to extract the data without a copy of your program disk (an important consideration if the program disk is copy-protected). Otherwise you will need to use a spool facility to create a duplicate copy of your data in ASCII.

The third method is for the typesetter to visit you with what is clumsily called a text retrieval terminal (TRT), colloquially a FART (Fast Accurate Retrieval Terminal) or milking machine. This is simply plugged into your micro and data is 'milked' out of it. Usually a degree of error-checking is included, and some of them can be connected to a Centronics parallel interface, rather than an RS232. This is useful if you are not sure about the use of your serial interface, since you can treat the TRT as if it were your printer. The computer should not notice the difference. Some TRTs also do a bit of code conversion during the transfer, which saves time and labour, and depending on the make the data will be written onto a C60 cassette, a mini-cassette, a tape cartridge, or a 3in or 5.25in disk. If disks are used they can be written in the typesetter's format, otherwise the data will have to be read off via the TRT's serial interface.

Finally, as far as hardware is concerned, you can use a modem. Of course, the typesetter also needs to have a similar sort of modem, and if it is not auto-answer nor permanently configured you will need an agreed logging-on procedure. (The price of modems has probably fallen faster than any other item of computer equipment, and it is quite possible to find a serviceable modem for about \$500.)

It's worth pointing out that while you really do need a full duplex modem, so that the receiving system can send a stop code when it opens a new file, it does not have to be fast. For instance, you should be able to reverse the normal operating speeds of a Viatel modem so that you can send your copy at 1200 baud, and just get back the odd control code at 75 baud — much more satisfactory than the normal 300/300 baud of the bulletin board.

## Options

Of course there are variants. One nice trick, if you or your typesetter subscribes to an electronic mail service, is to dump your text into a mail box for later retrieval and typesetting — you can usually leave it to the mail service to strip out control codes that the typesetter won't recog-

nise and sort out the differences in modem speeds.

If you don't already have a micro, or need another one, you can now buy several packages which make a micro emulate a typesetting system by generating all the codes that the printing unit will need. Thankfully they are all now available on MS-DOS micros, (Page-Planner, for instance, started life on the Cifer).

Normally they are sold with hardware and software bundles. If you want a lot of copies of the software to run on your own machines, some of the companies might oblige, but this often poses problems with warranties.

One other package, the APL, includes a very substantial modification of the Apple IIe built into a new box, as well as the bundled software. This gets over the problem that the menus on the other products can't totally overcome — the fact that a standard micro does not have all the special control keys that are found on a full-blown typesetting system. Having said this, they have all been very successful in the printing industry, and will help you cut costs by delivering files which are completely ready to drive a typesetter.

If you just want to send word processor files to the typesetter you have a choice of coding. You can start with no codes, not even tabs and underscores. Here, at least, the typesetter knows that apart from your text errors, the data is clean. If you have not marked them on the hard copy (you should always send a printout, even when using a modem) he will go through it marking which words are to go in italic — the printer's equivalent of underscore — and what other fonts and sizes to use. Once the typesetter has the data in his own format he will scroll through it and insert any control codes he needs to achieve these effects. Any mistakes will then be the typesetter's responsibility, but this obviously costs more.

An extension of this is for the typesetter to translate codes like your underscore and then add the rest himself, or

use the so-called generic codes. These are entered by the text creator and are quite simple, such as [i] for italic and [b] for bold — similar commands can be used to build up complex pages. They can be used all by themselves, or in combination with your own control codes as long as the typesetter knows *exactly* what you have done. I use '['and']' as they are on the non-shift part of the keyboard, and thus easy to get at. This is a convention adopted by the coding structure known as ASPIC, but many typesetters have their own versions. Only two things are important here: the codes must be easy to remember and key, and must comprise character strings that never get used in any other way in your data, or there will be trouble. A very simple version, for very simple text, is invisible coding. This just uses a specified number of <RETURNS> for each change, but clearly the number of codes one can create in this way is limited, and it can play havoc with your own screen display.

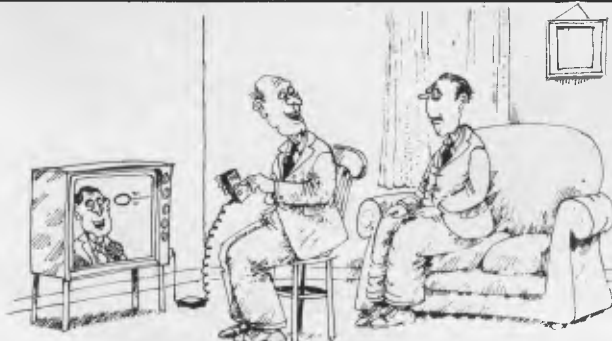
The final choice is full coding, which involves entering letter by letter the complex codes the typesetter wants. *Not recommended.*

## Warning

Remember that if you give the typesetter magnetic data, he is not responsible for proof-reading. The errors you make always look much worse typeset than in typescript, especially if you have put in an 'on' code without the following 'off' code. If you turn on a large type heading and forget to turn it off, the whole of the next section, up to the next heading, will be in the display size. This will be: unsightly, unreadable, and uneconomic — as you will have to pay the typesetter to correct and re-run it.

Finally, don't run before you can walk. If you have a typesetting requirement from disk, first of all discuss it with a typesetter and start with something simple like straightforward text rather than complex tables on forms.

END



'It's a special egg-throwing button.'





# Tandy 1000 vs DSE Multitech

*In case you didn't get a computer for Christmas, Dick Smith and Tandy are both offering PC compatibles to tempt the first time buyer. They are good value and well supported. Kester Cranswick reports on colour versions of DSE Multitech and Tandy 1000 computers.*



Santa has been and gone, leaving strained credit limits and jolly red bank balances no doubt. He left a computer in many homes too. Those who weren't so fortunate are probably looking enviously at the neighbour's glowing monitors and wishing for a late Christmas present, that doesn't cost a fortune.

Going along to a Dick Smith Electronics or a Tandy store might provide the answer. Both have on offer reputable IBM PC lookalikes at far from IBM prices.

The games machine is a thing of the past now. The computer, be it in the home or the office, is having to pay its way. Entertainment is not enough. Even the traditional home computer makers realize this — witness the recent launches from Commodore, Amstrad and Spectravideo, all with CP/M capability.

As the computer age has taken off, even the most casual user has realized that a computer can be used for far more than playing Elite. Home computers can run their own word processors, databases and the like, but the sophistication of these programs pales against the clout of Lotus 1-2-3 and Multimate.

There is a huge market for an affordable computer that can run powerful software for word processing, data management, communications and financial applications. Every corner computer shop seems to have its own imported Taiwanese PC clone at a low, low price. Though the price may be attractive, it is worth thinking about what you would do if the shop went out of business, or if you needed major repair work done, or if you found the hardware wouldn't do what you wanted it to do. You may pay dearly for a few hundred dollars saving. Buying from a High Street retailer has many advantages.

## Hardware

How much do you need to spend to get an IBM compatible business computer? According to Dick Smith Electronics, just \$1,395. That gets you a 128k, single disk driven, colour DSE/Multitech computer which you could plug into a television set. For \$1,995, you get a 256k, twin disk version, tested here. We added a DSE colour monitor for \$649 and a \$50 cable to get an outfit costing \$2,694.

Against that, we pitted a Tandy 1000, with 256k, twin disks and a colour monitor, costing \$3,246. Buying a 128k, single disk, mono Tandy 1000 sets you



*Tandy's keyboard has 90 keys, and is laid out in a non-standard fashion.*

back an affordable \$1,799, including monitor.

Both computers have a buff colour scheme, with colour toned keys. Both have a three box design — processor and disks in the main box, keyboard connected by a coiled cable and monitor on top.

The DSE/Multitech is the more compact of the two units. It has a metal processor casing, measuring 40 x 38 x 12cm, a little smaller than an IBM box. The two disk drives are stacked on the front, the keyboard connected to the back. All switches and ports are on the rear.

The Tandy comes in a substantially bigger box, made of plastic and with nicely rounded edges. It measures 47 x

34 x 14cm. The keyboard cable plugs into the front. The Tandy monitor and keyboard units are quite a bit larger than the DSE units, so it is a far more substantial piece of gear. However, the cables are long enough to sit it on the floor, so the processor box could be stowed out of sight.

There is more to the front of the Tandy. It has a cooling grille, a large, red reset button, two DIN joystick ports and LEDs on each disk drive. The illuminated on/off switch is on the right hand side. The front of the DSE/Multitech has just LEDs on each disk drive.

Perhaps the difference is due to the country of origin. The Tandy is made on the USA, where marketing is foremost in the minds of designers. It looks as



*The 84 keys on the DSE/Multitech look straight off an IBM.*



though it means business. The Taiwanese DSE/Multitech is built with value for money having the upper hand on styling.

Going to the back of the DSE/Multitech brings a host of goodies into view. From left to right, there is a power input socket, a monitor power output socket and a small on/off switch. Then there is a grille for the fan and a 15 pin game port. The four expansion slots are three-quarters occupied. The top one is free. Underneath is an array of RGB, composite video and audio sockets, above a parallel printer and RS-232C port, and all that is above the DIN socket for the keyboard.

On the back of the Tandy, from left to right, is a power in socket, a parallel printer port, a light pen port, RGB, audio and composite video ports, culminating in three spare board slots.

The DSE/Multitech has the more IBM compatible keyboard, with all 84 keys. Two fold down legs on the underside raise the long, flat unit to a reasonable angle.

The ten function keys are down the left hand side, in a brown-grey. The numeric keypad is to the right, as on the IBM. There are a few minor changes, chiefly in key size. The delete, backspace, scroll lock and numeric lock keys are all normal size, and the enter key is over large. A power on light glows yellow above the numeric keypad.

On the Tandy, there are 90 keys, and the layout is substantially different. Two legs raise the keyboard, and it has an overall squarer shape to it.

This is because the function keys, twelve of them, are arrayed along the top of the alphanumeric keyboard. There are panels for function key notes too. Other keys are in different positions. The Alt key is with the numeric keypad. The illuminated caps lock key is on the left, rather than the right of the space bar. There is a second enter key on the numeric keypad, plus separate insert, delete, break, print, home and four cursor control keys. Tandy has tried to improve on the IBM formula, and that's a plus point.

The downside is that keyboard overlays supplied with some programs will not be relevant to the Tandy user. Also, you may find programs such as Flight Simulator harder to play, as they are designed for a standard IBM keyboard layout.

The extra keys make the computer easier to use, but they take away one of the most comforting aspects of clones — if you are familiar with one, you are familiar with all.

In use, I preferred the Tandy keyboard. The keys are raised more, so miskeying

## Technical Specifications Tandy 1000

Processor:	4.77 MHz Intel 8088
RAM:	256k, expandable to 640k
ROM:	8k
Mass storage:	Two 360k 13cm built-in disk drives
Keyboard:	90 key, PC-compatible qwerty keyboard
Display:	RGB monitor; IBM colour graphics
Size:	47.0cm x 33.5cm x 14.0cm
I/O:	Three PC-compatible slots, lightpen, parallel printer, RGB, audio, video sockets, two joystick ports
Software:	MS-DOS 2.11, GW-Basic 2.02, Deskmate

is less of a problem. The DSE/Multitech keyboard has better colour coding, but if this is a first time IBM clone, then the new user will get used to the Tandy keyboard and appreciate the extra features it has built into it.

## System software

Each machine comes with built in diagnostic routines. Switching on the DSE/Multitech gives a beep, to check the sound is OK, three rows of coloured blocks, to check the colour, and an optional RAM check is prompted for. Then come the prompts for date and time. This computer has the added bonus of a built-in real time clock, something the Tandy does not have as standard.

Switching on the Tandy gives a display of the memory size, before the operating system is loaded up, the speaker beeps and date and time are prompted for. There is no RAM check.

Of the two, the DSE/Multitech is the noisier computer, with a more obtrusive whirr to the fan. The Tandy also has the neat reset button, and a more accessible on/off switch, so it is a little more pleasurable to use.

The two rivals both run an Intel 8088 processor at 4.77MHz. Neither maker has tried to outdo IBM by offering any extras. If you have more money to spend, you can find clones that run faster than the IBM, or handle CP/M as well as MS-DOS, or has other goodies to tempt the

performance conscious buyer. These two computers are aimed straight at the wallet, with few frills to whet the appetite.

On our benchmark tests, the marks went to the DSE/Multitech. Neither machine is particularly fast, but if speed is important, for number crunching and the like, then the DSE/Multitech has a slight advantage.

On the graphics front, Tandy has gone to town. It has managed to get eight colours into the high resolution mode, instead of the normal four. A Christmas demonstration package supplied with the test machine showed off the graphic capabilities very well indeed. Unfortunately, the extra graphics are only useful if you have the software to run them. Look to Tandy for that. With most PC software, you'll see no difference in images.

When it comes to expansion, both companies have taken a different approach. With the DSE/Multitech, users are almost encouraged to get inside the machine and do things to it. Three screws hold the lid on, and the accompanying documentation is crammed full of useful data about the internal workings.

There is a problem though. Dick Smith Electronics has filled up two of the three expansion slots, with a real time clock in one, and serial/parallel interfaces in the other. That leaves just one port for the user, and that may be a restriction if you buy the DSE/Multitech as the start of

## Technical Specifications DSE/Multitech

Processor:	4.77 MHz Intel 8088
RAM:	256k expandable to 512k
ROM:	8k
Mass storage:	Two 360k 13cm built-in disk drives
Keyboard:	84 key, PC-compatible qwerty keyboard
Display:	RGB monitor; IBM colour graphics
Size:	40.0cm x 38.0cm x 12.0cm
I/O:	One PC-compatible slot, joystick, parallel printer, RS-232C, RGB, video power sockets
Software:	MS-DOS 2.11, Easy

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## BENCHTEST

something big. Internally, another 256k of RAM can be added, to give a total capacity of 512k.

On the Tandy, users are dissuaded from delving inside. A stern warning says that there are no user serviceable parts inside the computer! That's the Americans for you — leave technology to the technicians.

Warnings aside, Tandy is very much a do it yourself type of outlet, and if you want technical information on the 1000, it is available for a price. There are three expansion ports free, and to these can be fitted all manner of goodies — a modem, hard disk controller, RS-232C port, clock and so on. Memory can be incremented to a total of 640k.

Tandy has more clearly catered for the user who wants a computer for novices. The light pen socket is a novelty, and used for Tandy's device, running with Tandy programs. Similarly, there are two joystick ports for the games player. Games players buying the DSE/Multitech won't be left in the cold entirely, as there is a joystick port provided as standard.

On the expansion front then, the Tandy is a clear winner. It is a computer on which you could spend thousands of dollars to upgrade as and when the need arose. It is an approach adopted by many of the compatibles. But, it also has ports that will encourage non-enthusiasts to add things to their computer.

Dick Smith Electronics has chosen to go for a machine with minimal upgrade potential, but plenty of enthusiast things built in. It has the clock and RS-232C port already. You must decide whether you want everything now, with little potential in the future, or a more expandable box of tricks that has less built-in.

### Software

In a further effort to up the value for money element, both suppliers throw in software with their computers. In the case of the Tandy, you get GW-Basic, and a multi-function package called Deskmate. DSE offers a Micropro word processor called Easy.

GW-Basic is the standard Microsoft Basic for PCs. If you are into home brewed programs, it is a must, but if your bag is more using commercial software, rather than creating it, then you'll not miss it on the DSE/Multitech. Incidentally, Tandy has not enhanced GW-Basic to take into account the light pen, external speaker and some of the video enhancements.

Easy is from the people who brought you Wordstar and Wordstar 2000. It retails for around \$300. The package



*Three expansion slots are on the back of the Tandy*

consists of four disks, a manual and a key guide.

Easy is the name, and easy is the aim. This is a word processor for those who have never typed, let alone used a computer. The four section tutorial disk guides a novice through the key features of the program, with graphics and plenty of explanation. Then there is a disk to install the program.

All the features of the program are accessed from menus, with a highlighting bar controlled by the cursor keys and help screens only a key away. There is a spelling checker too.

Wordstar users will note more than a few similarities. Easy is, essentially, Wordstar with menus and less commands to learn. It is Wordstar brought into the modern word processing world.

Because of the similarities, files created with Wordstar or Wordstar 2000 can be easily transferred to Easy, and vice versa. It also accepts ASCII files, such as those created under Lotus 1-2-3.

Files are selected from an onscreen menu. Text is entered in the normal fashion. A menu of text options offers bold, underlined, moving, copying and deleting text, indenting, centering, find and replace, single, double or triple line spacing, super or subscripts and file insertion. Files can be copied, renamed or deleted from within the program.

Those Wordstar commands not found in menus can be inserted with standard dot commands. You would use these for headers, footers, page numbering and the like.

Spelling checks are initiated from a menu option, and use a 65,000 word dictionary. Personal dictionaries can be created too. The program checks a word at a time, suggesting correct spellings against words it does not recognise.

A huge variety of printers is catered for, from Abati to Xerox. These are selected at the installation phase.

Easy is therefore an excellent word processing package for those who don't need facilities such as mail merge and on screen print previewing. It has some



*DSE provides more ports, but expansion potential is limited to one slot*



“ . . . full-scale computing power is now well within the reach of the smallest business”:

Gareth Powell, Computer Editor, Sydney Morning Herald



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Even the most discriminating user will appreciate the Multitech's professional characteristics. Spectacular high resolution graphics, 16 colour mode text. An industry standard, ergonomically designed keyboard boasts 84 keys, including 10 user programmable function keys and a numeric keypad. The RS-232C serial port allows computer-to-computer communication. Plus there is a host of other impressive features:

- \* RAM: available from 128K to 512K
- \* ROM: 8K for Bios and diagnostics. Socket for optional 32K (27256) user expandable.
- \* CHARACTER SET: 256 expandable ASCII
- \* VIDEO: IBM compatible colour graphics interface with 640 × 200, 320 × 200 graphics resolutions and 16 colour text mode. Video interface includes special "flicker-free" circuitry for reduced eye-strain.
- \* CLOCK: fully integrated crystal locked real time clock with battery back-up.
- \* INPUT/OUTPUT: RGB and composite video monitor outputs. Joystick/Games adaptor port. Parallel printer port, RS-232C serial communications port, and in-built speaker.
- \* DISK DRIVES: One slimline 360K disk drive — System One. Two slimline 360K disk drives — System Two. One slimline 360K disk drive with a 10MB hard disk — System Three.
- \* EXPANSION: One IBM expansion slot (for Systems One and Two)

### Unlimited software . . . .

Unlike many other computers, the Multitech accepts an extensive range of ready-to-run software. It's compatible with the MS-DOS operating system, and runs most IBM programs straight from the box. So you can select the best programs available for any task: word processing, analysis, stock control and more. . . even games programs!

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### Three versions . . . .

Best of all, the Multitech is available in three pre-configured versions —there's one to suit your budget.

#### System One . . . .

is the affordable start to powerful computing with 360K floppy disk drive, 128K RAM and MS-DOS version 2.11. Cat X-8000

**\$1395**

#### System Two . . . .

really gets down to business. Two 360K floppy disk drives, 256K RAM, MS-DOS 2.11 and the 'EASY' word processing package from MicroPro — with spelling check and six months on-site service. Cat X-8002 (In all capitals except Darwin, plus Newcastle)

**\$1995**

#### System Three . . . .

the powerful work-horse with 512K RAM, one 360K floppy disk and one 10 Megabyte hard disk drive. Includes AURA — the fully integrated business program which performs word processing, spreadsheet, database and information management. With six month on-site service agreement. For your convenience, DSE will install the Multitech System Three, free of charge. Cat X-8003 (In all capitals except Darwin, plus Newcastle)

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# BENCHTEST

limitations in the amount of text that can be moved as a block, but for the average user wanting a word processor it is a good program to start with, considering that it is given away with the DSE/Multitech.

Deskmate is much better. For some users, it could be the only software they ever need. It is a Tandy product, a suite of five major applications. To really make the most of it, an autodial modem in or connected to the computer is needed.

The main modules are a text editor, a filing system, a spreadsheet, a communications package and a diary.

On top of that, and accessible at any time, are a calculator, help screens, an alarm and a direct input to an autodial modem so a telephone can be controlled from the computer.

At the main menu, several system things can be done. The date and time can be reset, though there is no internal clock to keep track if the computer is turned off. An eight letter password can be set up to prevent unauthorized access to the data. Files can be selected, renamed, copied and deleted. A second disk drive can be activated and the amount of free memory displayed. At this time, screen colour options can be set with control and function keys. All the Tandy's colours can be used, depending on taste.

The alarm sounds with a warbling tone during any application. Entries can have text of up to 44 characters and entries from a calendar file can be merged with the alarm module. Within the alarm data base, individual records can be selected, copied, deleted or added. 20 entries are displayed at a time.

Remote operation of a host machine is possible with the remote module. Deskmate can interact with other Tandys running Deskmate to send or get files and mail. Files from each of the modules are sent with type indicators attached. Up to 18 mail items can be stored, and the mail functions as an electronic mail system such as Minerva does, with less frills.

During the running of any application, a two line calculator with basic mathematical functions, ten digit display and a memory can be called up at the base of the screen. Help screens relating to the current application can be called up using Alt and F1 keys. There are nine help files in all.

Other options using the Alt/function keys include toggling an alarm on or off, showing last and next alarm settings, resetting the date and redefine printer parameters such as lines per page, single sheet or continuous stationery and so on. There is some duplication of facilities.

The phone sub-function comes into its

own if you have an autodial modem. Up to 78 names and numbers can be stored, and a name searched for quickly. The directory has a sort facility and up to four dialling prefixes can be stored. There is provision to add and delete entries, to print out the directory and, of course, to dial the number automatically.

All these functions are activated with function keys, with a menu at the bottom of the screen showing what each function key does. The extra function keys of the Tandy are used in Deskmate too. F11 calls up the sub-function menu, and F12 acts as an escape key. Deskmate will not run on other PC compatibles because of features such as this.

With all this behind us, there are still the five major modules to consider. These can be selected individually, or a particular file on the main menu highlighted and chosen. Files are grouped according to their application.

The text editor is nowhere near as sophisticated as Easy, but it is fine for simple documents. Text is typed in. Files can be searched for key words, and word replacement done. Text can be inserted and deleted, and blocks of text selected. Other files can be merged too.

Selected text can be copied as many times as you like, within a document or to a separate document. Finally, text can be saved or printed out. It is therefore a simple text editor, but one that does enough for tasks that do not need formatting.

The spreadsheet is 99 rows by 99 columns, again modest, but fine for the beginner. Text, numbers and formulae can be added, the formula allowing such functions as averaging, minimum and maximum values, sums, logs, trigonometric functions and integer truncation. Quite complex formulae can be used, with the emphasis on the engineering rather than financial matters. Calculation is done manually.

Formats include left and right justification, up to seven decimal places and dollar format. Column widths can be altered, and individual or blocks of cells can be highlighted in colour. Other features are the ability to merge data from one file to another, to copy or delete cells and so on. The facilities are not wonderful when compared to Lotus 1-2-3 but Tandy has put some thought into providing useful features in a low spec spreadsheet.

The filing system is similarly modest but well thought out. Quite a few hundred records can be stored.

All the usual functions are there — add or delete records, merging and copying records to other files and so on.

The find feature is quite versatile. A search can be made of any of the 21 fields, with wildcards, and a report

## Benchmarks Tandy 1000

BM1	1.5
BM2	5.3
BM3	11.3
BM4	11.7
BM5	12.7
BM6	22.8
BM7	35.5
BM8	37.2

## Benchmarks Multitech

BM1	1.5
BM2	5.1
BM3	10.9
BM4	11.3
BM5	12.3
BM6	22.0
BM7	34.1
BM8	35.6

All timings in seconds. For a full listing of the Benchmark programs, see End Zone.

generated with only the information specified by the user. If telephone numbers are displayed, an autodial modem can be accessed from the program to call the number.

Forms are designed with fields up to 59 characters long. Fields can be given priority for sorting operations. A file can also be packed to increase storage capacity. An on screen indicator indicates when packing is recommended.

The telecommunications module allows an RS-232C port to be configured at up to 9,600 Baud. With autodial modems, dialing sequences and responses for voice dialing, auto logons and auto answering. These logon files can be edited later.

There is a terminal mode for conversation, a RAM buffer for text capture, files can be sent and received, any number called automatically, with a smart modem, and data from RAM saved to disk or displayed.

The only pity is that you need a modem to discover what this section of Deskmate can do for you. With an intelligent modem, it is good enough for almost any communications need except Viatel.

The calendar modules shows a month at a time, with the current date highlighted. There is also a week's time chart, hour by hour, day by day, with asterisks over those time scheduled in the calendar.

Entries are made on the screen and

sorted by date and time. Twelve are displayed at a time. In this section, searches for nominated strings, with wild cards, and inequalities can be made. A search can also be made for a date as well. Then there are the usual Deskmate features of select, merge, copy, add and delete. Given the ability to merge calendar files to the alarm module, again it is a handy program.

The final module is mail. This displays messages and a search can be made by originator, date or subject. Messages can be created and sideplayed too.

Deskmate then emerges as an excellent program. It is not difficult to master, yet has a wealth of useful features. For newcomers to computing, it gives a taste of the major types of serious software available, and, with GW-Basic and MS-DOS supplied, the Tandy 1000 owner need only buy a few games to have all the software needed for quite a while.

Both makers claim a high degree of PC compatibility. Both computers run common PC packages such as Lotus, Wordstar, Flight Simulator and other software tried on them. But, you may come across something that doesn't run. It is unlikely, but it may happen. Suffice to say, the chances are slim, and these PC compatibles are indeed compatible.

## Documentation

Tandy supplies four manuals. The first is a Deskmate tutorial, including a chapter on setting up the computer. The second is a Deskmate reference manual, comprehensive and clear as all good documentation should be. Then there is

a pocketable reference guide, and finally, a small reference guide to Basic.

As far as Deskmate goes, you have all you will ever need. As far as Basic goes, you have a list of commands and what they do, but nothing more. As far as MS-DOS goes, you have nothing. That is a bad omission, and you should also get some sort of guide to MS-DOS with the computer.

There should also be some technical information supplied about the interfaces and so on. It is not.

The DSE/Multitech comes with the standard MS-DOS reference guide from Microsoft. That is more than good enough for getting to grips with the operating system. It also has an excellent users' guide, with appendices detailing CPU registers and instruction sets, interface pins, memory maps and so on. It is an excellent user guide by any standards.

Easy comes with a good, clear manual and a keyboard guide. With the tutorial disk, nobody should have any complaints.

## Price

Both these computers are budget machines. The configurations we tested are towards the top end of the configurations, but they show what can be obtained for a modest amount of money.

At \$1,395, the DSE/Multitech with 128k and single disk is a steal. Plug into a TV and you have a PC compatible up and running. The mono Tandy 1000, at \$1,799 including monitor, is similarly excellent value.

The advantage of a second disk drive is that you will be able to run more software, and run it more efficiently. Getting 256k RAM means less disk changes too, bigger documents and a more powerful computer. Finally, colour is an option that speaks for itself. If you are into entertainment, it is essential. For business purposes, it is a luxury you can live without.

So, prices on these units depend on your needs. They are good value, however you buy them.

## Conclusion

At the price, both these PC compatibles are excellent value for money and worth purchasing.

Both can be recommended for different reasons. The DSE/Multitech has a price advantage at the start, and comes with the extra features of an RS-232C port and an internal clock. It would cost extra with most compatibles. The only restriction is on the expansion that can be done. If price is the most important specification, go for the DSE/Multitech.

The Tandy 1000 costs more but is a better computer in many regards. It is better engineered, with useful features and more expansion potential. It has the edge in graphics, a better, if individual keyboard, and GW-Basic is supplied. It also has Deskmate, a program that will show the potential of computers to anybody who has ever questioned it.

END

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# Making haste

*David McKay describes the use of macros in assembler on the BBC Micro, leading to increased versatility and friendliness within your programs.*

Users have been singing the praises of the BBC's Basic interpreter for a long time now, but a point that seems to have been missed is how closely the Basic can interact with assembler. The mnemonic assembler is included in the Basic interpreter chip, and this leads to a programming environment with no sacrifices to friendliness or power. One function of this is the ability to develop macros in the assembly program which can generate sections of code as needed.

## Code execution

The macro needs each routine to be entered only once, and, although the source code program will be longer than a similar section of code employing subroutines, it will execute faster. The assembly listing will be no longer than usual, and the source code will be easier to follow and to debug. This will make things easier for you, and for others.

Macros also encourage a modular style of program development, with each testable section of program added as it is developed, whether you favour a top-down, bottom-up, or combination style.

Consider the execution of the code generated by the following (incomplete) section of assembler:

```
JSR beep
.rest-of-prog
```

```
: JSR OSWRCH, #00000000
```

```
.beep
LDA #7
JSR oswrch
RTS
```

As the call to subroutine beep is

encountered, the program counter will hold the address which contains the next instruction to be executed. If this is a straightforward 'branchless' flow of execution, then the program counter will increment simply. If we need to jump to the start of a subroutine, the address in the program counter has to be saved, and referenced on return from the routine, to resume program execution from the correct point.

The saved address is held in the stack (page one,  $\&1100$ - $\&11FF$ ) as two eight-bit numbers. That is, a 16-bit memory address is held in two bytes, a high byte and a low byte. The high byte goes first, so the low byte is the top of the stack.

The subroutine in the example loads the accumulator with 7 and then 'prints' it, giving a 'beep'. The call to subroutine 'oswrch' will need to have the return address saved in the same manner as the call to beep. The return address from oswrch will be on the top of the stack, and will point inside beep. When it returns to this point the stack register notes the new top of the stack, and the return address from beep is again on top, ready to pass control back to the instruction after the calling JSR. You can therefore construct nested subroutines.

It would have made more sense to use a JMP to oswrch, and use the RTS in the oswrch routine to return us to the correct address. This would mean that there was no need to include an RTS of our own.

Now for the good news: all this stack manipulation is done for you, by the machine, and you don't need to be aware of it. However, as usual there are complications.



The BBC Micro uses a 6502A processor with a 2MHz clock, a cycle of which takes 0.5 microseconds. The saving and stack manipulation required for the subroutines adds to the execution time, as JSR and RTS take six cycles each, giving an increase of six microseconds for every subroutine call.

Further, if your subroutine uses the stack for saving registers, it must pull off as many as it pushes on, otherwise the address used as the return from the subroutine will contain a byte which is in fact a saved register, and nasty things will happen.

## Speed

If speed is required but you don't want to bother about the number of pushes and



pulls you have, or even if you want to use the stack as temporary storage, what can you do? You don't want to have to enter the same portion of code each time you want a certain function, for reasons of keyboard time and idleness, and also due to the length of the assembly listing.

Before long you can run into the problems of finding a location at which the source code is to be assembled. Macros are the answer.

Looking at the program in Fig 1, it can be seen that macros are set up with the Basic function facility, FN. These are

created and set out in the program below the main body of FN calls, in much the same way as all the DEF PROC lines are below the main body of PROC calls in Basic. This program does nothing apart from give a beep and serve as a demonstration of the techniques.

The operation is two-pass assembly, with the number of the pass held in the variable pass. The non-assembling statement, OPT, is used as an assembler directive to set up whether errors are flagged, or if a listing of the assembled code is shown at assembly time. The program here is using OPT 0 the first time round (no errors reported, no listing) and OPT 2 the second time (errors reported, no listing).

A function is like a procedure except it returns a value. The value returned by all

```

10 REM Example of simple macros
20
30 oswrch=%FFEE
40
50 FOR pass=0 TO 2 STEP 1
60 P%=%2000
70 [OPT pass
80 OPT FNsaveea
90 OPT FNbeep
100 OPT FNrestorera
110 RTS
120 ]
130 NEXT
140 CALL %2000
150 END
160
170 DEF FNsaveea
180 [OPT pass
190 FHF:FHA:TYA:FHA:TXA:FHA
200 ]:=pass
210
220 DEF FNrestorera
230 [OPT pass
240 FLA:TAH:FLA:TAY:FLA:PLP
250 ]:=pass
260
270 DEF FNbeep
280 [OPT pass
290 LDA #37
300 JSR oswrch
310 ]:=pass

```

Fig 1 An example of simple macros



# PROGRAMMING

these functions is pass; the clever part is that between the FN being called and returning this value, a section of code is generated as a matter of course. No calculation is required to find pass, as the FN simply returns the current value to the OPT statement. The difference bet-

```
10 REM Parameter passing in macros
20
30 :&2600=&00550044
40
50 FOR pass=0 TO 1
60 P%=&2500
70 LDPT pass
80 OPT FNdiv(&2600,2)
90 OPT FNdiv(&2602,3)
100 RTS
110 J
120 NEXT
130
140 CALL &2500
150 PRINT"&44 DIV 4 = "17&2600
160 PRINT"&55 DIV 8 = "17&2602
170 END
180
190 DEF FNdiv(address,no)
200 FOR bit_move=1 TO no
210 [OPT pass:LSR address+1:ROR address:]
220 NEXT bit_move
230 =pass
```

Fig 2 Simple parameter passing

ween a macro and a subroutine is that subroutines are called at run time and macros are called at assembly time.

Run the program, then type in command mode the following:

```
pass=1 <RETURN>
A=FNbeep <RETURN>
```

You will see something of the following form:

```
2012 OPT pass
2012 A9 07 LDS #&7
2014 20 EE FF JSR oswrch
```

Now type PRINT A and you will get the answer 1, the value of pass at the time the macro was called. Meanwhile, the above section of code has been generated. Note that OPT pass

and LDA #&7 share the same memory address, 2012. Of course they cannot do this, and in truth OPT pass is not assembled.

If you change line 50 of Fig 1 to 50 FOR pass=0 TO 1 and run it again, you will see the complete listing, and you will be able to pick out the OPT FN lines and the code generated below them starting

```
10 REM M.LABELS
20
30 DIM loop(5),done(5)
40 osasci=&FFFE3
50
60 FOR pass=0 TO 2 STEP 2
70 P%=&2500
80 LDPT pass
90 OPT FNtext(text1,1)
100 OPT FNtext(text2,2)
110 OPT FNtext(text3,3)
120 RTS
130 .text1
140 EQU$ "My first....."+CHR$&D
150 EQU$ &0
160 .text2
170 EQU$ "My last....."+CHR$&D
180 EQU$ &0
190 .text3
200 EQU$ "My everythins.."+CHR$&D
210 EQU$ &0
220 J
230 NEXT
240 CALL &2500:END
250
260 DEF FNtext(label,no)
270 [OPT pass
280 LDX #&0
290 .loop(no)
300 LDA label,X
310 BEQ done(no)
320 INX
330 JSR osasci
340 JMP loop(no)
350 .done(no)
360 ]:=pass
```

Fig 3 A demonstration of the usage of labels

with an OPT pass, then the first true operation code. They again appear to share the one location, but in fact only the opcode resides there.

That's how macros work, but how can you beneficially use them for code that

requires parameters to be passed?

The program in Fig 2 demonstrates how this can be done, using a rather trivial example. FNdiv(address,no) will emulate the Basic DIV 2 command, on the contents of any given location and location+1 (that is, a 16-bit number). You specify the address and the number of times the value is to be held there to undergo a DIV 2.

The value of pass is set to give a listing on the second pass, and you will see two lots of instructions generated by the first call and three sets of instructions generated by the second.

A nicer way to do things is to have 'conditional assembly' macros. Consider the following macro which will rotate a pair of locations, either right or left, a set number of times.

```
400 DE FNrotate(address,direct,no)
410 FOR bit_move=1 TO no
420 IF direct [OPT pass:LSR
address+1: ROR address:] ELSE
[OPT pass: ASL address: ROL
address+1:]
430 NEXT bit_move
440 =pass
```

You specify the address and number of times to rotate as before, but you also specify the direction by typing -1 or 0 (or TRUE or FALSE) as the middle parameter. -1 (TRUE) will rotate right, 0 (FALSE) will rotate left.

## Labels

More care must be taken when the macros become more complicated, such as those which contain internal loops as in the program in Fig 3, which is a demon-

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# PROGRAMMING

stration of the constraints placed upon the use of labels. Labels in assembler follow the same rules of legality as normal Basic variable names, as they are treated in the same manner (they are, in fact, one and the same). A label in assembler is given the value of the address of the memory location it represents. If a macro names a location '.title', for example, then is called again and names another location '.title', problems occur when you try to assemble with forward referencing. Take this macro:

```
270 DEF FNtext(label)
280 [OPT pass
290 LDX #80
300 .loop
310 LDA label, X
320 BEQ done
330 INX
340 JSR osasci
350 JMP loop
360 .done
370 ]:=pass
```

When the assembler tries to assemble an instruction telling it to jump or branch forward to a label, it won't know how far in bytes that jump needs to be until it has encountered that label in the assembly program. To do this, it needs to be able

to pass through the whole lot twice and note the unknown jumps, as well as noting the correct number of bytes for each one as it subsequently meets the labels.

During this first pass, incorrect values are used for the time being. During the second pass through the program, it substitutes the correct values for the incorrect ones. In other words, at the end of the second pass, all the variables have been updated to their new, correct values.

However, if the macro is called several times and a label is used several times, for example the label '.done', all occurrences of that label will be given the value it had during the last macro call. This is due to the one label of all the locations only holding one value, and this will have been updated to the final correct value. Code generated by the first call to the macro would exit to the code after that generated by the last call, which is where the incorrect value placed in .done would point to.

To overcome this, the labels are set up in an array that has as many elements as there are going to be calls to that macro. Fig 3 dimensions arrays 'loop' and 'done' to six elements each (0-5),

although the program only needs three in this instance.

With the number of the call specified in the parameters passed to the macro, the labels used will be of the form loop(1), done(3), and so on. As they are different names they will have different and independent values given to them, so the program assembles correctly and the code executes according to plan.

## Conclusion

It is to be hoped that the article and the examples presented have whetted readers' appetites, and shown the implications of this style (if not direct applications).

The shortening of execution times is not likely to inspire newcomers to 6502 to adopt the macro into their repertoire, but perhaps the other advantages, such as easy-to-read code and the modular format, will attract them. A library of macros 'SPOOLED on disk or tape would facilitate quick and reliable program development.

I look forward to seeing other macros in APC's 'TJ's Workshop' or the 'Programs' pages.

END

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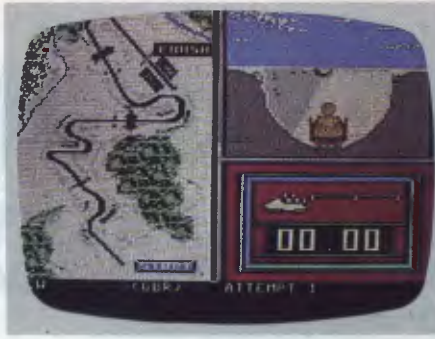


## Winter Games

**GAME:** Winter Games  
**MACHINE:** Commodore 64,  
 Spectrum  
**SUPPLIER:** ECP  
**PRICE:** \$29.95 disk,  
 \$19.95 cassette

Sports games come and go, but only Epyx has produced programs that capture the thrill and excitement of the real thing. Summer Games I and II are two classics of their genre, and now they are joined by a third in the form of Winter Games.

Winter Games leaves behind the sun-scorched running tracks of Epyx's previous two masterpieces, and takes us to the snow-capped mountain peaks of Calgary, Canada, where the action is



equally febrile and hard to master.

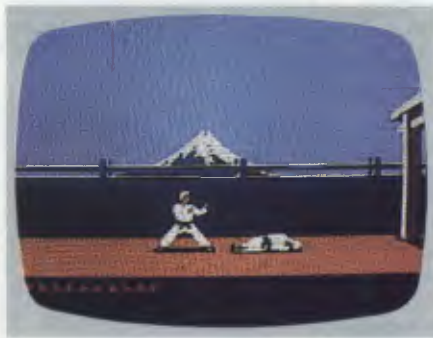
There are seven events, plus the by-now familiar opening ceremony. As is the case with most of Epyx's software, Winter Games is the product of programmers possessing an acute eye for detail.

Figure skating (short program) is one minute of sheer hell for a skater. In this even, the competitor is asked to perform seven different movements in one minute. Points are subsequently awarded not just for the execution of a movement, but also for the skater's grace.

The free program is similar to the figure skating, except that each of the seven moves must be performed three times in two minutes.

In both these events, the screen displays a small though brilliantly animated female skater who glides across the ice.

The craziest sport in Winter Games is Hot-Dog Aerials. Skiers propel themselves over mounds of snow in order to perform mid-air acrobatics.



## Chopping and changing

**GAME:** Karateka  
**MACHINE:** Commodore 64/128  
**SUPPLIER:** Imagineering  
**PRICE:** \$49.95 disk

The martial arts are once again becoming the big money-earner they were 10 years ago. Hollywood has certainly realised this fact, and so too, it seems, has the software industry. Although there have been several karate games launched

over the past few months, only Melbourne House's Way Of The Exploding Fist has stood out. Now it has a strong and worthy antagonist in the form of Karateka.

On the surface, Karateka is just another game where you kick and punch your way through a series of increasingly difficult fights. What makes it different is the way in which the contests have been woven into a film-like tale of good and evil.

You are the good guy who has returned home after years of study under a Master of karate, only to find that your village has been burned to the ground. The instigator of this malicious act is Akuma, the warlord. Unfortunately he has not only deprived you of your home, but also your fiancée, the Princess Mariko, whom he has abducted and incarcerated in his mountain fortress. The way ahead is clear, but the road is dangerous. You must enter the mountain fortress and rescue your bride-to-be before she's lost to you forever.

During the loading of Karateka, the story behind the game is flashed up onscreen and followed by a beautiful piece of computerised melodrama. Akuma is shown looking sternly at

Like the skaters, a hot-dogger's points depend on how well a manoeuvre is performed. Landing in the snow face down, feet up or without skis gains nothing, even in hot-dogging.

Rather more dangerous is the ski jump. Here the idea is simply to ski down a long ramp and hurl yourself into the ether, hopefully to land further from the take-off point than your opponents. The screen display for this event is particularly interesting. At the start of the jump, your skier is depicted as a small stick man speeding down a ramp. When he is in the air, a box showing a larger, much more detailed picture of your man opens in the top right-hand corner of the display.

There are two major stamina events in the games — speed skating and the Biathlon. Speed skating speaks for itself, but the Biathlon is more obscure. It is basically a mixture of cross-country skiing and prone target shooting. Not only does each competitor have to complete the course with a rifle strapped to his back, he also has to fire at several discreetly placed targets along the way.

Following the Biathlon it's on to the seventh and final event of the games, the bobsled.

Winter Games is an excellent piece of software which no serious games player should be without. It ranks equal to Epyx's two previous forays into the world of sport. Winter Games is nothing short of excellent.

Mariko. He points to one side, and she sombrely walks off the screen. The scene cuts to show the princess collapse onto the floor of her tiny cell, where she is left to languish until being rescued.

Akuma's palace, where Mariko is held prisoner, is guarded by a host of warriors, all of whom are also well-versed in the subtleties of karate. Your only hope of seeing her again is to defeat each one in turn, before finally coming face to face with the evil Akuma.

One of Karateka's nicest touches is the way in which Akuma sends out a new guard. Just one point of the master's finger sends a warrior running from the palace towards you. The screen then cuts back and forth between the two fighters. Although rather like *Wuthering Heights*, this neat touch does add drama to the proceedings.

During a fight you have full control over all your man's movements. You can even make him retreat.

Karateka is a wonderful little game. I have one gripe, though, and that is that each time you're defeated, you have to re-load part of side two. That aside, Karateka is a strong challenger to Way Of The Exploding Fist.

END



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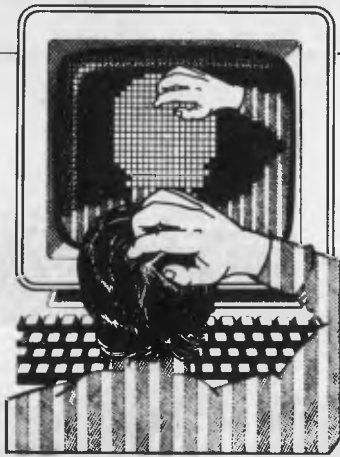
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## COMMODORE 64 SPRITE TEXT UTILITY

This is a utility which allows you to easily put text into sprites. This can be useful for adding titles to programs, or for moving large text easily. A sprite is made up of a grid of 24 dots across by 21 down, and a character is made up of 8 by 8 dots, so it's possible to fit three characters side by side into a sprite. It is also possible to use double-height characters.

The utility consists of a Basic loader program which POKES the machine code

into memory, which could be incorporated into any other program. This is followed by a short program which demonstrates the utility. The routine is used as follows: SYS52480, ADDR, S, C, D1, D2, D3 where ADDR is the address of the sprite data area; S is the character size (128 for double or 0 for normal); C determines whether or not a sprite is cleared before altering it; 1 means clear; and 0 means don't. D1, D2 and D3 are the three characters to be placed in the sprite. Any of the 255 characters can be used and the numbers should be the POKE codes of the characters, not the ASCII values.

Steve Mehew

```

10 REM
20 REM
30 REM
40 REM
50 REM
60 :
70 S=E24B0:CS=0:C=CS
80 FOR L=0 TO 22:LC=0:FOR D=0 TO 9
90 READ B:POKE S+C,B:C=C+1:LC=LC+B
100 CS=CS+B:NEXT:READ B:CS=CS+B
110 IF LC>B THEN 200
120 NEXT:IF CS<>60074 THEN 300
130 PRINT:PRINT"ALL DATA IS CORRECT.":END
200 PRINT"DATA ERROR IN LINE":500+5*L:STOP
300 PRINT"SERIOUS DATA ERROR. LINE CHECKSUMS"
310 PRINT"COULD BE WRONG. CHECK ALL DATA.":STOP
320 :
500 DATA 32,141,205,165,190,240,3,32,202,205,1415
505 DATA 173,14,220,41,254,141,14,220,165,1,1243
510 DATA 41,251,133,1,162,1,134,2,189,212,1126
515 DATA 205,133,251,169,0,133,252,162,2,6,1313
520 DATA 251,38,252,202,16,249,165,252,24,105,1554
525 DATA 208,133,252,160,0,177,251,132,158,72,1543
530 DATA 185,216,205,36,183,16,5,133,159,24,1162
535 DATA 101,159,168,104,145,253,36,183,16,26,1191
540 DATA 72,165,253,24,105,3,133,253,144,2,1154
545 DATA 230,254,104,145,253,165,253,56,233,3,1696
550 DATA 133,253,176,2,198,254,164,158,200,192,1730
555 DATA 8,208,198,230,253,208,2,230,254,166,1757
560 DATA 2,232,224,4,208,156,165,1,9,4,1005
565 DATA 133,1,173,14,220,9,1,141,14,220,926
570 DATA 96,32,253,174,32,138,173,32,247,183,1360
575 DATA 165,20,133,253,165,21,133,254,32,253,1429
580 DATA 174,32,158,183,134,183,32,253,174,32,1355

```

```

585 DATA 158,183,134,190,32,253,174,32,158,183,1497
590 DATA 142,213,205,32,253,174,32,158,183,142,1534
595 DATA 214,205,32,253,174,32,158,183,142,215,1608
600 DATA 205,96,160,63,169,0,145,253,136,16,1243
605 DATA 251,96,0,0,0,0,0,3,6,9,365
610 DATA 12,15,18,21,0,255,0,255,0,255,831

```

```

10 REM TEXT TO SPRITE DEMONSTRATION
20 REM
30 POKE 53280,0:POKE 53281,0:PRINTCHR$(147):
40 CLR:V=53248:TS=52480
50 FOR R=1 TO 8:POKE V+38+R,R:NEXT
60 POKE V+23,0:POKE V+29,255
70 FOR R=240 TO 247:POKE 2040+R-240,R
80 READ A,B,C
85 SYS TS,64*R,0,1,A,B,C :NEXT:S=50
90 FOR R=0 TO 8 STEP 2:POKE V+R,S:S=S+48:NEXT:S=98
95 FOR R=10 TO 14 STEP 2:POKE V+R,S:S=S+48:NEXT
100 FOR R=1 TO 15 STEP 2:POKE V+R,100-30*(R/9):NEXT
101 :
200 DATA 19,20,5,22,5,39,19,32,20,5,24,20,32
201 REM S T E V E ' S T E X T
210 DATA 20,15,32,19,16,18,9,20,5,19,32
211 REM T O S P R I T E S
212 :
230 POKE V+21,255:A=1:B=15:C=2
250 FOR T=0 TO 100
260 FOR R=A TO B STEP C:POKE V+R,PEEK(V+R)+A
265 NEXT:NEXT:PA=150
270 FOR R=0 TO 7:FOR T=0 TO PA:NEXT
280 POKE V+23,PEEK(V+23)OR 2^R:NEXT
290 FOR R=0 TO 7:FOR T=0 TO PA:NEXT
300 POKE V+23,PEEK(V+23)AND 255-2^R:NEXT
310 PA=PA-58:IF PA>=0 THEN 270
320 FOR R=1 TO 15 STEP 2:S=PEEK(V+R)
330 FOR Y=S TO 0 STEP -3
335 WAIT *+17,128,127:POKE V+R,Y:NEXT:NEXT
340 PRINT"THAT'S ALL FOLKS !":END

```

## SPECTRUM REPEAT... UNTIL COMMAND

This routine adds a REPEAT/UNTIL looping structure to a 48k ZX Spectrum with an Interface 1. Type in the program and RUN it. The program will POKE the code into memory and then tell you how to save it to microdrive or cassette. When you have

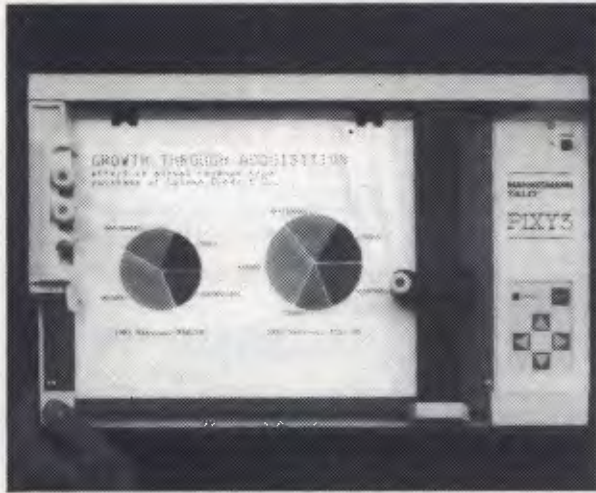
done this, clear the program with NEW. Before you can use the new commands, you must enable them by typing RANDOMIZE USR 65000; you can then type in the sample program to test out the routine. Both the new commands are preceded by ★ and have to be typed in letter by letter, but any condition following until may be typed in as normal.

Before loading the code, CLEAR RAMtop down to 64999 and remember that before using the new commands, or after using NEW, you must enable



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**Media Size:**  
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**Repeatability:**  
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Pen to pen — 0.4 mm (.016 in)

**Distance Accuracy:**  
± (1% travelled distance + 0.3 mm)

### PENS

**Type:**  
Fiber tip — water base for paper, oil base for transparency film

**Colors:**  
black, red, blue, green, brown, orange, rose.

### CHARACTER SET

**Basic:**  
96 characters ANSI or other (specified by font command)

**Extended:**  
 37 Greek characters  
 9 international character sets

**INTERFACES**  
 8-bit parallel or  
 RS-232 C

### POWER REQUIREMENTS

**Voltage:**  
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**Frequency:** 48 to 62 Hz  
**Consumption:** 40 VA maximum

### ENVIRONMENTAL REQUIREMENTS

**Temperature:**  
5 to 35°C (41 to 95°F)

**Relative Humidity:** 35 to 75%

### INDICATORS

Power On

Error

### OPERATING MODES

Plotter

Printer

Diagnostic

### DIMENSIONS AND WEIGHT

**Height:** 12.3 cm (4.9 in)

**Width:** 43.0 cm (16.9 in)

**Depth:** 26.7 cm (10.5 in)

**Weight:** 6 Kg (13.2 lb)

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the commands with **RANDOMIZE USR 65000**. To use the commands in your own programs, make the first line of the program **RANDOMIZE USR 65000**. The command allows up to

100 nested loops, and if it comes across an **★UNTIL** without a corresponding **★REPEAT**, it will give the **NEXT WITHOUT FOR** error message.  
*D Hales*

```

1 REM
2 REM REPEAT / UNTIL
3 REM b/ David Hales
4 REM
10 CLEAR 64999
20 PRINT AT 10,10; FLASH 1;"PLEASE WAIT"
100 FOR A=65000 TO 65174
110 READ B
120 POKE A,B
130 NEXT A
110 CLS
120 PRINT " THE CODE IS NOW IN MEMORY"
160 PRINT
170 PRINT "BEFORE RUNNING THE DEMONSTRATION PROGRAM SAVE THE CODE FIRST."
180 PRINT
190 PRINT "SAVE TO TAPE WITH:"
195 PRINT
200 PRINT "SAVE **R/U**CODE 65000,174"
210 PRINT
220 PRINT "DR MICRODRIVE 1 WITH:"
230 PRINT
240 PRINT "SAVE **M**11**R/U**CODE 65000,174"
250 STOP
990 REM
910 REM MC DATA
920 REM
1000 DATA 33,183,92,54,252,35,54,253,33,154
1010 DATA 254,34,151,254,62,0,50,153,254,201
1020 DATA 215,24,0,254,42,40,3,195,240,1
1030 DATA 215,32,0,254,02,40,7,254,05,40
1040 DATA 54,195,240,1,6,6,215,32,0,16
1050 DATA 201,205,103,5,50,153,254,254,100,32
1060 DATA 5,253,54,0,3,239,60,50,153,254
1070 DATA 42,151,254,50,69,92,119,35,00,70
1080 DATA 22,119,35,50,71,92,60,119,35,34
1090 DATA 151,254,175,193,5,6,5,215,32,0
1100 DATA 16,251,215,180,20,205,103,5,50,153
1110 DATA 254,254,0,32,5,254,54,0,0,239
1120 DATA 215,140,30,254,1,40,24,42,151,254
1130 DATA 220,40,126,50,60,92,43,126,50,67
1140 DATA 92,43,126,50,66,92,225,34,151,254
1150 DATA 195,193,5,42,151,254,43,43,43,34
1160 DATA 151,254,50,153,254,61,50,153,254,195
1170 DATA 193,5,0,0,0
1 REM
2 REM REPEAT UNTIL DEMO
3 REM PROGRAM TO FIND FIRST
4 REM OCCURENCE OF A BYTE
5 REM IN THE SPECTRUM ROM
6 REM (NOT DNE GO TO HERE!)
7 REM
8 RANDOMIZE USR 65000
90 LET INFINITY=0
90 *REPEAT
95 *REPEAT:UNTIL INKEYS="**"
100 PRINT AT 10,3;"REPEAT UNTIL DEMONSTRATION":AT 12,5;"PRESS ANY KEY TO START"
110 *REPEAT:UNTIL INKEYS("<")**"
120 CLS
140 *REPEAT
150 INPUT *TYPE A NUMBER BETWEEN 0 & 255 *;N
160 *UNTIL N=0 AND N<=255
165 PRINT AT 5,5;"SEARCHING ROM FOR ";N;AT 7,7;"PRESS **X** TO EXIT"
170 LET ADDRESS=1
180 *REPEAT
190 LET ADDRESS=ADDRESS+1
195 PRINT AT 10,5;"SEARCHING ADDRESS ";ADDRESS
200 *UNTIL PEEK ADDRESS=N OR INKEYS="**X"
205 CLS
210 IF PEEK ADDRESS=N THEN PRINT AT 5,6;"FOUND AT ADDRESS ";ADDRESS
220 *UNTIL INFINITY
    
```

## BBC EASY DISK LOADING

This utility speeds up the loading of Basic programs from disk, and should be used when **!BOOT** is unsuitable. The utility places a piece of code at 8900 which inserts a VDU 12 control code, followed by a CH. "HHHHHHH" and a return control code, into the keyboard buffer. The program can then be loaded as a **★** command, as the code strips off the filename after the **★** and automatically chains it.

To use the program, first

check that the required Basic program is on disk, then chain the Easy Load program (which you should have previously typed in and saved). You will be asked to name the Basic program Easy Loader; this name should be entered exactly as it is given in the disk catalogue. You will then be asked for the name of the machine code loader (the name to be placed after the asterisk) which should be as short as possible. You must ensure that this name is not the same as any of the OS commands, or any other Easy Load programs.  
*H Rees*

```

10 REM ***** EASY-LOAD *****
20 REM A Disc Utility for easier
30 REM loading of BASIC programs.
40
50 REM Written By Huw Rees.
60 REM 13th Aug 1985
70 MODE 7
80
90
100 PX=8900
110 REM Start of assembler.
120 L
130 OPT 2
140 PHA
150 TYA:PHA
160 TXA:PHA
170 LDA #5BA
180 LDX #60
190 LDY #3C
200 JSR &FFF4
210 LDY #543
220 JSR &FFF4
230 LDY #64B
240 JSR &FFF4
250 LDY #52E
260 JSR &FFF4
270 LDY #522
280 JSR &FFF4
    
```

## MS-DOS COUNTRIES

MS-DOS versions 2.0 or higher use a file called **CONFIG.SYS** during booting to set up various operating system parameters, one of which is **COUNTRY=44**. This refers to the operating system's ability to express the date in different formats, depending on the country of

use. (We use the same as the UK).

These are coded into **CONFIG.SYS** using the international trunk dialling codes, as shown in Fig 1.

These codes only configure the operating system and do not affect programs such as **dBasell**, so you won't be able to configure these to the local date format.

*RJ Akers*

CONFIG.SYS entry	date format	country
COUNTRY = 01	month:day:year	USA
COUNTRY = 44	day:month:year	UK
COUNTRY = 81	year:month:day	Japan

Fig 1

## VZ USER GRAPHICS

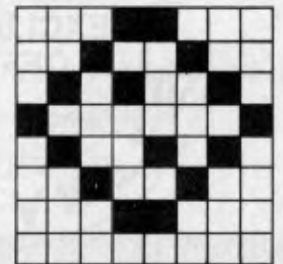
```

1000 A=44800:B=65536
1010 READ C:IF C=1THEN
1070ELSEPOKEA-B,C
:A=A+1:GOTO1010
1020 DATA245,197,213,
229,33,0,0,17,0,0
1030 DATA14,8,26,119,
35,19,26,119,6,31
1040 DATA35,5,120,254,
0,194,20,175,19,13
1050 DATA121,254,0,
194,12,175,241,193
1060 DATA209,225,
201,-1
1070 POKE30862,0:POKE
30863,175:RETURN
    
```

This routine will provide any VZ programmers with the ability of creating their own definable high resolution characters in 8x8 pixels.

For example

00000011	11000000
00001100	00110000
00110011	00001100
11000000	00000011
00110000	11001100
00001100	00110000
00000011	11000000
00000000	00000000



Refer to the technical manual for more details on high resolution graphics.

To activate this routine, you



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\* Dataflex is trademark of Dataflex  
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\*\*\* dBase II is trademark of Ashton-Tate

## TJ'S WORKSHOP

simply poke the starting address of the code for your user definable graphic into the memory location 44808/9 and the screen position of your user definable graphic into the memory location 44805/6.

Sample Program

```
5 GOSUB 1000
10 FOR T=45000 TO 45015
20 READ S:POKE T-65536,S
```

```
30 NEXT T
40 POKE 44808-65536, 200:POKE 44809-65536,175
50 POKE 44805-65536, 0:POKE 44806-65536,112
60 MODE(1):X=USR(0)
70 GOTO 70
1080 DATA 3,192,12,48, 51,12,192,3,48
1090 DATA 204,12,48,3, 192,0,0
```

## APPLE SWITCH

The Apple IIe has a colour switch which allows a sharper image on monochrome monitors. Unfortunately the switch is inconveniently located within the computer's case. This is a hassle if both a monochrome monitor and a colour TV (with a video modulator) is attached, as you have to frequently switch to colour for games and back to monochrome for word processing using graphic-text, for instance.

To improve accessibility, I connected a switch in parallel with the existing one and mounted the new switch in a more convenient location at the back of the computer where there are already various holes punched in the panel for cables etc. To do this the following parts are needed:

1xSPDT switch (push on/push off alternate action type is ideal);

2xE-Z clips or similar;  
2x0.5 metres of insulated hookup wire.

Solder the switch to one end of each wire and the clips to the other ends. Switch off the power, open the top lid on the computer's case and attach one clip to the right end of resistor R72 on the motherboard. (Left and right with respect to the keyboard being nearest to you and keyboard facing upwards). This resistor is found near coordinate B-14. (The motherboard is marked with letters along one edge, and numbers along the other). Attach the other clip to the left end of resistor R76 located at coordinate B-13. Mount the switch in a convenient location like the back panel. Set the existing colour switch located at B-15 to 'color' (ie, away from the keyboard). Finally close the lid and switch on the power.  
*K Lau*

## EXTRA VIC-20 VOICE

To gain an extra sound channel to the VIC-20 remove the main circuit board and connect a piece of wire between the CB2 line on the user port to the audio out line in the audio/video port and type the following:  
POKE 37147,16  
POKE 37144,N (where N is between 0 and 255 representing the note to be

played)  
POKE 37146,W (where W is 15, 51 or 85 for square waves)  
WARNING: DO NOT USE THE DATASETTE IN THIS MODE.  
POKE 37147,0 will restore the VIC to normal operations.

This extra voice may be used in conjunction with the other voices but there is no volume control for the extra voice.  
*P Austen*

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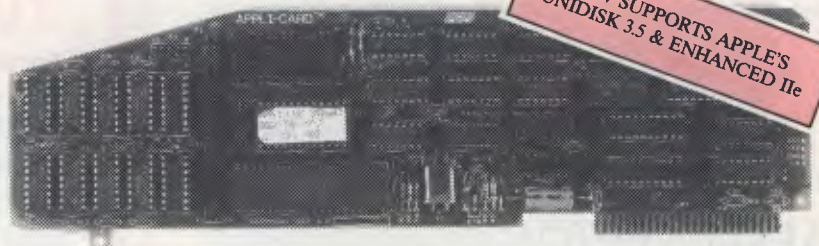
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## 64 TRACE

This routine for the Commodore 64 simulates a TRACE function. It is called with 'SYS 49216'; 'SYS 49227' turns it off again.

When activated, this routine prints the current line number that the computer is executing in square brackets.  
B Michell

```

100 REM TRACE (C) BEN MICHELL 1985
110 S=49152
120 READ A:B=B+A
130 IF A=-1 THEN GOTO 300
140 POKE S,A
150 S=S+1
160 GOTO 120
170 IF B(>)9484 THEN PRINT"ERROR":END
180 PRINT"SYS 49216 TO TURN TRACE ON"
190 PRINT"SYS 49227 TO TURN TRACE OFF"
200 DATA165,57,133.99,165,58,133.98,165
210 DATA157,201.0,208,14,165,57,205,52
220 DATA3,209,13,165,58,205,53,3,208,6
230 DATA32,53,192.76,228,167,32,53,192
240 DATA169,91,32,210,255,32,209,189
250 DATA169,93,32,210,255,76,228,167
260 DATA165,57,141,52,3,165,58,141,53,3
270 DATA96,169.0,141,9,3,169,192,141,9
280 DATA3,96,169,228,141,9,3,169,167
290 DATA141,9.3,96,-1
300 END
    
```

## BLUDNER

There is a bug in 'Old Apples' (APC, November, page 181). Line 110 in the first box.

```

110 A2E = PEEK (64435)
= 6: IF NOT A2E THEN
POKE 54,6: POKE 55,8:
CALL 1002
    
```



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# WordPerfect

*WordPerfect is a comprehensive but pricey word processing package. Brian Whalley puts it on trial to test its vast range of facilities against ease of use.*

A useful question when approaching a new word processor is: 'How easy is it to write a short letter or document without using control codes?' In this case, the answer must be 'very easy indeed'. WordPerfect comes close to the ideal of 'What you see is what you get' (WYSIWYG), and although it doesn't show right-hand justification onscreen, you work at all times on a screen uncluttered with control codes, simply with an indication (at bottom-right) of document, page, line and column.

Fig 1 is a screendump of some sample text. Start typing at the top of the screen and when you reach the bottom, the display will scroll up after each line typed. If you find the scrolling irritating at any time, pressing the Home key plus the down arrow key or the page down key, rewrites the screen so that you're typing about halfway down.

### The clean screen look

How does WordPerfect achieve its 'clean screen' appearance? As it offers the usual options for justified and unjustified paragraphs, bold or underlined text, variable margins and line spacing, and so on, and allows these format instructions to be stored with the document, there must be control codes. But where are they? Within the text, but hidden from view, is the answer.

How can their presence be checked and edited? Take the cursor to the beginning of the document, press the appropriate function key to 'reveal codes', and a screen such as that shown in Fig 2 appears. It may look odd, but it is very

revealing and extremely useful. The [ ] at the start is a flashing cursor which can be used within the reveal codes screen to delete unwanted codes; [W/O On] indicates 'Widows & Orphans On' to ensure that a paragraph never starts on the bottom line of a page and never ends on the top line of a new page; [Margin Set...] indicates the appropriate columns (column one is the left-hand edge of the paper, not of the print line); the paired [C] and [c], [B] and [b] enclose text to be centred and in boldface; and [HRt] indicates the use of the Return key at the end of a single line or paragraph, as distinct from a soft carriage return [SRt] automatically inserted with a paragraph at a point appropriate to the set margins (a process known as wordwrap). Pressing any key other than the left or right arrow, or Delete or Backspace, takes you back into

the document. These invisible control codes can be entered anywhere within a document to change the formatting to exactly what you require.

Sensible defaults and a function key template make it possible to produce formatted letters and other documents virtually without using the manual (although it is an excellent one, and not to be ignored). WordPerfect comes with four diskettes: two copies of the main program disk (one labelled 'IBM PC, XT, AT' and the other labelled 'Use this version if you are running TopView'), a speller disk and a supplementary disk. None of the disks are copy-protected, and the manual gives clear guidance on making working copies of a program disk, a speller disk and a learning disk. The latter will carry a sequence of 12

#### SAMPLE WordPerfect TEXT

```
This text has been prepared using the word processing software
WordPerfect from A M International. WordPerfect comes very close
to the ideal of "what you see is what you get" (WYSIWYG), and
although it does not show right hand justification on the screen,
you work at all times on a screen uncluttered with control codes,
simply with an indication (at bottom right) of document, page,
line and column. Since it offers the usual options for justified
or unjustified paragraphs, bold or underlined text, and so on,
there must be control codes, but they are hidden from view until
the Reveal Codes key is pressed.
```

Fig 1 Screendump to a dot-matrix printer

```
[ ]HRt Just On]EW/O On][Margin Set:10,75][C][B]SAMPLE WordPerfect TEXT[b][c][HRt
]
[HRt]
[HRt]
This text has been prepared using the word processing software[SRt]
```

Fig 2 The Reveal Codes screen



# SCREENTEST



The WordPerfect opening screen



The editing screen



Help commands are provided

documents (copied from the supplementary disk) to be used in conjunction with the 145-page learning section of the manual (supplemented by more lessons in the Special Features section covering newspaper-style columns, footnotes, tables and lists, macros, and so on).

The fact that an additional interactive tutorial disk (as well as a demonstration disk) is available from dealers who may suggest that WordPerfect is hard to learn. In reality, few users are likely to plough through all the learning material, but when getting to grips with some of the software's more powerful features, it's useful to have some step-by-step instructions to follow, using a real document which is already waiting on the learning disk. The manual also has a brief and well-illustrated Getting Started section, a detailed alphabetical Reference Guide with abundant cross-references, and an excellent index. The software package also contains a Quick Reference booklet listing every function in alphabetical order along with its function key and a brief explanation, and an Installation Booklet with information about set-up, convert and printer programs, and printer test files.

Much of the program's success must be attributed to its use of function keys. A colour-coded template is supplied to fit round these keys, each of which has four functions depending on whether it is used alone or with the Shift, Alt or Ctrl key. This may appear complicated but quickly becomes familiar and easy to use, and I much prefer this approach to one using the normal letter keys — though I have heard it argued that a professional typist moving into a word processing system prefers control codes based on keys with which he/she is already familiar.

Regrettably, the lettering on the template is small. I use spectacles for reading but not normally for computing, and I am thankful that I use a Qubie keyboard which has the function keys in a line above the normal Qwerty keyboard, thus allowing me to make my own overlay in

typescript. A standard template with larger, clearer lettering is needed, and should be possible.

## Formatting features

Like many word processors, WordPerfect arrives with initial settings for a range of formatting features. For example, page length is set for a 66-line sheet of paper with 54 text lines at six lines per inch and single spacing, margins are set at columns 10 and 74 with tabs every five spaces, and right justification is on. Any default can be changed, or you can temporarily change one or more for a work session. There is always the option to change them for the current document or a portion of it, in which case the settings are stored on disk as an integral part of the document.

The special set-up program for changing defaults (entered by typing WP/S instead of the normal WP at the system A> prompt) also provides for selecting colours for a colour monitor (or whether to have underlined or highlighted on a suitable mono monitor), activating a timed back-up. This means that your current document is automatically saved to disk at a predetermined time interval (in minutes), defining special characters for access via use of the Ctrl and Alt keys, and specifying default drives (or directories, on a hard disk system).

Cursor control is impressive (you can even select the style of cursor you prefer) and makes full use of the PC's arrow keys. These move the cursor one character left or right, one line up or down; Ctrl plus left or right arrow takes you along a line one word at a time. The Home key plus the up or down arrow takes you up or down one screen of text (the + and - keys on the numeric pad do the same), while Page Up or Down will take you to line one of the previous or following page; Home plus the left or right arrow takes you to the end of the line, and you can also get to the right-hand margin by using the End key; Home pressed twice followed by the up or down arrow takes

you to the start or the end of the current document.

Ctrl-Home produces a Goto prompt at the bottom left-hand corner of the screen, and typing an appropriate number takes you to line one of the specified page. A fast search facility (forward or reverse) will find any character string or control code, and position the cursor at that point. Replace provides for the deletion or substitution of characters or codes, either with a request for confirmation of each occurrence, or automatically right through the document.

WordPerfect holds an entire document available for viewing and editing: moving from page to page, from start to finish, is achieved with ease and speed. Page endings are produced automatically according to the page length default or an inserted choice, and they are shown visually by a line right across the screen. A page end can be forced at any point by using Ctrl-Return, and you can specify a number of lines (of a table or list, for instance) which must be kept together: this is known as a conditional page end.

Text can be marked for bold face printing, underlining, subscript or superscript; for changes between character sets on a dot-matrix printer; or to pause printing for a daisywheel change (or any other purpose). The appropriate control codes can be entered either while initially typing the text, or later. Press the function key before typing the text and, on a colour screen, boldface text will be shown highlighted, and underlined text in a selected colour; press the function key, and you're typing normal text again. To mark text that has already been typed, Alt-F4 is pressed to produce a flashing 'block on' message at the bottom-left of the screen. Moving the cursor then marks text in inverse video, one character at a time or more quickly by word, line or even page moves. When the text has been highlighted, pressing a function key marks it appropriately and switches off the block.

Erasing text is simple, with the Delete





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key acting on the character at the cursor position and Backspace deleting the character which is to the left of the cursor. Ctrl-Backspace removes either the word the cursor is on, or the previous word if the cursor is at a space. Ctrl-End erases to the end of the line (the Cancel function key will restore it if it's an accident or a mistake). Ctrl-PgDown allows you to erase from the cursor to the end of the page after replying Y to a request for confirmation — a valuable safety feature.

Ctrl-F4 is a 'Move' key: pressing it gives you a choice of the sentence, paragraph or page on which the cursor is positioned, followed by a choice of Cut (for deletion, or transfer to another position) or Copy. In either case, the text is saved in a buffer until you use Move again.

Sections of text can also be marked for deletion, transfer or copying by the use of the Block command already described. While a block is highlighted, the Move menu allows you to cut, copy or append the block. Cut can be used to transfer the marked text not only to a new position in the current document, but also to a second document which can be held in memory at the same time. Append allows you to add the marked text to a file already on disk (there is also a Retrieve function which allows a disk file to be inserted into the current document), while pressing the Save key will allow you to save it as a named file.

Tabs are available on most word processors, and while WordPerfect's default is to tabs at every fifth column, it is quite easy to clear them and set tabs wherever you require them within a particular document. There is also an Indent facility which is remarkably easy to use, either to indent from the left (at the tab position selected) until the Return key is next pressed, or to indent an equal amount from each margin (for quotations, for instance). Used with Margin Release (Alt-Tab), hanging paragraphs (the first line projecting beyond the left margin) are possible.

For producing a long report, there is an automatic paragraph numbering facility with a choice of three predefined styles — and the option to create your own by selecting from six number/letter styles and four punctuation styles.

## Spelling

The spelling program works on the current document rather than on a disk file, and entails replacing your document disk with the speller disk unless you are fortunate enough to have a hard disk, to which all WordPerfect's utilities are easily transferred. You are offered six

choices: to check a word, the current page, or the full document; to look up on a wildcard search or to use the phonetic facility; or to change dictionary. Any error located is immediately shown in context and you can correct it manually, or look up the correct spelling either by entering the letters you're sure about and a ★ for the rest, or by selecting the phonetic look-up.

The latter is rather curious and unpredictable. Although entering CUF produces a selection of eight alternatives including cuff, cough, coif, and the less likely cafe and chief, and THERE yields their and they're, entering COUGH produces no alternatives at all, the same being true of BOW and BOUGH, which is rather disappointing.

If the speller fails to recognise an acceptable word (perhaps a technical term) you can skip it once, skip it for the rest of the document, or add it to the dictionary (facilities also exist on the supplementary disk for editing the main dictionary by additions and removals, and for creating special-purpose dictionaries of your own). When you've checked and corrected a document, it's important to remember to save the edited version — a process which is not automatic.

## Advanced features

There are still more advanced features which will appeal to professional writers with large documents to produce. Text

can be marked for the creation of a table of contents, an index, or lists of various types (for example, of tables, graphs and illustrations). Footnotes and endnotes can be created in several styles.

Headers and/or footers can be defined for the automatic printing of the same text at the top or bottom of every page, with provision for page numbering and for alternative message or layout on odd and even numbered pages.

There is provision for mailmerge, label printing, form-filling, document assembly, and many other features which take a little time to learn but could save a remarkable amount of time in a busy office. For any frequently repeated text, format or operation, a macro can be created which reduces complexity to a couple of keystrokes. Non-WordPerfect files can be imported, and there is a special Convert program to cope with such formats as WordStar and DIF files.

A mathematical facility will provide automatic totals and subtotals of columns and rows, with limited provision for using formulae as on a spreadsheet. There is a special tab function which lines up figures on the decimal point, and producing columns with centred headings is no problem. However, WordPerfect takes the notion of columns a step further with its facility for defining columns such that a document can be automatically printed out in newspaper style, or a report can have sections printed in parallel column format (Fig 3). Up to five columns, of the same or differing

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---	---	---

Fig 3 Printing in multi-column format

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Fig 4 Formatted print on dot-matrix printer



widths, are easily defined within the limits of the margin settings being used.

## Printers

Fig 1 is a dump from the screen to an Epson MX-80 dot-matrix printer, while Fig 4 shows WordPerfect's output to the same printer. Fig 5 shows the results on a Qume Sprint 9 daisywheel printer.

The micro-spacing and justification of the Qume required no installation work on my part — merely the selection of the printer from a list of 30 printers (Fig 6).

Documents can be printed from screen or disk: from screen you can print the whole document, the currently displayed page or a marked block, to the default printer; from disk you can select start and end page numbers, and print to any one of up to six printers for which details have been stored on the working copy of your program disk (using the set-up program and the supplementary disk). These six printers normally include a DOS text printer (which allows printing to disk of a standard text file without formatting codes), and can include the same printer twice for, say, continuous forms and single-sheet operation. The printer control menu is easy to reach, but offers so much choice that although many users will rarely need to use it, it does warrant very careful reading of the manual.

Specifying your printer is very simple if it appears on the printer list (Fig 6), but detailed guidance is provided for installing other printers, and for making extensive modifications to the printer definitions and character tables if you have exceptional requirements. The supplementary disk contains a README file which can be used to print a 33-page, thoroughly indexed, printer program manual. There are also the aforementioned printer files, one of which is a printer test using the full range of control codes for you to check your printer's response. Another is a font test in order that you can correlate the characters displayed onscreen with those on a particular print wheel, providing a facility for you to produce an appropriate translation table if needed; a third allows you to make adjustments to the positions and widths of a proportionally spaced font.

These are sophisticated facilities which many users will rarely, if ever, use, but allow a dealer or the more enthusiastic user to achieve a remarkable degree of optimisation in the use of the wide range of standard printers already catered for by WordPerfect, or for newly introduced models.

## Weaknesses

You might have the impression that you've been reading a eulogy rather than a review, and you can hardly expect any software to be entirely perfect, whatever the implications of its name! WordPerfect does have its faults, although they are few in number, and I'd rather call them weaknesses. For example, I've

already mentioned the program's inability to display right justification in true WYSIWYG style, and I hope this will be introduced at the next revision. In the meantime, I'd be grateful for a patch that puts a justified message on the screen, like the one for 'typeover' which is switched on and off by the Insert key.

Changing the format defaults to those you most frequently need is very easy,

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Fig 5 Formatted print on a daisywheel printer

### Printers Currently Defined

- |                                   |                                 |
|-----------------------------------|---------------------------------|
| 1 Line Printer                    | 2 DOS Text Printer              |
| 3 Brother HR-15 / Dynax DX-15     | 4 C.Itoh Starwriter/Printmaster |
| 5 Centronics 351                  | 6 Diablo 630 ECS                |
| 7 Diablo 620/630 (Daisywriter)    | 8 Epson FX                      |
| 9 Epson MX-Graftrax/MX-Type III   | 10 Epson LQ-1500                |
| 11 HP 2686A LaserJet-A            | 12 HP 2686A LaserJet-B          |
| 13 IBM Graphics Printer           | 14 IBM Color Printer            |
| 15 IBM Wheelprinter/5218          | 16 IBM Quietwriter              |
| 17 NEC 2050                       | 18 NEC 3510/3530/7710/7730      |
| 19 NEC 3550                       | 20 NEC 3515/5515/7715/3525/7725 |
| 21 NEC Pinwriter P2/P3-2, P2/P3-7 | 22 NEC Pinwriter P2/P3-3        |
| 23 Okidata Microline 84           | 24 Okidata Microline 93         |
| 25 Qume Sprint 5/9/11/11+         | 26 Star Gemini                  |
| 27 Texas Instruments 855          | 28 Toshiba P1350/P1351          |
| 29 Toshiba P1340                  | 30 Standard Typewriter          |
| 31 DataProducts DP Series         |                                 |

Fig 6 List of printers already defined on disk



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but it's a pity that default values are not entered into the document like specifically selected values. Reprinting a document produced in accordance with defaults which you have since changed can have unexpected results, especially if tabs are involved. There are some oddities when text is being reformatted after you've added or removed text. Although no specific user action is needed (like the Ctrl-B to re-Block text in WordStar), the process is not entirely immediate and can cause some word-wrap shifts as you cursor down a page. However, whatever you've done by way of editing, moving from the start of the document to the end by Home-Home and the down arrow will re-format and repaginate the entire document, perhaps with a few requests to decide about hyphenating if you're using that facility. Occasionally the blank line between paragraphs will appear at the top of a page (hardly noticeable unless your pages have a header) or the second space after a full stop will appear at the start of a line, but these hiccups have been very rare in my experience.

I've already mentioned some weaknesses of the speller facility, especially in the phonetic look-up. The thesaurus



utility on the much less expensive Perfect Writer is of considerably more value, and I would gladly substitute it for WordPerfect's phonetic oddities. The speller produces a word count after a page or full document check, but it really would be nice to have a running word count such as is provided by some quite cheap home computer word processors — or at least some way of bypassing a full spelling check to obtain the count.

It would also be nice to have something like the automatic presentation of probable correct spellings which is a feature of SpellStar (in the WordStar Professional suite). There certainly should be a prompt to remove the speller disk and save the edited document after correcting spellings — it's far too easy to

forget to save it (potentially a very serious waste of time and effort), or to write it onto the speller disk (although this is merely an irritation and not dangerous).

## Conclusion

WordPerfect is quite an expensive package compared with many word processors for the IBM PC and compatibles, and if considering using it you will wonder about value for money. If you simply want to use your computer for the occasional letter, or for simple documents with little or no formatting, you can select from several cheaper programs. If you intend to create a variety of long documents, some with complex formatting, then do consider this very comprehensive package against others of similar power and complexity.

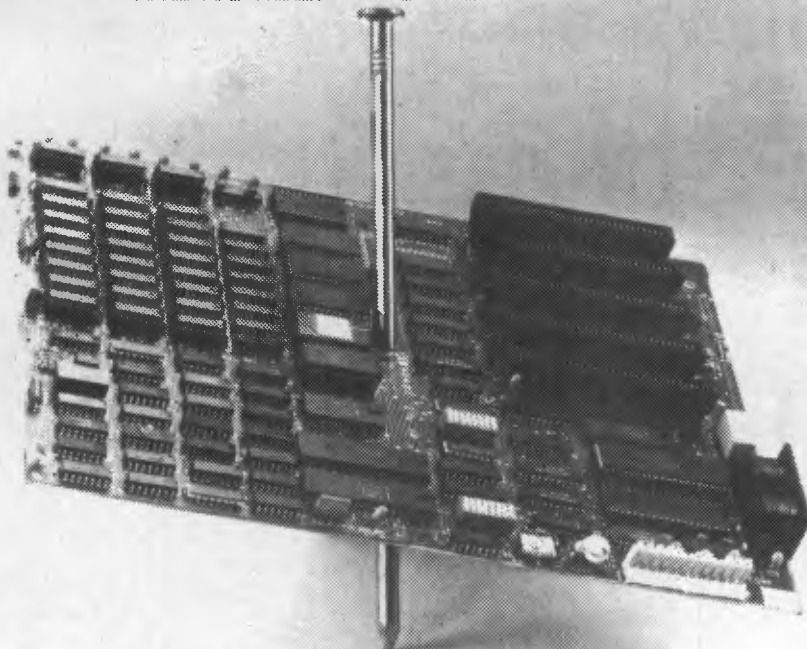
WordPerfect is a winner due to its sheer range of facilities allied to a remarkable simplicity of operation.

WordPerfect costs \$685 and is distributed by Sourceware, 4/73 Albert Avenue, Chatswood, NSW, 2067. Tel: (02) 411 5711.

END

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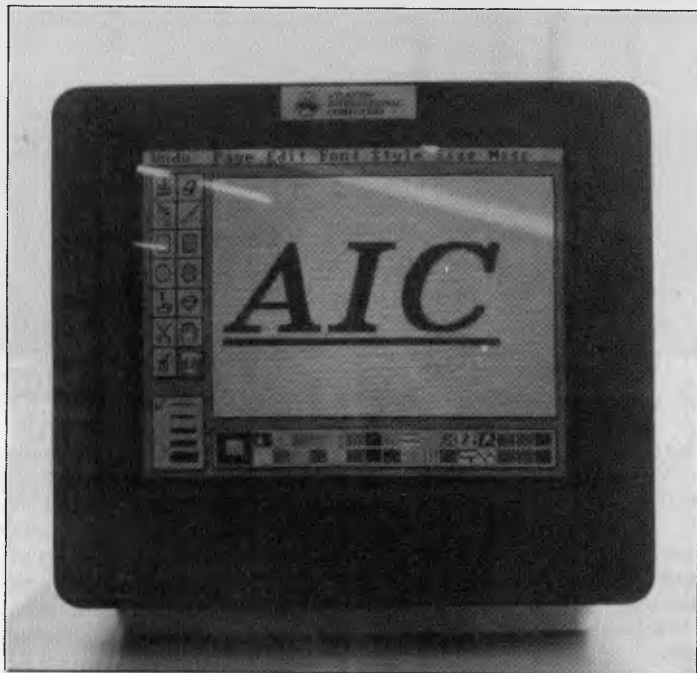
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POWER INPUT: 90-265VAC/50-60Hz  
POWER CONSUMPTION: 60W AC  
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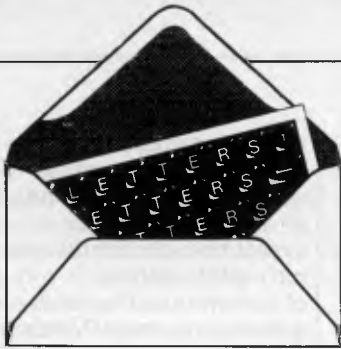
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## Anything's possible . . .

In your feature 'New Life' (APC, November) Geoff Simons draws some comparisons between the structural organisation of living things and computer systems. While this is to some extent semantic, there would seem to be no insurmountable obstacles in the way of its conclusion that an extension of existing electronics and programming will eventually enable the manufacture of a machine which is alive in the same sense that an animal is alive.

Such a machine, like any physical life, would necessarily be deterministic — in simple terms it would do what it was programmed to do, which, in the absence of malfunction or built-in randomising components and in full knowledge of all inputs, would be entirely explicable by its initial design. Similarly for animals and humans, although the full mechanism (in particular that of the brain) is not understood, the state of its physical constituents at any instant must be determined by their state an instant before through the action of intermediary forces.

However, this in no way explains our experience of life at its highest levels. We consider ourselves to be in control in a literally supernatural non-deterministic way (see *The Abolition of Man* by CS Lewis for some insights into the validity of this attitude). Here science has nothing to say, as inherently it deals with the natural. The presence of a supernatural component in human beings is of great

relevance to the understanding of artificial intelligence in its broadest and highest definition, as it must set the limits on the extent to which machines can be designed to do what we do.

It will be of considerable interest to discover in the coming decades just where these limits lie.

*Dr P Beardwood*

## . . . well, almost

I read Geoff Simons' article 'New Life' in the November issue of APC with some amusement. His statement that '... the whole of the plant kingdom is unable to reproduce without assistance from other species (namely birds and insects)' I found a little surprising.

It is good to see that the conifers, ferns, mosses and algae hold his views in a healthy disrespect. They colonised the dry land many millions of years before there were any insects or birds to assist them in propagating themselves. I can only assume that they were unusually long-lived, and very celibate.

As to how water plants must breed, I find it hard to believe that diving birds and water beetles are entirely responsible. Then there are species such as the dandelion, which have turned their nose up at sexual reproduction of any kind . . .

Enough: the man clearly doesn't suffer from hay fever. Other than this slight lapse of common sense on his part, I found the article thought-provoking, if a little bizarre. For those of a cynical disposition, I would strongly recommend an article in *A Random Walk*

in *Science* written from the point of view of a bunch of robots exploring the earth. They conclude that cars are the principal lifeforms, but note that they seem to be infested with small, bipedal parasites.

*Stephen Burt*

## Seduction

Geoff Simons ('New Life', APC, November) wrote an excellent and thought-provoking article. However, much of the plant kingdom can reproduce asexually without outside interference.

The electronic equivalent may be 'induction', perhaps what is really 'computer seduction'.

*P Lewis*

## Fuzzy cats

Oh dear, Oakley ('Letters', APC, November) has trotted out the old Cat Paradox to 'prove' the existence of fuzzy logic.

This supposed paradox is more a proof of a lack of practical logical thinking. Imagine I am presented with a sealed black box and am told that a cat is inside with a radioactive electrocution device attached. I have to assume that I am blindfolded and am wearing ear muffs, as the cat, if alive, would be frantic by now.

To me, logically, there is no cat. The box is sealed, and by definition, the presence of the cat, let alone its state, is unknowable and logically not describable. What I can work out logically from information received, is the future probability of the cat being alive in one minute's time when the box is opened and the cat exists for me for the

first time: that is,  $0.5 \times 61/60$  or 50.833 per cent.  
*W Brinicombe*

## . . . and so on

Many people think they have an intuitive understanding of the concept of infinity. They might like to solve this little conundrum:

A Take an infinite series of numbers:  
2,4,6,8,10,12, and so on.  
This is obviously a series of all the even numbers, and its sum is obviously infinite.

B Take another series:  
1,3,5,7,9,11,13,15, and so on  
This is obviously a series of all the odd numbers, and its sum is also infinite.

C Now put the two together, and derive the difference:  
2,4,6,8,10, and so on  
1,3,5,7,9, and so on  
1,1,1,1,1, and so on  
It is obvious that the further you extend these series, the greater becomes the sum of the differences; in fact, this tends to infinity. Therefore, obviously, the sum of all the even numbers is infinitely greater than the sum of all the odd numbers.

D Now let's add zero to the even numbers (zero is conventionally assumed to be even):  
0,2,4,6,8,10, and so on  
1,3,5,7,9,11, and so on  
-1,-1,-1,-1,-1, and so on  
It is obvious that the further you extend this series, the greater becomes the sum of the differences; in fact, it tends towards minus infinity. Therefore, obviously the sum of all



## LETTERS

the even numbers is infinitely less than the sum of all the odd numbers. This is a remarkable result, from just adding zero.

Which is right? C or D?  
C Walls

### Curse on C

I have recently learnt how to program in the C language but I don't know how to write C functions equivalent to Basic's GET\$ or INKEY\$. Our compiler (cc) is a full implementation of C, as specified in Kernighan and Ritchie's book, *The C programming language*.

I tried to use the routines in the book, but with no success. Altos has provided a screen package called CURSES in which it provides the function 'getch()' to do the job. This consumes large amounts of memory — my 512k of source code produces about 12k of

object code and still does not function properly. Can you provide a better function to do the job?

A Segar

*Firstly, an apology as I do not have the time nor space to provide full-scale programming solutions on these pages. However, I can point out the likely cause of a problem, and explain how I would go about tackling it.*

*Although the syntax of the C language is defined in the book you mention, the input and output commands are not fully specified. The designers of the language recognised that such facilities would inevitably vary from one machine to another and they deliberately avoided building such facilities into the core of the language. In C, input and output are performed by calling functions, rather than through the*

*use of specialised routines (such as Basic's INPUT, INKEY\$, and so on).*

*This approach makes it easy for systems programmers to move a C compiler from one machine to another, especially as C compilers are usually written in C. The implementors need only re-write the functions required by their compiler — without delving deep into machine code. The snag from the user's point of view is that the precise performance of input and output functions may vary between one type of computer and the next.*

*In this case it seems that the READ function will not return a 'dummy' character with the value zero when there is no data immediately available. This may stem from lazy implementation or incompatibility between the terminals you are*

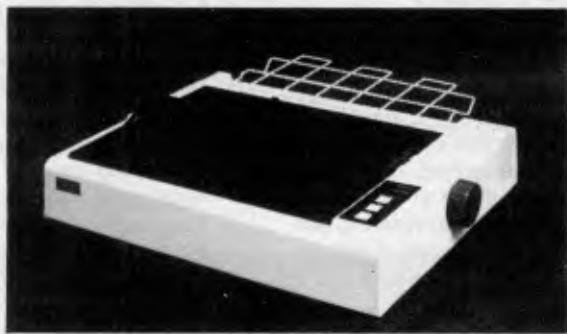
*using and the device drivers — the machine code routines at the heart of any Unix or Xenix system which handle the nitty-gritty details of communication with external devices. These routines vary a great deal between one implementation of Unix and another, as they communicate with the hardware at a very low level.*

*It is possible that the terminals which you are using are not configured correctly. Check this by consulting the person who installed the system, and reading through the configuration instructions. Make sure that the terminals you are using are set up to match the requirements of the device drivers.*

*The Altos terminal package consumes a lot of memory because it contains several functions associated with screen-*

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handling which you do not require. When you include the CURSES package, you tell the compiler to process the entire contents of the associated file. Unfortunately the source library feature of C means that most compilers are not clever enough to eliminate unused routines from the final output file, so much of your 12k object file contains routines that are never called by your test program. This would not be the case if you were using a more sophisticated language, such as Ada.

The solution is to extract the required routines from CURSES, and discard the rest. All of the CURSES routines should be in a standard text file, which you can copy and edit. Although this is a simple operation in theory, in practice you may find that getch()

interacts with other routines and variables declared in the file, so it could take you a while to discover which parts can safely be discarded.

It is best to remove routines one by one if you're not certain whether or not they are needed. You might be able to save time by contacting the person who implemented the package, but it tends to be difficult to track such people down without a lot of time, persistence and a big telephone budget!

Since you say that the screen package does not work properly in any case, it is likely that you will need to adjust the configuration of your system when you have reduced the size of the package. Check that your terminals transmit each character as it is typed — some terminals store characters and transmit a whole line

at a time. Some terminal interface boards (inside the computer) work similarly.

In both cases you should be able to inhibit this buffering, but you may find that system performance suffers as a result as the processor will be interrupted by the terminal more often. This is the price you pay for interactive computing, and one reason why micro networks often outperform multi-user systems on larger computers. SG

## Assembly time

Could you tell me how to convert an assembly program into machine code for the IBM PC? Could I use 'Debug' to achieve this? If so, how? I find the Debug menu very difficult to understand. Anita, no address supplied  
In theory you could use

Debug to enter programs, just as you could hammer nails into a wall with your fist — Debug is not designed for that purpose. Debug is a tool for experienced programmers who wish to test and make modifications to machine code.

You need an assembler. This is a program which translates mnemonics — the text of your assembly-language program — into binary instructions which can be directly executed by the PC's processor. You should be able to order an assembler from any PC dealer — there are several such programs available, including the Digital Research assembler which is supplied with a set of debugging tools. Be warned, though, that assembly-language programming is pretty tough going. SG

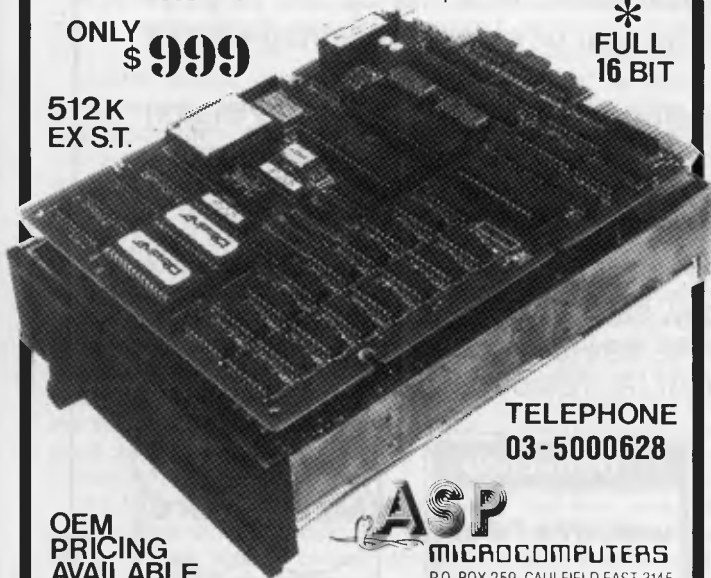
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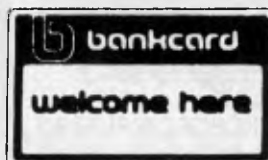
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# Mum's not the word

*The password this month is security, with Peter Tootill and Steve Withers offering sound advice on keeping intruders at bay.*

Security of online systems has been getting a good deal of publicity recently. As an example of the problems that can occur, someone left a commercial system just by dropping carrier instead of using the normal command 'bye'. A faulty modem meant that the system didn't realise, so the next caller found himself logged into another person's ID. Apparently the company concerned is criticising the original caller for not signing off properly!

Every online system should be able to cope with lost carriers as a matter of course. No matter how good the phone lines are, there is always the chance that a caller will lose the connection through no fault of his own. The system should be able to cope in order to guarantee a user complete security.

While on the subject of security, it's worth mentioning passwords. Most systems suggest that you change your password regularly. This is a little confusing, especially if you use several different ones and want to use a different password on each. However, it's certainly worth doing so on systems where, for example, someone could run up a big bill for you if they got hold of your password. Be especially careful if you use such a system in an environment where others might see you logging on.

Neither should you use a password which is easy to guess — you'd be surprised how many people log onto a BBS and use their girlfriend or wife's name as their password. One US network suggests that you use two unconnected words, joined by a symbol — for example, 'book:dog'. Not all online systems allow symbols, but it's a good tip — such passwords are very difficult to guess.

We suggest a two-level system of password for online systems, using a low level for bulletin boards, where it wouldn't be such a disaster if someone were to guess it. This one is rarely changed.

The high-level password is for sensitive systems where it would be a serious matter if the wrong person obtained access. Sensitive systems are those

which could prove expensive, such as Teledata, The Source, or Viatel, or those where I have access to facilities which could be misused if they fell into the wrong hands. At this level I use different passwords for each system. You should never use the same password on a BBS as on a commercial system: if someone did manage to hack into a BBS (possibly as a result of a privileged-user being careless with his or her password — don't laugh, it has happened!) he might well be able to view everyone's passwords. If you use the same password as on Teledata, for example, the hacker has only to find out your username — not a difficult task — in order to obtain access to your account.

Security on Austpac is more of a problem. Once you have been issued with an account (the equivalent of a password) you can't change it yourself, and Telecom charges about \$ to do it for you. If your Austpac account number fell into the wrong hands, someone could run up a very large bill for you very quickly. In my opinion, it's about time Telecom allowed subscribers to change their own passwords at will as the present system is obviously no longer good enough.

Hacking is a controversial subject. Some people say that it's just a harmless pursuit with people who have no intention of causing any damage. However, there are a few who definitely do cause damage — whether accidentally or on purpose. There have also been cases of BBSs carrying confidential information such as Austpac numbers as well as usernames and passwords for a variety of systems. Using someone else's Austpac account may be fun, but it is theft — just as much as if you took someone's wallet and used actual dollar notes to pay your bills.

Telecom and the police are now taking a very serious view of these matters. We have heard that the police are investigating certain boards, and it is rumoured that one sysop has had both voice and BBS phones disconnected and was told that he will never be allowed a phone line again. So be warned: hacking (or

encouraging hacking) could get you into serious trouble.

## System News

There are a couple of new Australian boards this month, one on each side of the continent. Kalgoorlie College has made its RCPM system available to the public for the exchange of information and software (public domain, of course). The information provided by the College didn't mention baud rates or operating hours, but 300 baud and 24 hours daily are reasonable assumptions in the circumstances. Further details and advice are available from Graham Clark, Computing Centre, Kalgoorlie College, PO Box 800, Kalgoorlie, WA 6430. The RCPM number is (090) 21 7755.

In Canberra, the Commodore User Group (ACT) have put a system on-line. At present it is available without charge on a 24 hour basis. Like the Kalgoorlie system, it provides message and file transfer facilities. Club secretary points that because it runs Punter Software not all C64 terminal programs are compatible with the system where up and downloading are concerned. For example Term 64 is OK, but VIPTerm runs into problems. The number is (062) 54 7365.

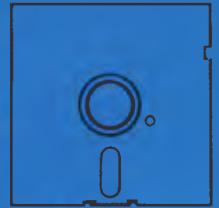
We also heard from Nick Andrew, the sysop of Sydney's Zeta RTRS. He corrected the operating hours printed last month, and provided some extra information. Nick wrote the software himself, and it features a tree-structured message system. Callers have direct access to the operating system (Newdos/80) and may run Zork I. Visitors have access to most of the system, but a once-only fee of \$5 (\$2 to students) gets you full access. You can't get much cheaper! One last point — the system caters for all machines, not just the TRS-80 and System 80.

Nick also passed on a message from Rowan Evans to the effect that Rowan's Orade System has in fact closed permanently.

As an experiment, we thought we would try listing overseas systems with a



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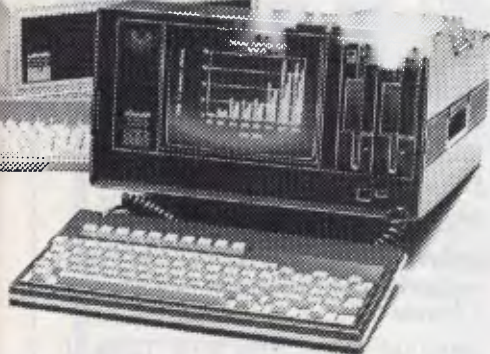
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# Real time

**Brian Heywood takes you step-by-step through the design techniques of a real-time operating system in C, which can provide a reliable and stable environment for programming codes.**

For some time, there has been an old micro lying around my house doing nothing, left over when I upgraded to my present personal computer. What could I use it for?

The obvious thing would be to use it to control something, for example the central heating, but to limit it to controlling one system was silly as I was bound to think of other ways of implementing it in the future. I decided to write a simple real-time operating system (RTOS), so that in the future it could be expanded to meet my varying requirements.

The system would be coded in C, as C was originally developed for writing the Unix operating system and would give a suitable level of control over the system while retaining a degree of portability across any future computer systems.

## Real-time systems

A real-time system can be described as any program which is designed to run *continuously* for long periods of time. This is the type of program which controls anything from a washing machine to an oil refinery, from a car control system to the NASA Space Shuttle's flight computers. In short, this type of program has to operate without anyone watching it. It therefore has to be reliable, and should be maintainable: that is, it must be adaptable to changes in the hardware it controls.

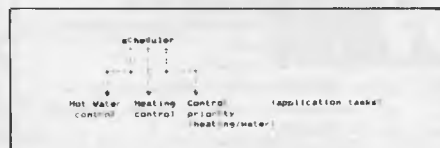
A real-time operating system is a program which is an attempt to achieve the twin goals of reliability and maintainability. A real-time operating system is a program which is designed to act as an environment for the code which does the work handling whatever it is that needs to be controlled. If you separate the tasks of running the computer and that of controlling 'whatever', and then need to change the 'whatever', you can concentrate on the section of code involved with that, without being side-tracked by the more mundane problem of controlling the computer environment.

The main feature of a real-time operating system is that it doesn't determine the function of the control task(s) running under it. Further, when you have split off the function of controlling the computer environment from the application tasks you can control more than one task, allowing the program to control more than one device. However, it will probably affect the structure of the application task's code and some of its operating characteristics, such as response time. As always there is a trade-off, in this case between speed and adaptability.

## Structure

Any real-time operating system can be broken down into two basic sections, comprising the scheduler and the application tasks. The scheduler is a program which executes other programs or procedures according to a simple set of rules; these rules may relate to things such as task priority, external events or timing considerations. The application tasks are the programs or procedures which the scheduler executes, and are the part of the system which do the actual work.

The scheduler is necessary to overcome the restriction that the CPU can only ever execute one piece of program code at any particular instant. With a scheduler, a computer can simulate the execution of more than one program at a time by swapping between programs. Several programs can apparently run simultaneously, the cost of this being



**Fig 1 A simple multi-task control program (central heating)**

that the programs will take longer to execute.

The application tasks are essentially

the same as the equivalent programs would have been if they were operating on separate computers in a single-tasking system. The difference is that the programs must periodically release execution control to the scheduler so that it can decide which task should be running according to its set of internal rules. The frequency with which the scheduler is run will determine the response of the system to changing conditions, so if response time isn't important, each program can run through to completion before releasing control to the system.

A further constraint on the application tasks is that they shouldn't interfere with each other's memory, although the compiler will usually handle this.

## Communications

One possible source of complexity in this type of system is the provision of inter-task communications. If the tasks are dependent on each other in any way, they must be provided with a means of talking to each other. There are two types of communication required between tasks, normally called 'pools' and 'channels'.

A pool is usually used for synchronisation purposes, and, as such, is implemented as a bit field or a Boolean variable. A channel is used for the transfer of data and can be a first in/first out (FIFO) buffer, a stack, or an area of RAM set aside for this purpose. For my simple system, I implemented only pools as part of the system. If I ever needed channel type communication, I could implement it outside the operating system.

Another feature usually found in real-time operating systems is the provision of some kind of clock. This is useful as it allows tasks to be run at particular time intervals or times of day. In its simplest form, this clock is implemented as a 'sleep' function. A task can put itself to sleep for a certain length of time by loading its sleep counter with a number,

which is decremented each time the scheduler is run (that is, when a task has finished execution). While the count is non-zero the scheduler will ignore this task, but when the count reaches zero, the scheduler will execute the task according to its priority as before.

## Error-handling

An important aspect of real-time systems is that they run continuously for long periods of time, so any faults in the software or hardware can (and probably will) accumulate. If the system is to be reliable you should provide a mechanism to detect the operating software going haywire, and take appropriate measures to recover from the fault.

There are two common ways of ensuring that the system will recover from fatal errors; one which involves a piece of hardware, the other solely software. The first is called a 'watchdog timer', a monostable timer, which is connected to the computer's reset line and can be triggered by software. The scheduler must periodically restart the timer. If a task goes wrong and stops the scheduler from running, the watchdog will 'bite' or time-out, resetting the computer and restarting the operating system. Obviously the timer period needs to be longer than it takes to run the longest task, and the system needs to load automatically on a hardware reset.

The other common method is sometimes called 'sanity checking'. This involves having a task which checks certain aspects of the system for consistency, and if it finds a fault, it will cause a

```

struct task_data {
    char state;
    char init;
    int sleep;
    int call;
    char task_state;
    char pool(?) ;
};
    
```

Fig 2 A task control data structure in C

software reset to restart the system from scratch. Two common types of sanity checks are checking that the stack doesn't overwrite code or workspace RAM, and monitoring selected 'guard' locations in RAM to ensure that a task hasn't run amuck and altered RAM not 'belonging' to it. This method is not as effective as the hardware 'watchdog', as the monitoring software itself could go 'insane'.

## Implementation

In any RTOS, the scheduler controls the various tasks by maintaining for each task a data area in which it stores various pieces of pertinent data as to the state of

the task with respect to the operating system. The most important piece of information is the state of each task. The task could be running, sleeping or inactive. Other data could relate to statistics for each task, such as whether the task has been initialised, the task sleep count, how many times it has run, and also data which is used by the tasks, such as the aforementioned communication 'pool' and possibly a task state variable (Fig 2).

The core of the scheduler could be a series of IF/ELSE statements, stepping through each task\_data block in turn

```

/* define external data */
struct task_data task[N]; /* N=number of tasks */
main() /* Yet Another Real Time Operating System */
{
    /* define local variables */
    int run_task, status;
    initialise_system(); /* set data areas etc */
    /* start of scheduler */
    while (TRUE) /* do forever */
    {
        update_sleep_counters();
        /* find out which task is to run */
        run_task = select_run_task();
        /* now execute task */
        switch (run_task) {
            case 1: status = task[run_task]; break;
            case 2: status = task2[run_task]; break;
            ...
            etc
            /* if no task active then do background */
            default: status = background(); break;
        }
        /* if any task returns an error restart the system */
        if (status == NO_ERROR) reset_system();
    } /* end of do forever loop */
} /* end of main body of program */
    
```

Fig 3 The basic scheduler design

and executing the first task it comes to with its state set to 'running'. In this scheme, the priority of each task is determined by its position among the IF statements, and when the task returns control to the scheduler the sequence starts over, ensuring that the highest-priority task is always executed.

A slightly more general way of implementing the scheduler would be to use a case construct in C to call the various tasks, making it easier to add new tasks as the need arises. Also, by splitting the scheduler into a system maintenance section and a task execution section, you can use a more complicated set of rules for determining the priority of the tasks and therefore which task will run first.

```

task(index) /* Application task frame */
{
    int index; /* task number for data reference */
    /* initialise task */
    if (task(index).init == TRUE)
    {
        /* code to initialise data/hardware for this task */
        task(index).init = FALSE; /* reset init flag */
    }
    /* --- main body of task --- */
    /* the code of the application task --- */
    return (NO_ERROR); /* we could return an error condition here if something goes seriously wrong */
} /* end of the application task code */
    
```

Fig 4 An application task structure

In Fig 3, 'update\_sleep\_counters()' maintains the sleep counter for each task and 'wakes up' any tasks that have timed out; 'select\_run\_task()' contains the set of rules which determines which task is going to run; and 'task1()', 'task2()' and

```

int select_run_task() /* select the next task to run */
{
    int rtask;
    rtask = 0;
    for (i=1; i<=N; i++)
        if (task[i].state==RUN && rtask==0) rtask=i;
    return(rtask);
} /* end of select_task */
    
```

Fig 5 The scheduler structure

so on, are the application tasks. To add another task, increase N by 1, insert another case statement, and recompile and link the system.

Each task has the basic structure as shown in Fig 4. The initialisation section is only executed once, and is used to set up any hardware and/or data areas. The main body of the task consists of the code needed to perform the function required by the application task.

The task execution code in this case

```

update_sleep_counters() /* maintains the sleep counter for each task */
{
    int i;
    for (i=1; i<=TASKS; i++)
        if (task[i].sleep == 0) task[i].sleep--;
        else if (task[i].state == ASLEEP) task[i].state=RUN;
} /* end of update_sleep */
    
```

Fig 6 Sleep counter code

just steps through each task data area and finds the first task with its state variable set to RUN. The individual task's priorities are determined by the position of their call in the main case statement, making it very simple to change a task's priority by moving it about within the case statement. This of course means that the priority of each task is fixed when you create the system (that is, compile the code), but you could easily make the priority dynamic by allocating one of the pool variables to 'task priority' and have 'select\_run\_task()' check this variable when it selects the next task.

```

goto_sleep(index, time) /* goto sleep for specified time (measured in clock ticks) */
{
    int index;
    int time;
    task(index).state = ASLEEP;
    task(index).sleep = time;
    return(NO_ERROR);
} /* end of goto sleep */
    
```

Fig 7 A simple sleep function

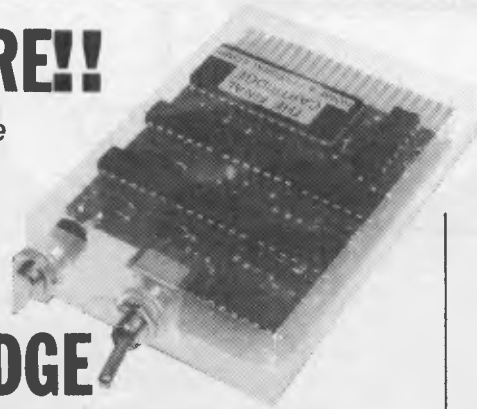
The sleep feature is implemented by 'update\_sleep\_counters()' which decrements any of the tasks which have non-zero 'sleep' counters, and sets any tasks in the SLEEP state with zero in their sleep counters to the RUN state. If the system had a built-in clock you could measure absolute time to update the



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sleep counters, but in this case you just decrement the sleep counters each time the scheduler is called.

To simplify the process of the task going to sleep, the code in the 'goto\_sleep()' loads the appropriate sleep counter with the desired sleep period. An advantage of making this a function is that in the future, you could easily install a new version of 'goto\_sleep()', secure in the knowledge that all cases had been accounted for (that is, rather than going through all the application tasks and altering each one in turn).

The error-recovery function is covered by 'reset\_system()' and is so dependent on the system in which it's running that I haven't included any code. This function should reload the system from permanent storage (for example, disk) otherwise you can jump to the load address for the operating system

### Conclusion

I have presented here a brief description of real-time operating systems, with some generic C code, as an example of one particular implementation of such a

system. The basic concepts can be (and have been) implemented in many different languages and computer systems, and there is no reason why anyone can't take advantage of the techniques.

END



*'I fed all your symptoms into the computer, Mr Bilkins, and it died.'*

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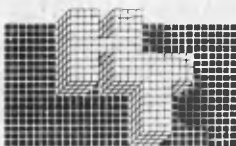
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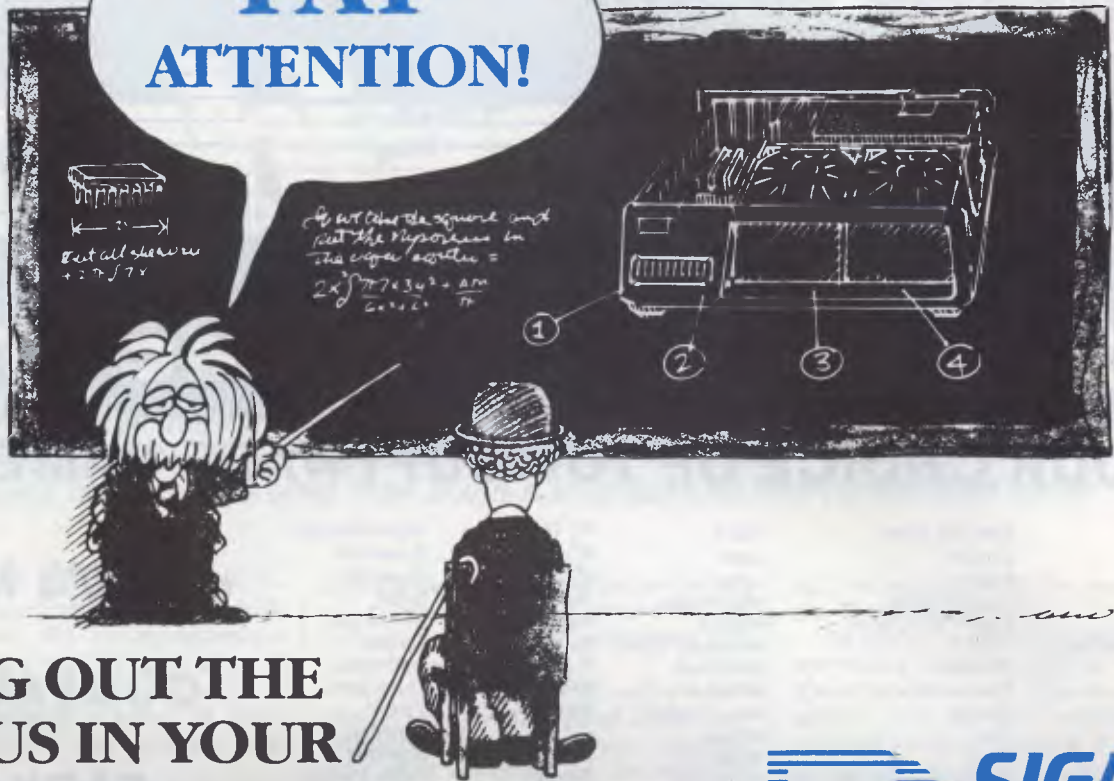
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# Voice Commander

*You must have seen many new devices to control a microcomputer. Keyboards, joysticks, trackballs and rodents have all had their day — the new craze in user access is voice. We sent Ron Dunn a microphone and turned him loose . . .*

Imagine never having to touch the keyboard of your computer, with all commands carried out in conversational English. To run your favourite program merely by whispering its name, or to ask for assistance with a shriek of 'help' would surely be the ultimate user interface.

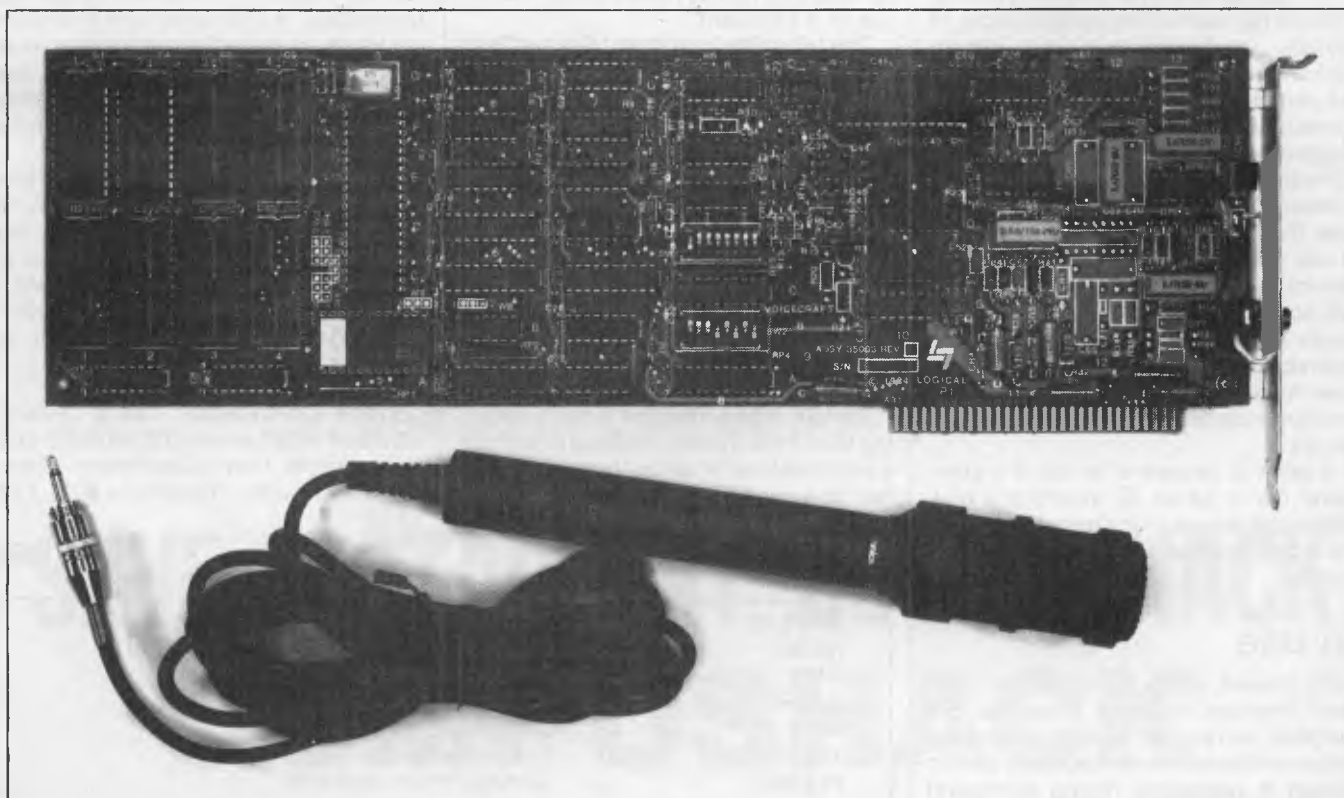
While this level of control exists only in the over-fertile imaginations of television and film script writers, I recently had the occasion to examine a voice interface for the IBM Personal Computer. The Voice

Commander voice control system allows you to perform simple control functions through a microphone connected to a board in the computer.

The Voice Commander system consists of a full length printed circuit card, software and a microphone. Installing the card is as simple as removing the cover of the PC, finding a vacant expansion slot and plugging in the card. The microphone plugs into a 1/4 inch jack on the rear of the expansion card. As my PC lost its cover screws at least two months

ago, the entire installation process took less than five minutes.

The system supplied for review was a pre-release version, and as such the documentation was atrocious. I am assured that the final version of the manuals will be supplied in a much better format. However, the documentation as supplied was sufficient to allow me to test and learn to use the system in a short period of time. This consisted of a short period of voice training (more later), then the operation of basic PC functions.



Voice Commander = full length board, microphone and software

## Training

The basis of the Voice Commander's operation is a command file which consists of the commands to be executed when a given word is received. Commands are organized in groups of menus, which may be linked together in a tree structure. Each command file may contain up to 200 menus, each with up to 500 commands. There is an overall restriction of 32,000 commands per file.

Each command consists of two parts: the word or phrase to be spoken; and the keystroke sequence performed on receipt of that phrase. For example, the word 'Basic' may cause the keystrokes B,A,S,I,C,<CR> to be passed to the computer. Special keystrokes (function keys, cursor control keys and so on) are entered by first pressing the F1 key, then the keystroke to be recorded. Another option is to specify that another command menu will be displayed on receipt of the command. Command phrases may be up to 36 characters in length.

Now comes the tedious step — the training of the computer to recognize particular voice patterns in response to each command. The voice training program displays each command phrase once in turn, at which point you must speak the phrase into the microphone. There is no means (and no likelihood) of actually validating that the phrase spoken accurately represents the text on the screen. I confused the heck out of some users by speaking GET LOST in response to the command BYE for one software package.

Voice training must be repeated at least three times for each user planning to use the system, with a recommendation for six passes. This means that for a full command file you would have to speak 192,000 phrases — a not inconsiderable effort. Individual users create their own voice recognition files, with recommended identification by user initials.

A point to beware of is that if a command file is edited by inserting a new command phrase in the menu structure, the entire command file will require voice training.

## In use

Once trained, using the system is easy. Two memory resident programs are installed, and you are ready to go with the initial command menu displayed on the screen if requested during command entry. The microphone is activated by pressing the NUM-LOCK key on the

numeric keypad, which acts as a toggle switch.

Both the keyboard and the microphone may be used in conjunction. For example, to move to another cell in Lotus 1-2-3 spreadsheet and enter a label, you may say 'up', 'up', 'left', 'left', then type the string 'Test Spreadsheet' at the keyboard. Function keys and cursor movement keys will not operate correctly while the NUM-LOCK key is pressed. Voice control must be toggled off to use all keyboard options.

With the system installed and working, I set about assessing its usefulness in a business environment. To impress potential users I wrote some small Basic programs to demonstrate voice operation. One of the most successful was a program that carried on an abusive conversation with the person performing the demonstration.

Having determined that the system operated as described, I began using it with different software packages. I set up command menus for Lotus 1-2-3, WordStar, and dBASE II, containing simple command structures to use for testing purposes.

The 1-2-3 command file was not considered a general success. Due to the nature of spreadsheet activities (a high degree of cursor movement and numerical data entry) most users preferred the use of a keyboard.

The WordStar command file met with immediate success with novice users. I programmed most of the common WordStar control sequences, and gave them meaningful phrases. O S became 'Underline', and K D became 'Save'. Using a simple list of words, users were immediately proficient with this package. More advanced users and speed typists found, however, that the pause for voice recognition in the midst of typing was inconvenient, and they tended to return to conventional operation of WordStar.

dBASE II provided the most interesting test of the system. I set out to provide a primitive level of natural language interface to a database system. The database structure, along with a selected set of dBASE interactive commands, was pro-

grammed into a command file. Users were then able to interrogate the database by voice. For example, it was possible to say 'Display name and address and telephone please' and have the computer list these details from a mailing list file. This was done using the commands and corresponding interpretations listed in table 1.

This type of work represents possibly the best use for this sort of system. With some effort, and a good natural language database system, it would be possible to program some quite effective information systems. By the end of the review, in fact, I was working on ways of interfacing the Voice Commander to the Intellect system on a mainframe computer. Intellect offers a very powerful command parser, allowing users to type commands such as 'Who works for department x and earns more than \$50,000'. A voice controller connected to this software would be an incredibly powerful tool. Only lack of time prevented the completion of this interface in the review period.

## Conclusion

When the time came to actually write this review, I had mixed feelings about the future of products such as these. It is almost as if the voice technology is a little too advanced for personal computing technology, in that some user interfaces are totally incompatible with this style of operation. The best packages for use with this system are those with a limited command vocabulary, used to control a command-line style of operation.

Given these limitations I was impressed by Voice Commander. It functioned transparently to our applications, and provided a degree of isolation from the computer keyboard. I await with interest commercial applications designed around this type of hardware.

*Voice Commander has a recommended retail price of \$1900.00 and is available from Brainstorm Computer Products. Telephone (02) 212 1622.*

END

DISPLAY	...	Display command in dBASE
NAME	...	Name field in database
AND	...	' ' separator character
ADDRESS	...	Address field in database
AND	...	' ' separator character
TELEPHONE	...	Telephone field in database
PLEASE	...	Carriage return character

Table 1



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# SCREENTEST TAS

**A multi-user data base management system for MS-DOS, TURBO-DOS, CP/M, MP/M systems with a high level language for well under \$300. In fact, TAS is claimed by its developers to be a major breakthrough in application development tools that is complete, affordable and sophisticated, yet easy to use. Well, TAS is affordable; TAS is complete enough to build applications (more on this point later); and TAS could be used to build sophisticated applications. But don't jump to any conclusions before reading Robin Ellis test.**

TAS is available in three levels. The first, Level 1 (reviewed here) is comprised of a data dictionary manager, a database manager and a language. Level 2 provides, in addition to the components of Level 1, packages written in TAS: a general ledger and accounts receivable and payable modules. Level 3 also includes payroll, inventory control, sales order entry and purchase order entry modules.

## Data dictionary manager

Is the TAS data manager a data dictionary? Not in the true sense. It is essentially a schema or record layout generator for use by the language to know where fields are within a record, in a file.

A complete data dictionary of course would allow definition of field-entity (loosely table) relationships, fields descriptions, attributes and so on at a conceptual or system wide level, and then allow integration into physical file designs at a later stage. The source code (in TAS) of the data dictionary does come with the product so it could be expanded if desired, although I doubt whether this would be a cost effective exercise.

One advantage with the TAS schema is the ability to generate a schema that can be used for more than one physical file at the one time. This means that while two files could share the same schema, (ie record or table definitions could be the same in both files) the data itself could be different. However if the same field is required to be defined in more

than one schema definition, then the field definition will have to be entered again under a new name within the new schema. This redefinition of the same field can lead to inconsistencies within the logical database structure of an application and is not a desirable feature.

Schema maintenance is done by entering the data dictionary manager option from the TAS main menu then using the following commands to manipulate the field definitions within the schema:

I for insert, D for delete, C for change, E to add at end of schema, H to print hard copy, N to move the line pointer to next line, P to move the pointer to the previous line and Q to quit schema maintenance. Simple but effective.

Unfortunately, there are no options or utilities to copy dictionary structures or to provide any cross reference reports about where different fields may be

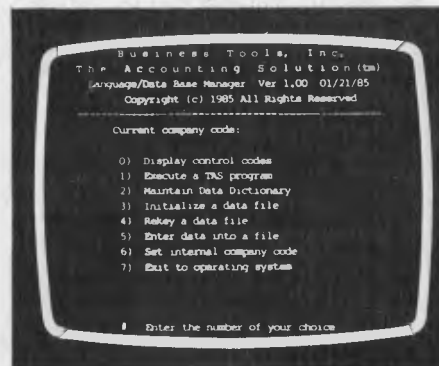
used, only a hard copy report of an actual schema is available.

When defining a schema a number of attributes are requested by the system.

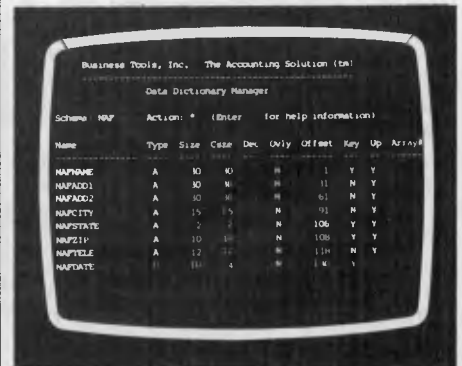
A schema name of up to eight characters is a unique label for each schema; then a field name of up to 15 characters is required.

Note again the restriction that within the one dictionary no two fields can have the same name. Therefore if you wish to define two related schemas in the same dictionary such as Transactions, containing a data item called Transaction-type, and a look-up table called Transaction-type table, the field in question would have to be called a different name in each schema.

The data type of each field (alphanumeric, numeric or date) and the size of each field (numbers up to 20 characters, alphanumeric up to 255 characters and dates are automatically 10 characters)



Schema entry, showing fields and field attributes.



The main menu of 'The Accounting Solution'.





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**W.A.** John Mills Agency, PO Box 278, Greenwood, W.A., 6024. Ph: (09) 448 1137.

**Tas.** Tasmanian Record Company, 10 Cameron St, Launceston, Tasmania, 7250.  
Ph: (003) 31 5588.

are somewhat sparse, in fact some run time errors did not appear in the manual. Even so, the message could be used successfully to find the offending code as a line number is given in the error message.

Performance is always a difficult area to judge especially in a multi-user environment. TAS seemed to perform

and fill strings, print a box and also print one of up to 20 character strings that may be set up during installation. These strings may be used to control certain screen attributes or print enhanced formats. Traps may be set to catch the system defined control sequences, such as save, delete and quit including up to two user defined traps. Certainly

duced a 16 page help system available with TAS and is looking at improving the manual itself. The manual is basically a tutorial with a couple of simple examples followed by a list of statements and their syntax. The manual does not even have an index.

TAS is written in assembler and runs under MS-DOS, PC-DOS, MP/M, TURBO-DOS (8- and 16-bit), CP/M-86, CP/M, the Nouvelle networking system, MMMOST (Televideo machines) and Oasis. A Unix version is due in the first quarter of 1986. TAS is distributed and supported by Fletcher DP Services in Australia and New Zealand and is priced at under \$300 for both the single and multi-user version. Developer prices are available at even less than this. At present no training is offered by Fletcher but the company will probably introduce two or three day courses for programmers early in 1986.

TAS has been developed by Business Tools of America, a company run and owned by Phil Mickelson, ex-Vice President of software development at O'Hanlon Computer systems, the developers of the Sensible Solution (tested in APC, September 1985).

TAS is cheap. It can be used to develop complex applications and already has an established user base (claimed to be 28 in Australia and 1500 worldwide) but offers no productivity tools such as editors or interactive debuggers, to package the environment.

This database system is essentially weak and the language offers little other than the basic procedural verbs to attract serious users of the product. TAS is affordable but at present has a long way to go to compare with other products on the market. It is still new, so no doubt some development will follow. For now, TAS is interesting and usable but needs more work to make it competitive in the market.

END

## *TAS seemed to perform adequately in the single user environment during an I/O intensive job but took an inordinate amount of time during a CPU intensive job.*

adequately in the single user environment during an I/O intensive job but took an inordinate amount of time during a CPU intensive job as the following tests show. Normally most jobs would be I/O bound anyway so the high CPU usage may not be a problem.

**I/O intensive job 1 TAS** — 55 seconds (loading 500 single key records)

Compiled Basic — 1 minute 30 seconds (proprietary ISAM system)

**I/O intensive job 2 TAS** — 25 seconds (reading 500 single key records sequentially by key)

Compiled Basic — 6 seconds (proprietary ISAM system)

Microsoft Basic interpreter — 2 minutes

**CPU intensive job TAS** — 6 seconds (loop 500 times and add an amount to running total)

Compiled Basic — less than 1 second

Microsoft Basic interpreter — 3.5 seconds

Even the Basic interpreter outperformed TAS in this last test.

While these tests are not meant to be conclusive, they do show that while TAS performs well from an I/O point of view its performance in a multi-user situation will need a powerful CPU to give adequate response.

The language allows screen inputs and report layouts to be designed using an editor in a full screen manner. (That is, field positions are marked on a line and when the line is printed or output to the screen, the fields will appear at the marked position). This type of interaction with screen or report is desirable but the reporting features in the language are virtually non-existent. Routines still have to be written to handle headings, control breaks, totalling, sorting and data calculations, and no graphics capability is offered. It is essential these days for productivity to have a powerful report writer which TAS lacks at present. Commands are provided to sound the bell, clear the screen, open and close files, justify, trim

a reasonable amount of control over screen and print formats is available.

## Conclusion

TAS should be considered an application tool for the system builder and certainly not for end-users as it really offers no end-user facilities at all, unless an end-user were to learn the TAS language. This is an important point, even for application builders, as while an original packaged application is built by experienced programmers who would be able to understand the TAS language, an end-user is going to use the product and will want to have an adhoc query facility even if it is fairly simple.

TAS does not provide a relational, or even relational-like database system, and as this type of architecture is proving ever more popular this fact cannot be overlooked. Bearing in mind that TAS is only a fairly new product, it's possible that its authors will provide more relational capabilities in the future.

The manual that comes with TAS Level 1 is insufficient. In apparent recognition of this, the Australian distributor, Fletcher DP Services, has already pro-



*'He's trying to get the computer to malfunction, so we can start the war.'*



# Final version

*Colin Cohen provides a cost-effective guide on turning the output from your word processor/database into polished typeset copy.*

If, as a user of a micro with a word processing or database program, you ever need to have the results printed — say, as a newsletter, price list, or specialised directory — you might wish it could be typeset in a 'real' typeface without having to have all the data re-keyed by an expensive typesetter. However, not all micros use the same format of floppy disk: indeed, if you know anything about disk formats this will appear a gross understatement.

## Problems

Ever since IBM laid down a standard for the 8in diskette, other manufacturers have realised just what a good idea the floppy disk was. On the other hand, for a variety of commercial reasons, almost every micro manufacturer has seen fit to place the data on the disk in different ways. These variations in disk format have two different sources: the disk drive itself and the Disk Operating System (DOS) of the micro.

First of all, the drive: clearly an 8in diskette will not fit a 5.25in drive any more than one of the newer 3in-plus micro-diskettes, which also come in several shapes and sizes. And, while a double-sided floppy will fit quite neatly into a single-sided drive of the same size, you will not be able to read the second side. Then if, for example, there are only 40 'steps' available on the drive, it will not read an 80-track disk — although this problem is not totally insoluble.

From the DOS point of view there is a degree of flexibility in the number of tracks on a disk, but the real problem is the number of wedge-shaped sectors in each track and how the information is laid down within them. With the majority of disks being 'soft-sectored' — that is, controlled by the software — there is almost no limit to the number of sectors that can be laid down on a disk. Even hard-sectored disks, on which the sectors are marked out by a series of holes near the spindle, are by no means uniform. The 3in disk can be laid out to emulate the 5.25in disk, although the latter is usually completely different from the original 8in model; and then you can

unplug a 5.25in drive and substitute a 3in+.

Finally, as far as the DOS is concerned, some micros, like The Victor 9000/Sirius and Apple's Macintosh, pack more information into their disks by the nightmare solution of varying the speed of the drive, dependent on the position of the track being read. The only good news in this department is that the popularity of operating systems such as CP/M and PC-DOS/MS-DOS families has introduced a degree of standardisation, so that once a specialised disk reader has cracked one format in a family the others are less difficult.

But the bad news is not over. To be able to read a disk is not only to make sense of it, but then to be able to set type from it — economically. So, before you give up the whole idea of typesetting from disk, let me say that a sound understanding of the problems involved is the best basis for making the operation a success.

For example, I have a database program that writes the data back-to-front on the disk! If I try to read the database data disk back within my word processor program, what I get is the data back-to-front on the screen, with the blank spaces in each field padded out with what look like random control codes. You don't have to be a genius to see that unless the database were huge it would not be economic, as opposed to possible, to write a conversion program to strip out the garbage. Indeed, as the whole rationale of this exercise is to save money, the cost of any extra work involved in conversion, such as laborious writing of programs and conversion tables, has to be set against the cost of re-keying at perhaps 20,000 keystrokes per hour for ordinary copy.

Other problems can come from academic word processors, which have a character set which cannot be accommodated within the normal seven-bit ASCII standard. These extra characters may well clash with the receiving system's software and cause some form of crash.

Another aspect to be considered is how to handle the codes generated by

your word processor or database. The most obvious of these codes are the printer control characters to change fonts, start underlining, and control other functions.

Leaving out the specialised laser printers, the dot-matrix or daisywheel printers found in homes and offices are unlikely to have more than a handful of fonts available — each of which will only be in one size. The typesetter, on the other hand, may have as many as 1200 fonts available online, each available in a large number of point sizes. Even 'starter' systems can offer over 1000 online combinations of font and size. If you then consider that each one of the 128 or so characters in a font is of a different width, you will begin to appreciate the complexity of the problems facing typesetters.

## Agreement

Typesetters and their clients naturally approach the conversion of computer files on a variety of different levels. Their approach will depend on the sophistication of their decoding equipment, their relationship with trade unions and the original typist's grasp of the problem.

At the lowest level, you have to find a typesetter who is both prepared and physically able to accept your data.

There are four ways in which your word processing or database can be transferred for setting. Firstly, you can send the typesetter a disk which he can read in a suitable multi-format reader. These readers are specialised devices with slots for 8in, 5.25in and 3in disks, and sometimes tape, and they cost in the region of \$20,000. They are widely used both in typesetting and in the software business when programs need to be prepared for different systems — one system is said to be able to read over 60,000 disk formats! The reader will either read your disk and write a new disk in the typesetting computer's format, or read it and transfer it to the typesetter by way of a serial RS232C interface.

Alternatively, if the typesetter has the same computer as you, or a good look-alike, you can send him a disk for him to read in the usual way and transfer to his



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typesetter via the ubiquitous RS232C. Provided that your word processor or database saves a standard ASCII file, the typesetter should be able to extract the data without a copy of your program disk (an important consideration if the program disk is copy-protected). Otherwise you will need to use a spool facility to create a duplicate copy of your data in ASCII.

The third method is for the typesetter to visit you with what is clumsily called a text retrieval terminal (TRT), colloquially a FART (Fast Accurate Retrieval Terminal) or milking machine. This is simply plugged into your micro and data is 'milked' out of it. Usually a degree of error-checking is included, and some of them can be connected to a Centronics parallel interface, rather than an RS232. This is useful if you are not sure about the use of your serial interface, since you can treat the TRT as if it were your printer. The computer should not notice the difference. Some TRTs also do a bit of code conversion during the transfer, which saves time and labour, and depending on the make the data will be written onto a C60 cassette, a mini-cassette, a tape cartridge, or a 3in or 5.25in disk. If disks are used they can be written in the typesetter's format, otherwise the data will have to be read off via the TRT's serial interface.

Finally, as far as hardware is concerned, you can use a modem. Of course, the typesetter also needs to have a similar sort of modem, and if it is not auto-answer nor permanently configured you will need an agreed logging-on procedure. (The price of modems has probably fallen faster than any other item of computer equipment, and it is quite possible to find a serviceable modem for about \$500.)

It's worth pointing out that while you really do need a full duplex modem, so that the receiving system can send a stop code when it opens a new file, it does not have to be fast. For instance, you should be able to reverse the normal operating speeds of a Viatel modem so that you can send your copy at 1200 baud, and just get back the odd control code at 75 baud — much more satisfactory than the normal 300/300 baud of the bulletin board.

## Options

Of course there are variants. One nice trick, if you or your typesetter subscribes to an electronic mail service, is to dump your text into a mail box for later retrieval and typesetting — you can usually leave it to the mail service to strip out control codes that the typesetter won't recog-

nise and sort out the differences in modem speeds.

If you don't already have a micro, or need another one, you can now buy several packages which make a micro emulate a typesetting system by generating all the codes that the printing unit will need. Thankfully they are all now available on MS-DOS micros, (Page-Planner, for instance, started life on the Cifer).

Normally they are sold with hardware and software bundles. If you want a lot of copies of the software to run on your own machines, some of the companies might oblige, but this often poses problems with warranties.

One other package, the APL, includes a very substantial modification of the Apple IIe built into a new box, as well as the bundled software. This gets over the problem that the menus on the other products can't totally overcome — the fact that a standard micro does not have all the special control keys that are found on a full-blown typesetting system. Having said this, they have all been very successful in the printing industry, and will help you cut costs by delivering files which are completely ready to drive a typesetter.

If you just want to send word processor files to the typesetter you have a choice of coding. You can start with no codes, not even tabs and underscores. Here, at least, the typesetter knows that apart from your text errors, the data is clean. If you have not marked them on the hard copy (you should always send a printout, even when using a modem) he will go through it marking which words are to go in italic — the printer's equivalent of underscore — and what other fonts and sizes to use. Once the typesetter has the data in his own format he will scroll through it and insert any control codes he needs to achieve these effects. Any mistakes will then be the typesetter's responsibility, but this obviously costs more.

An extension of this is for the typesetter to translate codes like your underscore and then add the rest himself, or

use the so-called generic codes. These are entered by the text creator and are quite simple, such as [i] for italic and [b] for bold — similar commands can be used to build up complex pages. They can be used all by themselves, or in combination with your own control codes as long as the typesetter knows *exactly* what you have done. I use '['and']' as they are on the non-shift part of the keyboard, and thus easy to get at. This is a convention adopted by the coding structure known as ASPIC, but many typesetters have their own versions. Only two things are important here: the codes must be easy to remember and key, and must comprise character strings that never get used in any other way in your data, or there will be trouble. A very simple version, for very simple text, is invisible coding. This just uses a specified number of <RETURNS> for each change, but clearly the number of codes one can create in this way is limited, and it can play havoc with your own screen display.

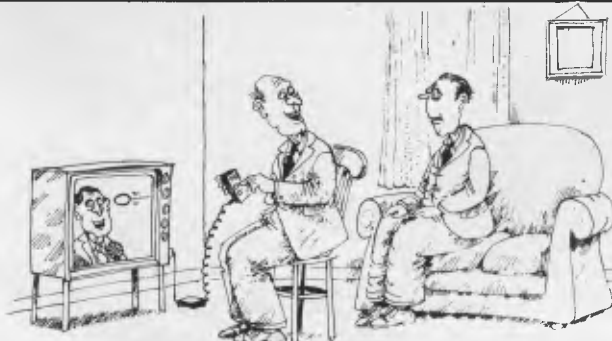
The final choice is full coding, which involves entering letter by letter the complex codes the typesetter wants. *Not recommended.*

## Warning

Remember that if you give the typesetter magnetic data, he is not responsible for proof-reading. The errors you make always look much worse typeset than in typescript, especially if you have put in an 'on' code without the following 'off' code. If you turn on a large type heading and forget to turn it off, the whole of the next section, up to the next heading, will be in the display size. This will be: unsightly, unreadable, and uneconomic — as you will have to pay the typesetter to correct and re-run it.

Finally, don't run before you can walk. If you have a typesetting requirement from disk, first of all discuss it with a typesetter and start with something simple like straightforward text rather than complex tables on forms.

END



'It's a special egg-throwing button.'



# Tandy 1000 vs DSE Multitech

*In case you didn't get a computer for Christmas, Dick Smith and Tandy are both offering PC compatibles to tempt the first time buyer. They are good value and well supported. Kester Cranswick reports on colour versions of DSE Multitech and Tandy 1000 computers.*





Santa has been and gone, leaving strained credit limits and jolly red bank balances no doubt. He left a computer in many homes too. Those who weren't so fortunate are probably looking enviously at the neighbour's glowing monitors and wishing for a late Christmas present, that doesn't cost a fortune.

Going along to a Dick Smith Electronics or a Tandy store might provide the answer. Both have on offer reputable IBM PC lookalikes at far from IBM prices.

The games machine is a thing of the past now. The computer, be it in the home or the office, is having to pay its way. Entertainment is not enough. Even the traditional home computer makers realize this — witness the recent launches from Commodore, Amstrad and Spectravideo, all with CP/M capability.

As the computer age has taken off, even the most casual user has realized that a computer can be used for far more than playing Elite. Home computers can run their own word processors, databases and the like, but the sophistication of these programs pales against the clout of Lotus 1-2-3 and Multimate.

There is a huge market for an affordable computer that can run powerful software for word processing, data management, communications and financial applications. Every corner computer shop seems to have its own imported Taiwanese PC clone at a low, low price. Though the price may be attractive, it is worth thinking about what you would do if the shop went out of business, or if you needed major repair work done, or if you found the hardware wouldn't do what you wanted it to do. You may pay dearly for a few hundred dollars saving. Buying from a High Street retailer has many advantages.

## Hardware

How much do you need to spend to get an IBM compatible business computer? According to Dick Smith Electronics, just \$1,395. That gets you a 128k, single disk driven, colour DSE/Multitech computer which you could plug into a television set. For \$1,995, you get a 256k, twin disk version, tested here. We added a DSE colour monitor for \$649 and a \$50 cable to get an outfit costing \$2,694.

Against that, we pitted a Tandy 1000, with 256k, twin disks and a colour monitor, costing \$3,246. Buying a 128k, single disk, mono Tandy 1000 sets you



*Tandy's keyboard has 90 keys, and is laid out in a non-standard fashion.*

back an affordable \$1,799, including monitor.

Both computers have a buff colour scheme, with colour toned keys. Both have a three box design — processor and disks in the main box, keyboard connected by a coiled cable and monitor on top.

The DSE/Multitech is the more compact of the two units. It has a metal processor casing, measuring 40 x 38 x 12cm, a little smaller than an IBM box. The two disk drives are stacked on the front, the keyboard connected to the back. All switches and ports are on the rear.

The Tandy comes in a substantially bigger box, made of plastic and with nicely rounded edges. It measures 47 x

34 x 14cm. The keyboard cable plugs into the front. The Tandy monitor and keyboard units are quite a bit larger than the DSE units, so it is a far more substantial piece of gear. However, the cables are long enough to sit it on the floor, so the processor box could be stowed out of sight.

There is more to the front of the Tandy. It has a cooling grille, a large, red reset button, two DIN joystick ports and LEDs on each disk drive. The illuminated on/off switch is on the right hand side. The front of the DSE/Multitech has just LEDs on each disk drive.

Perhaps the difference is due to the country of origin. The Tandy is made on the USA, where marketing is foremost in the minds of designers. It looks as



*The 84 keys on the DSE/Multitech look straight off an IBM.*

though it means business. The Taiwanese DSE/Multitech is built with value for money having the upper hand on styling.

Going to the back of the DSE/Multitech brings a host of goodies into view. From left to right, there is a power input socket, a monitor power output socket and a small on/off switch. Then there is a grille for the fan and a 15 pin game port. The four expansion slots are three-quarters occupied. The top one is free. Underneath is an array of RGB, composite video and audio sockets, above a parallel printer and RS-232C port, and all that is above the DIN socket for the keyboard.

On the back of the Tandy, from left to right, is a power in socket, a parallel printer port, a light pen port, RGB, audio and composite video ports, culminating in three spare board slots.

The DSE/Multitech has the more IBM compatible keyboard, with all 84 keys. Two fold down legs on the underside raise the long, flat unit to a reasonable angle.

The ten function keys are down the left hand side, in a brown-grey. The numeric keypad is to the right, as on the IBM. There are a few minor changes, chiefly in key size. The delete, backspace, scroll lock and numeric lock keys are all normal size, and the enter key is over large. A power on light glows yellow above the numeric keypad.

On the Tandy, there are 90 keys, and the layout is substantially different. Two legs raise the keyboard, and it has an overall squarer shape to it.

This is because the function keys, twelve of them, are arrayed along the top of the alphanumeric keyboard. There are panels for function key notes too. Other keys are in different positions. The Alt key is with the numeric keypad. The illuminated caps lock key is on the left, rather than the right of the space bar. There is a second enter key on the numeric keypad, plus separate insert, delete, break, print, home and four cursor control keys. Tandy has tried to improve on the IBM formula, and that's a plus point.

The downside is that keyboard overlays supplied with some programs will not be relevant to the Tandy user. Also, you may find programs such as Flight Simulator harder to play, as they are designed for a standard IBM keyboard layout.

The extra keys make the computer easier to use, but they take away one of the most comforting aspects of clones — if you are familiar with one, you are familiar with all.

In use, I preferred the Tandy keyboard. The keys are raised more, so miskeying

## Technical Specifications Tandy 1000

Processor:	4.77 MHz Intel 8088
RAM:	256k, expandable to 640k
ROM:	8k
Mass storage:	Two 360k 13cm built-in disk drives
Keyboard:	90 key, PC-compatible qwerty keyboard
Display:	RGB monitor; IBM colour graphics
Size:	47.0cm x 33.5cm x 14.0cm
I/O:	Three PC-compatible slots, lightpen, parallel printer, RGB, audio, video sockets, two joystick ports
Software:	MS-DOS 2.11, GW-Basic 2.02, Deskmate

is less of a problem. The DSE/Multitech keyboard has better colour coding, but if this is a first time IBM clone, then the new user will get used to the Tandy keyboard and appreciate the extra features it has built into it.

## System software

Each machine comes with built in diagnostic routines. Switching on the DSE/Multitech gives a beep, to check the sound is OK, three rows of coloured blocks, to check the colour, and an optional RAM check is prompted for. Then come the prompts for date and time. This computer has the added bonus of a built-in real time clock, something the Tandy does not have as standard.

Switching on the Tandy gives a display of the memory size, before the operating system is loaded up, the speaker beeps and date and time are prompted for. There is no RAM check.

Of the two, the DSE/Multitech is the noisier computer, with a more obtrusive whirr to the fan. The Tandy also has the neat reset button, and a more accessible on/off switch, so it is a little more pleasurable to use.

The two rivals both run an Intel 8088 processor at 4.77MHz. Neither maker has tried to outdo IBM by offering any extras. If you have more money to spend, you can find clones that run faster than the IBM, or handle CP/M as well as MS-DOS, or has other goodies to tempt the

performance conscious buyer. These two computers are aimed straight at the wallet, with few frills to whet the appetite.

On our benchmark tests, the marks went to the DSE/Multitech. Neither machine is particularly fast, but if speed is important, for number crunching and the like, then the DSE/Multitech has a slight advantage.

On the graphics front, Tandy has gone to town. It has managed to get eight colours into the high resolution mode, instead of the normal four. A Christmas demonstration package supplied with the test machine showed off the graphic capabilities very well indeed. Unfortunately, the extra graphics are only useful if you have the software to run them. Look to Tandy for that. With most PC software, you'll see no difference in images.

When it comes to expansion, both companies have taken a different approach. With the DSE/Multitech, users are almost encouraged to get inside the machine and do things to it. Three screws hold the lid on, and the accompanying documentation is crammed full of useful data about the internal workings.

There is a problem though. Dick Smith Electronics has filled up two of the three expansion slots, with a real time clock in one, and serial/parallel interfaces in the other. That leaves just one port for the user, and that may be a restriction if you buy the DSE/Multitech as the start of

## Technical Specifications DSE/Multitech

Processor:	4.77 MHz Intel 8088
RAM:	256k expandable to 512k
ROM:	8k
Mass storage:	Two 360k 13cm built-in disk drives
Keyboard:	84 key, PC-compatible qwerty keyboard
Display:	RGB monitor; IBM colour graphics
Size:	40.0cm x 38.0cm x 12.0cm
I/O:	One PC-compatible slot, joystick, parallel printer, RS-232C, RGB, video power sockets
Software:	MS-DOS 2.11, Easy



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## BENCHTEST

something big. Internally, another 256k of RAM can be added, to give a total capacity of 512k.

On the Tandy, users are dissuaded from delving inside. A stern warning says that there are no user serviceable parts inside the computer! That's the Americans for you — leave technology to the technicians.

Warnings aside, Tandy is very much a do it yourself type of outlet, and if you want technical information on the 1000, it is available for a price. There are three expansion ports free, and to these can be fitted all manner of goodies — a modem, hard disk controller, RS-232C port, clock and so on. Memory can be incremented to a total of 640k.

Tandy has more clearly catered for the user who wants a computer for novices. The light pen socket is a novelty, and used for Tandy's device, running with Tandy programs. Similarly, there are two joystick ports for the games player. Games players buying the DSE/Multitech won't be left in the cold entirely, as there is a joystick port provided as standard.

On the expansion front then, the Tandy is a clear winner. It is a computer on which you could spend thousands of dollars to upgrade as and when the need arose. It is an approach adopted by many of the compatibles. But, it also has ports that will encourage non-enthusiasts to add things to their computer.

Dick Smith Electronics has chosen to go for a machine with minimal upgrade potential, but plenty of enthusiast things built in. It has the clock and RS-232C port already. You must decide whether you want everything now, with little potential in the future, or a more expandable box of tricks that has less built-in.

### Software

In a further effort to up the value for money element, both suppliers throw in software with their computers. In the case of the Tandy, you get GW-Basic, and a multi-function package called Deskmate. DSE offers a Micropro word processor called Easy.

GW-Basic is the standard Microsoft Basic for PCs. If you are into home brewed programs, it is a must, but if your bag is more using commercial software, rather than creating it, then you'll not miss it on the DSE/Multitech. Incidentally, Tandy has not enhanced GW-Basic to take into account the light pen, external speaker and some of the video enhancements.

Easy is from the people who brought you Wordstar and Wordstar 2000. It retails for around \$300. The package



*Three expansion slots are on the back of the Tandy*

consists of four disks, a manual and a key guide.

Easy is the name, and easy is the aim. This is a word processor for those who have never typed, let alone used a computer. The four section tutorial disk guides a novice through the key features of the program, with graphics and plenty of explanation. Then there is a disk to install the program.

All the features of the program are accessed from menus, with a highlighting bar controlled by the cursor keys and help screens only a key away. There is a spelling checker too.

Wordstar users will note more than a few similarities. Easy is, essentially, Wordstar with menus and less commands to learn. It is Wordstar brought into the modern word processing world.

Because of the similarities, files created with Wordstar or Wordstar 2000 can be easily transferred to Easy, and vice versa. It also accepts ASCII files, such as those created under Lotus 1-2-3.

Files are selected from an onscreen menu. Text is entered in the normal fashion. A menu of text options offers bold, underlined, moving, copying and deleting text, indenting, centering, find and replace, single, double or triple line spacing, super or subscripts and file insertion. Files can be copied, renamed or deleted from within the program.

Those Wordstar commands not found in menus can be inserted with standard dot commands. You would use these for headers, footers, page numbering and the like.

Spelling checks are initiated from a menu option, and use a 65,000 word dictionary. Personal dictionaries can be created too. The program checks a word at a time, suggesting correct spellings against words it does not recognise.

A huge variety of printers is catered for, from Abati to Xerox. These are selected at the installation phase.

Easy is therefore an excellent word processing package for those who don't need facilities such as mail merge and on screen print previewing. It has some



*DSE provides more ports, but expansion potential is limited to one slot*



“ . . . full-scale computing power is now well within the reach of the smallest business”:

Gareth Powell, Computer Editor, Sydney Morning Herald



**NEW!**  
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Even the most discriminating user will appreciate the Multitech's professional characteristics. Spectacular high resolution graphics, 16 colour mode text. An industry standard, ergonomically designed keyboard boasts 84 keys, including 10 user programmable function keys and a numeric keypad. The RS-232C serial port allows computer-to-computer communication. Plus there is a host of other impressive features:

- \* **RAM:** available from 128K to 512K
- \* **ROM:** 8K for Bios and diagnostics. Socket for optional 32K (27256) user expandable.
- \* **CHARACTER SET:** 256 expandable ASCII
- \* **VIDEO:** IBM compatible colour graphics interface with 640 × 200, 320 × 200 graphics resolutions and 16 colour text mode. Video interface includes special “flicker-free” circuitry for reduced eye-strain.
- \* **CLOCK:** fully integrated crystal locked real time clock with battery back-up.
- \* **INPUT/OUTPUT:** RGB and composite video monitor outputs. Joystick/Games adaptor port. Parallel printer port, RS-232C serial communications port, and in-built speaker.
- \* **DISK DRIVES:** One slimline 360K disk drive — System One. Two slimline 360K disk drives — System Two. One slimline 360K disk drive with a 10MB hard disk — System Three.
- \* **EXPANSION:** One IBM expansion slot (for Systems One and Two)

### Unlimited software . . . .

Unlike many other computers, the Multitech accepts an extensive range of ready-to-run software. It's compatible with the MS-DOS operating system, and runs most IBM programs straight from the box. So you can select the best programs available for any task: word processing, analysis, stock control and more. . . even games programs!

**Commercial leasing available through AGC**

\*At time of printing

### Three versions . . . .

Best of all, the Multitech is available in three pre-configured versions —there's one to suit your budget.

#### System One . . . .

is the affordable start to powerful computing with 360K floppy disk drive, 128K RAM and MS-DOS version 2.11. Cat X-8000

**\$1395**

#### System Two . . . .

really gets down to business. Two 360K floppy disk drives, 256K RAM, MS-DOS 2.11 and the 'EASY' word processing package from MicroPro — with spelling check and six months on-site service. Cat X-8002 (In all capitals except Darwin, plus Newcastle)

**\$1995**

#### System Three . . . .

the powerful work-horse with 512K RAM, one 360K floppy disk and one 10 Megabyte hard disk drive. Includes AURA — the fully integrated business program which performs word processing, spreadsheet, database and information management. With six month on-site service agreement. For your convenience, DSE will install the Multitech System Three, free of charge. Cat X-8003 (In all capitals except Darwin, plus Newcastle)

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limitations in the amount of text that can be moved as a block, but for the average user wanting a word processor it is a good program to start with, considering that it is given away with the DSE/Multitech.

Deskmate is much better. For some users, it could be the only software they ever need. It is a Tandy product, a suite of five major applications. To really make the most of it, an autodial modem in or connected to the computer is needed.

The main modules are a text editor, a filing system, a spreadsheet, a communications package and a diary.

On top of that, and accessible at any time, are a calculator, help screens, an alarm and a direct input to an autodial modem so a telephone can be controlled from the computer.

At the main menu, several system things can be done. The date and time can be reset, though there is no internal clock to keep track if the computer is turned off. An eight letter password can be set up to prevent unauthorized access to the data. Files can be selected, renamed, copied and deleted. A second disk drive can be activated and the amount of free memory displayed. At this time, screen colour options can be set with control and function keys. All the Tandy's colours can be used, depending on taste.

The alarm sounds with a warbling tone during any application. Entries can have text of up to 44 characters and entries from a calendar file can be merged with the alarm module. Within the alarm data base, individual records can be selected, copied, deleted or added. 20 entries are displayed at a time.

Remote operation of a host machine is possible with the remote module. Deskmate can interact with other Tandys running Deskmate to send or get files and mail. Files from each of the modules are sent with type indicators attached. Up to 18 mail items can be stored, and the mail functions as an electronic mail system such as Minerva does, with less frills.

During the running of any application, a two line calculator with basic mathematical functions, ten digit display and a memory can be called up at the base of the screen. Help screens relating to the current application can be called up using Alt and F1 keys. There are nine help files in all.

Other options using the Alt/function keys include toggling an alarm on or off, showing last and next alarm settings, resetting the date and redefine printer parameters such as lines per page, single sheet or continuous stationery and so on. There is some duplication of facilities.

The phone sub-function comes into its

own if you have an autodial modem. Up to 78 names and numbers can be stored, and a name searched for quickly. The directory has a sort facility and up to four dialling prefixes can be stored. There is provision to add and delete entries, to print out the directory and, of course, to dial the number automatically.

All these functions are activated with function keys, with a menu at the bottom of the screen showing what each function key does. The extra function keys of the Tandy are used in Deskmate too. F11 calls up the sub-function menu, and F12 acts as an escape key. Deskmate will not run on other PC compatibles because of features such as this.

With all this behind us, there are still the five major modules to consider. These can be selected individually, or a particular file on the main menu highlighted and chosen. Files are grouped according to their application.

The text editor is nowhere near as sophisticated as Easy, but it is fine for simple documents. Text is typed in. Files can be searched for key words, and word replacement done. Text can be inserted and deleted, and blocks of text selected. Other files can be merged too.

Selected text can be copied as many times as you like, within a document or to a separate document. Finally, text can be saved or printed out. It is therefore a simple text editor, but one that does enough for tasks that do not need formatting.

The spreadsheet is 99 rows by 99 columns, again modest, but fine for the beginner. Text, numbers and formulae can be added, the formula allowing such functions as averaging, minimum and maximum values, sums, logs, trigonometric functions and integer truncation. Quite complex formulae can be used, with the emphasis on the engineering rather than financial matters. Calculation is done manually.

Formats include left and right justification, up to seven decimal places and dollar format. Column widths can be altered, and individual or blocks of cells can be highlighted in colour. Other features are the ability to merge data from one file to another, to copy or delete cells and so on. The facilities are not wonderful when compared to Lotus 1-2-3 but Tandy has put some thought into providing useful features in a low spec spreadsheet.

The filing system is similarly modest but well thought out. Quite a few hundred records can be stored.

All the usual functions are there — add or delete records, merging and copying records to other files and so on.

The find feature is quite versatile. A search can be made of any of the 21 fields, with wildcards, and a report

## Benchmarks Tandy 1000

BM1	1.5
BM2	5.3
BM3	11.3
BM4	11.7
BM5	12.7
BM6	22.8
BM7	35.5
BM8	37.2

## Benchmarks Multitech

BM1	1.5
BM2	5.1
BM3	10.9
BM4	11.3
BM5	12.3
BM6	22.0
BM7	34.1
BM8	35.6

All timings in seconds. For a full listing of the Benchmark programs, see End Zone.

generated with only the information specified by the user. If telephone numbers are displayed, an autodial modem can be accessed from the program to call the number.

Forms are designed with fields up to 59 characters long. Fields can be given priority for sorting operations. A file can also be packed to increase storage capacity. An on screen indicator indicates when packing is recommended.

The telecommunications module allows an RS-232C port to be configured at up to 9,600 Baud. With autodial modems, dialing sequences and responses for voice dialing, auto logons and auto answering. These logon files can be edited later.

There is a terminal mode for conversation, a RAM buffer for text capture, files can be sent and received, any number called automatically, with a smart modem, and data from RAM saved to disk or displayed.

The only pity is that you need a modem to discover what this section of Deskmate can do for you. With an intelligent modem, it is good enough for almost any communications need except Viatel.

The calendar modules shows a month at a time, with the current date highlighted. There is also a week's time chart, hour by hour, day by day, with asterisks over those time scheduled in the calendar.

Entries are made on the screen and



sorted by date and time. Twelve are displayed at a time. In this section, searches for nominated strings, with wild cards, and inequalities can be made. A search can also be made for a date as well. Then there are the usual Deskmate features of select, merge, copy, add and delete. Given the ability to merge calendar files to the alarm module, again it is a handy program.

The final module is mail. This displays messages and a search can be made by originator, date or subject. Messages can be created and sideplayed too.

Deskmate then emerges as an excellent program. It is not difficult to master, yet has a wealth of useful features. For newcomers to computing, it gives a taste of the major types of serious software available, and, with GW-Basic and MS-DOS supplied, the Tandy 1000 owner need only buy a few games to have all the software needed for quite a while.

Both makers claim a high degree of PC compatibility. Both computers run common PC packages such as Lotus, Wordstar, Flight Simulator and other software tried on them. But, you may come across something that doesn't run. It is unlikely, but it may happen. Suffice to say, the chances are slim, and these PC compatibles are indeed compatible.

## Documentation

Tandy supplies four manuals. The first is a Deskmate tutorial, including a chapter on setting up the computer. The second is a Deskmate reference manual, comprehensive and clear as all good documentation should be. Then there is

a pocketable reference guide, and finally, a small reference guide to Basic.

As far as Deskmate goes, you have all you will ever need. As far as Basic goes, you have a list of commands and what they do, but nothing more. As far as MS-DOS goes, you have nothing. That is a bad omission, and you should also get some sort of guide to MS-DOS with the computer.

There should also be some technical information supplied about the interfaces and so on. It is not.

The DSE/Multitech comes with the standard MS-DOS reference guide from Microsoft. That is more than good enough for getting to grips with the operating system. It also has an excellent users' guide, with appendices detailing CPU registers and instruction sets, interface pins, memory maps and so on. It is an excellent user guide by any standards.

Easy comes with a good, clear manual and a keyboard guide. With the tutorial disk, nobody should have any complaints.

## Price

Both these computers are budget machines. The configurations we tested are towards the top end of the configurations, but they show what can be obtained for a modest amount of money.

At \$1,395, the DSE/Multitech with 128k and single disk is a steal. Plug into a TV and you have a PC compatible up and running. The mono Tandy 1000, at \$1,799 including monitor, is similarly excellent value.

The advantage of a second disk drive is that you will be able to run more software, and run it more efficiently. Getting 256k RAM means less disk changes too, bigger documents and a more powerful computer. Finally, colour is an option that speaks for itself. If you are into entertainment, it is essential. For business purposes, it is a luxury you can live without.

So, prices on these units depend on your needs. They are good value, however you buy them.

## Conclusion

At the price, both these PC compatibles are excellent value for money and worth purchasing.

Both can be recommended for different reasons. The DSE/Multitech has a price advantage at the start, and comes with the extra features of an RS-232C port and an internal clock. It would cost extra with most compatibles. The only restriction is on the expansion that can be done. If price is the most important specification, go for the DSE/Multitech.

The Tandy 1000 costs more but is a better computer in many regards. It is better engineered, with useful features and more expansion potential. It has the edge in graphics, a better, if individual keyboard, and GW-Basic is supplied. It also has Deskmate, a program that will show the potential of computers to anybody who has ever questioned it.

END

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# Making haste

*David McKay describes the use of macros in assembler on the BBC Micro, leading to increased versatility and friendliness within your programs.*

Users have been singing the praises of the BBC's Basic interpreter for a long time now, but a point that seems to have been missed is how closely the Basic can interact with assembler. The mnemonic assembler is included in the Basic interpreter chip, and this leads to a programming environment with no sacrifices to friendliness or power. One function of this is the ability to develop macros in the assembly program which can generate sections of code as needed.

## Code execution

The macro needs each routine to be entered only once, and, although the source code program will be longer than a similar section of code employing subroutines, it will execute faster. The assembly listing will be no longer than usual, and the source code will be easier to follow and to debug. This will make things easier for you, and for others.

Macros also encourage a modular style of program development, with each testable section of program added as it is developed, whether you favour a top-down, bottom-up, or combination style.

Consider the execution of the code generated by the following (incomplete) section of assembler:

```
JSR beep
.rest-of-prog
```

```
: JSR OSWRCH, JSR BEEP
```

```
.beep
LDA #7
JSR oswrch
RTS
```

As the call to subroutine beep is

encountered, the program counter will hold the address which contains the next instruction to be executed. If this is a straightforward 'branchless' flow of execution, then the program counter will increment simply. If we need to jump to the start of a subroutine, the address in the program counter has to be saved, and referenced on return from the routine, to resume program execution from the correct point.

The saved address is held in the stack (page one, &1100-&11FF) as two eight-bit numbers. That is, a 16-bit memory address is held in two bytes, a high byte and a low byte. The high byte goes first, so the low byte is the top of the stack.

The subroutine in the example loads the accumulator with 7 and then 'prints' it, giving a 'beep'. The call to subroutine 'oswrch' will need to have the return address saved in the same manner as the call to beep. The return address from oswrch will be on the top of the stack, and will point inside beep. When it returns to this point the stack register notes the new top of the stack, and the return address from beep is again on top, ready to pass control back to the instruction after the calling JSR. You can therefore construct nested subroutines.

It would have made more sense to use a JMP to oswrch, and use the RTS in the oswrch routine to return us to the correct address. This would mean that there was no need to include an RTS of our own.

Now for the good news: all this stack manipulation is done for you, by the machine, and you don't need to be aware of it. However, as usual there are complications.



The BBC Micro uses a 6502A processor with a 2MHz clock, a cycle of which takes 0.5 microseconds. The saving and stack manipulation required for the subroutines adds to the execution time, as JSR and RTS take six cycles each, giving an increase of six microseconds for every subroutine call.

Further, if your subroutine uses the stack for saving registers, it must pull off as many as it pushes on, otherwise the address used as the return from the subroutine will contain a byte which is in fact a saved register, and nasty things will happen.

## Speed

If speed is required but you don't want to bother about the number of pushes and





pulls you have, or even if you want to use the stack as temporary storage, what can you do? You don't want to have to enter the same portion of code each time you want a certain function, for reasons of keyboard time and idleness, and also due to the length of the assembly listing.

Before long you can run into the problems of finding a location at which the source code is to be assembled. Macros are the answer.

Looking at the program in Fig 1, it can be seen that macros are set up with the Basic function facility, FN. These are

created and set out in the program below the main body of FN calls, in much the same way as all the DEF PROC lines are below the main body of PROC calls in Basic. This program does nothing apart from give a beep and serve as a demonstration of the techniques.

The operation is two-pass assembly, with the number of the pass held in the variable pass. The non-assembling statement, OPT, is used as an assembler directive to set up whether errors are flagged, or if a listing of the assembled code is shown at assembly time. The program here is using OPT 0 the first time round (no errors reported, no listing) and OPT 2 the second time (errors reported, no listing).

A function is like a procedure except it returns a value. The value returned by all

```

10 REM Example of simple macros
20
30 oswrch=%FFEE
40
50 FOR pass=0 TO 2 STEP 1
60 P%=%2000
70 [OPT pass
80 OPT FNsaveer
90 OPT FNbeep
100 OPT FNrestorerer
110 RTS
120 ]
130 NEXT
140 CALL %2000
150 END
160
170 DEF FNsaveer
180 [OPT pass
190 FHF:FHA:TYA:FHA:TXA:FHA
200 ]:=pass
210
220 DEF FNrestorerer
230 [OPT pass
240 FLA:TAH:FLA:TAY:FLA:PLP
250 ]:=pass
260
270 DEF FNbeep
280 [OPT pass
290 LDA #37
300 JSR oswrch
310 ]:=pass

```

Fig 1 An example of simple macros

# PROGRAMMING

these functions is pass; the clever part is that between the FN being called and returning this value, a section of code is generated as a matter of course. No calculation is required to find pass, as the FN simply returns the current value to the OPT statement. The difference bet-

```
10 REM Parameter passing in macros
20
30 :&2600=&00550044
40
50 FOR pass=0 TO 1
60 P%=&2500
70 LDPT pass
80 OPT FNdiv(&2600,2)
90 OPT FNdiv(&2602,3)
100 RTS
110 J
120 NEXT
130
140 CALL &2500
150 PRINT"&44 DIV 4 = "17&2600
160 PRINT"&55 DIV 8 = "17&2602
170 END
180
190 DEF FNdiv(address,no)
200 FOR bit_move=1 TO no
210 [OPT pass:LSR address+1:ROR address:]
220 NEXT bit_move
230 =pass
```

Fig 2 Simple parameter passing

ween a macro and a subroutine is that subroutines are called at run time and macros are called at assembly time.

Run the program, then type in command mode the following:

```
pass=1 <RETURN>
A=FNbeep <RETURN>
```

You will see something of the following form:

```
2012 OPT pass
2012 A9 07 LDS #&7
2014 20 EE FF JSR oswrch
```

Now type PRINT A and you will get the answer 1, the value of pass at the time the macro was called. Meanwhile, the above section of code has been generated. Note that OPT pass

and LDA #&7 share the same memory address, 2012. Of course they cannot do this, and in truth OPT pass is not assembled.

If you change line 50 of Fig 1 to 50 FOR pass=0 TO 1 and run it again, you will see the complete listing, and you will be able to pick out the OPT FN lines and the code generated below them starting

```
10 REM M.LABELS
20
30 DIM loop(5),done(5)
40 osasci=&FFEE3
50
60 FOR pass=0 TO 2 STEP 2
70 P%=&2500
80 LDPT pass
90 OPT FNtext(text1,1)
100 OPT FNtext(text2,2)
110 OPT FNtext(text3,3)
120 RTS
130 .text1
140 EQU$ "My first....."+CHR$&D
150 EQU$ &0
160 .text2
170 EQU$ "My last....."+CHR$&D
180 EQU$ &0
190 .text3
200 EQU$ "My everythins.."+CHR$&D
210 EQU$ &0
220 J
230 NEXT
240 CALL &2500:END
250
260 DEF FNtext(label,no)
270 [OPT pass
280 LDX #&0
290 .loop(no)
300 LDA label,X
310 BEQ done(no)
320 INX
330 JSR osasci
340 JMP loop(no)
350 .done(no)
360 ]:=pass
```

Fig 3 A demonstration of the usage of labels

with an OPT pass, then the first true operation code. They again appear to share the one location, but in fact only the opcode resides there.

That's how macros work, but how can you beneficially use them for code that

requires parameters to be passed?

The program in Fig 2 demonstrates how this can be done, using a rather trivial example. FNdiv(address,no) will emulate the Basic DIV 2 command, on the contents of any given location and location+1 (that is, a 16-bit number). You specify the address and the number of times the value is to be held there to undergo a DIV 2.

The value of pass is set to give a listing on the second pass, and you will see two lots of instructions generated by the first call and three sets of instructions generated by the second.

A nicer way to do things is to have 'conditional assembly' macros. Consider the following macro which will rotate a pair of locations, either right or left, a set number of times.

```
400 DE FNrotate(address,direct,no)
410 FOR bit_move=1 TO no
420 IF direct [OPT pass:LSR
address+1: ROR address:] ELSE
[OPT pass: ASL address: ROL
address+1:]
430 NEXT bit_move
440 =pass
```

You specify the address and number of times to rotate as before, but you also specify the direction by typing -1 or 0 (or TRUE or FALSE) as the middle parameter. -1 (TRUE) will rotate right, 0 (FALSE) will rotate left.

## Labels

More care must be taken when the macros become more complicated, such as those which contain internal loops as in the program in Fig 3, which is a demon-

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# PROGRAMMING

stration of the constraints placed upon the use of labels. Labels in assembler follow the same rules of legality as normal Basic variable names, as they are treated in the same manner (they are, in fact, one and the same). A label in assembler is given the value of the address of the memory location it represents. If a macro names a location 'title', for example, then is called again and names another location 'title', problems occur when you try to assemble with forward referencing. Take this macro:

```
270 DEF FNtext(label)
280 [OPT pass
290 LDX #80
300 .loop
310 LDA label, X
320 BEQ done
330 INX
340 JSR osasci
350 JMP loop
360 .done
370 ]:=pass
```

When the assembler tries to assemble an instruction telling it to jump or branch forward to a label, it won't know how far in bytes that jump needs to be until it has encountered that label in the assembly program. To do this, it needs to be able

to pass through the whole lot twice and note the unknown jumps, as well as noting the correct number of bytes for each one as it subsequently meets the labels.

During this first pass, incorrect values are used for the time being. During the second pass through the program, it substitutes the correct values for the incorrect ones. In other words, at the end of the second pass, all the variables have been updated to their new, correct values.

However, if the macro is called several times and a label is used several times, for example the label 'done', all occurrences of that label will be given the value it had during the last macro call. This is due to the one label of all the locations only holding one value, and this will have been updated to the final correct value. Code generated by the first call to the macro would exit to the code after that generated by the last call, which is where the incorrect value placed in 'done' would point to.

To overcome this, the labels are set up in an array that has as many elements as there are going to be calls to that macro. Fig 3 dimensions arrays 'loop' and 'done' to six elements each (0-5),

although the program only needs three in this instance.

With the number of the call specified in the parameters passed to the macro, the labels used will be of the form loop(1), done(3), and so on. As they are different names they will have different and independent values given to them, so the program assembles correctly and the code executes according to plan.

## Conclusion

It is to be hoped that the article and the examples presented have whetted readers' appetites, and shown the implications of this style (if not direct applications).

The shortening of execution times is not likely to inspire newcomers to 6502 to adopt the macro into their repertoire, but perhaps the other advantages, such as easy-to-read code and the modular format, will attract them. A library of macros 'SPOOLED on disk or tape would facilitate quick and reliable program development.

I look forward to seeing other macros in APC's 'TJ's Workshop' or the 'Programs' pages.

END

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*The holidays are here, so why not indulge in a spot of summer and winter gaming — doves, eternal flames and all? Stephen Applebaum goes downhill while looking at the new games releases for the Commodore 64/128.*



## Summer Games

**GAME:** Summer Games II

**MACHINE:** Commodore 64/128

**SUPPLIER:** ECP

**PRICE:** \$29.95

Summer Games II looks like becoming a massive hit, especially in the current climate where it's considered trendy to have a number in the title of your product; a method of marketing assiduously pursued by the incomprehensible Sylvester Stallone.

Summer Games II is a remarkable piece of software. Not surprisingly, it owes a lot to its predecessor Summer Games, in terms of design and the way in which it is played. This similarity makes reviewing difficult, as you find yourself looking for comparisons rather than judging the sequel on its own merits. What I have done, therefore, is to look at Summer Games II as an extension of its predecessor, which in fact it is, as both can be linked together to form one mega-competition.

The Games open with all the pomp of the first day of the Olympics. Following the cliched but well-executed lighting of the eternal flame, doves fly out across the stadium in solemn recognition of the peace and (somewhat affected) brotherhood between the competing nations.



After this pre-game ritual, players are requested to select a flag under which they wish to compete. There are as many as 18 countries to choose from, all of which are not only represented by their flags, but also their national anthems. When this has been done, the Games proper can begin.

The first event is the knee-crunching triple jump. Thankfully, the joystick movement required to make your man jump is rather more subtle than in other games of this kind. Instead of the usual frantic thrashing, four sharp taps of the stick are all that is required to send him bounding along the runway and, hopefully, into the pit. Successful jumps are rewarded with a slow-motion action replay on a small video screen situated above the main arena, while all the loser receives is a faceful of sand.

After wrecking your athlete's legs, you then subject his arms to the rigours of world-class rowing. You are spared from what could have been a gruelling experience, and have little more to do than to languidly move the joystick from side to side.

Throwing the javelin, and the high jump, are the only events where you have to belabour your joystick under a hail of speedy taps. Only the equestrian event comes close in the mindless thrashing stakes, but is redeemed by the amount of skill involved in keeping your rider astride his horse as it leaps over the more difficult obstacles.

There are also fencing, cycling and



kayaking events. The cycling wins hands down for the most unusual use of a joystick: instead of the conventional side-to-side movement, you have to rotate the stick in time with a spinning arrow. The more in sync the two are, the faster the cyclist pedals.

Kayaking is the most difficult part of Summer Games II. As in the real thing, the idea is simply to steer your way through a series of 'gates'. This is all very well in theory, but when you're up against a strong current, the going can get quite tough.

Unless you've seen an Epyx game first-hand, you can't appreciate just how much work its programmers put into the graphics. Those in Summer Games II, for example, are a superb example of the art of animation, and should be seen by anyone who enthuses about good graphics.

Although I have no qualms about the game itself, there is one bugbear and that's the age-old problem of loading speeds. Like so many games for the Commodore 64, Summer Games II is seriously hampered by the slow data transfer rates of Commodore's storage devices. Even the disk drive, which is a veritable hare when compared to the tortoise-like cassette deck, leaves you wondering whether you have time for a second cup of tea.

Although this causes a certain amount of hassle, I'd advise potential buyers not to be put off — the results are really worth waiting for.



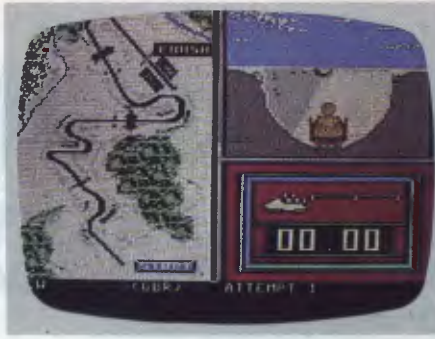


## Winter Games

**GAME:** Winter Games  
**MACHINE:** Commodore 64,  
 Spectrum  
**SUPPLIER:** ECP  
**PRICE:** \$29.95 disk,  
 \$19.95 cassette

Sports games come and go, but only Epyx has produced programs that capture the thrill and excitement of the real thing. Summer Games I and II are two classics of their genre, and now they are joined by a third in the form of Winter Games.

Winter Games leaves behind the sun-scorched running tracks of Epyx's previous two masterpieces, and takes us to the snow-capped mountain peaks of Calgary, Canada, where the action is



equally febrile and hard to master.

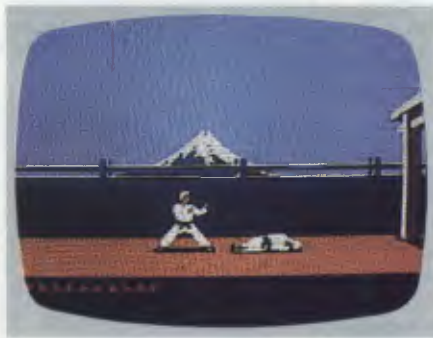
There are seven events, plus the by-now familiar opening ceremony. As is the case with most of Epyx's software, Winter Games is the product of programmers possessing an acute eye for detail.

Figure skating (short program) is one minute of sheer hell for a skater. In this even, the competitor is asked to perform seven different movements in one minute. Points are subsequently awarded not just for the execution of a movement, but also for the skater's grace.

The free program is similar to the figure skating, except that each of the seven moves must be performed three times in two minutes.

In both these events, the screen displays a small though brilliantly animated female skater who glides across the ice.

The craziest sport in Winter Games is Hot-Dog Aerials. Skiers propel themselves over mounds of snow in order to perform mid-air acrobatics.



## Chopping and changing

**GAME:** Karateka  
**MACHINE:** Commodore 64/128  
**SUPPLIER:** Imagineering  
**PRICE:** \$49.95 disk

The martial arts are once again becoming the big money-earner they were 10 years ago. Hollywood has certainly realised this fact, and so too, it seems, has the software industry. Although there have been several karate games launched

over the past few months, only Melbourne House's Way Of The Exploding Fist has stood out. Now it has a strong and worthy antagonist in the form of Karateka.

On the surface, Karateka is just another game where you kick and punch your way through a series of increasingly difficult fights. What makes it different is the way in which the contests have been woven into a film-like tale of good and evil.

You are the good guy who has returned home after years of study under a Master of karate, only to find that your village has been burned to the ground. The instigator of this malicious act is Akuma, the warlord. Unfortunately he has not only deprived you of your home, but also your fiancée, the Princess Mariko, whom he has abducted and incarcerated in his mountain fortress. The way ahead is clear, but the road is dangerous. You must enter the mountain fortress and rescue your bride-to-be before she's lost to you forever.

During the loading of Karateka, the story behind the game is flashed up onscreen and followed by a beautiful piece of computerised melodrama. Akuma is shown looking sternly at

Like the skaters, a hot-dogger's points depend on how well a manoeuvre is performed. Landing in the snow face down, feet up or without skis gains nothing, even in hot-dogging.

Rather more dangerous is the ski jump. Here the idea is simply to ski down a long ramp and hurl yourself into the ether, hopefully to land further from the take-off point than your opponents. The screen display for this event is particularly interesting. At the start of the jump, your skier is depicted as a small stick man speeding down a ramp. When he is in the air, a box showing a larger, much more detailed picture of your man opens in the top right-hand corner of the display.

There are two major stamina events in the games — speed skating and the Biathlon. Speed skating speaks for itself, but the Biathlon is more obscure. It is basically a mixture of cross-country skiing and prone target shooting. Not only does each competitor have to complete the course with a rifle strapped to his back, he also has to fire at several discreetly placed targets along the way.

Following the Biathlon it's on to the seventh and final event of the games, the bobsled.

Winter Games is an excellent piece of software which no serious games player should be without. It ranks equal to Epyx's two previous forays into the world of sport. Winter Games is nothing short of excellent.

Mariko. He points to one side, and she sombrely walks off the screen. The scene cuts to show the princess collapse onto the floor of her tiny cell, where she is left to languish until being rescued.

Akuma's palace, where Mariko is held prisoner, is guarded by a host of warriors, all of whom are also well-versed in the subtleties of karate. Your only hope of seeing her again is to defeat each one in turn, before finally coming face to face with the evil Akuma.

One of Karateka's nicest touches is the way in which Akuma sends out a new guard. Just one point of the master's finger sends a warrior running from the palace towards you. The screen then cuts back and forth between the two fighters. Although rather like *Wuthering Heights*, this neat touch does add drama to the proceedings.

During a fight you have full control over all your man's movements. You can even make him retreat.

Karateka is a wonderful little game. I have one gripe, though, and that is that each time you're defeated, you have to re-load part of side two. That aside, Karateka is a strong challenger to Way Of The Exploding Fist.

END

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## COMMODORE 64 SPRITE TEXT UTILITY

This is a utility which allows you to easily put text into sprites. This can be useful for adding titles to programs, or for moving large text easily. A sprite is made up of a grid of 24 dots across by 21 down, and a character is made up of 8 by 8 dots, so it's possible to fit three characters side by side into a sprite. It is also possible to use double-height characters.

The utility consists of a Basic loader program which POKES the machine code

into memory, which could be incorporated into any other program. This is followed by a short program which demonstrates the utility. The routine is used as follows: SYS52480, ADDR, S, C, D1, D2, D3 where ADDR is the address of the sprite data area; S is the character size (128 for double or 0 for normal); C determines whether or not a sprite is cleared before altering it; 1 means clear; and 0 means don't. D1, D2 and D3 are the three characters to be placed in the sprite. Any of the 255 characters can be used and the numbers should be the POKE codes of the characters, not the ASCII values.

Steve Mehew

```

10 REM
20 REM
30 REM
40 REM
50 REM
60 :
70 S=E24B0:CS=0:C=CS
80 FOR L=0 TO 22:LC=0:FOR D=0 TO 9
90 READ B:POKE S+C,B:C=C+1:LC=LC+B
100 CS=CS+B:NEXT:READ B:CS=CS+B
110 IF LC>B THEN 200
120 NEXT:IF CS<>60074 THEN 300
130 PRINT:PRINT"ALL DATA IS CORRECT.":END
200 PRINT"DATA ERROR IN LINE":500+5*L:STOP
300 PRINT"SERIOUS DATA ERROR. LINE CHECKSUMS"
310 PRINT"COULD BE WRONG. CHECK ALL DATA.":STOP
320 :
500 DATA 32,141,205,165,190,240,3,32,202,205,1415
505 DATA 173,14,220,41,254,141,14,220,165,1,1243
510 DATA 41,251,133,1,162,1,134,2,189,212,1126
515 DATA 205,133,251,169,0,133,252,162,2,6,1313
520 DATA 251,38,252,202,16,249,165,252,24,105,1554
525 DATA 208,133,252,160,0,177,251,132,158,72,1543
530 DATA 185,216,205,36,183,16,5,133,159,24,1162
535 DATA 101,159,168,104,145,253,36,183,16,26,1191
540 DATA 72,165,253,24,105,3,133,253,144,2,1154
545 DATA 230,254,104,145,253,165,253,56,233,3,1696
550 DATA 133,253,176,2,198,254,164,158,200,192,1730
555 DATA 8,208,198,230,253,208,2,230,254,166,1757
560 DATA 2,232,224,4,208,156,165,1,9,4,1005
565 DATA 133,1,173,14,220,9,1,141,14,220,926
570 DATA 96,32,253,174,32,138,173,32,247,183,1360
575 DATA 165,20,133,253,165,21,133,254,32,253,1429
580 DATA 174,32,158,183,134,183,32,253,174,32,1355

```

```

585 DATA 158,183,134,190,32,253,174,32,158,183,1497
590 DATA 142,213,205,32,253,174,32,158,183,142,1534
595 DATA 214,205,32,253,174,32,158,183,142,215,1608
600 DATA 205,96,160,63,169,0,145,253,136,16,1243
605 DATA 251,96,0,0,0,0,0,3,6,9,365
610 DATA 12,15,18,21,0,255,0,255,0,255,831

```

```

10 REM TEXT TO SPRITE DEMONSTRATION
20 REM
30 POKE 53280,0:POKE 53281,0:PRINTCHR$(147):
40 CLR:V=53248:TS=52480
50 FOR R=1 TO 8:POKE V+38+R,R:NEXT
60 POKE V+23,0:POKE V+29,255
70 FOR R=240 TO 247:POKE 2040+R-240,R
80 READ A,B,C
85 SYS TS,64*R,0,1,A,B,C :NEXT:S=50
90 FOR R=0 TO 8 STEP 2:POKE V+R,S:S=S+48:NEXT:S=98
95 FOR R=10 TO 14 STEP 2:POKE V+R,S:S=S+48:NEXT
100 FOR R=1 TO 15 STEP 2:POKE V+R,100-30*(R/9):NEXT
101 :
200 DATA 19,20,5,22,5,39,19,32,20,5,24,20,32
201 REM S T E V E ' S T E X T
210 DATA 20,15,32,19,16,18,9,20,5,19,32
211 REM T O S P R I T E S
212 :
230 POKE V+21,255:A=1:B=15:C=2
250 FOR T=0 TO 100
260 FOR R=A TO B STEP C:POKE V+R,PEEK(V+R)+A
265 NEXT:NEXT:PA=150
270 FOR R=0 TO 7:FOR T=0 TO PA:NEXT
280 POKE V+23,PEEK(V+23)OR 2^R:NEXT
290 FOR R=0 TO 7:FOR T=0 TO PA:NEXT
300 POKE V+23,PEEK(V+23)AND 255-2^R:NEXT
310 PA=PA-58:IF PA>=0 THEN 270
320 FOR R=1 TO 15 STEP 2:S=PEEK(V+R)
330 FOR Y=S TO 0 STEP -3
335 WAIT *+17,128,127:POKE V+R,Y:NEXT:NEXT
340 PRINT"THAT'S ALL FOLKS !":END

```

## SPECTRUM REPEAT... UNTIL COMMAND

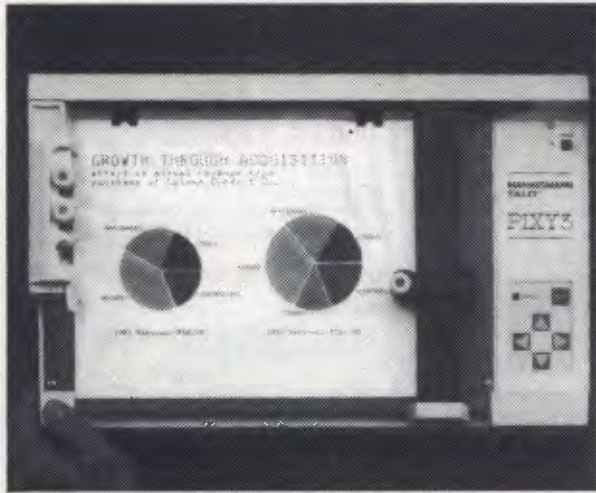
This routine adds a REPEAT/UNTIL looping structure to a 48k ZX Spectrum with an Interface 1. Type in the program and RUN it. The program will POKE the code into memory and then tell you how to save it to microdrive or cassette. When you have

done this, clear the program with NEW. Before you can use the new commands, you must enable them by typing RANDOMIZE USR 65000; you can then type in the sample program to test out the routine. Both the new commands are preceded by ★ and have to be typed in letter by letter, but any condition following until may be typed in as normal.

Before loading the code, CLEAR RAMtop down to 64999 and remember that before using the new commands, or after using NEW, you must enable

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the commands with **RANDOMIZE USR 65000**. To use the commands in your own programs, make the first line of the program **RANDOMIZE USR 65000**. The command allows up to

100 nested loops, and if it comes across an **★UNTIL** without a corresponding **★REPEAT**, it will give the **NEXT WITHOUT FOR** error message.  
*D Hales*

```

1 REM
2 REM REPEAT / UNTIL
3 REM b/ David Hales
4 REM
10 CLEAR 64999
20 PRINT AT 10,10; FLASH 1;"PLEASE WAIT"
100 FOR A=65000 TO 65174
110 READ B
120 POKE A,B
130 NEXT A
110 CLS
120 PRINT " THE CODE IS NOW IN MEMORY"
160 PRINT
170 PRINT "BEFORE RUNNING THE DEMONSTRATION PROGRAM SAVE THE CODE FIRST."
180 PRINT
190 PRINT "SAVE TO TAPE WITH:"
195 PRINT
200 PRINT "SAVE **R/U**CODE 65000,174"
210 PRINT
220 PRINT "DR MICRODRIVE 1 WITH:"
230 PRINT
240 PRINT "SAVE **M**11**R/U**CODE 65000,174"
250 STOP
990 REM
910 REM MC DATA
920 REM
1000 DATA 33,183,92,54,252,35,54,253,33,154
1010 DATA 254,34,151,254,62,0,50,153,254,201
1020 DATA 215,24,0,254,42,40,3,195,240,1
1030 DATA 215,32,0,254,02,40,7,254,05,40
1040 DATA 54,195,240,1,6,6,215,32,0,16
1050 DATA 201,205,103,5,50,153,254,254,100,32
1060 DATA 5,253,54,0,3,239,60,50,153,254
1070 DATA 42,151,254,50,69,92,119,35,00,70
1080 DATA 22,119,35,50,71,92,60,119,35,34
1090 DATA 151,254,175,193,5,6,5,215,32,0
1100 DATA 16,251,215,180,20,205,103,5,50,153
1110 DATA 254,254,0,32,5,254,54,0,0,239
1120 DATA 215,140,30,254,1,40,24,42,151,254
1130 DATA 220,40,126,50,60,92,43,126,50,67
1140 DATA 92,43,126,50,66,92,225,34,151,254
1150 DATA 195,193,5,42,151,254,43,43,43,34
1160 DATA 151,254,50,153,254,61,50,153,254,195
1170 DATA 193,5,0,0,0
1 REM
2 REM REPEAT UNTIL DEMO
3 REM PROGRAM TO FIND FIRST
4 REM OCCURENCE OF A BYTE
5 REM IN THE SPECTRUM ROM
6 REM (NOT DNE GO TO HERE!)
7 REM
8 RANDOMIZE USR 65000
90 LET INFINITY=0
90 *REPEAT
95 *REPEAT:UNTIL INKEYS="**"
100 PRINT AT 10,3;"REPEAT UNTIL DEMONSTRATION":AT 12,5;"PRESS ANY KEY TO START"
110 *REPEAT:UNTIL INKEYS("<")**"
120 CLS
140 *REPEAT
150 INPUT *TYPE A NUMBER BETWEEN 0 & 255 *;N
160 *UNTIL N=0 AND N<=255
165 PRINT AT 5,5;"SEARCHING ROM FOR ";N;AT 7,7;"PRESS **X** TO EXIT"
170 LET ADDRESS=1
180 *REPEAT
190 LET ADDRESS=ADDRESS+1
195 PRINT AT 10,5;"SEARCHING ADDRESS ";ADDRESS
200 *UNTIL PEEK ADDRESS=N OR INKEYS="**X"
205 CLS
210 IF PEEK ADDRESS=N THEN PRINT AT 5,6;"FOUND AT ADDRESS ";ADDRESS
220 *UNTIL INFINITY
    
```

## BBC EASY DISK LOADING

This utility speeds up the loading of Basic programs from disk, and should be used when **!BOOT** is unsuitable. The utility places a piece of code at 8900 which inserts a VDU 12 control code, followed by a CH. "HHHHHHH" and a return control code, into the keyboard buffer. The program can then be loaded as a **★** command, as the code strips off the filename after the **★** and automatically chains it.

To use the program, first

check that the required Basic program is on disk, then chain the Easy Load program (which you should have previously typed in and saved). You will be asked to name the Basic program Easy Loader; this name should be entered exactly as it is given in the disk catalogue. You will then be asked for the name of the machine code loader (the name to be placed after the asterisk) which should be as short as possible. You must ensure that this name is not the same as any of the OS commands, or any other Easy Load programs.  
*H Rees*

```

10 REM ***** EASY-LOAD *****
20 REM A Disc Utility for easier
30 REM loading of BASIC programs.
40
50 REM Written By Huw Rees.
60 REM 13th Aug 1985
70 MODE 7
80
90
100 PX=8900
110 REM Start of assembler.
120 L
130 OPT 2
140 PHA
150 TYA:PHA
160 TXA:PHA
170 LDA #5BA
180 LDX #60
190 LDY #3C
200 JSR &FFF4
210 LDY #543
220 JSR &FFF4
230 LDY #64B
240 JSR &FFF4
250 LDY #52E
260 JSR &FFF4
270 LDY #522
280 JSR &FFF4
    
```

## MS-DOS COUNTRIES

MS-DOS versions 2.0 or higher use a file called **CONFIG.SYS** during booting to set up various operating system parameters, one of which is **COUNTRY=44**. This refers to the operating system's ability to express the date in different formats, depending on the country of

use. (We use the same as the UK).

These are coded into **CONFIG.SYS** using the international trunk dialling codes, as shown in Fig 1.

These codes only configure the operating system and do not affect programs such as **dBasell**, so you won't be able to configure these to the local date format.

*RJ Akers*

CONFIG.SYS entry	date format	country
COUNTRY = 01	month:day:year	USA
COUNTRY = 44	day:month:year	UK
COUNTRY = 81	year:month:day	Japan

Fig 1

## VZ USER GRAPHICS

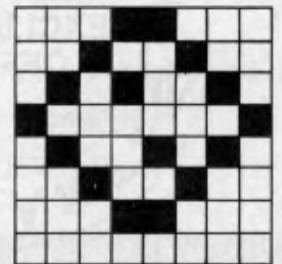
```

1000 A=44800:B=65536
1010 READ C:IF C=1THEN
1070ELSEPOKEA-B,C
:A=A+1:GOTO1010
1020 DATA245,197,213,
229,33,0,0,17,0,0
1030 DATA14,8,26,119,
35,19,26,119,6,31
1040 DATA35,5,120,254,
0,194,20,175,19,13
1050 DATA121,254,0,
194,12,175,241,193
1060 DATA209,225,
201,-1
1070 POKE30862,0:POKE
30863,175:RETURN
    
```

This routine will provide any VZ programmers with the ability of creating their own definable high resolution characters in 8x8 pixels.

For example

00000011	11000000
00001100	00110000
00110011	00001100
11000000	00000011
00110000	11001100
00001100	00110000
00000011	11000000
00000000	00000000



Refer to the technical manual for more details on high resolution graphics. To activate this routine, you

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\* Dataflex is trademark of Dataflex  
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\*\*\* dBase II is trademark of Ashton-Tate



## TJ'S WORKSHOP

simply poke the starting address of the code for your user definable graphic into the memory location 44808/9 and the screen position of your user definable graphic into the memory location 44805/6.

Sample Program

```
5 GOSUB 1000
10 FOR T=45000 TO 45015
20 READ S:POKE T-65536,S
```

```
30 NEXT T
40 POKE 44808-65536, 200:POKE 44809-65536,175
50 POKE 44805-65536, 0:POKE 44806-65536,112
60 MODE(1):X=USR(0)
70 GOTO 70
1080 DATA 3,192,12,48, 51,12,192,3,48
1090 DATA 204,12,48,3, 192,0,0
```

## APPLE SWITCH

The Apple IIe has a colour switch which allows a sharper image on monochrome monitors. Unfortunately the switch is inconveniently located within the computer's case. This is a hassle if both a monochrome monitor and a colour TV (with a video modulator) is attached, as you have to frequently switch to colour for games and back to monochrome for word processing using graphic-text, for instance.

To improve accessibility, I connected a switch in parallel with the existing one and mounted the new switch in a more convenient location at the back of the computer where there are already various holes punched in the panel for cables etc. To do this the following parts are needed:

1xSPDT switch (push on/push off alternate action type is ideal);

2xE-Z clips or similar;  
2x0.5 metres of insulated hookup wire.

Solder the switch to one end of each wire and the clips to the other ends. Switch off the power, open the top lid on the computer's case and attach one clip to the right end of resistor R72 on the motherboard. (Left and right with respect to the keyboard being nearest to you and keyboard facing upwards). This resistor is found near coordinate B-14. (The motherboard is marked with letters along one edge, and numbers along the other). Attach the other clip to the left end of resistor R76 located at coordinate B-13. Mount the switch in a convenient location like the back panel. Set the existing colour switch located at B-15 to 'color' (ie, away from the keyboard). Finally close the lid and switch on the power.  
*K Lau*

## EXTRA VIC-20 VOICE

To gain an extra sound channel to the VIC-20 remove the main circuit board and connect a piece of wire between the CB2 line on the user port to the audio out line in the audio/video port and type the following:  
POKE 37147,16  
POKE 37144,N (where N is between 0 and 255 representing the note to be

played)  
POKE 37146,W (where W is 15, 51 or 85 for square waves)  
WARNING: DO NOT USE THE DATASETTE IN THIS MODE.  
POKE 37147,0 will restore the VIC to normal operations.

This extra voice may be used in conjunction with the other voices but there is no volume control for the extra voice.  
*P Austen*

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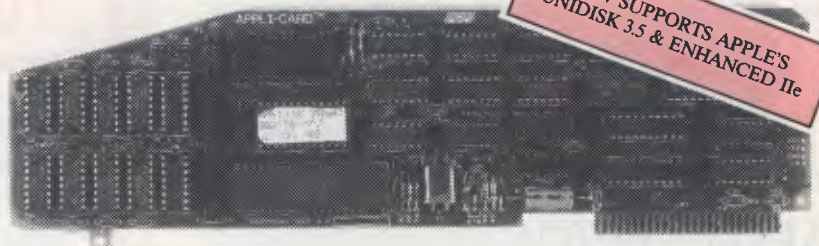
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## 64 TRACE

This routine for the Commodore 64 simulates a TRACE function. It is called with 'SYS 49216'; 'SYS 49227' turns it off again.

When activated, this routine prints the current line number that the computer is executing in square brackets.  
B Michell

```

100 REM TRACE (C) BEN MICHELL 1985
110 S=49152
120 READ A:B=B+A
130 IF A=-1 THEN GOTO 300
140 POKE S,A
150 S=S+1
160 GOTO 120
170 IF B(>)9484 THEN PRINT"ERROR":END
180 PRINT"SYS 49216 TO TURN TRACE ON"
190 PRINT"SYS 49227 TO TURN TRACE OFF"
200 DATA165,57,133.89,165,58,133.98,165
210 DATA157,201.0,208,14,165,57,205,52
220 DATA3,209,13,165,58,205,53,3,208,6
230 DATA32,53,192.76,228,167,32,53,192
240 DATA169,91,32,210,255,32,209,189
250 DATA169,93,32,210,255,76,228,167
260 DATA165,57,141,52,3,165,58,141,53,3
270 DATA96,169.0,141,9,3,169,192,141,9
280 DATA3,96,169,228,141,9,3,169,167
290 DATA141,9.3,96,-1
300 END
    
```

## BLUDNER

There is a bug in 'Old Apples' (APC, November, page 181). Line 110 in the first box.

```

110 A2E = PEEK (64435)
= 6: IF NOT A2E THEN
POKE 54,6: POKE 55,8:
CALL 1002
    
```



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## SCREENTEST

# WordPerfect

*WordPerfect is a comprehensive but pricey word processing package. Brian Whalley puts it on trial to test its vast range of facilities against ease of use.*

A useful question when approaching a new word processor is: 'How easy is it to write a short letter or document without using control codes?' In this case, the answer must be 'very easy indeed'. WordPerfect comes close to the ideal of 'What you see is what you get' (WYSIWYG), and although it doesn't show right-hand justification onscreen, you work at all times on a screen uncluttered with control codes, simply with an indication (at bottom-right) of document, page, line and column.

Fig 1 is a screendump of some sample text. Start typing at the top of the screen and when you reach the bottom, the display will scroll up after each line typed. If you find the scrolling irritating at any time, pressing the Home key plus the down arrow key or the page down key, rewrites the screen so that you're typing about halfway down.

### The clean screen look

How does WordPerfect achieve its 'clean screen' appearance? As it offers the usual options for justified and unjustified paragraphs, bold or underlined text, variable margins and line spacing, and so on, and allows these format instructions to be stored with the document, there must be control codes. But where are they? Within the text, but hidden from view, is the answer.

How can their presence be checked and edited? Take the cursor to the beginning of the document, press the appropriate function key to 'reveal codes', and a screen such as that shown in Fig 2 appears. It may look odd, but it is very

revealing and extremely useful. The [ ] at the start is a flashing cursor which can be used within the reveal codes screen to delete unwanted codes; [W/O On] indicates 'Widows & Orphans On' to ensure that a paragraph never starts on the bottom line of a page and never ends on the top line of a new page; [Margin Set...] indicates the appropriate columns (column one is the left-hand edge of the paper, not of the print line); the paired [C] and [c], [B] and [b] enclose text to be centred and in boldface; and [HRt] indicates the use of the Return key at the end of a single line or paragraph, as distinct from a soft carriage return [SRt] automatically inserted with a paragraph at a point appropriate to the set margins (a process known as wordwrap). Pressing any key other than the left or right arrow, or Delete or Backspace, takes you back into

the document. These invisible control codes can be entered anywhere within a document to change the formatting to exactly what you require.

Sensible defaults and a function key template make it possible to produce formatted letters and other documents virtually without using the manual (although it is an excellent one, and not to be ignored). WordPerfect comes with four diskettes: two copies of the main program disk (one labelled 'IBM PC, XT, AT' and the other labelled 'Use this version if you are running TopView'), a speller disk and a supplementary disk. None of the disks are copy-protected, and the manual gives clear guidance on making working copies of a program disk, a speller disk and a learning disk. The latter will carry a sequence of 12

#### SAMPLE WordPerfect TEXT

```
This text has been prepared using the word processing software
WordPerfect from A M International. WordPerfect comes very close
to the ideal of "what you see is what you get" (WYSIWYG), and
although it does not show right hand justification on the screen,
you work at all times on a screen uncluttered with control codes,
simply with an indication (at bottom right) of document, page,
line and column. Since it offers the usual options for justified
or unjustified paragraphs, bold or underlined text, and so on,
there must be control codes, but they are hidden from view until
the Reveal Codes key is pressed.
```

Fig 1 Screendump to a dot-matrix printer

```
[ ]HRt Just On]EW/O On][Margin Set:10,75][C][B]SAMPLE WordPerfect TEXT[b][c][HRt
]
[HRt]
[HRt]
This text has been prepared using the word processing software[SRt]
```

Fig 2 The Reveal Codes screen

# SCREENTEST



The WordPerfect opening screen



The editing screen



Help commands are provided

documents (copied from the supplementary disk) to be used in conjunction with the 145-page learning section of the manual (supplemented by more lessons in the Special Features section covering newspaper-style columns, footnotes, tables and lists, macros, and so on).

The fact that an additional interactive tutorial disk (as well as a demonstration disk) is available from dealers who may suggest that WordPerfect is hard to learn. In reality, few users are likely to plough through all the learning material, but when getting to grips with some of the software's more powerful features, it's useful to have some step-by-step instructions to follow, using a real document which is already waiting on the learning disk. The manual also has a brief and well-illustrated Getting Started section, a detailed alphabetical Reference Guide with abundant cross-references, and an excellent index. The software package also contains a Quick Reference booklet listing every function in alphabetical order along with its function key and a brief explanation, and an Installation Booklet with information about set-up, convert and printer programs, and printer test files.

Much of the program's success must be attributed to its use of function keys. A colour-coded template is supplied to fit round these keys, each of which has four functions depending on whether it is used alone or with the Shift, Alt or Ctrl key. This may appear complicated but quickly becomes familiar and easy to use, and I much prefer this approach to one using the normal letter keys — though I have heard it argued that a professional typist moving into a word processing system prefers control codes based on keys with which he/she is already familiar.

Regrettably, the lettering on the template is small. I use spectacles for reading but not normally for computing, and I am thankful that I use a Qubie keyboard which has the function keys in a line above the normal Qwerty keyboard, thus allowing me to make my own overlay in

typescript. A standard template with larger, clearer lettering is needed, and should be possible.

## Formatting features

Like many word processors, WordPerfect arrives with initial settings for a range of formatting features. For example, page length is set for a 66-line sheet of paper with 54 text lines at six lines per inch and single spacing, margins are set at columns 10 and 74 with tabs every five spaces, and right justification is on. Any default can be changed, or you can temporarily change one or more for a work session. There is always the option to change them for the current document or a portion of it, in which case the settings are stored on disk as an integral part of the document.

The special set-up program for changing defaults (entered by typing WP/S instead of the normal WP at the system A> prompt) also provides for selecting colours for a colour monitor (or whether to have underlined or highlighted on a suitable mono monitor), activating a timed back-up. This means that your current document is automatically saved to disk at a predetermined time interval (in minutes), defining special characters for access via use of the Ctrl and Alt keys, and specifying default drives (or directories, on a hard disk system).

Cursor control is impressive (you can even select the style of cursor you prefer) and makes full use of the PC's arrow keys. These move the cursor one character left or right, one line up or down; Ctrl plus left or right arrow takes you along a line one word at a time. The Home key plus the up or down arrow takes you up or down one screen of text (the + and — keys on the numeric pad do the same), while Page Up or Down will take you to line one of the previous or following page; Home plus the left or right arrow takes you to the end of the line, and you can also get to the right-hand margin by using the End key; Home pressed twice followed by the up or down arrow takes

you to the start or the end of the current document.

Ctrl-Home produces a Goto prompt at the bottom left-hand corner of the screen, and typing an appropriate number takes you to line one of the specified page. A fast search facility (forward or reverse) will find any character string or control code, and position the cursor at that point. Replace provides for the deletion or substitution of characters or codes, either with a request for confirmation of each occurrence, or automatically right through the document.

WordPerfect holds an entire document available for viewing and editing: moving from page to page, from start to finish, is achieved with ease and speed. Page endings are produced automatically according to the page length default or an inserted choice, and they are shown visually by a line right across the screen. A page end can be forced at any point by using Ctrl-Return, and you can specify a number of lines (of a table or list, for instance) which must be kept together: this is known as a conditional page end.

Text can be marked for bold face printing, underlining, subscript or superscript; for changes between character sets on a dot-matrix printer; or to pause printing for a daisywheel change (or any other purpose). The appropriate control codes can be entered either while initially typing the text, or later. Press the function key before typing the text and, on a colour screen, boldface text will be shown highlighted, and underlined text in a selected colour; press the function key, and you're typing normal text again. To mark text that has already been typed, Alt-F4 is pressed to produce a flashing 'block on' message at the bottom-left of the screen. Moving the cursor then marks text in inverse video, one character at a time or more quickly by word, line or even page moves. When the text has been highlighted, pressing a function key marks it appropriately and switches off the block.

Erasing text is simple, with the Delete







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key acting on the character at the cursor position and Backspace deleting the character which is to the left of the cursor. Ctrl-Backspace removes either the word the cursor is on, or the previous word if the cursor is at a space. Ctrl-End erases to the end of the line (the Cancel function key will restore it if it's an accident or a mistake). Ctrl-PgDown allows you to erase from the cursor to the end of the page after replying Y to a request for confirmation — a valuable safety feature.

Ctrl-F4 is a 'Move' key: pressing it gives you a choice of the sentence, paragraph or page on which the cursor is positioned, followed by a choice of Cut (for deletion, or transfer to another position) or Copy. In either case, the text is saved in a buffer until you use Move again.

Sections of text can also be marked for deletion, transfer or copying by the use of the Block command already described. While a block is highlighted, the Move menu allows you to cut, copy or append the block. Cut can be used to transfer the marked text not only to a new position in the current document, but also to a second document which can be held in memory at the same time. Append allows you to add the marked text to a file already on disk (there is also a Retrieve function which allows a disk file to be inserted into the current document), while pressing the Save key will allow you to save it as a named file.

Tabs are available on most word processors, and while WordPerfect's default is to tabs at every fifth column, it is quite easy to clear them and set tabs wherever you require them within a particular document. There is also an Indent facility which is remarkably easy to use, either to indent from the left (at the tab position selected) until the Return key is next pressed, or to indent an equal amount from each margin (for quotations, for instance). Used with Margin Release (Alt-Tab), hanging paragraphs (the first line projecting beyond the left margin) are possible.

For producing a long report, there is an automatic paragraph numbering facility with a choice of three predefined styles — and the option to create your own by selecting from six number/letter styles and four punctuation styles.

## Spelling

The spelling program works on the current document rather than on a disk file, and entails replacing your document disk with the speller disk unless you are fortunate enough to have a hard disk, to which all WordPerfect's utilities are easily transferred. You are offered six

choices: to check a word, the current page, or the full document; to look up on a wildcard search or to use the phonetic facility; or to change dictionary. Any error located is immediately shown in context and you can correct it manually, or look up the correct spelling either by entering the letters you're sure about and a ★ for the rest, or by selecting the phonetic look-up.

The latter is rather curious and unpredictable. Although entering CUF produces a selection of eight alternatives including cuff, cough, coif, and the less likely cafe and chief, and THERE yields their and they're, entering COUGH produces no alternatives at all, the same being true of BOW and BOUGH, which is rather disappointing.

If the speller fails to recognise an acceptable word (perhaps a technical term) you can skip it once, skip it for the rest of the document, or add it to the dictionary (facilities also exist on the supplementary disk for editing the main dictionary by additions and removals, and for creating special-purpose dictionaries of your own). When you've checked and corrected a document, it's important to remember to save the edited version — a process which is not automatic.

## Advanced features

There are still more advanced features which will appeal to professional writers with large documents to produce. Text

can be marked for the creation of a table of contents, an index, or lists of various types (for example, of tables, graphs and illustrations). Footnotes and endnotes can be created in several styles.

Headers and/or footers can be defined for the automatic printing of the same text at the top or bottom of every page, with provision for page numbering and for alternative message or layout on odd and even numbered pages.

There is provision for mailmerge, label printing, form-filling, document assembly, and many other features which take a little time to learn but could save a remarkable amount of time in a busy office. For any frequently repeated text, format or operation, a macro can be created which reduces complexity to a couple of keystrokes. Non-WordPerfect files can be imported, and there is a special Convert program to cope with such formats as WordStar and DIF files.

A mathematical facility will provide automatic totals and subtotals of columns and rows, with limited provision for using formulae as on a spreadsheet. There is a special tab function which lines up figures on the decimal point, and producing columns with centred headings is no problem. However, WordPerfect takes the notion of columns a step further with its facility for defining columns such that a document can be automatically printed out in newspaper style, or a report can have sections printed in parallel column format (Fig 3). Up to five columns, of the same or differing

### SAMPLE WordPerfect TEXT

<p>This text has been prepared using the word processing software WordPerfect from A M International. WordPerfect comes very close to the ideal of "what you see is</p>	<p>what you get" (WYSIWYG), and although it does not show right hand justification on the screen, you work at all times on a screen uncluttered with control codes,</p>	<p>simply with an indication (at bottom right) of document, page, line and column. Since it offers the usual options for justified or unjustified para-</p>
---	---	---

Fig 3 Printing in multi-column format

### SAMPLE WordPerfect TEXT

This text has been prepared using the word processing software WordPerfect from A M International. WordPerfect comes very close to the ideal of "what you see is what you get" (WYSIWYG), and although it does not show right hand justification on the screen, you work at all times on a screen uncluttered with control codes, simply with an indication (at bottom right) of document, page, line and column. Since it offers the usual options for justified or unjustified paragraphs, bold or underlined text, and so on, there must be control codes, but they are hidden from view until the Reveal Codes key is pressed.

Fig 4 Formatted print on dot-matrix printer

widths, are easily defined within the limits of the margin settings being used.

## Printers

Fig 1 is a dump from the screen to an Epson MX-80 dot-matrix printer, while Fig 4 shows WordPerfect's output to the same printer. Fig 5 shows the results on a Qume Sprint 9 daisywheel printer.

The micro-spacing and justification of the Qume required no installation work on my part — merely the selection of the printer from a list of 30 printers (Fig 6).

Documents can be printed from screen or disk: from screen you can print the whole document, the currently displayed page or a marked block, to the default printer; from disk you can select start and end page numbers, and print to any one of up to six printers for which details have been stored on the working copy of your program disk (using the set-up program and the supplementary disk). These six printers normally include a DOS text printer (which allows printing to disk of a standard text file without formatting codes), and can include the same printer twice for, say, continuous forms and single-sheet operation. The printer control menu is easy to reach, but offers so much choice that although many users will rarely need to use it, it does warrant very careful reading of the manual.

Specifying your printer is very simple if it appears on the printer list (Fig 6), but detailed guidance is provided for installing other printers, and for making extensive modifications to the printer definitions and character tables if you have exceptional requirements. The supplementary disk contains a README file which can be used to print a 33-page, thoroughly indexed, printer program manual. There are also the aforementioned printer files, one of which is a printer test using the full range of control codes for you to check your printer's response. Another is a font test in order that you can correlate the characters displayed onscreen with those on a particular print wheel, providing a facility for you to produce an appropriate translation table if needed; a third allows you to make adjustments to the positions and widths of a proportionally spaced font.

These are sophisticated facilities which many users will rarely, if ever, use, but allow a dealer or the more enthusiastic user to achieve a remarkable degree of optimisation in the use of the wide range of standard printers already catered for by WordPerfect, or for newly introduced models.

## Weaknesses

You might have the impression that you've been reading a eulogy rather than a review, and you can hardly expect any software to be entirely perfect, whatever the implications of its name! WordPerfect does have its faults, although they are few in number, and I'd rather call them weaknesses. For example, I've

already mentioned the program's inability to display right justification in true WYSIWYG style, and I hope this will be introduced at the next revision. In the meantime, I'd be grateful for a patch that puts a justified message on the screen, like the one for 'typeover' which is switched on and off by the Insert key.

Changing the format defaults to those you most frequently need is very easy,

### SAMPLE WordPerfect TEXT

This text has been prepared using the word processing software WordPerfect from A M International. WordPerfect comes very close to the ideal of "what you see is what you get" (WYSIWYG), and although it does not show right hand justification on the screen, you work at all times on a screen uncluttered with control codes, simply with an indication (at bottom right) of document, page, line and column. Since it offers the usual options for justified or unjustified paragraphs, bold or underlined text, and so on, there must be control codes, but they are hidden from view until the Reveal Codes key is pressed.

Fig 5 Formatted print on a daisywheel printer

### Printers Currently Defined

- |                                   |                                 |
|-----------------------------------|---------------------------------|
| 1 Line Printer                    | 2 DOS Text Printer              |
| 3 Brother HR-15 / Dynax DX-15     | 4 C.Itoh Starwriter/Printmaster |
| 5 Centronics 351                  | 6 Diablo 630 ECS                |
| 7 Diablo 620/630 (Daisywriter)    | 8 Epson FX                      |
| 9 Epson MX-Graftrax/MX-Type III   | 10 Epson LQ-1500                |
| 11 HP 2686A LaserJet-A            | 12 HP 2686A LaserJet-B          |
| 13 IBM Graphics Printer           | 14 IBM Color Printer            |
| 15 IBM Wheelprinter/521B          | 16 IBM Quietwriter              |
| 17 NEC 2050                       | 18 NEC 3510/3530/7710/7730      |
| 19 NEC 3550                       | 20 NEC 3515/5515/7715/3525/7725 |
| 21 NEC Pinwriter P2/P3-2, P2/P3-7 | 22 NEC Pinwriter P2/P3-3        |
| 23 Okidata Microline 84           | 24 Okidata Microline 93         |
| 25 Qume Sprint 5/9/11/11+         | 26 Star Gemini                  |
| 27 Texas Instruments 855          | 28 Toshiba P1350/P1351          |
| 29 Toshiba P1340                  | 30 Standard Typewriter          |
| 31 DataProducts DP Series         |                                 |

Fig 6 List of printers already defined on disk



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but it's a pity that default values are not entered into the document like specifically selected values. Reprinting a document produced in accordance with defaults which you have since changed can have unexpected results, especially if tabs are involved. There are some oddities when text is being reformatted after you've added or removed text. Although no specific user action is needed (like the Ctrl-B to re-Block text in WordStar), the process is not entirely immediate and can cause some word-wrap shifts as you cursor down a page. However, whatever you've done by way of editing, moving from the start of the document to the end by Home-Home and the down arrow will re-format and repaginate the entire document, perhaps with a few requests to decide about hyphenating if you're using that facility. Occasionally the blank line between paragraphs will appear at the top of a page (hardly noticeable unless your pages have a header) or the second space after a full stop will appear at the start of a line, but these hiccups have been very rare in my experience.

I've already mentioned some weaknesses of the speller facility, especially in the phonetic look-up. The thesaurus



## SCREENTEST

utility on the much less expensive Perfect Writer is of considerably more value, and I would gladly substitute it for WordPerfect's phonetic oddities. The speller produces a word count after a page or full document check, but it really would be nice to have a running word count such as is provided by some quite cheap home computer word processors — or at least some way of bypassing a full spelling check to obtain the count.

It would also be nice to have something like the automatic presentation of probable correct spellings which is a feature of SpellStar (in the WordStar Professional suite). There certainly should be a prompt to remove the speller disk and save the edited document after correcting spellings — it's far too easy to

forget to save it (potentially a very serious waste of time and effort), or to write it onto the speller disk (although this is merely an irritation and not dangerous).

## Conclusion

WordPerfect is quite an expensive package compared with many word processors for the IBM PC and compatibles, and if considering using it you will wonder about value for money. If you simply want to use your computer for the occasional letter, or for simple documents with little or no formatting, you can select from several cheaper programs. If you intend to create a variety of long documents, some with complex formatting, then do consider this very comprehensive package against others of similar power and complexity.

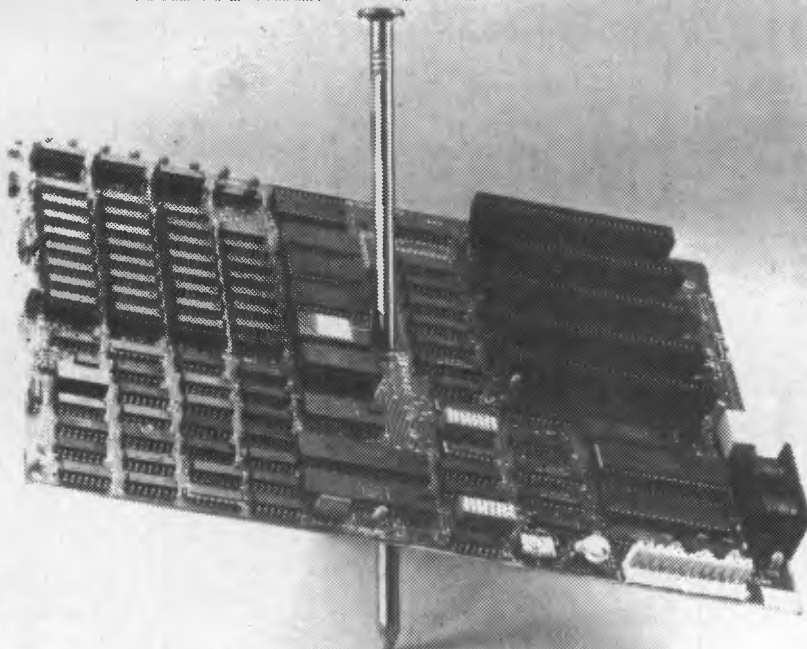
WordPerfect is a winner due to its sheer range of facilities allied to a remarkable simplicity of operation.

WordPerfect costs \$685 and is distributed by Sourceware, 4/73 Albert Avenue, Chatswood, NSW, 2067. Tel: (02) 411 5711.

END

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POWER CONSUMPTION: 60W AC  
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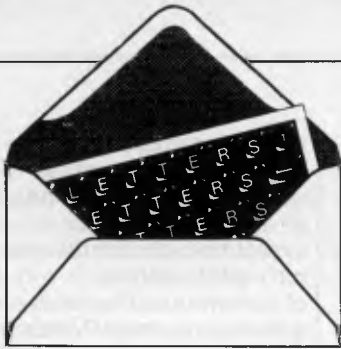


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***This is the chance to air your views — mail to 'Letters', Australian Personal Computer, 2nd Floor, 215 Clarence Street, Sydney 2000. Please be as brief as possible and add 'not for publication' if your letter is to be kept private.***

## Anything's possible . . .

In your feature 'New Life' (APC, November) Geoff Simons draws some comparisons between the structural organisation of living things and computer systems. While this is to some extent semantic, there would seem to be no insurmountable obstacles in the way of its conclusion that an extension of existing electronics and programming will eventually enable the manufacture of a machine which is alive in the same sense that an animal is alive.

Such a machine, like any physical life, would necessarily be deterministic — in simple terms it would do what it was programmed to do, which, in the absence of malfunction or built-in randomising components and in full knowledge of all inputs, would be entirely explicable by its initial design. Similarly for animals and humans, although the full mechanism (in particular that of the brain) is not understood, the state of its physical constituents at any instant must be determined by their state an instant before through the action of intermediary forces.

However, this in no way explains our experience of life at its highest levels. We consider ourselves to be in control in a literally supernatural non-deterministic way (see *The Abolition of Man* by CS Lewis for some insights into the validity of this attitude). Here science has nothing to say, as inherently it deals with the natural. The presence of a supernatural component in human beings is of great

relevance to the understanding of artificial intelligence in its broadest and highest definition, as it must set the limits on the extent to which machines can be designed to do what we do.

It will be of considerable interest to discover in the coming decades just where these limits lie.

*Dr P Beardwood*

## . . . well, almost

I read Geoff Simons' article 'New Life' in the November issue of APC with some amusement. His statement that '... the whole of the plant kingdom is unable to reproduce without assistance from other species (namely birds and insects)' I found a little surprising.

It is good to see that the conifers, ferns, mosses and algae hold his views in a healthy disrespect. They colonised the dry land many millions of years before there were any insects or birds to assist them in propagating themselves. I can only assume that they were unusually long-lived, and very celibate.

As to how water plants must breed, I find it hard to believe that diving birds and water beetles are entirely responsible. Then there are species such as the dandelion, which have turned their nose up at sexual reproduction of any kind . . .

Enough: the man clearly doesn't suffer from hay fever. Other than this slight lapse of common sense on his part, I found the article thought-provoking, if a little bizarre. For those of a cynical disposition, I would strongly recommend an article in *A Random Walk*

in *Science* written from the point of view of a bunch of robots exploring the earth. They conclude that cars are the principal lifeforms, but note that they seem to be infested with small, bipedal parasites.

*Stephen Burt*

## Seduction

Geoff Simons ('New Life', APC, November) wrote an excellent and thought-provoking article. However, much of the plant kingdom can reproduce asexually without outside interference.

The electronic equivalent may be 'induction', perhaps what is really 'computer seduction'.

*P Lewis*

## Fuzzy cats

Oh dear, Oakley ('Letters', APC, November) has trotted out the old Cat Paradox to 'prove' the existence of fuzzy logic.

This supposed paradox is more a proof of a lack of practical logical thinking. Imagine I am presented with a sealed black box and am told that a cat is inside with a radioactive electrocution device attached. I have to assume that I am blindfolded and am wearing ear muffs, as the cat, if alive, would be frantic by now.

To me, logically, there is no cat. The box is sealed, and by definition, the presence of the cat, let alone its state, is unknowable and logically not describable. What I can work out logically from information received, is the future probability of the cat being alive in one minute's time when the box is opened and the cat exists for me for the

first time: that is,  $0.5 \times 61/60$  or 50.833 per cent.  
*W Brinicombe*

## . . . and so on

Many people think they have an intuitive understanding of the concept of infinity. They might like to solve this little conundrum:

A Take an infinite series of numbers:  
2,4,6,8,10,12, and so on.  
This is obviously a series of all the even numbers, and its sum is obviously infinite.

B Take another series:  
1,3,5,7,9,11,13,15, and so on  
This is obviously a series of all the odd numbers, and its sum is also infinite.

C Now put the two together, and derive the difference:  
2,4,6,8,10, and so on  
1,3,5,7,9, and so on  
1,1,1,1,1, and so on  
It is obvious that the further you extend these series, the greater becomes the sum of the differences; in fact, this tends to infinity. Therefore, obviously, the sum of all the even numbers is infinitely greater than the sum of all the odd numbers.

D Now let's add zero to the even numbers (zero is conventionally assumed to be even):  
0,2,4,6,8,10, and so on  
1,3,5,7,9,11, and so on  
-1,-1,-1,-1,-1, and so on  
It is obvious that the further you extend this series, the greater becomes the sum of the differences; in fact, it tends towards minus infinity. Therefore, obviously the sum of all

## LETTERS

the even numbers is infinitely less than the sum of all the odd numbers. This is a remarkable result, from just adding zero.

Which is right? C or D?  
C Walls

### Curse on C

I have recently learnt how to program in the C language but I don't know how to write C functions equivalent to Basic's GET\$ or INKEY\$. Our compiler (cc) is a full implementation of C, as specified in Kernighan and Ritchie's book, *The C programming language*.

I tried to use the routines in the book, but with no success. Altos has provided a screen package called CURSES in which it provides the function 'getch()' to do the job. This consumes large amounts of memory — my 512k of source code produces about 12k of

object code and still does not function properly. Can you provide a better function to do the job?

A Segar

*Firstly, an apology as I do not have the time nor space to provide full-scale programming solutions on these pages. However, I can point out the likely cause of a problem, and explain how I would go about tackling it.*

*Although the syntax of the C language is defined in the book you mention, the input and output commands are not fully specified. The designers of the language recognised that such facilities would inevitably vary from one machine to another and they deliberately avoided building such facilities into the core of the language. In C, input and output are performed by calling functions, rather than through the*

*use of specialised routines (such as Basic's INPUT, INKEY\$, and so on).*

*This approach makes it easy for systems programmers to move a C compiler from one machine to another, especially as C compilers are usually written in C. The implementors need only re-write the functions required by their compiler — without delving deep into machine code. The snag from the user's point of view is that the precise performance of input and output functions may vary between one type of computer and the next.*

*In this case it seems that the READ function will not return a 'dummy' character with the value zero when there is no data immediately available. This may stem from lazy implementation or incompatibility between the terminals you are*

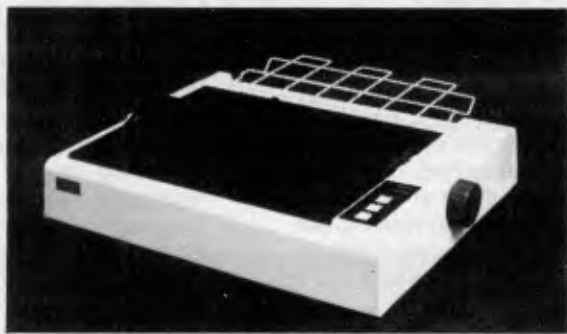
*using and the device drivers — the machine code routines at the heart of any Unix or Xenix system which handle the nitty-gritty details of communication with external devices. These routines vary a great deal between one implementation of Unix or Xenix and another, as they communicate with the hardware at a very low level.*

*It is possible that the terminals which you are using are not configured correctly. Check this by consulting the person who installed the system, and reading through the configuration instructions. Make sure that the terminals you are using are set up to match the requirements of the device drivers.*

*The Altos terminal package consumes a lot of memory because it contains several functions associated with screen-*

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# LETTERS

handling which you do not require. When you include the CURSES package, you tell the compiler to process the entire contents of the associated file. Unfortunately the source library feature of C means that most compilers are not clever enough to eliminate unused routines from the final output file, so much of your 12k object file contains routines that are never called by your test program. This would not be the case if you were using a more sophisticated language, such as Ada.

The solution is to extract the required routines from CURSES, and discard the rest. All of the CURSES routines should be in a standard text file, which you can copy and edit. Although this is a simple operation in theory, in practice you may find that getch()

interacts with other routines and variables declared in the file, so it could take you a while to discover which parts can safely be discarded.

It is best to remove routines one by one if you're not certain whether or not they are needed. You might be able to save time by contacting the person who implemented the package, but it tends to be difficult to track such people down without a lot of time, persistence and a big telephone budget!

Since you say that the screen package does not work properly in any case, it is likely that you will need to adjust the configuration of your system when you have reduced the size of the package. Check that your terminals transmit each character as it is typed — some terminals store characters and transmit a whole line

at a time. Some terminal interface boards (inside the computer) work similarly.

In both cases you should be able to inhibit this buffering, but you may find that system performance suffers as a result as the processor will be interrupted by the terminal more often. This is the price you pay for interactive computing, and one reason why micro networks often outperform multi-user systems on larger computers. SG

## Assembly time

Could you tell me how to convert an assembly program into machine code for the IBM PC? Could I use 'Debug' to achieve this? If so, how? I find the Debug menu very difficult to understand. Anita, no address supplied  
In theory you could use

Debug to enter programs, just as you could hammer nails into a wall with your fist — Debug is not designed for that purpose. Debug is a tool for experienced programmers who wish to test and make modifications to machine code.

You need an assembler. This is a program which translates mnemonics — the text of your assembly-language program — into binary instructions which can be directly executed by the PC's processor. You should be able to order an assembler from any PC dealer — there are several such programs available, including the Digital Research assembler which is supplied with a set of debugging tools. Be warned, though, that assembly-language programming is pretty tough going. SG

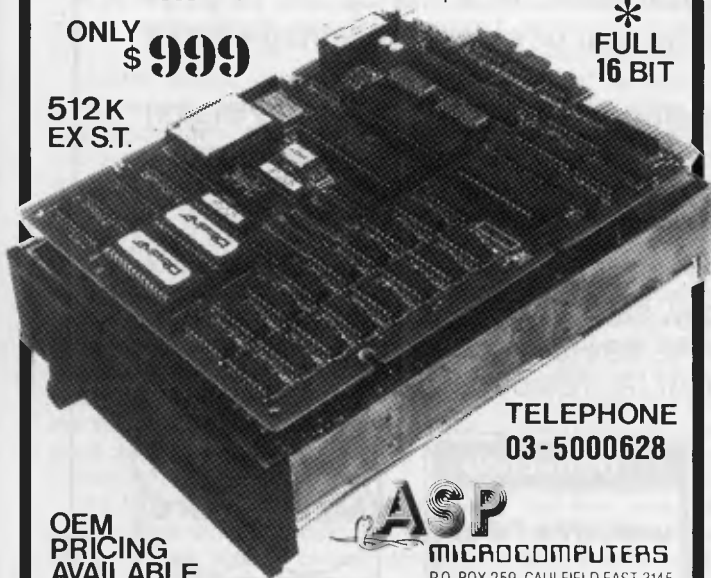
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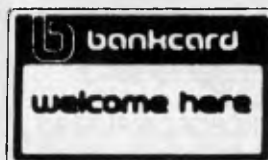
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# Mum's not the word

*The password this month is security, with Peter Tootill and Steve Withers offering sound advice on keeping intruders at bay.*

Security of online systems has been getting a good deal of publicity recently. As an example of the problems that can occur, someone left a commercial system just by dropping carrier instead of using the normal command 'bye'. A faulty modem meant that the system didn't realise, so the next caller found himself logged into another person's ID. Apparently the company concerned is criticising the original caller for not signing off properly!

Every online system should be able to cope with lost carriers as a matter of course. No matter how good the phone lines are, there is always the chance that a caller will lose the connection through no fault of his own. The system should be able to cope in order to guarantee a user complete security.

While on the subject of security, it's worth mentioning passwords. Most systems suggest that you change your password regularly. This is a little confusing, especially if you use several different ones and want to use a different password on each. However, it's certainly worth doing so on systems where, for example, someone could run up a big bill for you if they got hold of your password. Be especially careful if you use such a system in an environment where others might see you logging on.

Neither should you use a password which is easy to guess — you'd be surprised how many people log onto a BBS and use their girlfriend or wife's name as their password. One US network suggests that you use two unconnected words, joined by a symbol — for example, 'book:dog'. Not all online systems allow symbols, but it's a good tip — such passwords are very difficult to guess.

We suggest a two-level system of password for online systems, using a low level for bulletin boards, where it wouldn't be such a disaster if someone were to guess it. This one is rarely changed.

The high-level password is for sensitive systems where it would be a serious matter if the wrong person obtained access. Sensitive systems are those

which could prove expensive, such as Teledata, The Source, or Viatel, or those where I have access to facilities which could be misused if they fell into the wrong hands. At this level I use different passwords for each system. You should never use the same password on a BBS as on a commercial system: if someone did manage to hack into a BBS (possibly as a result of a privileged-user being careless with his or her password — don't laugh, it has happened!) he might well be able to view everyone's passwords. If you use the same password as on Teledata, for example, the hacker has only to find out your username — not a difficult task — in order to obtain access to your account.

Security on Austpac is more of a problem. Once you have been issued with an account (the equivalent of a password) you can't change it yourself, and Telecom charges about \$ to do it for you. If your Austpac account number fell into the wrong hands, someone could run up a very large bill for you very quickly. In my opinion, it's about time Telecom allowed subscribers to change their own passwords at will as the present system is obviously no longer good enough.

Hacking is a controversial subject. Some people say that it's just a harmless pursuit with people who have no intention of causing any damage. However, there are a few who definitely do cause damage — whether accidentally or on purpose. There have also been cases of BBSs carrying confidential information such as Austpac numbers as well as usernames and passwords for a variety of systems. Using someone else's Austpac account may be fun, but it is theft — just as much as if you took someone's wallet and used actual dollar notes to pay your bills.

Telecom and the police are now taking a very serious view of these matters. We have heard that the police are investigating certain boards, and it is rumoured that one sysop has had both voice and BBS phones disconnected and was told that he will never be allowed a phone line again. So be warned: hacking (or

encouraging hacking) could get you into serious trouble.

## System News

There are a couple of new Australian boards this month, one on each side of the continent. Kalgoorlie College has made its RCPM system available to the public for the exchange of information and software (public domain, of course). The information provided by the College didn't mention baud rates or operating hours, but 300 baud and 24 hours daily are reasonable assumptions in the circumstances. Further details and advice are available from Graham Clark, Computing Centre, Kalgoorlie College, PO Box 800, Kalgoorlie, WA 6430. The RCPM number is (090) 21 7755.

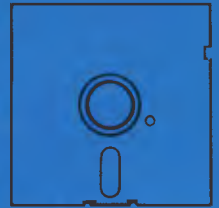
In Canberra, the Commodore User Group (ACT) have put a system on-line. At present it is available without charge on a 24 hour basis. Like the Kalgoorlie system, it provides message and file transfer facilities. Club secretary points that because it runs Punter Software not all C64 terminal programs are compatible with the system where up and downloading are concerned. For example Term 64 is OK, but VIPTerm runs into problems. The number is (062) 54 7365.

We also heard from Nick Andrew, the sysop of Sydney's Zeta RTRS. He corrected the operating hours printed last month, and provided some extra information. Nick wrote the software himself, and it features a tree-structured message system. Callers have direct access to the operating system (Newdos/80) and may run Zork I. Visitors have access to most of the system, but a once-only fee of \$5 (\$2 to students) gets you full access. You can't get much cheaper! One last point — the system caters for all machines, not just the TRS-80 and System 80.

Nick also passed on a message from Rowan Evans to the effect that Rowan's Orade System has in fact closed permanently.

As an experiment, we thought we would try listing overseas systems with a

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common theme — in this case systems of interest to DEC Rainbow users. If you like the idea, let us know — we are open to suggestions for future themes, whether they are particular computers or other subjects like sex or religion.

Finally, the bad news. The editor has decreed that there is no longer enough space for our listings in every issue. From next month we will only show new systems, alterations, and corrections. Full listings will appear every six months or so.

## **Microtex 666**

According to Computing Australia, (a controlled-circulation weekly), the obscenity filter built into Microtex's Blackboard bulletin board had the unexpected effect of changing references to the former Liberal leader to Andrew Pea\*\*\*\*. You can't win 'em all!

## **Bulletin Boards**

Each entry shows the available information in this order: name, phone number, access control ("P" for public access and "M" for member, possibly with a "V" for visitor access), operator's name, operating times, and any special notes including modem type if not V21 (300 baud).

Systems outside Australasia are only listed if we have been informed that they are available to the public 24 hours per day.

## **Australian Systems**

**Micro Design Lab Citadel.** (02) 663 0150 and (02) 663 0151. P. Stephen Jolly. 5pm-7am weekdays, 24 hours weekends.

**MI Computer Club BBS.** (02) 662 1686. MV Rose Vines. 24 hours daily. Program downloading.

**Sydney Public Access RCPM.** (02) 808 3536. MV. Barrie Hall and David Simpson. 24 hours daily.

**Prophet RBBS.** (02) 628 7030. P. Larry Lewis. 24 hours daily.

**Texpac RBBS.** M. Shane Andersen. Mon & Tues 7pm-6.30am, Wed 7pm-Mon 6.30am. For membership write to TISHUG. (attn Texpac Sysop), PO Box 595, Marrickville, NSW 2204.

**AUGABBS.** (02) 451 6575. MV. Mathew Barnes and Andrew Riley. 24 hours daily.

**AUSBOARD.** (02) 95 5377. P. Daniel Moran. 24 hours daily.

**Club-80 RTRS.** (02) 332 2494. MV. Michael Cooper. 24 hours daily.

**Omen I.** (02) 498 2495. P. Ted Romer. 4.30pm-9am weekdays, 24 hours weekends.

**Oracle.** Permanently closed.

**Infocentre.** (02) 344 9511. M. 24 hours daily.

**Dick Smith Electronics RIBM.** (02) 887 2276. P. Ian Lindquist. 24 hours daily. Program downloading.

**Sorcerer Users Group RCPM.** (02) 387 4439. MV. John Woolner. 6pm-8am weekdays, 24 hours weekends. Ring-back system.

**Contact BBS** (02) 550 1004. MV. Steven Williams. 9am-11pm weekdays, 24 hours weekends. Computer dating.

**Keyboard TBBS.** (02) 629 2230. P. Philip Keegan. 6pm-8.30am daily.

**RUNX Unix System** (02) 487 2533. MV. Mark Webster. 24 hours daily. Call (02) 48 3831 for system status. Also on (02) 48 3831 (V22) and (02) 487 1860 (V23).

**Tesseract RCPM.** (02) 651 1404. MV. John Hastwell-Batten. 24 hours daily.

**Tomorrowland's DIRECT.** (02) 411 2053. NV. Mike Kidson. 24 hours daily. Helpline: (02) 412 3909.

**RCOM BBS.** (02) 667 1930. MV. Simon Finch. 24 hours daily. For Commodore 64 users, software downloading to registered users only \$20/year to Box 1542, GPO, Sydney 2001. Half duplex.

**BERT.** (02) 211 0855. P. Resource Data. 24 hours daily. V23 videotex.

**Commboard.** (02) 664 2334. MV. Graham Lee. 24 hours daily. For Commodore 64 users, membership \$25/year to 199 Coogee Bay Road, Coogee 2034.

**Scorpio BBS.** (02) 621 7487 MV. Russ Morrison. 24 hours daily. C64, full access \$25 — contact 64 Blacktown Users Group.

**Bresike Omen** (02) 457 8281. Geoff Arthur. 24 hours daily. TRS-80.

**Skull BBS.** (02) 529 8750. Les Ayling. 24 hours daily (but sometimes off-line). Apple.

**Zeta RTRS.** (02) 627 4177. Nick Andrew. 24 hours weekdays, 7pm-7am weekends.

**Irata BBS.** (02) 600 9041. 6pm-12pm daily. Atari.

**Palantir BBS.** (02) 451 6576. P. Steve Sharp. 24 hours daily.

**ACRIBBS.** (02) 982 8252. 24 hours daily.

**Bee-Tech BBS.** (02) 607 7584. P. Bob

Fryer. 24 hours daily. MicroBee, file up/downloading.

**Newcastle Microcomputer Club RCPM RBBS.** (049) 68 5385. MV. Tony Nicholson. 5pm-8.30am weekdays, 24 hours weekends. RBBS free to all, RCPM for members only — \$4/year to PO Box 293, Hamilton, NSW 2303.

**Canberra RBBS.** (062) 88 8318. 24 hours daily.

**Canberra IBBS** (062) 58 1406. MV. 24 hours daily.

**DSA-80 RTRS.** (062) 41 4395. MV. Anonymous. 24 hours daily. Full access granted only to Canberra Micro 80 Users Group Inc and non-residents of Canberra.

**Commodore User Group (ACT).** (062) 54 7365. P. 24 hours daily.

**MICOM CBMS.** (03) 762 5088. MV. Peter Jetson. 24 hours daily.

**Melbourne PIE.** (03) 878 6847. P. Len Gould. 24 hours daily.

**Sorcerer Computer Users Association CBBS.** (03) 434 3529. MV. David Woodberry. 24 hours daily. Program downloading for members.

**PC Connection IBBS.** (03) 528 3750. Lloyd Borrett. 24 hours daily. IBM PC program downloading.

**Omen IV.** (03) 846 4034. Philip Westh. 24 hours daily.

**Hisoft IBBS.** (03) 799 2001. Richard Tolhurst. 24 hours daily. IBM PC program downloading.

**Computers Galore IBBM.** (03) 561 8497. Bob Cooban and Martin Scerri. 24 hours daily. IBM PC program downloading.

**East Ringwood RCPM.** (03) 870 4623. Mick Stock. 4pm-midnight. Monday-Friday ONLY.

**C64-BBS.** (03) 489 4557. MV. Alan Miles. 24 hours daily. Commodore 64 software up/downloading.

**MicroBee RBBS.** (03) 873 5734. G. Forrest. 24 hours daily.

**MicroPro BBS.** (03) 568 8180. MV.

**AM-NET.** (03) 366 7055. MV. Peter Hallgarten. 24 hours daily. Membership \$5/year.

**National IBBS.** (03) 818 1934. P. John Blackett-Smith. 5pm-9am. 24 hours weekends.

**BUGM RCPM.** (03) 500 0562. P. Sol Green. Midnight-6pm Monday-Saturday, Midnight-Midday Sunday.

**Victorian Apple Bulletin Board.** (03) 877 1990. Graham Willis. 24 hours daily.

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*Atlantis International Computers RBBS.* (03) 277 6824. P. 24 hours daily.

*Viatel Computers RBBS.* (03) 288 3599. P. 24 hours daily.

*Gippsland RCPM.* Permanently off-line.

*Mail-Bus.* (051) 27 7245. M. Max Moore. 24 hours. Membership virtually essential. Write to PO Box 234, Newborough, Vic 3825.

*MIN-NET.* (054) 41 3013. MV. Mal Fields. 24 hours daily. Enquiries to (054) 43 2589 during business hours ONLY.

*Software Tools RCPM.* Current number unknown — can you help? Bill Bolton. 24 hours daily. CP/M, MS-DOS, Unix program downloading. V22 (1200 baud) only.

*BEX II RCPM.* (07) 395 1809. Rick Dalley. 24 hours daily.

*Tomorrowland.* (07) 394 2300. 24 hours daily.

*CCUG.* (07) 808 2125. 24 hours daily. Commodore users' group.

*ACEA.* (07) 341 0285. 24 hours daily. Commodore.

*Brisbane Microbee RCPM.* (07) 38 4833. 6pm-8am weekdays, 24 hours weekends.

*Compotron IBBS.* (07) 52 9498. 24 hours daily.

*HiTech C BBS.* (07) 38 6872. 24 hours daily.

*TI-BBS.* (07) 263 6161. 7pm-6am weekdays only.

*CAD-IBBS.* (070) 51 1360. 6pm-8am weekdays, 24 hours weekends.

*COCO-LINE.* Off-line or number changed — can you help? 24 hours daily. Tandy Color Computer.

*Adelaide Micro Users Group BBS.* (08) 271 2043. MV. 9am-9pm weekdays, 10am-10pm weekends and public holidays.

*Computer Ventures CBBS.* (08) 255 9146. Daniel Schumacher. 24 hours daily. NB: This number has been misprinted in recent issues — please ensure your own records are correct.

*The Electronic Oracle.* (08) 260 6686. MV. Don Crago and Grayham Smith. 24 hours daily. Program downloading. Membership \$35/year to 12 Brentwood Road, Flinders Park, SA 5025.

*Multiple BBS.* (08) 255 5116. 24 hours daily.

*Nexus.* (08) 243 2477. 24 hours daily.

*SAC64.* (08) 382 4631. 24 hours daily. Commodore users' group.

*Red Centre RCPM.* (089) 52 8852. 24 hours daily.

*Omen II.* (089) 27 4454. Terry O'Brien. 24 hours daily.

*Outback RCPM.* (089) 27 7111. Phil Sampson. 24 hours daily.

*Omen III.* (09) 279 8555. Greg Watkins. 24 hours daily.

*NEMO.* (09) 370 1855. Graeme Platt. 24 hours daily.

*Computext.* (09) 447 0522. Russell Stokes. 24 hours daily.

*The PAD.* (09) 337 2941. 9pm-4pm daily.

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*Trash II.* (09) 478 2419. 8pm-7am daily.

*Kalgoorlie College RCPM.* (090) 21 7755. P. 24 hours daily.

## New Zealand systems

*NZ Micro Club RBBS.* Off-line or number changed — can you help? Chris Cotton. 24 hours daily.

Software up/downloading. Type "help" to log in.

*Attache RBBS.* 0011 64 9 78 9084. 24 hours daily.

## DEC/Rainbow oriented bulletin boards

Bulletin Boards are believed to be open 24 hours. Unless noted, all accept Bell 300 and 1200 baud rates; some accept 2400 baud. International access code is 0011.

*DEC-WARE II* 1 201 750 3748. 107/317 Iselin, NJ David Horowitz.

*DEC-WARE* 1 212 535 8924. 107/79 New York, NY Matt Kanter.

*Southbay RB* 1 213 618 8454. 102/383 Torrance, CA Glenn Bowes.

*Rainbow Brite* 1 213 644 1963. 102/3603 Hawthorne, Ca Bruce Headly.

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*Illini Data* 1 312 759 5402. 115/393 Bolingbrook, IL Rob Elliot.

*DECUS Central* 1 314 432 4129. 100/51 St. Louis, MO Ken Kaplan.

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MidNet 1 608 233 8449. 11/90 Madison, WI Mike Mansfield.

Thieve's World 1 616 343 0996. Kalamazoo, MI Ian Schirado.

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DEC-Line 1 617 721 1688. 101/202 Winchester, MA Bill MacNeil.

Dave's FIDO 1 617 632 1861. 101/27 Gardner, MA David Rene.

Dave's Annex 1 617 874 4325. 101/310 Westminster, MA David Rene.

NECS 1 617 646 3610. 101/44 Arlington, MA. Dave Mitton.

RBG-ENG HootNet 1 617 486 2285. 101/367 Littleton, MA Bruce Gibson (Run by Rainbow Engineering Group at DEC).

The Bear's Den 1 703 671 0598. 109/74 Falls Church, VA Kurt Reisler.

Wash-A-RUG 1 703 359 6549. 109/483 Fairfax, VA Washington Area Rainbow User's Group — Kurt Reisler.

Medic 1 714 964 0454. 102/410 Huntington Beach, CA Philip St. Erne, MD.

Catt House Fido 1 717 794 5268. 13,489 Blue Ridge Summit, PA Bob Catt.

IMALUG RUG 1 801 262 5251. 15/1003 Midvale, UT J. R. Westmoreland.

Oberon Systems 1 805 643 0982. 102/430 Ventura, CA Scott Johnson.

DEC Domain 1 806 795 0102. 19/67 Lubbock, TX Alan Minchew.

DEC Bronson 1 806 742 5328. 19/918 Lubbock, TX Bronson Johnson.

Day Rainbow 1 46 541 33 170. 101/348 Karlstad, Sweden Conny Jonsson (300 baud, CCITT except during FIDONET).

CP/M-Net (tm) 1 201 249 0691. East Piscataway, NJ.

ROBIN RBBS 1 505 831 0205. Albuquerque, NM Elroy Gonzales.

PDL 1 617 467 4824. (Scientific Applications Public Domain Software; to log onto system respond to prompt for 'Username' and 'Password' with 'PDL'.

DEC MARKET: 1 617 467 7437. Login: Type <Return> to start. At the @ prompt, type "LOG LGK.KERMIT KERMIT". The last word will not show on the screen.

This list appears by courtesy of the Washington Area Rainbow Users' Group.

END

These listings are believed to be correct, but we welcome new information. Please mention whether you have first-hand knowledge of the systems you tell us about, or are simply passing on the information. Viatel users can send messages to Mailbox 063000030, users of RUNX and other systems on ACSnet can mail to stephenw@murdu, and letters may be sent to Steve Withers, C/- Computer Publications, 77 Glenhantly Road, Elwood, Victoria 3184.

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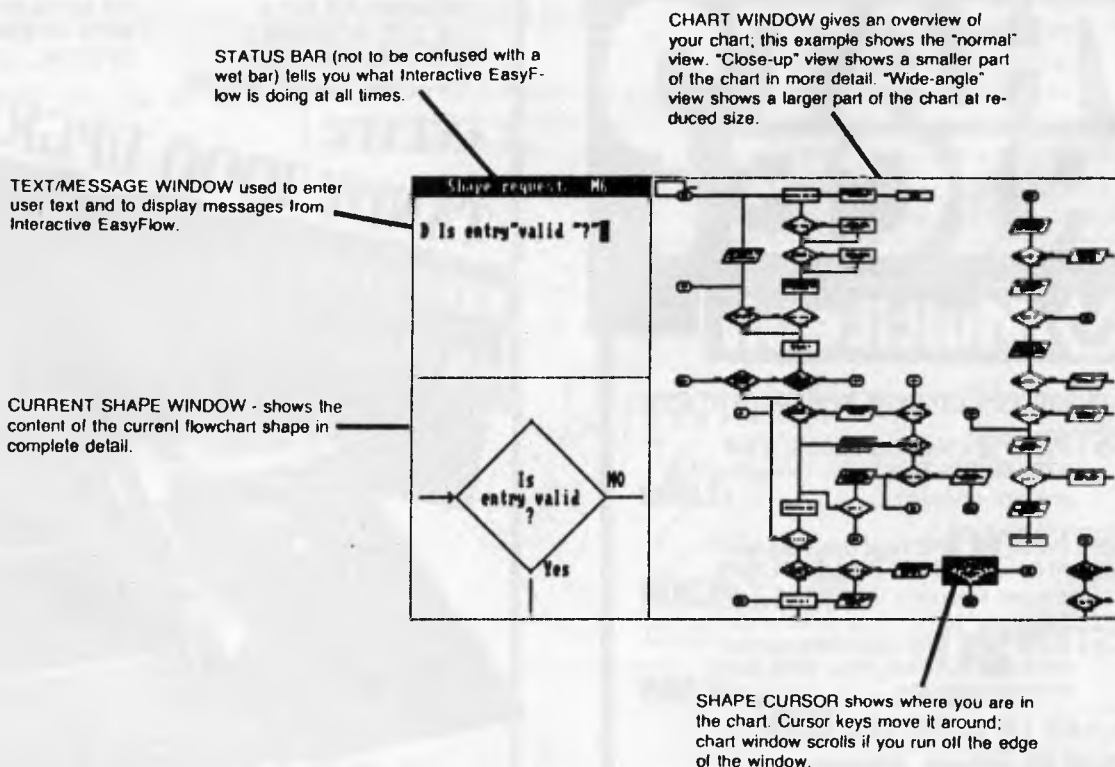
are automatically re-routed as necessary. •Large chart size (up to 16 shapes wide by 16 shapes high) allows very large flowcharts and organization charts to be handled with ease. •Charts can be larger than the screen - the window into the chart scrolls both horizontally and vertically as necessary. •Flexible printer interface allows it to work with all printers, not just dot matrix printers. Wide charts can be printed in strips. •Eighteen standard flowcharting shapes included. •User defined shapes can easily be added. •The manual is extensive and includes many examples. •On-line "help" facility provides immediate assistance at any time. •Any number of titles can be placed on a chart. •Commentary text blocks can be placed anywhere in the chart. •Plus

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The sample screen display shown below is typical of what you see while editing a chart. Other screen displays are provided for entering titles, changing options, getting "help" and so on.



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# Artificial Stupidity

*Bryan Baker explores the ultimate in computer garbage.*

The preview copy of a new software system, Cacophony, has arrived and all my peripherals are tingling with excitement. Its creators say it's 'the most important advance in information technology since notched sticks'. They're too modest: Cacophony is the most important advance since fingers and toes.

## Wordherder

The most conventional part of Cacophony is its word massage module, Wordherder. This does all the usual editing tricks, and features WYGIWYG (What You Get Is What You Get). Need to know exactly how your document will look when printed? Just print it and look at it!

Naturally, Wordherder can handle those pesky typos. Spellmeister, the strictest spelling checker available outside the Iron Curtain, won't let you enter a misspelled word. If you try to enter the same misspelling twice, Spellmeister delivers a mild electric shock. The word-whipping package also features Slangbang, the subroutine that seeks out and destroys vulgar usages.

Some of today's advanced word processors include a style checker, which can locate well-known, time-honoured hackneyed phrases and replace them with a variety of ultranew computer-generated alternatives. With these, you can have tomorrow's clichés today. Wordherder has something more useful, Tritewrite, which takes complicated and subtle metaphors and reduces them to easily understood clichés.

## Alternate Brain

Word processing is just the beginning of Cacophony's talents. The next part of the package is Alternate Brain. More than a

database diddler, more than an 'ideas processor', Alternate Brain is the first concept management program. It takes your idle thoughts, whims, daydreams and empty japes, and collates, coddles, cross-links, incubates, re-interprets and transforms them into luminous *concepts*. Finally, depending on the hardware available, it will print out these concepts, save them to disk, or make them into feature-length films.

One drawback of similar, primitive thought processors is that they tend to point out illogic, inconsistencies and non-sequiturs that most of us would just as soon not know about. The seventh-generation Cacophony system can either obfuscate or totally eliminate these embarrassments at the touch of a button.

This attribute, known in the industry as Artificial Stupidity (AS), will do much more than the highly touted Artificial Intelligence to make computers function in the complex realms of human thought. Artificial Stupidity makes your computer a useful friend rather than a dangerous sceptic.

## Yesman/Yesbut

Potentially the most useful spin-off of Artificial Stupidity is Yesman, a Cacophony program that takes your concepts (generated by Alternate Brain) and renders them indistinguishable from your boss's. In file-update mode, Yesman will automatically search previous concepts and delete any evidence that you ever disagreed. At last, a program so smart it knows when not to be.

The most sophisticated version of Yesman, known as Yesbut, can handle employers who don't trust toadies, yet will not tolerate disagreement beyond a certain threshold. Yesbut enables you, by

answering a few simple questions, to determine your boss's threshold and stay just below it.

Yesman and Yesbut will soon be an important part of every executive's safety equipment. For those who prefer rapid advancement over job safety, Yesman and Yesbut can, of course, ignore your immediate boss and concentrate on agreeing with *his* boss or, for the truly daring, his boss's boss.

## Forgon

Especially exciting is the application of Artificial Stupidity to so-called expert systems. Up to now, these programs have used Artificial Intelligence to emulate the ability of highly-paid professional experts to analyse masses of data, apply their specialised knowledge, and arrive at an expert judgment. This seems logical enough, but ignores a crucial element of the expertise of doctors, solicitors, and other professionals, most easily illustrated by real-life examples.

When a doctor examines a patient to determine which disease may be at work, he can't simply rely on history, symptoms, and test results. He has to know what kind of disease his patient can afford.

A solicitor, in representing his client, cannot simply look at the law and the evidence to sift out the objective truth; he must isolate that portion which supports his client's version. And, as with medical expertise, there is the question of how much justice a client can afford.

Or take engineers, often called upon in this technological age to provide expert opinions. This might mean assuring the local planning committee that the proposed Riverdale housing estate will never flood, or it could be assuring the



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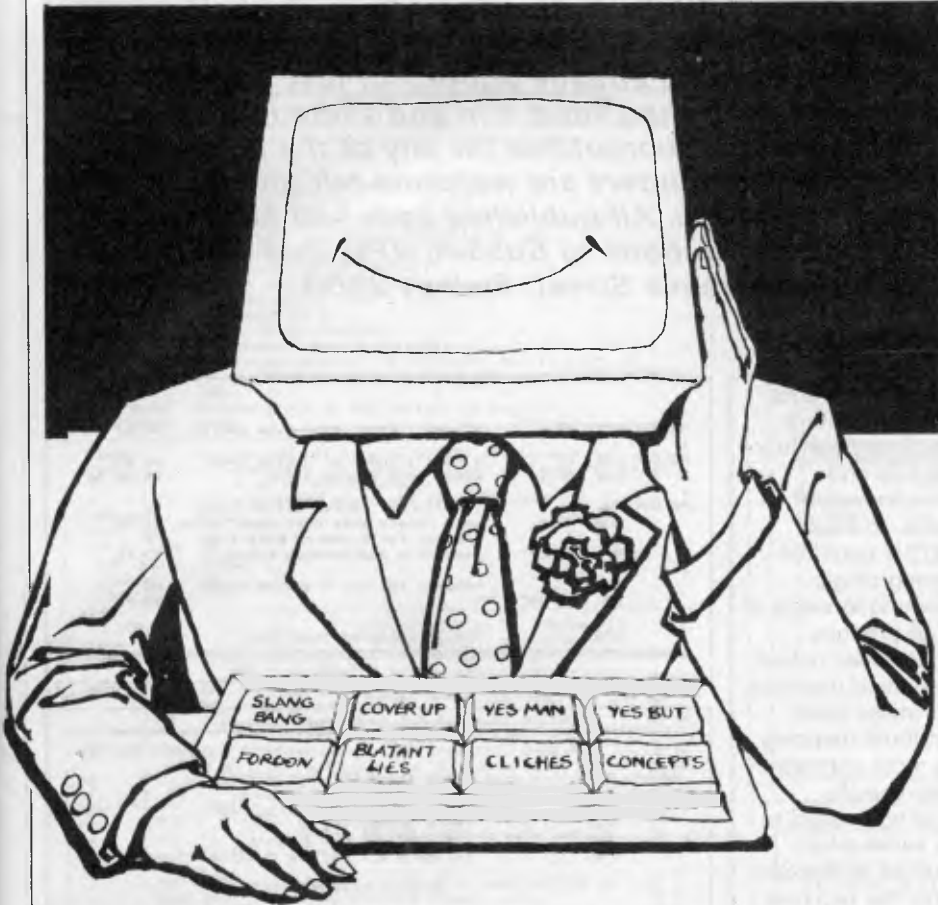
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authorities that a proposed nuclear power plant will run forever. In any case, a busy expert often does not have the time to produce data in support of his client's case. Finding the right data might take years; in what the experts themselves call 'worst-case scenarios', such data might be impossible to produce under any known system of physics or metaphysics.

What do these human experts have in common? They all keep the range of desired conclusions firmly in mind before, during, and after applying their expertise. To produce useful results on a timely basis, they must develop sophisticated analytical systems; systems which, given any credible set of data, will produce the desired result, and do it with leaps and flourishes too rapid for the non-expert to follow.

It is precisely this expert function that computers, even artificially intelligent fifth-generation computers, have heretofore been totally lacking. They are simply too literal-minded, too inflexible, too logical to emulate a human expert's generation of desired conclusions.

Even the few expert programs which attempt to perform conclusion-depen-

dent analysis do it badly. These are the sixth-generation programs, which exhibit Artificial Dishonesty (AD). The subterfuge is clumsy, the manipulations obvious, each leap of faith a bit too unbelievable. These programs are the software equivalent of the 'accidental' erasure of the Watergate tapes. Any idiot can see the trickery: there is always the danger that even a planning authority might spot it. Nothing could be further from the performance of the human expert, where the result is always inherent in the method but never appears so.

With seventh-generation Forgon, a credible expert system is at last available. Forgon realises the fullest potential of Artificial Stupidity, ensuring that the smearing over and outright excision of unpleasant contradictions is carried out subtly and believably.

You might think Forgon is nothing more than Yesman with a different name and a higher price, but you would be wrong. So wrong, in fact, that if you were to put such a thought in writing, the good folks at Cacophony would be forced to alert their expert lawyer system to sue you for libel.

Of course, there are similarities between Forgon and Yesman. Both rely on Artificial Stupidity to function credibly in the executive environment, but where Yesman is one of the best AS *applications*, Forgon provides the first artificially stupid programming *language*.

Forgon includes many commands which could never be executed in primitive 'logical' languages, powerful commands such as:

IF<true> THEN IGNORE

IF <A is not equal to B> THEN DELETE  
<all reference to A>

WHILE<statement 1> THEN PRETEND  
<exact opposite of statement 1>

The Forgon language also has user-programmable dynamic true/false toggles; a random optimistic forecast generator; a three-tier scenario filter; and much, much more, all completely conclusion-dependent. Like the advertisement states: 'If it's a Forgon conclusion, you can rely on it.'

## The future

Now that the seventh generation of computer systems has been reached, we have machines that can mimic the most sophisticated aspects of human performance. Most software companies would be content with that remarkable achievement.

Not Cacophony. It is already hard at work on the next generation, and planning for the generations to come after — systems that will transcend mere human capabilities. Here's how the company sees the present and the future. (While everyone agrees that AI is the fifth generation, no one seems to know what the first four generations were. It's best to leave them off the list.)

5th Generation — Artificial Intelligence (AI)

6th Generation — Artificial Dishonesty (AD)

7th Generation — Artificial Stupidity (AS)

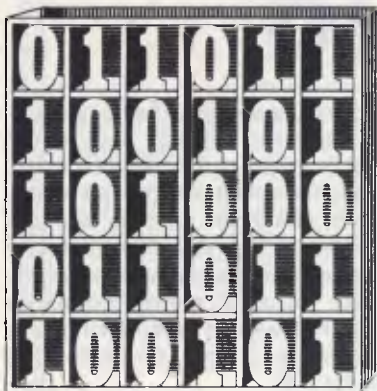
8th Generation — Artificial Libido (AL)

9th Generation — Artificial Omniscience (AOS)

10th Generation — Artificial Omnipotence (AOP)

Even the folks at Cacophony don't know exactly how these future generations will work: they have only the dimmest vision of how they might transform the work environment of the future. Suffice it to say that the first person in the office to get Artificial Omnipotence up and running won't have to worry any longer whether his concepts agree with the boss's.





*David Barrow presents more documented machine code routines and useful information for the assembly language programmer. If you have a good routine, an improvement or conversion of one already printed, or just a helpful programming hint, then send it in and share it with other programmers. Subroutines for any of the popular processors and computers are welcome but please include full documentation. All published code will be paid for. Send your contributions to SubSet, APC, 2nd Floor, 215 Clarence Street, Sydney 2000.*

## 6502 bit rotation

ROTBIT (Datasheet 1) from Andy Armstrong is a short and speedy version of BITROT (APC, October).

Andy uses a much improved algorithm to cut the routine's length from 69 to only 17 bytes and reduce execution time to only 919 clock cycles (assuming that the loops don't cross a page boundary).

The rotation is useful for converting screen-mapped graphics based on an 8-bit by 8-bit matrix (eight bytes stacked vertically) to printer-ready bit-image values. This is necessary when dumping normal screen formats to Epson standard printers. Video logic usually maps the eight bits in each byte to a horizontal line of dots but printers expect each byte to encode the bit-image data of

a vertical line of eight dots.

Many home computers use an eight by eight matrix for both graphics and alphanumeric in monochrome modes. In these systems ROTBIT could be used for turning single characters around in steps of 90 degrees to produce movement. However, colour and high resolution graphics systems can utilise quite varied bit-attribute mapping and a much more sophisticated, system-specific routine would be needed to produce the same effect.

ROTBIT would be SubSet Class 1 if only the registers and flags used in the routine were returned unaltered on exit. The only way to do this is shown in Fig 1. Unfortunately, this slight enhancement would add 12 bytes to the routine's length, four bytes to its stack use and 36 clock cycles to its execution time.

## Datasheet 1

```

: ROTBIT Rotate an 8 x 8 matrix.

:JOB To rotate an 8 x 8 bit matrix, stored as eight
contiguous bytes in page zero, clockwise by 90
degrees, storing the result similarly.
:ACTION For source byte 7 to source byte 0
[ Read source byte to accumulator.
For destination byte 7 to destination byte 0
[ Shift accumulator msb to Carry.
Rotate Carry into destination byte msb. ] ]

:CPU 6502.
:HARDWARE None.
:SOFTWARE None.

:INPUT 8 byte source matrix in M0 to M7.
:OUTPUT 8-byte destination matrix in M0 to M7.
A = 0. X = Y = $FF. P changed.
Source (M0 to M7) is unchanged.

:ERRORS None.
:REG USE P A X Y
:STACK USE 0
:RAM USE M0 to M7 inclusive.
:LENGTH 17
:CYCLES 919

:CLASS 2 -discreet *interruptable *promable
:***** *reentrant *relocatable *robust
    
```

```

:
ROTBIT LDY #7 ;Index / count of 8-byte source. A0 07
:
RB-SRC LOX #7 ;Index / count of 8-byte dest. A2 07
LDA M0,Y ;Read next source byte. B9 M0 00
:
RB-DST ASL A ;Shift next source bit to Carry 0A
ROR M0,X ;and rotate into next dest. byte. 76 M0
DEX ;Repeat for B source bits into CA
BPL RB-DST ;msb of B destination bytes. 10 FA
:
DEY ;Repeat for all B source bytes. 00
BPL RB-SRC ; 10 F2
:
RTS ;Exit, rotation completed. 60
    
```

```

:
: cycles code
ENTRY PHP ;Save flags to stack first, 3 00
PHA ;followed by accumulator, 2 40
TXA ;then X and Y index registers 2 8A
PHA ;both pushed via A. 3 40
TYA ;This leaves A = Y, with 2 98
PHA ;flags N & Z set for Y value. 3 40
:
: Routine code
EXIT PLA ;Restore Y and X index registers 4 60
TAY ;from stack via A. 2 A0
PLA ; 4 60
TAX ; 2 AA
PLA ;Restore accumulator, then 4 60
PLP ;finally the flags. 4 20
:
RTS ;Exit with all register and 60
flag values as on input.
    
```

Fig 1

## Z80 bit rotation

Datasheet 2, from John Hardman, is a Z80 version of the 8-bit by 8-bit matrix rotation. Designed specifically for rotating characters in situ, it is called ROTCH.

The first part of ROTCH forms the rotated matrix in reverse order in stack memory. This process destroys the source. The second part pulls the eight bytes of the rotated matrix from stack and restores them to the source matrix space in the correct order.

ROTCH is SubSet Class 1 standard. All registers and

flags used by the routine are preserved on stack during its operation and, like ROTBIT, this adds four bytes to the stack use (AF and BC only are saved for this purpose: the saving of HL is due to the routine's pointer manipulation). However, the Z80 PUSH and POP instructions act on any double register and so only four bytes are added to the length of the routine itself.

Because the full 2-byte AF, not just A, has to be pushed, the stacking of the 8-byte result in ROTCH takes 16 stack bytes.

## Datasheet 2

```

:
: ROTCH Rotate an 8 x 8 matrix.
:
: JOB To rotate an 8 x 8 bit matrix, stored as eight
: contiguous bytes, clockwise by 90 degrees, storing
: the result in the original source space.
: ACTION Address matrix byte 0.
: For count of 8
: [ Save matrix pointer.
: For count of 8
: [ Shift addressed matrix byte 1sb to Carry.
: Rotate Carry into accumulator 1sb.
: Increment matrix pointer. ]
: Restore matrix pointer.
: Push accumulator value. ]
: Address matrix byte 7 + 1.
: For count of 8
: [ Pull to accumulator.
: Decrement matrix pointer.
: Move accumulator to addressed matrix byte. ]
:
: CPU Z80.
: HARDWARE 8-byte block of RAM containing matrix.
: SOFTWARE None.
:
: INPUT HL address 1st byte of 8-byte source matrix.
: OUTPUT HL addresses 1st byte of 8-byte destination matrix,
: (i.e. HL is unchanged).
: All registers and flags are unchanged.
: ERRORS None.
: REG USE HL
: STACK USE 20
: RAM USE None.
: LENGTH 30
: CYCLES 3191
:
: CLASS 1 #discreet #interruptible #promable
: #***** #reentrant #relocatable #robust
:
: ROTCH PUSH AF ;Save flags and registers for F5
: PUSH BC ;use in ROTCH. C5
: LD C,B ;Set count for 8 result bytes. 0E 08
:
: RC-RST PUSH HL ;Save pointer to matrix byte 0. E5
: LD B,B ;Set count for 8 source bits. 06 08
:
: RC-SRC SRL (HL) ;Get next source byte 1sb shifted CB 3E
: RLA ;into current result byte 1sb. 17
: INC HL ;Point to next source byte and 23
: DJNZ RC-SRC ;repeat until result byte filled. 10 FA
:
: POP HL ;Restore pointer to matrix byte 0. E1
: PUSH AF ;Push current result byte. F5
: DEC C ;repeat until all 8 result bytes in 0D
: JR NZ,RC-RST ;reverse order in stack memory. 20 F2
:
: .... Loop RC-SRC leaves B = 8.
: .... Move result from stack to matrix memory, reversing order.
:
: LD C,B ;Set BC = 8, add to matrix pointer 0E 08
: ADD HL,BC ;to address byte following matrix. 09
: LD B,C ;Set count for 8 destination bytes. 41
:
: RC-DST POP AF ;Pop next result byte. F1
: DEC HL ;Address next destination byte 2B
: LD (HL),A ;and store result, repeating for all 77
: DJNZ RC-DST ;8 result bytes in reverse order. 10 FB
:
: POP BC ;Restore registers and flags C1
: POP AF ;used in ROTCH, and exit with F1
: RET ;rotated matrix in same space. C9

```

## 6809 matrix transposition

OSMATR from Richard Bamford is a 6809 routine to transpose a matrix of single byte elements in its own space.

Transposition is the action of converting from storage row after row in memory, to column after column. The action of OSMATR on a small matrix is shown in Fig 2.

If you don't need to put the result matrix in the same space as the source, or can

transfer the result after transposition, then see MATRAN (APC November 1983) which does the job in only 26 bytes. The extra 57 bytes of OSMATR is the cost of sophistication.

For the record, the 6502 own-space transposition, TRANS (APC January 1984), is 102 bytes long. The Z80 equivalent, OSMTRN (APC March 1984), is only 35 bytes in length but uses a slower method involving more exchanges. As yet, no one has submitted a transposition routine for the 8086 or 68000 series.

Cols	Rows	Start:	Row following Row.
4	3	a1 a2 a3 a4	b1 b2 b3 b4 c1 c2 c3 c4
3	2	a1 a2 a3 a4	b1 b2 b3 b4 c1 c2 c3 c4
3	1	a1 b1 a2 a3 a4	b2 b3 b4 c1 c2 c3 c4
2	2	a1 b1 c1 a2	a3 a4 b2 b3 b4 c2 c3 c4
2	1	a1 b1 c1 a2 b2	a3 a4 b3 b4 c2 c3 c4
1	2	a1 b1 c1 a2 b2 c2	a3 a4 b3 b4 c3 c4
1	1	a1 b1 c1 a2 b2 c2 a3	b3 a4 b4 c3 c4
0	0	a1 b1 c1 a2 b2 c2 a3 b3	c3 a4 b4 c4

End: Column following Column.

Fig 2

## Datasheet 3

```

: OSMATR Own Space Matrix Transposition.
:
: JOB To transpose a 2-dimensional array, or matrix, of
: single byte elements, in its own space, with
: sequential row storage becoming sequential column
: storage, or vice versa.
: ACTION Col-cnt = no. of columns - 1.
: Src-ptr = dst-ptr.
: Pass-cnt = 0.
: FOR col-cnt
: [ Save src-ptr.
: Row-cnt = no. of rows.
: FOR row-cnt

```

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```

; IF dst-ptr < src-ptr
; THEN [ Accumulator = (src-ptr).
; Shift #memory (dst-ptr to src-ptr -1) to
; memory (dst-ptr + 1 to src-ptr).
; (dst-ptr) = accumulator. ]
;
; ELSE [ Src-ptr = dst-ptr. ]
; Dst-ptr = dst-ptr + 1.
; Src-ptr = src-ptr + no. of columns - pass-cnt. ]
; Restore src-ptr.
; Src-ptr = src-ptr + 2.
; Pass-cnt = pass-cnt + 1. ]

```

```

;CPU 6809.
;HARDWARE RAM containing matrix.
;SOFTWARE None.
;
;INPUT X addresses 1st byte of matrix.
; A contains number of columns (1 to 256; #00 = 256).
; B contains number of rows (1 to 256; #00 = 256).
;OUTPUT Transpose of source matrix occupies matrix space.
; CC is changed.
; All other registers are unchanged.
;ERRORS Loop count error if input number of columns = 1.
;REG USE A B X CC
;STACK USE S: 15
;RAM USE None.
;LENGTH 83
;CYCLES Not given.

```

```

;CLASS 2 -discreet #interruptable #promable
;----- #reentrant #relocatable -robust

```

```

;
;OSMATR PSHS U,Y,X,D ;Save registers used in OSMATR. 34 76
; LEAS -7,S ;Allow for variable storage. 32 79
; DECA ;Set col-cnt = no.of cols. - 1. 4A
; CLR 6,S ;Set pass-cnt = 0. 6F 66
; TFR X,Y ;Set src-ptr = dst-ptr. 1F 12
;
;LCOL STY ,S ;Save src-ptr at pass start. 10 AF E4
; LDB 8,S ;Get row-cnt for this pass. E6 68
;
;LROW STY 2,S ;Save src-ptr for comparison. 10 AF 62
; CMPX 2,S ;If src-ptr = dst-ptr then no AC 62
; BEQ LSKP ;rotation needed. If src-ptr 27 1B
; BLT LOK ;above dst-ptr then rotate. 20 04
;

```

```

;TFR X,Y ;Else equalise src-ptr and 1F 12
;BRA LSKP ;dst-ptr ready for increments. 20 15
;
;.... Rotate all memory between destination and source pointers,
;.... moving byte at src-ptr to location at dst-ptr.
;
;LOK STD 4,S ;Save col-cnt & row-cnt. ED 64
; LOA ,Y ;Get byte at (src-ptr). A6 A4
; TFR Y,U ;Move src-ptr to shift-ptr and. 1F 23
; STX 2,S ;leave dst-ptr for shift end test. AF 62
;
;SHFT LDB ,U ;Dec shift-ptr & move next shift E6 C2
; STB 1,U ;byte higher by one location. E7 41
; CMPU 2,S ;Test if shift-ptr at dst-ptr 11 A3 62
; BNE SHFT ;repeating until so, shift done. 26 F7
;
; STA ,X ;Store rotated byte to dest. A7 84
; LDD 4,S ;Restore col-cnt & row-cnt. EC 64
;
;LSKP LEAX 1,X ;Increment dst-ptr. 30 01
; STB 2,S ;Temporarily save row-cnt and E7 62
; EXB X,Y ;move src-ptr to X for increment. 1E 12
;
; LDB 7,S ;Get initial cols. and subtract E6 67
; SUBB 6,S ;pass-cnt then add to E8 66
; ABX ;src-ptr as next src address. 3A
;
; EXB X,Y ;Restore src-ptr to Y and 1E 12
; LDB 2,S ;restore row-cnt from stack. E6 62
; DECB ;Repeat for row-cnt as one pass. 5A
; BNE LROW ; 26 CC
;
; DECA ;Repeat for col-cnt passes 4A
; BEQ TERM ;then end. 27 09
;
; LDY ,S ;Restore pass start src-ptr and 10 AE E4
; LEAY 2,Y ;increment past completed part. 31 22
; INC 6,S ;Increment pass-cnt, pass done, 4C 66
; BRA LCOL ;and go do another pass. 20 88
;
;TERM LEAS 7,S ;Clean up stack variable space 32 67
; PULS U,Y,X,D ;and restore registers used. 35 76
; RTS ;Exit, matrix transposed. 39

```

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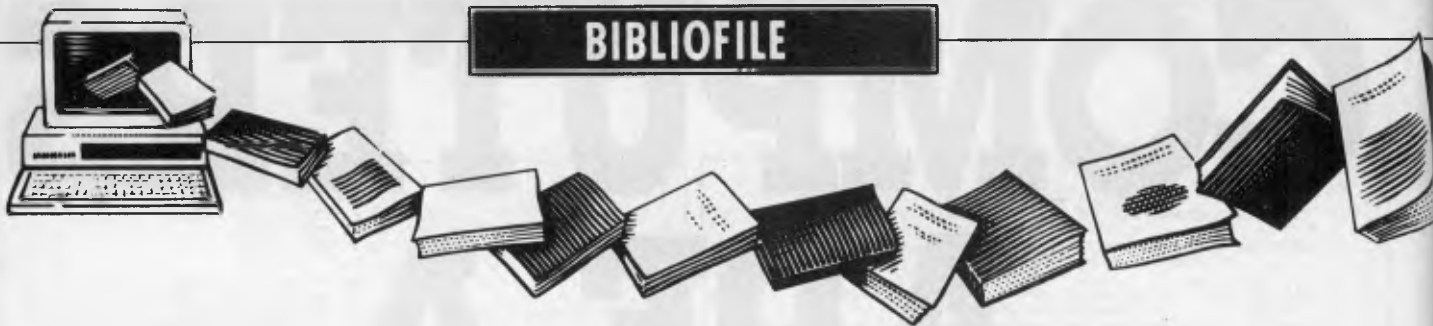
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**Happy hacking is the theme as David Taylor logs on. And, now that there's no end to what can be done with computers, there's a book to explain how it all started.**

## Cloak and hacker

You've read the news, now read the book. It is wicked to hack; not very wicked, hacker Hugo protests, but a little bit wicked just the same. The FBI takes a very dim view. Blokes with suspicious-looking bulges under their armpits might come knocking at your door. Your '64 could be seized in the middle of the night.

It's all very well, provided we take hacking to mean only you and your modem messing about on more or less legitimate lines — a database here, a bulletin board there. That's an innocent educational sport, the way Hugo sees it. If now and again you're not, so to speak, *welcome* to look around — well, there's probably no harm done.

But logging on unscrupulously — where to hack is to poke your nose into other people's computerised business without their knowledge or permission — that's definitely wicked. It's usually tricky and long-winded, probably illegal and, of course, it sounds like tremendous fun.

Computerniks have been at it for years: relishing the tease of locating some remote system, defeating its protection and having a quick, unauthorised rummage. No-one knows how many succeed. Hackers would naturally like everyone to believe that they're surreptitiously re-programming the mainframe at Fort Knox or breaking into the Kremlin's electronic mailbox most evenings. Victims, on the other hand, are equally anx-

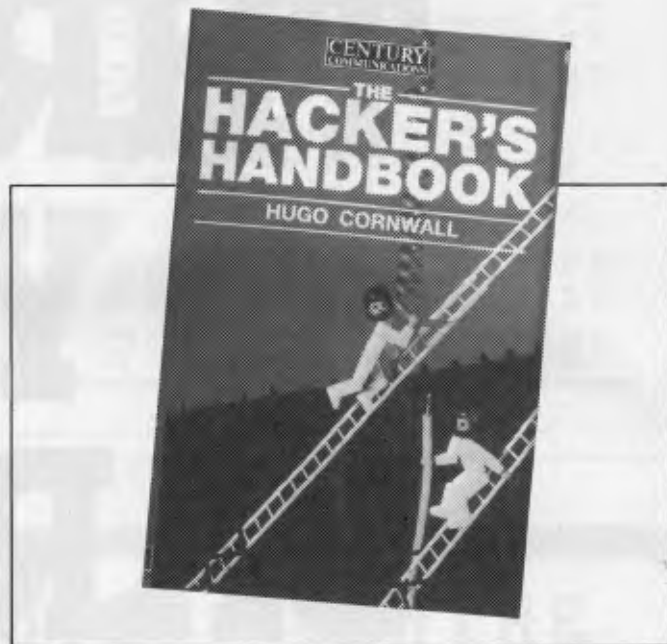
ious to allay fears that their files could ever have been tampered with. Vested interests make the actual extent of hackers' mischief pretty hard to assess.

Public opinion tends to be in exaggerated awe of hackers. We're easily bemused by sensational reports of computerised crime or by such Hollywood hokum as *War-games*, in which a schoolkid dials into the Pentagon and nearly starts World War III.

Reality is more prosaic. With a few spectacular exceptions, like 'The Great Prince Philip Hack', it is, as a rule, pretty dull. The satisfaction, so all hackers insist, is the ingenuity (and persistence) needed just to fathom a good connection.

This book offers general guidelines and looks at methodology from some entertaining examples of hacks by pseudonymous Hugo himself (he's a professional computer security consultant). It describes the first principles of developing hacker's intuition, and reveals that 95 per cent of successful hacks rely on simple password acquisition. It explodes the myth that virtuosity at the keyboard is all, and urges you to scour by the hour for random clues and disconnected information — everywhere from specialised publications to exhibitions and obscure libraries, even dustbins. Hugo cheekily demonstrates how such gleanings can be used, for example to build up a shrewd idea of what systems spy organisations use.

It's a lively if often super-



ficial account, but despite Hugo's protestations that *anything* is still possible — that men will always boldly hack where no men have hacked before — the conclusion seems to be that the best days are now over. As the targets get smarter, hacking isn't what it used to be.

Title: The Hacker's Handbook  
 Author: Hugo Cornwall  
 Publisher: Century Communications  
 Price: Not available at press time

## Cracking nuts

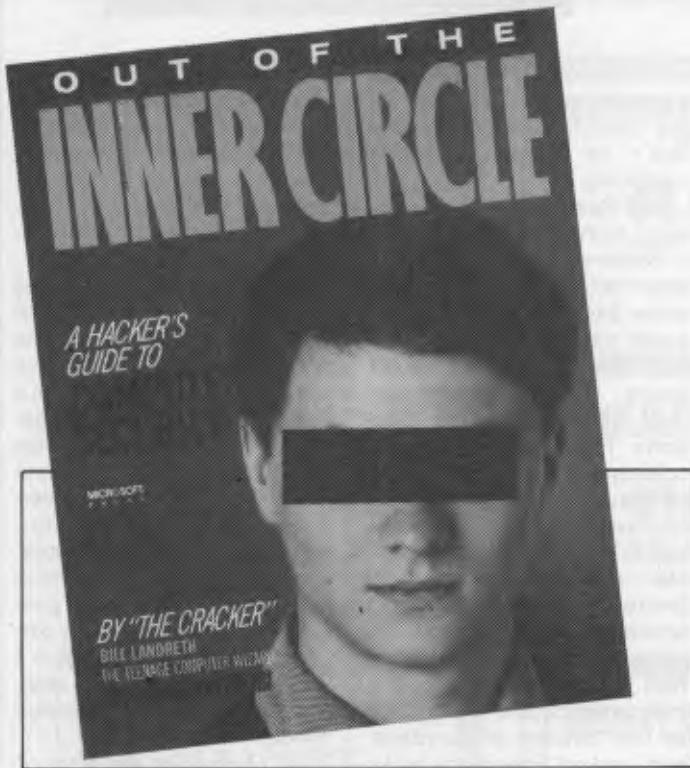
It's certainly all over now for Bill Landreth — The Cracker — who was one of America's most notorious teenage computer wizards until he was apprehended by the FBI, and indicted by a Federal Grand Jury.

Gee whiz, you guys, he was only having fun. He didn't mean no harm. He was just a kid. They were all teenage kids in California's 'Inner Circle' of computer freaks. All they

seem to have done was to hack about in GTE Telenet's system.

Still, the FBI wasn't taking any chances — these kids could be Commies! Even the judge insisted Landreth be looked over by a psychiatrist before sentence was passed.

Now The Cracker is a reflective old-timer of 19. This is his life story and his summary of a reformed insider's advice to those who'd rather not become victims of insidious hacking.



It's stirring stuff... It's Sunday night and I'm in my room, deep into a hack. My eyes are on the monitor and my hands are on the keyboard, but my mind is really on the operating system of a super-minicomputer a thousand miles away — a super-mini with an operating system that does a good job of tracking users and that will show my activities in its user logs, unless I can outwit it in the few hours before the Monday-morning staff arrives for work.' It sure beats homework.

The Cracker then identifies five kinds of (American) hackers, from *novices* star-struck by *Wargames* (who are a nuisance), through *students* (who find hacking a whole lot more intellectually stimulating than school), *tourists* (who seem to come to hacking much as they might come to an occasional crossword), *crashers* (who are trouble-makers out to

cause havoc for kicks) and the out-and-out computer *thief*.

This book isn't so much stirring as rather depressing. It implies that hooligan hacking is reaching epidemic proportions in the US, and plays on paranoid fears that your precious data files will be next unless you're extra vigilant. I dare say there's some truth in it. The risk is that people can easily become obsessively cautious, living in fear of the sinister, suspecting constant conspiracy, becoming convinced that evil-doers are all out there and trying to get them. That, if you like, is the dark side of happy hacking and it does not make for an edifying read.

Title: Out of The Inner Circle  
— A Hacker's Guide To  
Computer Security  
Author: Bill Landreth  
Publisher: Microsoft/  
Penguin  
(paperback)  
Price: \$19.95

## Chips off the monolithic block

Bemused by all that com-

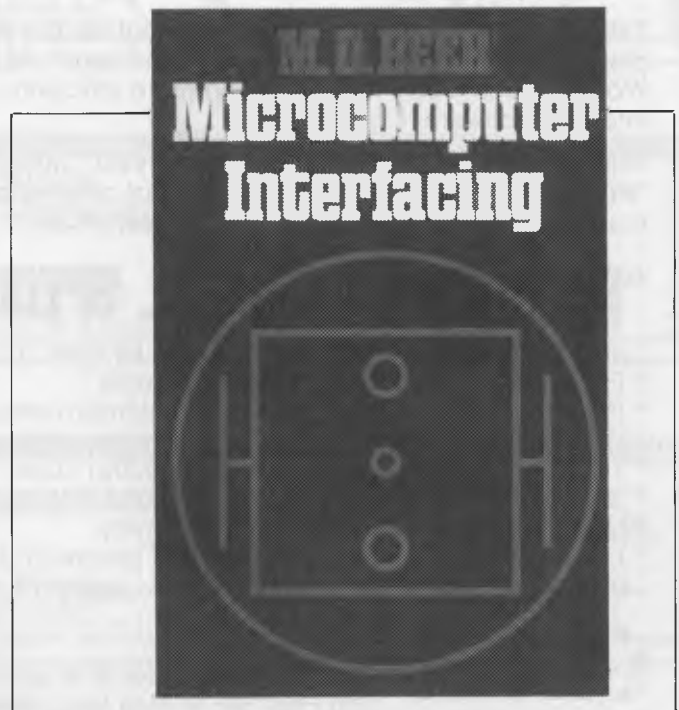
puters can do today, and confused by the ever more extravagant claims for what they'll be able to do tomorrow, the world from time to time wonders whose smart idea it was in the first place — *who invented the computer?*

There is, alas, no simple answer. There never was one sudden and dramatic flash of inspiration, no single mad boffin to slap his forehead and cry 'Eureka!' Rather than a big leap forward, the history of the computer has been a series of small, but significant hops. Computers were not so much invented — they *evolved*.

Daft as it may seem, the crazily complex, early 19th-century mechanical calculator or 'analytical engine' of the redoubtable Charles Babbage is, as often as not, cited as the first stirrings of computers' conceptual operations. Then again, I dare say Leibniz contributed with calculus, Boolean algebra must have helped, and Bell Labs' Messrs Shockley, Brattain and Jar-

deen ought certainly to be given credit for their Nobel Prize-winning invention in 1947 of that most useful of electronic devices, the transistor.

There are umpteen others who might claim to have honed this or perfected that along the twisty trail of turning computer theory into practice, but here comes eager Mr Reid (of *The Washington Post*) to urge that we single out two relatively unknown pioneers for the hall of fame. America's Jack Kilby (*who?*) and Robert Noyce (*never heard of him!*) changed the world in the late 1950s as much as ever had Thomas Edison, Alexander Graham Bell or Henry Ford (*sic*), insists Mr Reid, for it was their rare and unsung





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ingenuity which first gave us the 'monolithic integrated circuit' or semi-conducting microchip.

Mr Reid tells his stirring story with gusto...

'Kilby was strangely nervous as he hooked up the wires from the battery to his small monolithic circuit, and from the circuit to the oscilloscope. He fiddled with the dials. He checked the connections. He looked up at his colleague who gave him a here-goes-nothin' shrug. He checked the connections again. He took a deep breath. He pushed the switch. Immediately a bright green snake of light started undulating across the screen in a perfect, unending sine wave. The integrated circuit, the answer to the tyranny of numbers, had worked. Everybody broke into broad smiles. A new era in electronics had been born.'

In Dallas, it turns out, where Kilby was a Texas Instruments lab-hand. Noyce, meanwhile,

was in San Francisco's Silicon Valley and moving independently towards a similar invention. In due course he was to co-found Intel Corp and produce this thing called a 1k RAM chip.

The pace of detailed development and production of solid-state devices was soon reaching breakneck speed. By 1975, America's *Popular Electronics* magazine would be describing how to wire up what Mr Reid reckons was the world's first personal micro. This book, too, maintains a cracking pace, and if you can cope with the rather breathless gee-whiz, drum-beating-for-Yankee-ingenuity style, it is a lively and informative read. Highly recommended for your holiday reading.

Title: Microchip: the story of a revolution and the men who made it

Author: TR Reid  
Publisher: Collins  
Price: \$25.95

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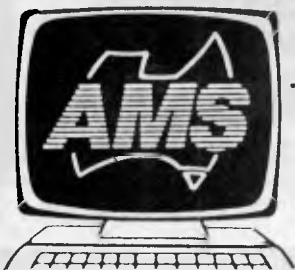
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## The Novag Super Constellation, accepted for a rating by the United States Chess Federation, took on David Welsh in a qualifying tournament. Kevin O'Connell describes the moves.

The World Chess Federation's debate about whether to allow a team of chess computers to play in the Chess Olympiad continued at the recent World Chess Federation congress at Graz in Austria. This debate has been going on, at temperatures varying from warm to very hot indeed, for more than four years. The computer team will, after all, take part — the computers don't need the money, but the World Chess Federation does.

Meanwhile, the US Chess Federation has started a Computer Rating Agency. The idea behind it is that the USCF, by playing many games against players of comparable strength under controlled tournament conditions, can develop a computer as accurate as the ratings of human players (all active players are rated, from the humblest up to the world champion).

US Chess Federation for rating was a chess machine, the Novag Super Constellation.

In a 40-game tournament against players rated between 1900 and 2100 (very strong club players), the Super Constellation scored 22 points and acquired an official USCF rating of 2018. Here is one of the games from that tournament.

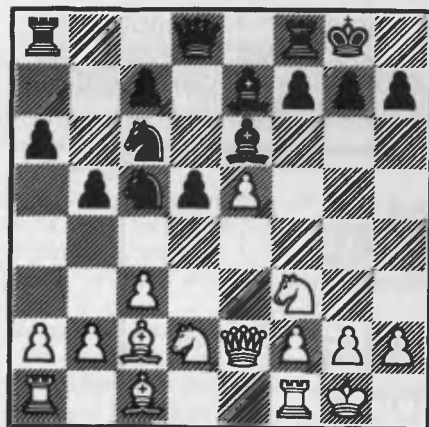
The first program submitted to the

**White: David Welsh. Black: Super Constellation. Spanish Opening.**

- |   |        |        |
|---|--------|--------|
| 1 | e2-e4  | e7-e5  |
| 2 | Ng1-f3 | Nb8-c6 |
| 3 | Bf1-b5 | a7-a6  |
| 4 | Bb5-a4 | Ng8-f6 |
| 5 | 0-0    | Nf6xe4 |

(The Open Variation of the Spanish is quite a good choice for a program as it leads to active piece play for Black.)

- |   |        |        |
|---|--------|--------|
| 6 | d2-d4  | b7-b5  |
| 7 | Ba4-b3 | d7-d5  |
| 8 | d4xe5  | Bc8-e6 |
| 9 | c2-c3  | Bf8-e7 |



*Control over d4 is important*

- |    |        |     |
|----|--------|-----|
| 10 | Nb1-d2 | 0-0 |
| 11 | Qd1-e2 |     |

(Less common than 11 Bb3-c2, but there is nothing wrong with this.)

- |    |         |        |
|----|---------|--------|
| 11 | ...     | Ne4-c5 |
| 12 | Bb3-c2? |        |

(A natural enough move to preserve the light-square bishop, which can often be of great importance to White in this opening, but White should play 12 Nf3-d4, keeping control over the d4 square which is even more important.)

- |    |     |        |
|----|-----|--------|
| 12 | ... | d5-d4! |
|----|-----|--------|

(Now Black gets extremely active play.)

- |    |        |        |
|----|--------|--------|
| 13 | Nf3xd4 | Nc6xd4 |
| 14 | c3xd4  | Qd8xd4 |
| 15 | Nd2-f3 | Qd4-c4 |
| 16 | Rf1-e1 | Qc4xe2 |

(When ahead it is a good idea to exchange pieces, and Black is significantly ahead in positional terms here.)

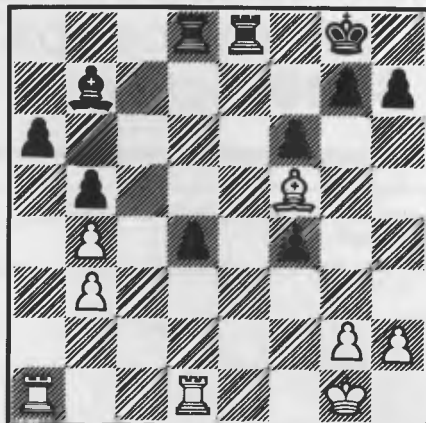
- |    |        |        |
|----|--------|--------|
| 17 | Re1xe2 | Be6-c4 |
| 18 | Re2-d2 | Ra8-d8 |
| 19 | b2-b3  | Bc4-d5 |
| 20 | Nf3-d4 | Nc5-e6 |
| 21 | Bc1-b2 | Ne6xd4 |
| 22 | Bb2xd4 | Be7-b4 |
| 23 | Rd2-d1 | c7-c5  |

(Often in the Open Spanish, Black's only real problems are his backward c-pawn at c7 and a weak square on c5. In this game Black has none of those problems, having instead the significant advantage of a good queen-side pawn majority (3-2).)

- |    |       |        |
|----|-------|--------|
| 24 | a2-a3 | c5xd4  |
| 25 | a3xb4 | Bd5-b7 |

(The queen-side pawn majority has gone, but it has been replaced by a healthy passed d-pawn and the added benefit of crippled white queen-side pawns.)

- |    |        |
|----|--------|
| 26 | Bc2-f5 |
|----|--------|



*The computer's task could be harder*

- |    |       |         |
|----|-------|---------|
| 26 | ...   | Rf8-e8  |
| 27 | f2-f4 | f7-f6   |
| 28 | e5xf6 |         |
| 28 | ...   | Re8-e2! |

(The Super Constellation has been playing excellent positional chess, and this is a very neat tactical point.)

- |    |        |       |
|----|--------|-------|
| 29 | Bf5-h3 | g7xf6 |
| 30 | Ra1-c1 |       |

(The culmination of White's plan, initiated by 26 Bc2-f5, of taking control of the c-file. Unfortunately it merely loses the exchange and the game. Both 30 Kg1-f1 and 30 Rd1-e1 would have been better.)

- |    |        |        |
|----|--------|--------|
| 30 | ...    | d4-d3! |
| 31 | Rc1-c7 | d3-d2! |
| 32 | Kg1-f1 |        |
- (32 Rc7xb7 loses horribly to 32...Re2-e1+.)

- |    |     |
|----|-----|
| 32 | ... |
|----|-----|

- |    |        |        |
|----|--------|--------|
| 33 | Rd1xd2 | Rd8-e8 |
|----|--------|--------|
- (There is no choice, but now White is helpless.)

- |    |         |         |
|----|---------|---------|
| 33 | ...     | Bb7xg2+ |
| 34 | Bh3xg2  | Re2xd2  |
| 35 | Bg2-b7  | Rd2-d4  |
| 36 | Bb7xa6  | Rd4xf4+ |
| 37 | Kf1-g2  | Rf4-g4+ |
| 38 | Kg2-f3  | Rg4xb4  |
| 39 | Rc7-c3  | Kg8-f7  |
| 40 | Ba6-b7  | Re8-e5  |
| 41 | Rc3-d3  | f6-f5   |
| 42 | Bb7-d5+ | Kf7-g6  |
| 43 | h2-h3   | Kg6-g5  |
| 44 | Bd5-g8  | h7-h5   |

(Black plays the ending surprisingly well for a program, and soon finishes off White in fine fashion.)

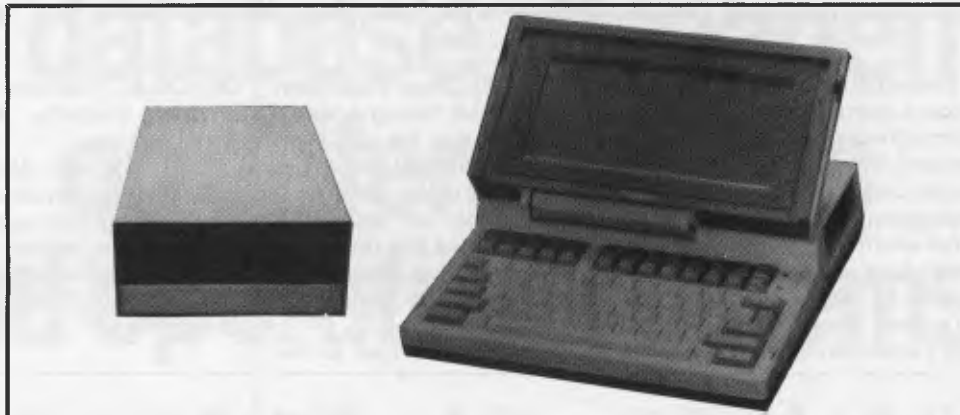
- |    |        |        |
|----|--------|--------|
| 45 | Rd3-d7 | Re5-e8 |
| 46 | Bg8-f7 | Re8-c8 |
| 47 | Rd7-d3 | Rc8-c2 |
| 48 | Kf3-g3 | h5-h4+ |
| 49 | Kg3-f3 | Rc2-h2 |
|    | 0-1    |        |

(White resigns because he cannot defend the h-pawn.)

END



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## *Mike Mudge looks at the interesting sums of reciprocals.*

The harmonic series  $1/1 + 1/2 + 1/3 + 1/4 + \dots$  is known to be divergent, which means that the sequence of partial sums:

$S_n = 1/1 + 1/2 + 1/3 + 1/4 + \dots + 1/n$  does not tend to a limit as  $n$  tends to infinity.

The sequence,  $S_n$ , in its lowest terms begins (1/1, 3/2, 11/6, 25/12, 137/60, 49/20, 363/140 ...)

**Problem 1a.** What is the most frequently occurring denominator?

**Problem 1b.** Can there be a repetition among the numerators?

**Note.**  $S_{13} = 1145993/360360$ ,

$S_{14} = 1171733/360360$ ,

$S_{15} = 1195757/360360$ .

Now  $S_n - \log_e n$  tends to Euler's Constant, denoted conventionally by a small Greek letter gamma, as  $n$  tends to infinity. This constant is of fundamental importance in number theory and is approximately 0.577.

**Problem 2.** Determine this constant as accurately as your hardware allows.

The sum of a finite number of different terms chosen from the harmonic series may itself yield an integer — for example,  $1/2 + 1/4 + 1/6 + 1/12 = 1$ .

**Problem 3.** How can a given integer be expressed as a sum of such terms?

**Reference:** RC Lyness, *Math Gaz* 24, 1940, pp206-209, established that the decomposition of 10 requires more than 12366 terms.

Consider now the sum of three fractions of the form  $1/n$  (not necessarily all different) write  $T_3 = 1/x + 1/y + 1/z$ .

Can  $T_3$  yield  $4/n$  for any  $n$  greater than 1?

For example,  $4/2 = 1/1 + 1/2 + 1/2$ ,  
 $4/3 = 1/2 + 1/2 + 1/3$ .

R Oblath and SA Rosati have proved this for  $n$  less than 141648.

Can  $T_3$  yield  $5/n$  for any  $n$  greater than 1?

For example,  $5/2 = 1/1 + 1/1 + 1/2$ ,  
 $5/3 = 1/1 + 1/1 + 1/3$ .

G Palama, *Boll Un Mat Ital* (3) 13, 1958, pp 65-72, has proved this for  $n$  less than or equal to 922321.

**Problem 4.** Construct possible  $T_3$  decompositions of  $4/n$ ,  $5/n$ ,  $6/n$  ... for a range of  $n$  and investigate possible patterns. How does this extend to  $T_4$  ...?

**Appendix** ..... a large number

The largest number which the author has met recently is SKEWES' Number:

79

( e )  
( e )

where  $e$  as usual is approximately 2.71828.

Investigate the significance of Skewes' number in number theory and determine (approximately) how many decimal digits it has.

Readers are invited to submit the results of the above investigation (to be used in the event of a tie-break situation), together with solutions to some, or all, of the above problems to: Mike Mudge, C/-APC, 2nd floor, 215 Clarence Street, Sydney 2000.

Submissions, which must reach me by 1 March, will be judged using suitably vague criteria. A prize will be awarded for the best entry received.

### Prize-winner June

Some general introductory material relating to Euler's Totient function can be found, for example, in *A Pathway into Number Theory* by RP Burn, CUP 1982, or *An Introduction to the Theory of Numbers* by IM Vinogradov, translation published through Pergamon Press 1955. Detailed references to numerical results are given in *A Handbook of Integer Sequences* by NJA Sloane, Academic Press 1973.

This month's prize-winner is Robin Merson whose achievements include the following:

- (i) Solutions of  $\phi(n) = \phi(n+1)$  from  $n = 8$  up to  $n = 20171384$ .. run time 16 days.
- (ii) All nontotients less than  $10^4$ , with verification of 210 less than  $10^3$  and 2627 less than  $10^4$ .
- (iii) All noncototients less than 30000.
- (iv) Determination of  $s(k)$  up to  $s(43) = 12531330$ .
- (v) Print of nontotients  $2^k m$  with  $k$

greater than 3 and  $m$  a product of at least three different primes up to 547872.

(vi) Numbers in arithmetic progression and having the same phi, including six in a row: 165488430, 165488460, 165488490, 165488520, 165488550 and 165488580, all with phi equal to 44130240.

### The Moebius funtion — July review

Readers interested in some background to this and other elementary functions of number theory are referred to *An Introduction to the Theory of Numbers* by GH Hardy and EM Wright, OUP, 4th Edition 1960; those with mathematics background may find *Exercises in Number Theory* by DP Parent, Springer-Verlag 1984, most rewarding reading.

The efficient handling of the Moebius Function on a digital computer clearly requires its storage to be restricted to two bits. (Recall that it is a three-valued function.) Thus, for example, its value for eight consecutive integers can be represented in one 16-bit integer variable: the efficient insertion and extraction of this information then being an interesting programming exercise.

The predominance of Greek characters in the original article may have been responsible for the poor response to this problem. However, the clear winner is M Meuser, who used his Tandy model 100 with 24k RAM to tabulate  $M_n$  and  $S_n$  up to  $n = 5439600$ . The strange behaviour of these functions is clearly visible and the theoretical explanation seems as far away as ever.

END





## BENCHMARKS

*A list of Benchmarks used when evaluating micros is given below.  
An explanation can be found in the February '84 issue.*

100 REM Benchmark 1  
110 PRINT "S"  
120 FOR K=1 TO 1000  
130 NEXT K  
140 PRINT "E"  
150 END

100 REM Benchmark 2  
110 PRINT "S"  
120 K=0  
130 K=K+1  
140 IF K<1000 THEN 130  
150 PRINT "E"  
160 END

100 REM Benchmark 3  
110 PRINT "S"  
120 K=0  
130 K=K+1  
140 A=K/K\*K+K-K  
150 IF K<1000 THEN 130  
160 PRINT "E"  
170 END

100 REM Benchmark 4  
110 PRINT "S"  
120 K=0  
130 K=K+1  
140 A=K/2\*3+4-5  
150 K<1000 THEN 130  
160 PRINT "E"  
170 END

100 REM Benchmark 5  
110 PRINT "S"  
120 K=0  
130 K=K+1  
140 A=K/2\*3+4-5  
150 GOSUB 190  
160 IF K<1000 THEN 130  
170 PRINT "E"  
180 END  
190 RETURN

100 REM Benchmark 6  
110 PRINT "S"  
120 K=0

130 DIM M(5)  
140 K=K+1  
150 A=K/2\*3+4-5  
160 GOSUB 220  
170 FOR L=1 TO 5  
180 NEXT L  
190 IF K<1000 THEN 140  
200 PRINT "E"  
210 END  
220 RETURN

100 REM Benchmark 7  
110 PRINT "S"  
120 K=0  
130 DIM M(5)  
140 K=K+1  
150 A=K/2\*3+4-5  
160 GOSUB 230  
170 FOR L=1 TO 5  
180 M(L)=A  
190 NEXT L  
200 IF K<1000 THEN 140  
210 PRINT "E"

220 END  
230 RETURN

100 REM Benchmark 8  
110 PRINT "S"  
120 K=0  
130 K=K+1  
140 A=K 2  
150 B=LOG(K)  
160 C=SIN(K)  
170 IF K<1000 THEN 130  
180 PRINT "E"  
190 END

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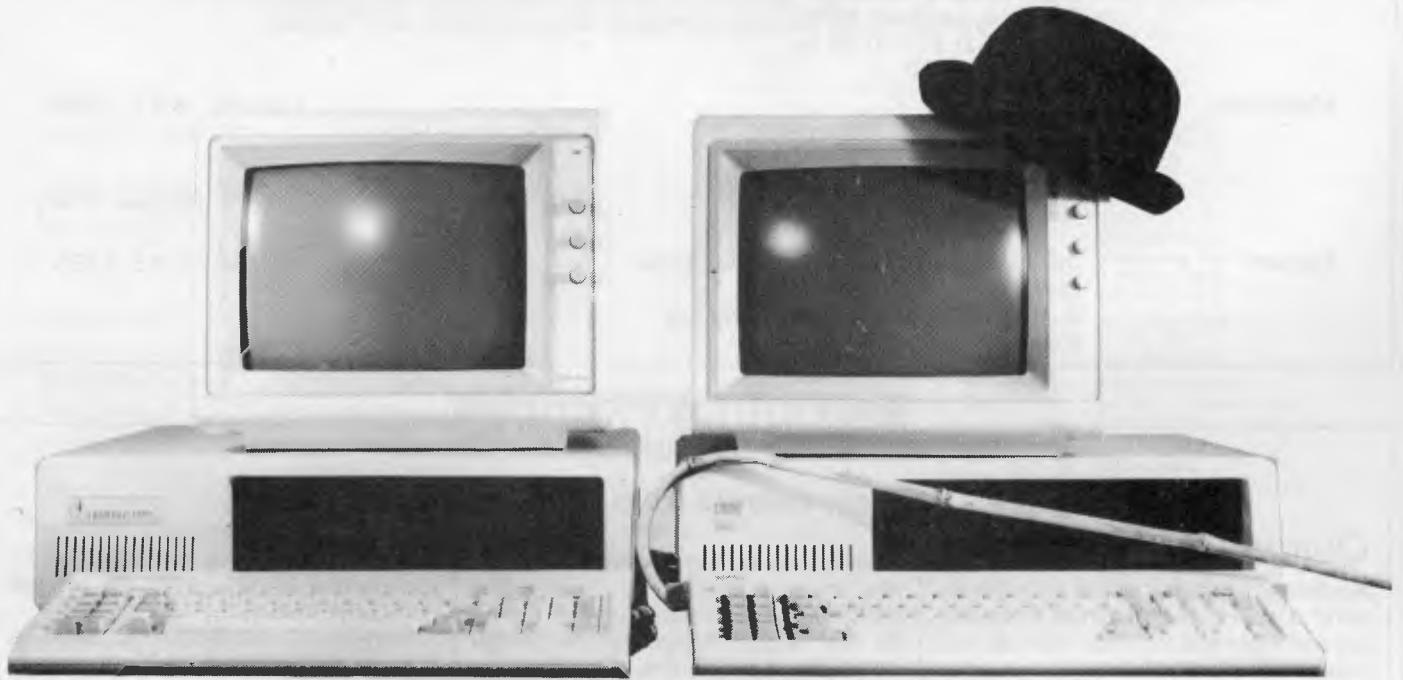
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Australian Personal Computer Page 127





## DIARY DATA

**Readers are strongly advised to check details with exhibition organisers before making travel arrangements to avoid wasted journeys due to cancellations, printers' errors, etc.**

Sydney	Information Online '86 Contact: Kaye Paterson (02) 332 4622	January 20-22, 1986
Hobart	Primaus V Contact: Ken Peters, PO Box 282, Lindfield, NSW 2070. (02) 957 3144 or (02) 957 5102	February 12-14, 1986
Melbourne	Finance '86 Contact: Publicity Department, BPI Exhibitions Pty Ltd, 162 Goulburn St, Darlinghurst, NSW, 2010. (02) 266 9799	February 18-21, 1986
Sydney	6th Australian Personal Computer Show Contact: Ms F Michael, Australian Exhibition Services Pty Ltd, (03) 267 4500	March 12-15, 1986

## LAZING AROUND

*Brain-teasers from JJ Clessa*

### Quickie

Another old chestnut. There are eight litres of milk in a churn. Using a three-litre jug and a five-litre jug only, how can you measure four litres?

### Prize puzzle

Find a nine-digit number which contains each of the digits 1-9, and which can be fractioned into three 3-digit numbers which between them also use all digits 1-9.

As this can be done in more ways than one, you must find:

- (a) The smallest 9-digit number; and
- (b) The largest 9-digit number which meets the above criteria.

Answers on postcards please, or backs of envelopes, to reach us not later than 20 January, 1986.

### October prize puzzle

There were lots of entries with few incorrect solutions to the problem of the

number which, when multiplied by 13 and divided by 11, gives the original number in reverse.

Many of you pointed out that zero was a solution — indeed, several people submitted zero as an entry, but I didn't allow it.

The answer I was seeking was 77319, and the winning entry came from Sue Marshman of Yokine, WA. Congratulations, your prize is on its way.

END

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# USER GROUPS INDEX

**Below is a complete list of User Groups known to us in Australia and New Zealand.**  
**User Groups' Secretaries are asked to provide us with alterations, additions and corrections as promptly as possible to avoid a longer than necessary delay before publication.**  
**During the next four months these changes will be published and the next complete listing will appear in the May issue of APC.**

NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
<b>NEW SOUTH WALES</b>			
APF User Group	APF	—	Norm Mc Mahon 288 Kissing Point Road, Turramurra 2074 (02) 44 2645
Apple User Group	Apple	2nd Monday of each month at the Sydney Grammar School Science Auditorium, College Street, City at 6.30pm.	Apple User Group PO Box 505 Bankstown 2200
Ausborne User Group	Osborne	Every 3rd Wednesday of the month at 6.30pm at the North Sydney Council Chambers, 200 Miller Street.	Ian Stretton Napier Box C530 Clarence Street, Sydney 2000
Australian Unix User Group	Unix	—	Chris Campbell PO Box 324 Pymble 2073 (02) 449 4400
Australasian ZX User Group	Sinclair Computers — ZX80, ZX81 and Spectrum	—	Send S.A.S.E. to: PO Box 397 Dapto 2530 (042) 61 5451
Bathurst Computer Group	General	Meets at West Bathurst Public School at 7.30pm on every 2nd Friday during school term.	Liz Haddon Secretary 10 Uralla Circuit Kelso 2795
Bay User Group	Commodore 64/128	Meets on the last Thursday of each month, between 5 and 7pm at Nelson Bay High School.	Wayne Herring Secretary PO Box 308 Nelson Bay 2135
Blakehurst Computer College	BBC	—	Marie Michaels (02) 546 7502
Bondwell User Group	Bondwell	—	Ray Richards 7/39 Ross Street North Parramatta 2151
Broken Hill MicroBee User Group	MicroBee	—	Peter Cotter 533 Radium Street, Broken Hill 2880 (080) 88 1621 (AH)
Cat User Group	Dick Smith Cat	1st Tuesday of each month at 6.30pm, Kirribilli Neighbourhood Centre, 16 Fitzroy Street, Kirribilli.	A Robertson 71 Milson Road Cremorne 2090
Compucolor User Group	Compucolor	1st Tuesday of each month at 8pm.	President Tony Lee NSW CCII User Group 52 Cowan Road St Ives 2075
Compu-tech Computer Club	Commodore VIC 20, C 64 and PET	VIC-20 chapter meets 1st Tuesday of every month, C-64 and PET chapter meets 4th Tuesday of every month.	Geoff Rayner PO Box 115 Mayfield 2304
Eastern Suburbs Commodore	Commodore	Meets every 2nd Monday at 8pm, State Emergency Service building, at the rear of 1355 Botany Street, Botany.	R Kellaway Secretary 10 Erang Avenue Kirrawee 2232
Excalibur 64 User Group	Excalibur 64	—	A Bendeli 99 Bradfield Road Lindfield (02) 46 1976
Gosford Commodore Computer Users (GOSCOM)	Commodore VIC 20, C16, C64, Plus/4, C128	Meetings are held every 3rd Wednesday of the month at 7.30 pm at the Library of East Gosford Public School, East Gosford.	Rob Jackson C/- GOSCOM PO Box 86 Umina 2257
Great Western User Group	General	Meetings are held on the 1st Tuesday of every month at 8pm.	Great Western User Group PO Box 210 Wentworthville 2145 (02) 631 2066



# USER GROUPS INDEX

NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
Griffith Computer Association	General	—	Ron Gauci Secretary Griffith Computer Association PO Box 425 Griffith 2680
Hitachi/6809 User Group	Hitachi/6809	Meets at 2pm, 1st Saturday of each month.	Rob Lohr President Hitachi/6809 User Group PO Box 966 Bondi Junction 2022 (02) 662 4150
Hunter User Group	General	Meets at University of Newcastle, Room W308 Education Building on the 2nd Wednesday of each month at 7.30pm.	Secretary, PO Box 39 Broadmeadow 2292
Illawarra Apple Core	Apple computer	Meets on the 4th Monday of each month at Holy Spirit College, Bond Street, Bellambi at 8pm.	Bob Williams (042) 96 6115
Illawarra Super 80 User Group	Super 80	Meets on the 1st Monday of each month at 5.30pm at 86 Market Street, Wollongong	PO Box 1775 Wollongong 2500
Lismore C-64 User Group	Commodore 64	Meets on the 2nd Monday of each month at Kadina High School Library, commencing at 7pm.	Lismore C-64 User Group PO Box 385, Lismore 2480 (066) 21 4054
Macarthur Computer Users Association	General	Meets on the 1st Monday of each month at the Airds High School Library, Briar Road, Campbelltown, 7.30pm.	J Napier 23 Athel Tree Crescent Bradbury 2560
Macwest	Apple Macintosh	—	Macwest 11 Toohey Avenue Westmead 2145
MicroBee User Group	MicroBee	—	Eric Eulenstein 202 Kooba Street, Albury 2640 (060) 25 1601
NEC User Group of NSW	NEC APC	Meets on the 2nd Tuesday of each month at the Crows Nest Club, Hayberry Street, Crows Nest at 7.30pm.	Hon. Secretary NEC User Group PO Box 568 Milsons Point 2061
Newcastle Microcomputer Club	General	Meets on the 2nd and 4th Monday of each month at 7.30pm in Room G12, Physics Building, University of Newcastle.	PO Box 293 Hamilton 2303 or Angus Bliss (049) 67 2433 Tony Nicholson (049) 52 6017
NSW Peach User Club	Hitachi Peach	Monthly meetings are held on the 1st Saturday of each month. Contact them for location details	Daniel Soussi 37 Mooramie Street Kensington 2033
Southern Districts Commodore User Group	Commodore	Meets on the 1st and 3rd Wednesday of every month, at the A.P.I. Hall, Kurrajong Road, Prestons, 6pm.	A Toms President 3 Lucille Crescent Casula 2170 (02) 602 8691
Spellbinder User Group	Apple	Meets at the Sydney Grammar School Science Auditorium on the 2nd Monday of each month at 6.30pm	Frank Revill (047) 36 448
Sydney Apple User Group	Apple	Meets at the Sydney Grammar School Science Auditorium on the 2nd Monday of each month at 6.30pm	Frank Revill (047) 36 448
Sydney Forth Group	General	Meets at Room LG19, John Goodsell Commerce Building, University of NSW on 2nd Friday of each month at 7pm	Peter Tregreagle 10 Binda Avenue, Yowie Bay 2228 (02) 524 7490 (AH)
Sydney MicroBee User Group	MicroBee	Meets on the 3rd Saturday of each month at the Strathfield Girls High School, from 1pm to 5pm.	President/Editor David Butler S.M.U.G. PO Box C233 Clarence Street Sydney 2000 (02) 638 2993
System 80/TRS-80 and Color Computer User Group	System 80/TRS-80 and Color Computer	—	Jim Fisher 37 Fairburn Avenue West Pennant Hills Sydney 2120
T.I.S.H.U.G.	Texas Instruments TI-99/4 and other 16 bit TMS 9900-based personal computers	—	John Robinson PO Box 149 Pennant Hills 2120
Texas Instruments User Group	Texas Instruments	Meetings are held on the 1st Saturday of each month at St John's Hall, Victoria Street, Darlinghurst.	Shane Anderson Editor TISHUG PO Box 595 Marrackville 2204
The Blue Mountain Computer Club	General	Meetings are held at Springwood Civic Centre on the 2nd and 4th Friday of each month at 7.30pm	Eric Lindsay 6 Hillcrest Avenue, Faulconbridge (047) 51 2258 (AH)

# USER GROUPS INDEX

NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
The Central Coast Apple User Group	Apple and Apple compatible	Meetings are held on the 1st Tuesday of each month at the Niagara Park Public School from 7.30pm.	662 The Entrance Road Warmbernal 2260
Tuggerah Lakes Computer User Group	General	Meets at the Old Primary School Wyong, (cnr Alison Road and Rankin Street), on every 2nd Thursday at 6.30pm.	F James 125 Woolana Avenue Budgewoi 2262
Wagga Wagga Computer Club	General	Meets every 2nd Wednesday at the corner of Simmons and Johnstone Streets, Wagga Wagga.	Wagga Wagga Computer Club PO Box 844, Wagga Wagga 2650
Western Sydney PC and Compatible User Group	PC and compatibles	Meetings are held on the 3rd Sunday of each month at 27 Cosgrove Crescent, Kingswood 2750.	Ben Sharif (047) 36 4825
Wollongong Computer Club	General	—	PO Box 397 Dapto 2530 (042) 615 451
<b>VICTORIA</b>			
Apple User Society of Melbourne	Apple	Meetings are held on the first Saturday of each month at the Burwood Regional Community Education Centre, Burwood Highway, Melbourne.	Graham Willis AUSOM PO Box 43 Forest Hills 3131
Albury/Wodonga Apple User Group	Apples and clones	2nd Wednesday of each month at Wodonga High School, 7.30pm.	Secretary Jenny Scott (060) 24 3225 President Don McLennan (060) 24 6028
88C User Group	88C	Meets on the last Wednesday of each month, 7-9.30pm at Copiquet, 423 Clarendon Street, South Melbourne.	Secretary Mr G E Howell (03) 420 2611 (BH) President Mr T Robinson (03) 386 7529 (AH)
Color Computer Club	TR8-80 Color Computer	1st Friday of each month at Geelong College, 8pm.	Secretary David Collen (052) 43 2128
Compucolor User Group	Compucolor	Meets on the second Wednesday of each month at the Community Centre, Surrey Hills, Victoria at 8pm.	CUVIC PO Box 420 Camberwell 3124
Forth Interest Group	Forth	Meets on the 1st Friday of each month at 8pm. Contact secretary for details	Lance Collins, PO Box 103 Camberwell 3124 (03) 29 2600
Geelong Atari User Group	Atari	Meets on the 1st Tuesday of each month at the Newtown Club, Skene Street, Newtown, commencing at 7.45pm.	Secretary Brian Oates PO Box 293 Geelong 3220
Geelong Commodore Computer Club	Commodore	—	D Gerrard Geelong Commodore Computer Club C/- 15 Jacaranda Place Belmont Geelong 3216
Lap Computer User Group	All lap computers	—	The Secretary Lap Computer User Group Box 2884DD GPO Melbourne 3001
MicroBee User Group (Mbug)	MicroBee	—	Secretary Axel Joscht PO Box 157 Nunawading 3131
Melbourne Atari Computer Enthusiasts Group	Atari	Usually held at the Rotunda at Monash University on the 1st Sunday of each month at 12pm.	Peter Coleman M.A.C.E. Secretary, PO Box 340 Rosanna 3084
Melb PC User Group	IBM and compatibles	Meets on the 2nd Wednesday of each month at 6pm at the Ground Floor Auditorium of Clunes Ross House at 191 Royal Parade, Parkville.	Stephen Wagen C/- Pannell Kerr Forster 14th Floor 500 Bourke Street Melbourne 3000 (03) 830 5067 (6-8pm)
Melbourne VIC 20 User Group	VIC-20	Meetings are held on the 4th Wednesday of every month at Box Hill TAFE Building No 4, 465 Elgar Road at 7.30pm	John Ruddock PO Box 252 Northcote 3070
NEC Portable User Group	NEC 8201A	Meetings are held on the 2nd Wednesday of each month at Myers Computer Centre, Lonsdale Street, Melbourne, 7.30pm.	D Green (03) 611 3380 (BH)
NM Micro User Group	Interested staff members of National Mutual in the Melbourne head office using any computer.	Monthly	Mr R Prewett Convenor, NM MUG Box 2830 AA GPO Melbourne 3001



# USER GROUPS INDEX

NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
Osborne User Group	Osborne	—	Osborne User Group PO Box 169 Camberwell 3124
Otrona Attache User Group	Otrona Attache	—	David Broadbent Chairman (03) 528 2792
Peninsula Group	General	Meets at the Frankston Library on the 2nd Tuesday of each month at 7.30pm.	M.G. Thompson (03) 772 2674
Personal Programmers of Melbourne Club	Hand held computers or calculators	3rd Tuesday of each month on the ninth floor of the Monash University Menzies building, 8pm.	Paul Cooper 40 Karen Street Box Hill North 3129
Turbo Pascal User Group	Turbo Pascal	1st Wednesday of each month, 7pm, at the Institute Function Room, RMIT Union, Melbourne.	Ron Savage PO Box 81 East Caulfield 3145
Victorian Wizzard User Group	Dick Smith Wizzard, Funvision and Hanimex Ramses	—	Barry Klein 24 Russell Street Bulleen 3105
Western Suburbs MicroBee User Group	MicroBee	1st and 3rd Thursday of each month at the Multiple Sclerosis Centre, corner of Furlong and St Albans Roads, St Albans.	Ian Walker (03) 741 3625 Bradley Bouchaud (03) 336 1019
Yarra Valley Commodore User Group	Commodore	1st Tuesday of each month at the Melba Hall on the corner of Market and Castella Streets, Lilydale at 8pm.	Barrie Vickers Secretary 735 0638 Jon Hall 725 0176
RCA VIP, ETI 660, Dream 6800 or Comx 35 Micros	RCA VIP, ETI 660, Dream 6800, Comx 35	—	Frank Rees 27 King Street, Boort 3537
Seymour-Pucka Computer Club	General	—	Garry Sutton 25 Malaya Road Puckapunyal 3662 (057) 93 1091
Sorcerer Computer Users (Australia)	Sorcerer	Meets on the 1st Sunday of each month at Burwood Teachers College, 2pm.	Public Relations Officer GPO Box 2402 Melbourne 3001
Spectravideo User Group	Spectravideo	—	Mitch Raitt 68 Grassy Flat Road Diamond Creek 3098 (03) 438 2687
Teach-80 Group	General	Meets at the Waverley Centre, Miller Street, Mt Waverley.	G Behrendorff Secretary (03) 232 4569
The Color Computer Club	TRS-80 Color Computer	Meets on the 1st Friday of each month at Geelong College at 8pm	Andrew Gay 3 Quamby Avenue, North Geelong 3215 (052) 78 3424
The Eastern Suburbs Eighty User Group	TRS-80/System 80	Meets on the 4th Wednesday of each month at the Junior Science Lab, Kingswood College, 355 Station Street, Box Hill, Victoria	Cameron McKern ESEUG 8 Chestnut Street Surrey Hills 3127 (03) 288 1713 (AH)
TI-99/4A Users Group Melbourne	TI-99/4A	—	Jack Grant Co-ordinator 34 Cherrytree Grove, Croydon, 3136 (03) 725 6087
<b>A.C.T.</b>			
ACT Apple	Apple	Meets on the 2nd Thursday of each month	Eddie Tsui, Secretary PO Box 1231 Canberra City 2601
ACT VIC 20 User Association	VIC 20	Meets each month. Details available from Association	Chris Groenhout 25 Kerferd Street, Watson 2602 (062) 412 316
Adam User Group	Coleco Vision Adam	Meetings are held on the 1st Monday of each month at 7.30pm at 53 Chirnside Circuit, Kambah, Canberra.	Dennis Riley President (062) 31 5621 (AH) Frank Ellis Secretary (062) 65 4934
ASUG	Sirius (Victor 9000)	—	Rob Judd 31 Altree Crescent, Phillip 2605
Atari User Group of Canberra	Atari	Meetings are held on the first Monday of each month at 8pm. 1st Floor, Building A, Canberra TAFE College, Reid.	ACTARI PO Box E112 Old Canberra ACT 2600

# USER GROUPS INDEX

NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
Australian Adventure Club	—	—	Bernard Wiemers 10 Tardent Street, Downer 2602 ACT
Australian ZX User Association (AZUA)	Sinclair computers	Meets on the last Wednesday of each month at the Woden Valley High School library, Ainsworth Street, Phillip	David Vernon AZUA 50 Waller Crescent, Campbell 2601 ACT
Canberra Micro-80 Users Group	TRS-80, System 80 and any other Z80 based microcomputers	Meets on the 3rd Monday of each month in the large lecture theatre of Building J, Canberra Technical College, Constitution Avenue, Reid at 7.30pm	Harry Cooper Secretary 113 Owen Dixon Drive Evatt 2617 ACT (062) 58 3700 (AH)
Commodore User Group	Commodore	Meets on the 1st Monday of each month at Melba High School and on the 3rd Monday each month at the Woden Town Centre Library.	Commodore User Group (ACT) PO Box 599 Belconnen ACT 2616
Compucolor User Group	Compucolor	—	Ken Kerrison 5 Beltana Road Pialligo ACT 2609 (063) 73 7743
Excalibur 64 User Group	Excalibur 64	—	Frank Nugent 28 Kingston Street Evatt 2617 (062) 58 4591
MICSIG	General	Meetings held on 2nd Tuesday of each month at the Oliphant Building, Australian National University at 7.45pm.	Registrar, MICSIG, PO Box E237 Old Canberra ACT 2600
NEC User Group of Canberra	NEC	Meets on the 1st Tuesday of each month at the Main Conference Room, CSIRO Headquarters, Limestone Avenue, Canberra at 7.30pm.	Mal Smith PO Box 173 Belconnen 2616 (062) 541 614
The Australian ZX Users Association	ZX80, ZX81 and Zx Spectrum Micro-computers	—	AZUA 19 Godfrey Street, Campbell 2601

## QUEENSLAND

Adventure Club	General	—	Ms Christine Ogden 37 Samford Road Leichhardt, Ipswich Queensland 4305
Adventure Club	Commodore 64	—	Stuart Elflett Adventure News MSF.550 Toogoolawah Qld 4313
Apple-Q Brisbane User Group	Apple	Meets every 3rd Sunday of the month at Hooper Education Centre, Kuran Street, Wavell Heights 8.30am — 4.30pm	David Bourne PO Box 721 South Brisbane 4101
Australian Computer Education Association	General	—	Guy Coppens, ACEA PO Box 4075 (07) 379 9365
Brisbane 16-bit User Group	16-bit micros	Meets on the 3rd Sunday of each month, 2pm at the Toowong High School.	Roy Willie Jnr BRISBUG PO Box 305 Wynnum Central Qld 4178
Commodore Computer Users Group (Townsville)	Commodore	Meetings are held at 7.30pm on the 1st Wednesday of every month (except January) at the computer room of Ignatius Park College, Ross River Road.	A Moore Secretary 1 Paxton Street Townsville 4810 (077) 72 6454
Commodore Computer Users Group Queensland	Commodore	Meetings are held on the 1st Tuesday of the month at 7.30pm at Milton State Primary School, Bayswater Road, Milton	John Egan PO Box 274 Springwood 4127 (07) 287 2705
Compucolor User Group	Compucolor	Meets on the 2nd Saturday of each month at 1pm.	Ray Halliday 325 Enoggera Road Newmarket 4051 (07) 356 4236
Cranium Computers	General	—	Chris Lucey 34 Lawless Street, Blackwater 4717
Darling Downs Apple User Group	Apple	—	Lloyd Ernst PO Box 53 Darling Heights Qld 4350 (076) 38 3060
Macintosh Association of Queensland	Apple Macintosh, Lisa	Meets every 2nd Saturday of each month, 2pm, at the Coorparoo State High School Library, Cavendish Road, Coorparoo.	Mark Dancer 49 Fanny Street Annerley 4103 Qld
Medfly User Group	Medfly	—	Medfly User Group 120 Highgate Street Coopers Plain 4108



# USER GROUPS INDEX

NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
NEC User Group of Queensland	NEC	Meets every 2nd Wednesday of each month at 165 Wellington Road, East Brisbane.	Guy Coppens President PO Box 194 Corinda Qld 4075
Ohio Superboard User Group	Ohio Scientific Microcomputers	—	Ed Richardson 146 York Street, Nundah 4012
Osborne Users Group	Osborne	—	Glen McBride (07) 371 4243 (AH) (07) 377 2763 (BH)
Peach Computer Users Group Queensland	All MB6890 users	Meets every 4th Tuesday at 7.30pm, Taringa Primary School, Brisbane	Leo Burke (07) 356 6080 or Brian Williams 19 Patrick Street, Norman Park
PC 1500/PC 2 Club	PC 1500 and PC 2 users	—	Mark Tischler PO Box 3 Wavell Heights, Brisbane 4012
Queensland Amstrad Users Cassette Journal	Amstrad	Circulation of a monthly cassette	Frank Ellett 59 Twentysventh Ave, Palm Beach Qld 4221
Queensland CP/M Users	Any CP/M computer	Meetings held on the last Sunday of each month at the University of Queensland Civil Engineering Work Room 1.01 (off Staff House Road) from 1pm.	Secretary/Treasurer PO Box 1025 Milton Qld 4064 (07) 369 4288
S.C.C.U.G.	Commodore	Every Monday night at 7pm (ex school holidays), Labrador State School, Turpin Road, Labrador	Bill Fitzpatrick 5/19 Huth Street, Labrador 4215 (075) 32 0061
Sinclair Computer Club	Sinclair Spectrum	Meets every third Sunday of each month, 2.00pm at Everton Park State High School, Brisbane.	Mrs V Lewis Secretary 37 Samford Road Leichhardt Ipswich Queensland 4305
Southport Commodore Computer User Group	Commodore	Meets weekly at the Labrador State Primary School, Turpin Road, Labrador.	Bill Fitzpatrick President/Editor (075) 32 0061, or John Smith Treasurer (075) 5B 2929
T.I.B.U.G.	TI 99/4 users	Meets 1st Friday every month	R Saunders PO Box 57 Aspley 4034
Townsville MicroBee User Group	MicroBee	Meets at 7.30pm on the 2nd Monday of each month at Town & Country Computers, CTL Centre, Anne Street, Aitkenvale	John Johnson (077) 79 5628 (AH)
The Brisbane Southside Spectravideo User Group	Spectravideo	Meetings are held every 3rd Tuesday of each month at the Woodridge Primary School, Wembley Road, Woodridge, at 7.30pm.	Mrs L Parker Secretary 25 Primrose Street Woodridge Queensland 4114 (07) 208 5951
TRS-80/System 80 Computer Group	TRS-80/System 80	Meets on the 1st Sunday of each month, 2pm, at Lindum Hall, Lindum Road, Lindum.	W Allen Secretary 16 Laver Street Macgregor 4109 (07) 343 5771
University of Queensland Osborne User Group	Osborne	Meets every 2nd Wednesday of each month at the Axan Building (on campus) at 7pm.	Glen McBride C/- Womens College, College Road, St Lucia Qld 4067 (07) 870 1177
User Group for the TRS-80 Model I and III, MC-10, COCO, System 80, Apple and Commodore 64	TRS-80 Model I and III, MC-10, COCO, System 80, Apple and Commodore 64	—	Chris Lucey 34 Lawless Street Blackwater Queensland 4717 (079) 826 146
VZ-200/300 Computer Club	VZ-200/300	—	VZ-200/300 Club 24 Albert Street, Goodna Qld 4300 (07) 288 3045
VZ South Pacific User Group	VZ-200/300	—	John D'Alton 39 Agnes Street, Toowong Qld 4066 (07) 371 3707
<b>SOUTH AUSTRALIA</b> Adelaide Atari Computer Club	Atari	The group meets at the Gillies Street Primary School, City, on the 1st Monday (2nd, if first is on a public holiday), and 3rd Monday of each month at 7.30pm.	Adelaide Atari Computer Club PO Box 333, Norwood SA 5067

# USER GROUPS INDEX

NAME OF GROUP:	CATERING FOR:	MEETINGS:	CONTACT:
Adelaide Micro User Group Inc.	General	—	Helen Ross 36 Sturt Street Adelaide SA 5000
Adelaide Sega User Group	John Sands Sega	Meets on the 1st and 3rd Wednesday of each month, 7pm, at the Lutheran Church Hall, 137 Archer Street, North Adelaide.	Jamie Anderson (08) 263 5020 (AH)
Aquarius User Club	Aquarius	—	Aquarius User Club 7 Duncraig Lane, Stirling SA 5152
Beebnet Inc			
BBC & Econet users			
PO Box 262 Kingswood 5062			
Commodore User Group	Commodore	Meets on the 2nd Tuesday of each month at the Royal Caledonian Hall, 379 King William Street at 7.30pm.	Commodore User Group PO Box 427 North Adelaide 5000
Compucolor User Group	Compucolor	—	Brian O'Sullivan PO Box 86 Torensville 5031 (08) 352 3296
Exalibur 64	Excalibur	—	Terry Mulvaney 31 Charmouth Street Elizabeth West 5113 (08) 255 7123
Hitachi User Group	Hitachi	—	Geoff Drury 27 Creslin Terrace, Camden Park 5038 (08) 295 2778 (AH)
IBM PC SA User Group	All 8088 users are welcome	Meets on the first Thursday of each month at the location advertised in the newsletter	Don Richards PO Box 68 Walkerville 5081 (08) 261 9590
Kaypro User Group	Kaypro	—	Ralph Engler Kaypro User Group 16/34 John Street Payneham SA 5070
MicroBee Users Group of South Australia	MicroBee	—	Brian Uren GPO Box 767, Adelaide 5001 (08) 260 5038
MicroBee User Group of South Australia Incorporated	MicroBee	Meets on the 3rd Monday of each month (except January) at 18 Arthur Street, Unley, 7.30pm.	Richard Jackson Secretary GPO Box 767, Adelaide SA 5001
Sorcerer User Group of South Australia	Sorcerer	Meetings are held on the 2nd Wednesday of every month at Adelaide University in the Eric Russel room of the Lower Napier Building	Don Ide 14 Scott Road, Newton 5074
SA Foundation for Computer Literacy	Caters for children aged from six years of age with special emphasis on the needs of handicapped, educably disabled and socially disadvantaged children.	—	SA Foundation for Computer Literacy PO Box 210 Norwood SA 5067
SA Microprocessor Group	General	Meetings are held on the 2nd Friday of each month at the Adelaide Archery Club Rooms, Cnr Bundeys and War Memorial Drive, North Adelaide.	Secretary (08) 793 445
<b>TASMANIA</b>			
Devonport Computer Interest Group	General	Meets 4th Thursday of each month. Contact group for location details	John Stevenson RSD 422, Sheffield 7306 (004) 92 3237
SVI-MSX Australasian User Group	Spectravideo/MSX	—	SVI-MSX Australasian User Group PO Box 191 Launceston South Tasmania 7249
Tandy Hobart User Group	All Tandy Computers	—	Kristen Rees Secretary GPO Box 127IN Hobart Tasmania (002) 72 1426
Tasbeeb	BBC	Meets on the 1st Monday of each month, 8pm at the Elizabeth Matriculation College, D Block (entrance off Warwick Street) Hobart.	John Hannon PO Box 25 North Hobart Tasmania 7000 (002) 342 704
Tasmanian Apple User Club	Apple	Meetings are held on the 3rd Tuesday of each month at 75 Murray Street, Hobart, commencing at 8.15pm.	Ray Williams Secretary TAVC PO Box 188 North Hobart 7008



# USER GROUPS INDEX

## NAME OF GROUP:

Tasmanian TI 99/4A

## CATERING FOR:

Texas Instruments

## MEETINGS:

Meets on the 3rd Sunday of each month commencing at 2pm at the University of Tasmania in Room 373.

## CONTACT:

L Lonergan  
Secretary/Treasurer  
7 Tarana Road  
Blackman's Bay 7152  
(002) 29 4009

Tasmanian Computer Group

General

Meets 1st Tuesday of each month. Contact group for location details

Allan Appleby  
17 Ninabah Street,  
Howrah 7018  
(002) 30 2386 (BH)

Ti 99/4 User Group

Ti 99/4 users

Monthly meetings at the University of Tasmania, room 373, on every 3rd Sunday

Rex C. Shepherd  
1 Benboyd Court,  
Rokeby 7019

## NORTHERN TERRITORY

NT Computer Club

Commodore 64, VIC 20 and other machines

Meetings are held at Wulagi Primary School on the 1st and 3rd Thursday of each month at 7.30pm.

Ian Diss  
NT Computer Club  
349 McMillans Road  
Anula NT 5793  
(089) 27 9208

## WESTERN AUSTRALIA

Compucolor User Group

Compucolor

1st Wednesday of each month at 8pm.

John Newman  
WAIT Computer Centre  
Kent Street  
Sth Bentley 6102

Excalibur 64 User Group

Exalibur 64

—

Jim Barbas  
(09) 342 3625 (AH)  
(09) 325 4409 (BH)

MicroBee User Group of Western Australia

MicroBee

—

Secretary  
MUGWA  
4 Garnkirk Road  
Greenwood WA 6024  
(09) 447 5366

The Australian QL User Association

Sinclair QL

—

Graeme Ashford  
Secretary  
12 St Michael Terrace  
Mount Pleasant 6153

Osborne User Group (OSWEST)

Osborne and other machines running CP/M

Meetings are held on the first and third Wednesday of each month at the Palmyra Recreation Centre (first Wednesday), Subiaco Exhibition Hall (third Wednesday). Meetings are held at 7.30pm.

The Secretary  
Oswest  
PO Box 199  
Mundaring 6554

VIC-UPS Computer User Group

Commodore

Twice a month at various locations.

Russ Coppins  
Secretary  
PO Box 178  
Nedlands WA 6009  
(09) 332 5313

WA Cromemco User Group

Cromemco

Meets monthly (Feb to Nov) every 3rd Tuesday at Suite 2, 294 Rokeby Road, Subiaco.

Secretary  
WA Cromemco User Group  
Suite 2  
294 Rokeby Road  
Subiaco 6008 WA

## NEW ZEALAND

ACES (Auckland Computer Education Society): C/- Director, Computer Centre, Secondary Teachers College, Private Bag, Symonds Street, Auckland. Meets 3rd Thursday, Teachers College, Epsom Avenue, Auckland.

ATARI Microcomputer Users Group: Ian Mason, 25 Manutara Avenue, Forrest Hill. Telephone: 467 347 (H). Meetings: 2nd Tuesday, Western Suburbs Radio Club, Gt North Road, New Lynn.

EPSON HX20 Users Group: C-W Nighy. Telephone: 774 268. Meetings: 1st Wednesday, 231 Khyber Pass Road, Auckland.

HP41C Users Group (AK): Grant Buchanan. Telephone: 790 328 (W). Meetings: 3rd Wednesday, Centre Computers, Great South Road, Epsom.

NZ TRS-80 Microcomputer Club: Olef Skarsholt, 203a Godley Road, Titirangi. Telephone: (09) 817 8698 (H). Meets 1st Tuesday, OSNZ Hall, 107 Hillsborough Road, Mt Roskill.

OSI Users Group (AK): Ken Hartley, 77 Boundary Road, Blockhouse Bay. Meets 3rd Tuesday at the VHF Clubrooms, Hazel Avenue, Mt Roskill.

Christchurch '80 Users Group: Brendon Thompson, P.O. Box 4118, Christchurch. Telephone: (03) 370 381 (A.H.).

Nelson Commodore Users Group: Peter Archer, P.O. Box 860, Nelson, NZ. Telephone: (054) 79 362.

NZ PC 1500 User group: Allan Thomas, P.O. Box 155, Napier, NZ.

Taranaki Microcomputer Society: Keith Smith, P.O. Box 7003, Bellblock, New Plymouth, NZ. Telephone: Waitata 8556.

NZ Microcomputer Club Inc: P.O. Box 6210, Auckland. Monthly meetings the 1st Wednesday of each month at 7.30pm at the OSNZ Hall, 107 Hillsborough Road, Mt Roskill.

OSI/BBC User Group Inc. Gary Plumpton, 15 Reiman Street, New Lynn, Auckland, New Zealand.

*The following User Groups are part of the NZ Micro Club, all meetings start at 7.30pm.*

APPLE Users Group: Ross Bryon. Telephone: 770 630 Extn 518 (W). Meetings: 3rd Tuesday each month at the DSNZ Hall, 107 Hillsborough Road, Mt Roskill.

BBC Users Group: Dave Fielder. Telephone: 770 630 Extn 518 (W). Meetings: 2nd Wednesday at the VHF Clubrooms, Hazel Avenue, Mt Roskill.

BUSINESS Users Group: Cathy Arrow. Telephone 491 012 (H). Meetings: 4th

Tuesday each month. Even months at the VHF Clubrooms, Hazel Avenue, Mt Roskill. Visits to business computer establishments are arranged for odd months.

CP/M Users group: Kerry Koppert. Telephone: 695 355 (H). Meetings: 1st Wednesday 9pm (after the Club meetings) each month at the OSNZ Hall, 107 Hillsborough Road, Mt Roskill.

IBM PC Users Group: Terry Bowden. Telephone: 452 639 (H), 778 910 (W). Meetings 3rd Thursday each month at the OSNZ Hall, 107 Hillsborough Road, Mt Roskill.

NZ COMMODORE Users Group (AK): John Walker. Telephone 8339 589, P.O. Box 5223, Auckland. Meetings: 3rd Wednesday each month at the Remuera Primary School Hall, Dromorne Road, Remuera.

NZ Microcomputer Club Inc: Selwyn Arrow (Chairman). Telephone: 491 012, P.O. Box 6210, Auckland, (See above for full details).

NZ OSBORNE Users Group (MZOG): Brian Jones. Telephone: 659 738 (H). Meetings: 1st Thursday each month at 20 Kingsley Street, Grey Lynn.

POCKET COMPUTER Users Group: Peter Taylor, 14 Gollan Road, Mt Wellington, Auckland 6. Telephone: 576 618 (H).

SINCLAIR Users Group: Doug Farmer. Telephone 567 589 (H). Meetings: 4th Wednesday at the VHF Clubrooms, Hazel Avenue, Mt Roskill.

SORCERER Users Group (NZ): Selwyn Arrow. Telephone: 491 012 (H). Meets 1pm at Saturday Micro Workshop (see above).

SORD Users Group (NZ): Graeme Hall, 5 Brouder Place, Manurewa. Telephone: 266 8133 (H).

TI 99/4A Users Group: Ray Tucker. Telephone: 568 155 (H).

ToMorrow Users Group: Chris Cotton. Telephone: 789 153. Meetings: 3rd Thursday, 20 Kingsley Street, Grey Lynn. BYO floppy disk.

WIZZARD Users Group: Richard McFadden, 11 Hilling Street, Titirangi. Telephone: 8178 219 (H).

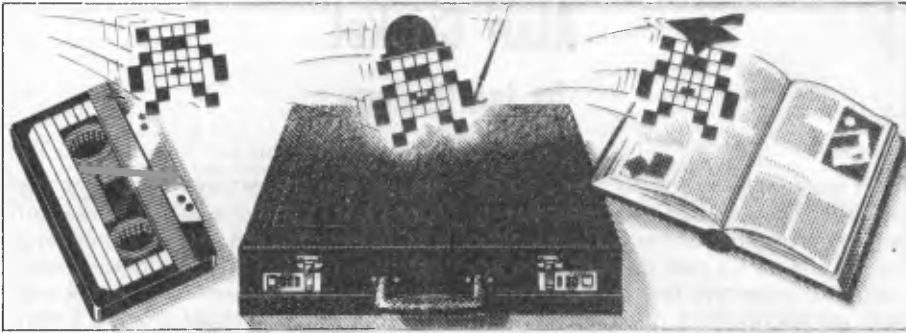
1802 Users Group: Brian Conquer. Telephone: 695 669 (H).

2650 Users Group: Trevor Sheffield. Telephone: 676 591 (H).

68xx(x) Users Group: John Kucernak. Telephone: 606 935 (H).

*All the above use the Micro Club's postal address.*

# PROGRAMS



**We select the best of readers' programs. For details on submitting your own, see the end of this section.**

Christmas has come and gone (some would say thankfully), so we can all get down to some serious holiday-making — albeit with empty pockets.

Many of you will have brand new reasons to do some programming after Christmas, so for all those readers who have itchy minds and want to submit programs to APC, here are a few guidelines as to what is likely to be accepted for publication.

Take some time to study the type of program we publish regularly. Obviously, a program which has wider appeal than solely for the owners of one machine will be more popular. It helps if the coding is clear, in order that other users can understand what you are trying to do. Remember that people will be typing in the programs, and will be unwilling to spend time on something that is lengthy and incomprehensible.

APC is interested in all types of programs and in all languages, but what is published must reflect the desires of the average reader. No-one is likely to want a program about butterfly migratory patterns written in Ada. Generally, utilities, business, educational, scientific and games programs are welcome, but remember that most of our readers are serious computer users and are less interested in games than in original and useful ideas.

We want original, well-written, useful, interesting and preferably general-purpose programs. For more information on submitting programs, see the end of Programs.

Australia's recent performances on the cricket field haven't been raging successes, so it's probably not a good time to present a cricket simulation. Anyhow, this month there's one for the Atari.






Commodore 64 owners have a com-

bined Basic and machine language action game to key in over the holiday period; and there's also APC's first offering for the Sega, plus an 'ampersand utilities' listing for the Apple II.

CS-Bureau may well be the last WIMP (windows, icons, menus, pull-down menus) program that we'll accept for the BBC Micro. (What about offerings in this vein for other machines?) It was in fact written for the Electron, but works fine on the BBC as well. It provides an easy way to put windows and icons into your own programs, making them far more friendly.

For the Amstrad there is a drawing program that is packed with facilities such as colour-filling, airbrushes, line-drawing, circles, and so on. You can also save pictures to cassette (or disk, if you alter the program to cope with it).

Apart from the recent star over the stable in Bethlehem, there is another heavenly visitor hanging round the sky at the moment. This is Halley's Comet (which some say was the star of Bethlehem) which should be visible very soon. This program, written for the Sharp MZ-700 in Hu-Basic but easily converted to other machines with no-digit precision, can be used to calculate the position of this or other comets, or planets and asteroids.

-  **Games**
-  **Scientific/mathematic**
-  **Business**
-  **Toolkit/utilities**
-  **Educational/Computer Aided Learning**

# AMSTRAD

**CPC 464  
CPC 664  
CPC 6128**

## Software

### WORD PROCESSING WITH AMSTRAD

The hardware features of Amstrad computers combined with the extensive facilities of Tasword word processors provide the ideal word processing system for both home and business users. Every Tasword comes complete with a comprehensive manual and a cassette or disc. A tutor program is included with the software to make learning easy and enjoyable.

**TASWORD 464 \$49.50**

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# PROGRAMS

```

660 ? CHR$(125):STA=BAT
670 FOR OVER=0 TO MO-1
680 ? CHR$(125):POSITION 15,0
690 Z=1:BALL=0
700 IF BAT=2 THEN GOSUB 3290:GOSUB 3860
710 IF BAT=1 THEN GOSUB 3460:GOSUB 3630
720 Z=0:MAID=1
730 FOR BALL=1 TO 6
740 GO=0:GOSUB 1330
750 IF OUT=10 THEN B20
760 IF S1>S2 AND STA=2 THEN 920
770 IF S2>S1 AND STA=1 THEN 920
780 NEXT BALL
790 BW(1,BOW)=BW(1,BOW)+1:BW(4,BOW)=BW(4,BOW)+MAID
800 CC=CA:CA=CB:CB=CC
810 NEXT OVER
820 GOSUB 4100
830 IF BAT=1 THEN O1=OUT
840 IF BAT=2 THEN O2=OUT
850 IF INN=1 THEN GOTO 920
860 IF BAT=1 THEN BAT=2:GOTO 880
870 IF BAT=2 THEN BAT=1
880 FOR I=0 TO 11:FOR J=0 TO 3:BT(J,I)=0:NEXT J:NEXT I
890 FOR I=0 TO 6:FOR J=0 TO 4:BW(J,I)=0:NEXT J:NEXT I
900 INN=1:OUT=0:CA=1:CB=2:BT(1,CA)=1:BT(1,CB)=1:EX=0:BOV=0
910 GOTO 670
920 GOSUB 4090:GRAPHICS 1+16:? 6:"FINAL SCORE":? 6:? 6:O2=OUT
930 IF STA=2 THEN 1010
940 ? 6:N1$:" ";S1;
950 IF O1=10 THEN ? 6:" ALL OUT"
960 IF O1<>10 THEN ? 6:" FOR ";O1
970 ? 6:? 6:? 6:? 6:N2$:" ";S2;
980 IF O2=10 THEN ? 6:" ALL OUT"
990 IF O2<>10 THEN ? 6:" FOR ";O2
1000 GOTO 1070
1010 ? 6:N2$:" ";S2;
1020 IF O2=10 THEN ? 6:" ALL OUT"
1030 IF O2<>10 THEN ? 6:" FOR ";O2
1040 ? 6:? 6:? 6:? 6:N1$:" ";S1;
1050 IF O1=10 THEN ? 6:" ALL OUT"
1060 IF O1<>10 THEN ? 6:" FOR ";O1
1065 ? 6:? 6:? 6
1070 IF S1=S2 THEN ? 6:"THE MATCH WAS DRAWN":GOTO 1130
1080 ? 6:? 6:"THE WINNERS ARE....."
1090 IF S2>S1 AND STA=1 THEN ? 6:N2$:" BY ";10-O2:? 6;" WICKETS.":GOTO 1130
1100 IF S2>S1 AND STA=2 THEN ? 6:N2$:" BY ";S2-S1;" RUNS.":GOTO 1130
1110 IF S1>S2 AND STA=1 THEN ? 6:N1$:" BY ";S1-S2;" RUNS.":GOTO 1130
1120 IF S1>S2 AND STA=2 THEN ? 6:N1$:" BY ";10-O1:? 6;" WICKETS."
1130 X=USR(ADR(FSH$),100):RUN
1140 IF INN=0 THEN RETURN
1150 IF BAT=1 AND S1>S2 THEN 920
1160 IF BAT=2 AND S2>S1 THEN 920
1170 RETURN
1180 ? CHR$(125):? " DO YOU WANT TO INPUT YOUR OWN TEAM ":GET 1,A
1190 IF A<>89 AND A<>121 THEN RETURN
1200 ? CHR$(125):? "HOME TEAMS NAME >":INPUT N1$
1210 FOR T=1 TO 11:"PLAYER ";T:" (MAX 10 CHARS) >":INPUT TP$
1220 T1$(LEN(T1$)+1)=TP$:T1$(LEN(T1$)+1)="-":NEXT T:T1$(LEN(T1$))=""
1230 ? "NOW TYPE IN THE NUMBERS OF THE BOWLERS":
1240 ? :FOR T=1 TO 6:"BOWLER NUMBER ";T:" >":INPUT TP$
1250 B1$(LEN(B1$)+1)=TP$:B1$(LEN(B1$)+1)="-":NEXT T:B1$(LEN(B1$))=""
1260 ? CHR$(125):? "AWAY TEAMS NAME >":INPUT N2$
1270 FOR T=1 TO 11:"PLAYER ";T:" (MAX 10 CHARS) >":INPUT TP$
1280 T2$(LEN(T2$)+1)=TP$:T2$(LEN(T2$)+1)="-":NEXT T:T2$(LEN(T2$))=""
1290 ? "NOW TYPE IN THE NAMES OF THE BOWLERS":
1300 ? :FOR T=1 TO 6:"BOWLER NUMBER ";T:" >":INPUT TP$
1310 B2$(LEN(B2$)+1)=TP$:B2$(LEN(B2$)+1)="-":NEXT T:B2$(LEN(B2$))=""
1320 RETURN
1330 GOSUB 2910
1340 IF BAT=1 AND CA=1 THEN TE=T1$(1,TAB1(0)):TP$=SP$(40-LEN(STR$(S1))):GOTO 1380
1350 IF BAT=1 THEN TE=T1$(TAB1(CA-2)+2,TAB1(CA-1)):TP$=SP$(40-LEN(STR$(S1))):GOTO 1380
1360 IF BAT=2 AND CA=1 THEN TE=T2$(1,TAB2(0)):TP$=SP$(40-LEN(STR$(S2))):GOTO 1380
1370 IF BAT=2 THEN TE=T2$(TAB2(CA-2)+2,TAB2(CA-1)):TP$=SP$(40-LEN(STR$(S2)))
1380 POSITION 1,22:"OVERS BOWLED:":OVER:TP$:? " FACING:":ITE$
1390 IF BAT=1 AND BOW=1 THEN TE=B2$(1,BP2(0)):TO=S1:GOTO 1430
1400 IF BAT=1 THEN TE=B2$(BP2(BOW-2)+2,BP2(BOW-1)):TO=S1:GOTO 1430
1410 IF BAT=2 AND BOW=1 THEN TE=B1$(1,BP1(0)):TO=S2:GOTO 1430
1420 IF BAT=2 THEN TE=B1$(BP1(BOW-2)+2,BP1(BOW-1)):TO=S2
1430 POSITION 1,23:"BALL ";BALL:" TOTAL:":TO:SP$(40-LEN(STR$(OVER))):" BOWLE
R:":YES:
1440 FOR T=31 TO 29 STEP -1:POSITION T,10:" CHR$(12):CHR$(32):PZ=5:GOSUB 3250:NE
XT T:POSITION 28,10:" CHR$(1):CHR$(32):PZ=10:GOSUB 3250
1450 POSITION 27,10:" CHR$(2):CHR$(32):PZ=5:GOSUB 3250:POSITION 26,10:" CHR$(4):
CHR$(32)
1460 FOR T=24 TO 20 STEP -1:POSITION T,10:" CHR$(16):CHR$(32):PZ=5:GOSUB 3250:NE
XT T
1470 POSITION 20,10:" " :FOR T=19 TO 18 STEP -1:POSITION T,11:"CHR$(16):CHR$(3
2):PZ=5:GOSUB 3250:NEXT T
1480 POSITION 16,11:" "
1490 POSITION 15,11:" CHR$(16):CHR$(32)
1500 POSITION 14,11:" CHR$(11):CHR$(32)
1510 GJ=INT(RND(1)*300)+1:X=15:Y=11
1520 IF GJ<130 THEN POSITION 0,22:" SP$:SP$:POSITION 4,23:" "BALL GOES THROUGH
TO THE KEEPER":PZ=100:GOSUB 3250:RETURN
1530 IF GJ=86 OR GJ=99 THEN 2430
1540 IF GJ=52 OR GJ=77 THEN 2380
1550 IF GJ=73 THEN 2400
1560 IF GJ=48 OR GJ=64 THEN 2670
1570 IF GJ=74 OR GJ=102 THEN 2720
1580 BY=INT(RND(1)*40)+INT(RND(1)+6)-INT(RND(1)*6):SOUND 1,10,14.7:SOUND 1,0,0,0
1590 BY=INT(RND(1)*22)+INT(RND(1)*5)-INT(RND(1)*5)
1600 SD=INT(RND(1)*5)+2:D=BX-14:P=BY-11:X=14:Y=11:Q1=Q/SD:P1=P/SD
1610 FOR T=1 TO 50
1620 IF T>50 THEN 1750
1630 X=X+D1:Y=Y+P1:IF X<1 OR X>37 OR Y<1 OR Y>20 THEN 1700
1640 LOCATE X,Y,W
1650 IF W=15 OR W=4 THEN LD=0:GOTO 2330

```

# FMS

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1660 IF W=13 AND X=13 THEN 2380
1670 IF W=13 AND X<13 THEN POSITION 26,11: CHR$(13)
1680 IF W=10 THEN POSITION X,Y: CHR$(10)
1690 GOTO 1720
1700 SF=INT(RND(1)*5)+1: IF SF=3 THEN 2620
1710 GOTO 2570
1720 IF INT(X)=13 AND INT(Y)=9 THEN 2380
1730 POSITION X,Y: CHR$(16): PZ=10: GOSUB 3250: POSITION X,Y: CHR$(W)
1740 NEXT T
1750 POSITION X,Y: CHR$(16)
1760 AL=1000
1770 FOR T=1 TO 11
1780 TX=ABS(BX-FX(T)): TY=ABS(BY-FY(T)): F(T)=TX+TY
1790 IF F(T)<AL THEN F1=FX(T): F2=FY(T): AL=F(T): LO=T
1800 NEXT T
1910 POSITION F1,F2: CHR$(143): FOR T=1 TO 3: U(T)=0: NEXT T
1820 POSITION 0,22: SP: SP:
1830 POSITION 12,23: " " RUN (Y/N) " "
1840 GET 1,A
1850 IF A<>89 AND A<>121 AND A<>78 AND A<>110 THEN GOTO 1840
1860 POSITION 0,22: SP: SP:
1870 POSITION 25,11: " " : POSITION 14,12: " "
1880 IF A<>89 AND A<>121 AND GO=0 THEN RETURN
1890 IF A<>89 AND A<>121 AND GO<0 THEN RETURN
1900 U(1)=0: U(2)=0: AL=1000: B1=14: B2=11: B3=25: B4=12: L=0: SE=INT(RND(1)*9)+5: GO=GO+1
1910 IF BX<19 THEN T1=26: T2=11
1920 IF BX<=19 THEN T1=13: T2=11
1930 IF U(3)=0 THEN GOTO 2040
1940 POSITION F1,F2: CHR$(15)
1950 Q=T1-BX: O1=Q/SE
1960 P=T2-BY: P1=P/SE
1970 POSITION BX, BY: " "
1980 BX=BX+O1: BY=BY+P1
1990 IF L>3 THEN BX=BX+O1: BY=BY+P1
2000 POSITION BX, BY: CHR$(16)
2010 IF ABS(BX-T1)+ABS(BY-T2)<0.8 THEN POSITION T1,T2: CHR$(14): GOTO 2470
2020 L=L+1
2030 GOTO 2110
2040 IF SGN(BY-F1)=-1 THEN A$=CHR$(12)
2050 IF SGN(BY-F1)=1 THEN A$=CHR$(3)
2060 IF SGN(BX-F1)=0 THEN A$=CHR$(15)
2070 POSITION F1,F2: " "
2080 F1=F1+(SGN(BX-F1)/2): F2=F2+(SGN(BY-F2)/2)
2090 POSITION F1,F2: A$
2100 IF INT(F1)=INT(BX) AND INT(F2)=INT(BY) THEN U(3)=1
2110 IF U(1)=1 THEN GOTO 2140
2120 POSITION B1,B2: " " : B1=B1+1: POSITION B1,B2: CHR$(7)
2130 IF B1=25 THEN U(1)=1
2140 IF U(2)=1 THEN GOTO 2180
2150 POSITION B3,B4: " " : B3=B3-1: POSITION B3,B4: CHR$(8)
2160 IF B3=14 THEN U(2)=1
2170 GOTO 1930
2180 BT(2,CA)=BT(2,CA)+1: BW(3,BOW)=BW(3,BOW)+1: MAID=0: CC=CA: CA=CB: CB=CC
2190 IF BAT=1 THEN S1=S1+1: MAID=0
2200 IF BAT=2 THEN S2=S2+1: MAID=0
2210 GOSUB 1140
2220 GOTO 1830
2230 FOR T=1 TO 11: IF T<>LO THEN POSITION FX(T),FY(T)
2240 IF T<>LO THEN ? CHR$(6)
2250 NEXT T: POSITION 0,22: SP: SP: POSITION 13,23: " * HOWZAT * " : GOSUB 227
0
2260 FOR T=1 TO 150 STEP 10: SOUND 0,T,6,15-(T/10): SOUND 1,T,8,15-(T/10): NEXT T: S
DUND 0,0,0,0: SOUND 1,0,0,0: RETURN
2270 IO=INT(RND(1)*10)+1: RETURN
2280 IF OUT=10 THEN RETURN
2290 CA=OUT+2: BT(1,CA)=1: IF BAT=1 THEN GOTO 3630
2300 IF BAT=2 THEN GOTO 3860
2310 IO=INT(RND(0)*19)+1: POSITION 0,23: SP: SP: RETURN
2320 IF A=27 THEN GOTO 3020
2330 GOSUB 2230: GOSUB 2270: GOSUB 2310
2340 IF IO<3 THEN GOSUB 2310: POSITION 17,23: " DROPPED " : PZ=100: GOTO 3250
2350 BT(1,CA)=2: BW(2,BOW)=BW(2,BOW)+1: OUT=OUT+1: BT(3,CA)=BOW-1
2360 POSITION 17,23: " CAUGHT " : PZ=100: GOSUB 3250
2370 GOTO 2280
2380 POSITION X,Y: " " : POSITION 13,11: CHR$(14): GOSUB 2230: GOSUB 2310: BT(1,CA)
=3: BW(2,BOW)=BW(2,BOW)+1: OUT=OUT+1: BT(3,CA)=BOW-1
2390 POSITION 17,23: " BOWLED " : PZ=100: GOSUB 3250: GOTO 2280
2400 POSITION 10,11: CHR$(32): CHR$(5): CHR$(14): " " : CHR$(11): GOSUB 2230: GOSUB 2
310
2410 IF IO<5 THEN POSITION 16,23: " NOT OUT " : PZ=100: GOTO 3250
2420 BT(1,CA)=4: BT(3,CA)=BOW-1: BW(2,BOW)=BW(2,BOW)+1: OUT=OUT+1: POSITION 16,23: "
STUMPED " : PZ=100: GOSUB 3250: GOTO 2280
2430 GOSUB 2230: GOSUB 2310
2440 IF IO<10 THEN POSITION 16,23: " NOT OUT " : PZ=100: GOSUB 3250: RETURN
2450 BT(1,CA)=6: BW(2,BOW)=BW(2,BOW)+1: OUT=OUT+1: BT(3,CA)=BOW-1
2460 POSITION 18,23: " L.B.W " : PZ=100: GOSUB 3250: GOTO 2280
2470 GOSUB 2230: GOSUB 2310: IF OUT=10 THEN 2520
2480 IF GO=1 OR GO=3 OR GO=5 AND T1=13 THEN OT=CB: CB=OUT+3: GOTO 2520
2490 IF GO=2 OR GO=4 AND T1=26 THEN OT=CB: CB=OUT+3: GOTO 2520
2500 IF GO=1 OR GO=3 OR GO=5 AND T1=26 THEN OT=CA: CA=OUT+3: GOTO 2520
2510 IF GO=2 OR GO=4 AND T1=13 THEN OT=CA: CA=OUT+3: GOTO 2520
2520 BT(1,OT)=5: OUT=OUT+1: POSITION 16,23: " RUN OUT " : PZ=100: GOSUB 3250
2530 IF OUT=10 THEN RETURN
2540 BT(1,OUT+2)=1
2550 IF BAT=1 THEN GOTO 3630
2560 IF BAT=2 THEN GOTO 3860
2570 BT(2,CA)=BT(2,CA)+4: BW(3,BOW)=BW(3,BOW)+4: MAID=0
2580 IF BAT=1 THEN S1=S1+4: MAID=0
2590 IF BAT=2 THEN S2=S2+4: MAID=0
2600 GOSUB 2310: POSITION 1,22: " *****
2610 POSITION 1,23: " ***** FOUR ***** " : PZ=100: GOSUB 3250
: RETURN
2620 BT(2,CA)=BT(2,CA)+6: BW(3,BOW)=BW(3,BOW)+6: MAID=0
2630 IF BAT=1 THEN S1=S1+6: MAID=0
2640 IF BAT=2 THEN S2=S2+6: MAID=0
2650 GOSUB 2310: POSITION 1,22: " *****
2660 POSITION 1,23: " ***** SIX ***** " : PZ=100: GOSUB 3250
: RETURN
2670 GOSUB 2310: POSITION 0,22: SP: SP: POSITION 10,23: " W I D E "

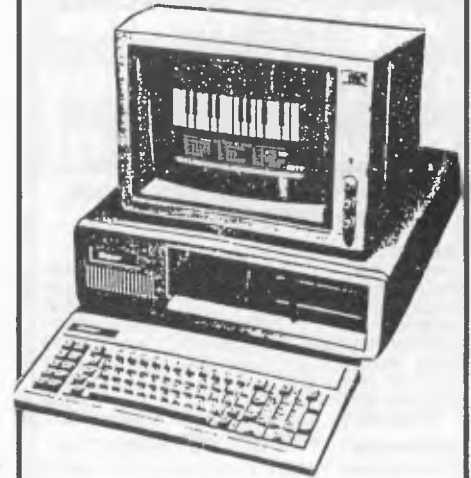
```

# PROGRAMS

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1:PZ=100:GOSUB 3250
2680 BALL=BALL-1:BW(3,BOW)=BW(3,BOW)+1:EX=EX+1
2690 IF BAT=1 THEN S1=S1+1
2700 IF BAT=2 THEN S2=S2+1
2710 RETURN
2720 GOSUB 2310:POSITION 0,22:? SP*1SP*1:POSITION 10,23:? " N O B A L L "
1:PZ=100:GOSUB 3250
2730 BALL=BALL-1:BW(3,BOW)=BW(3,BOW)+1:EX=EX+1
2740 IF BAT=1 THEN S1=S1+1
2750 IF BAT=2 THEN S2=S2+1
2760 RETURN
2770 REM CHARACTER DATA
2780 DATA 0,24,152,125,58,56,72,132,8,52,52,28,28,28,36,66
2790 DATA 0,24,24,122,188,56,228,66,0,48,48,28,60,92,82,17
2800 DATA 1,26,28,120,184,56,72,72,129,153,90,60,60,60,36,36
2810 DATA 24,24,124,186,121,37,195,2,24,24,62,93,156,164,195,64
2820 DATA 12,12,156,92,62,18,18,18,48,48,56,120,184,168,168,36
2830 DATA 24,25,58,60,56,40,40,72,0,48,48,188,122,56,69,130
2840 DATA 0,0,124,84,84,84,84,0,50,1,84,84,92,92,84
2850 DATA 24,24,126,189,189,36,36,36,0,0,24,24,0,0,0
2860 DATA 255,255,192,192,192,192,192,255,255,0,0,0,0,0,0
2870 DATA 255,255,3,3,3,3,3,192,192,192,192,192,255,255
2880 DATA 0,0,0,0,0,0,255,255,3,3,3,3,3,255,255
2890 DATA 192,192,192,192,192,192,192,3,3,3,3,3,3,3,3
2900 DATA 66,121,32,52,65,68,65,77,32,76,65,84,84,69,82,46
2910 ? CHR$(125):POKE 710,194:POKE 712,194:POKE 709,12:POKE 752,1:POSITION 1,0:?
CHR$(17):COLOR 18:PLOT 2,0:DRAWTO 38,0
2920 POSITION 38,0:? CHR$(19):COLOR 23:PLDT 1,1:DRAWTO 1,21:COLOR 24:PLOT 38,1:D
RAWTO 38,21
2930 POSITION 1,21:? CHR$(20):COLOR 21:PLDT 2,21:DRAWTO 38,21:POSITION 38,21:? C
HR$(22)
2940 POSITION 13,11:? CHR$(13):POSITION 26,11:? CHR$(13)
2950 POSITION 14,11:? CHR$(9):POSITION 25,12:? CHR$(10)
2960 POSITION 32,10:? CHR$(15)
2970 FOR T=1 TO 11
2980 IF T=2 THEN NEXT T
2990 POSITION FX(T),FY(T)? CHR$(15):NEXT T
3000 DL=PEEK(560)+256*PEEK(561):POKE DL+26,130:POKE 512,0:POKE 513,6:POKE 54286,
192
3010 RETURN
3020 POKE 752,1:GOSUB 2910:FOR T=3 TO 11:POSITION FX(T)+1,FY(T)? T-2:NEXT T
3030 POSITION 1,0:? "CHANGE THE POSITION OF FIELDER NUMBER ":POKE 764,255:GET
1,A
3040 IF A=27 THEN GOTO 3230
3050 A=A-48:IF A<1 OR A>9 THEN GOTO 3020
3060 GOSUB 2910:POSITION 1,0:? "PLACE THE FIELDER USING THE ARROW KEYS"
3070 XT=FX(A+2):YT=FY(A+2)
3080 P=PEEK(764):IF P<=15 AND P<>14 AND P<>7 AND P<>6 AND P<>33 AND P<>28 THEN 3
080
3090 POSITION XT,YT:? "IF FL=1 THEN GOSUB 2910:POSITION 1,0:? "PLACE THE FIEL
DER USING THE ARROW KEYS":FL=0
3100 XT=XT+(P=7)-(P=6)
3110 YT=YT+(P=15)-(P=14)
3120 IF XT<2 THEN XT=37
3130 IF XT>37 THEN XT=2
3140 IF YT<2 THEN YT=20
3150 IF YT>20 THEN YT=2
3160 FX(A+2)=XT:FY(A+2)=YT:LDCATE XT,YT,2:IF Z<>32 THEN FL=1
3170 POSITION XT,YT:? CHR$(143)
3180 IF P=33 OR P=28 THEN 3220
3190 POKE 764,255:GOTO 3080
3200 GOSUB 2910:POSITION 1,0:? "PLACE THE FIELDER USING THE ARROW KEYS"
3210 FX(A+2)=XT:FY(A+2)=YT
3220 IF P<>28 THEN GOTO 3020
3230 IF BAT=2 THEN GOTO 3290
3240 GOTO 3460
3250 FOR LP=1 TO PZ:NEXT LP:RETURN
3260 DATA 255,255,3,3,3,3,3,192,192,192,192,192,255,255
3270 DATA 0,0,0,0,0,0,255,255,3,3,3,3,3,255,255
3280 DATA 192,192,192,192,192,192,192,3,3,3,3,3,3,3,3
3290 POKE B2,0:? ? CHR$(125):POKE 710,130:POKE 712,130:POKE 709,12:? N1$:? :POK
E 752,1:POKE DL+26,2
3300 ZZ=1:FOR WW=0 TO 5:POSITION 0,WW+3:? WW+1:"":POSITION 4,WW+3:? B1$(ZZ,BP1(
WW)):ZZ=BP1(WW)+2:NEXT WW
3310 POSITION 18,11:? "OVERS":POKE B2,20:? :FOR T=1 TO 6:? BW(1,T):NEXT T
3320 POSITION 27,11:? "M":POKE B2,27:? :FOR T=1 TO 6:? BW(4,T):NEXT T
3330 POSITION 31,11:? "R":POKE B2,31:?
3340 FOR T=1 TO 6:? BW(3,T):NEXT T
3350 POSITION 35,11:? "W":POKE B2,35:?
3360 FOR T=1 TO 6:? BW(2,T):NEXT T
3370 POSITION 0,18:? " PRESS ESCAPE TO MOVE THE FIELD
3380 POSITION 13,13:? " NEW BOWLER ":POKE 764,255:GET 1,A:IF A=27 THEN GOTO 3
020
3390 A=A-48:IF A<1 OR A>6 THEN POKE B2,0:? :GOTO 3290
3400 IF A=BOW THEN GOTO 3290
3410 POKE B2,21:?
3420 IF TYPE=2 AND BW(1,A)+1>11 THEN ? "MAX 11 PER BOWLER":GET 1,A:GOTO 3290
3430 IF TYPE=3 AND BW(1,A)+1>8 THEN ? "MAX 8 PER BOWLER":GET 1,A:GOTO 3290
3440 IF TYPE=4 AND BW(1,A)+1>4 THEN ? "MAX 4 OVERS PER BOWLER":GET 1,A:GOTO 329
0
3450 POKE B2,0:BOW=A?:RETURN
3460 POKE B2,0:? :? CHR$(125):POKE 710,130:POKE 712,130:POKE 709,12:? N2$:? :POK
E 752,1:POKE DL+26,2
3470 ZZ=1:FOR WW=0 TO 5:POSITION 0,WW+3:? WW+1:"":POSITION 4,WW+3:? B2$(ZZ,BP2(
WW)):ZZ=BP2(WW)+2:NEXT WW
3480 POSITION 16,11:? "OVERS":POKE B2,20:? :FOR T=1 TO 6:? BW(1,T):NEXT T
3490 POSITION 27,11:? "M":POKE B2,27:? :FOR T=1 TO 6:? BW(4,T):NEXT T
3500 POSITION 31,11:? "R":POKE B2,31:?
3510 FOR T=1 TO 6:? BW(3,T):NEXT T
3520 POSITION 35,11:? "W":POKE B2,35:?
3530 FOR T=1 TO 6:? BW(2,T):NEXT T
3540 POSITION 0,18:? " PRESS ESCAPE TO MOVE THE FIELD
3550 POSITION 13,13:? " NEW BOWLER ":POKE 764,255:GET 1,A:IF A=27 THEN GOTO 3
020
3560 A=A-48:IF A<1 OR A>6 AND A<>-21 THEN POKE B2,0:? :GOTO 3460
3570 IF A=BOW THEN GOTO 3460
3580 POKE B2,21:?
3590 IF TYPE=2 AND BW(1,A)+1>11 THEN ? "MAX 11 PER BOWLER":GET 1,A:GOTO 3460
3600 IF TYPE=3 AND BW(1,A)+1>8 THEN ? "MAX 8 PER BOWLER":GET 1,A:GOTO 3460
3610 IF TYPE=4 AND BW(1,A)+1>4 THEN ? "MAX 4 OVERS PER BOWLER":GET 1,A:GOTO 346
0

```



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3620 POKE 82,0: BOW=A: ? : RETURN
3630 POKE DL+26,2: IF OUT=10 THEN POP : RETURN
3640 ? CHR$(125): POKE 82,0: ? : POKE 709,0: POKE 710,136: POKE 712,136: ? N1$: ? : POKE
752,1
3650 T=1: P=1
3660 ZZ=1: FOR WW=0 TO 10: POSITION 0, WW+4: ? WW+1: ? " : POSITION 4, WW+4: ? T1$(ZZ, TAB
1(WW)): ZZ=TAB1(WW)+2: NEXT WW
3670 POKE 82,15: POSITION 15,2: ? "HOW OUT": ?
3680 FOR T=1 TO 11: IF BT(1,T)=1 THEN ? "NOT OUT": POSITION 3, T+3: ? " *": POSITION 1
5, T+4: GOTO 3760
3690 IF BT(1,T) <> 0 AND BT(3,T)=0 THEN TE$=B2$(1, BP2(0))
3700 IF BT(1,T) <> 0 AND BT(3,T) <> 0 THEN TE$=B2$(BP2(BT(3,T)-1)+2, BP2(BT(3,T)))
3710 IF BT(1,T)=2 THEN ? "CAUGHT b.": TE$
3720 IF BT(1,T)=3 THEN ? "BOWLED ": TE$
3730 IF BT(1,T)=4 THEN ? "STUMPED b.": TE$
3740 IF BT(1,T)=5 THEN ? "RUN OUT"
3750 IF BT(1,T)=6 THEN ? "L.B.W b.": TE$
3760 NEXT T
3770 POKE 82,36: POSITION 35,2: ? "RUNS": ?
3780 FOR T=1 TO OUT+2: ? BT(2,T): NEXT T
3790 POSITION 17,16: ? "EXTRAS": ? EX
3800 POKE 82,0: IF Z=0 THEN POSITION 2,18: ? : ? " NEW BATSMAN IS NUMBER ": ? 0
UT+2
3810 POSITION 10,19: ?
3820 ? : ? "S1": ? FOR ": OUT: " FROM ": OVER: ", ": BALL: " OVERS.":
3830 IF INN=1 THEN POSITION 4,22: ? N1$: ? REQUIRE ": S2-S1+1: " RUNS TO WIN"
3840 GET 1,A
3850 RETURN
3860 POKE DL+26,2: IF OUT=10 THEN POP : RETURN
3870 ? CHR$(125): POKE 82,0: ? : POKE 710,136: POKE 712,136: POKE 709,0: ? N2$: ? : POKE
752,1
3880 T=1: P=1
3890 ZZ=1: FOR WW=0 TO 10: POSITION 0, WW+4: ? WW+1: ? " : POSITION 4, WW+4: ? T2$(ZZ, TAB
2(WW)): ZZ=TAB2(WW)+2: NEXT WW
3900 POKE 82,15: POSITION 15,2: ? "HOW OUT": ?
3910 FOR T=1 TO 11: IF BT(1,T)=1 THEN ? "NOT OUT": POSITION 3, T+3: ? " *": POSITION 1
5, T+4: GOTO 3990
3920 IF BT(1,T) <> 0 AND BT(3,T)=0 THEN TE$=B1$(1, BP1(0))
3930 IF BT(1,T) <> 0 AND BT(3,T) <> 0 THEN TE$=B1$(BP1(BT(3,T)-1)+2, BP1(BT(3,T)))
3940 IF BT(1,T)=2 THEN ? "CAUGHT b.": TE$
3950 IF BT(1,T)=3 THEN ? "BOWLED ": TE$
3960 IF BT(1,T)=4 THEN ? "STUMPED b.": TE$
3970 IF BT(1,T)=5 THEN ? "RUN OUT"
3980 IF BT(1,T)=6 THEN ? "L.B.W b.": TE$
3990 NEXT T
4000 POKE 82,36: POSITION 35,2: ? "RUNS": ?
4010 FOR T=1 TO OUT+2: ? BT(2,T): NEXT T
4020 POSITION 17,16: ? "EXTRAS": ? EX
4030 POKE 82,0: IF Z=0 THEN POSITION 2,18: ? : ? " NEW BATSMAN IS NUMBER ": ? 0
UT+2
4040 POSITION 10,19: ?
4050 ? : ? "S2": ? FOR ": OUT: " FROM ": OVER: ", ": BALL: " OVERS.":
4060 IF INN=1 THEN POSITION 4,22: ? N2$: ? REQUIRE ": S1-S2+1: " RUNS TO WIN"
4070 GET 1,A
4080 RETURN
4090 DIM FSH$(32): FSH$="": RETURN
4100 ? CHR$(125): POKE 712,50: POKE 710,50: POKE 709,12: POKE DL+26,2
4105 IF BALL=7 THEN BALL=0
4106 IF BALL=6 THEN BW(1, BOW)=BW(1, BOW)+1: BALL=0
4110 IF BAT=2 THEN GOTO 4140
4120 ZZ=1: FOR WW=0 TO 10: POSITION 0, WW+4: ? WW+1: ? " : POSITION 4, WW+4: ? T1$(ZZ, TAB
1(WW)): ZZ=TAB1(WW)+2: NEXT WW
4130 GOTO 4150
4140 ZZ=1: FOR WW=0 TO 10: POSITION 0, WW+4: ? WW+1: ? " : POSITION 4, WW+4: ? T2$(ZZ, TAB
2(WW)): ZZ=TAB2(WW)+2: NEXT WW
4150 POKE 82,15: POSITION 15,2: ? "HOW OUT": ?
4160 FOR T=1 TO 11: IF BT(1,T)=1 THEN ? "NOT OUT": GOTO 4260
4170 IF BT(1,T) <> 0 AND BT(3,T)=0 AND BAT=1 THEN TE$=B2$(1, BP2(0))
4180 IF BT(1,T) <> 0 AND BT(3,T) <> 0 AND BAT=2 THEN TE$=B1$(1, BP1(0))
4190 IF BT(1,T) <> 0 AND BT(3,T) <> 0 AND BAT=1 THEN TE$=B2$(BP2(BT(3,T)-1)+2, BP2(BT
(3,T)))
4200 IF BT(1,T) <> 0 AND BT(3,T) <> 0 AND BAT=2 THEN TE$=B1$(BP1(BT(3,T)-1)+2, BP1(BT
(3,T)))
4210 IF BT(1,T)=2 THEN ? "CAUGHT b.": TE$
4220 IF BT(1,T)=3 THEN ? "BOWLED ": TE$
4230 IF BT(1,T)=4 THEN ? "STUMPED b.": TE$
4240 IF BT(1,T)=5 THEN ? "RUN OUT"
4250 IF BT(1,T)=6 THEN ? "L.B.W b.": TE$
4260 NEXT T
4270 POKE 82,36: POSITION 35,2: ? "RUNS": ?
4280 FOR T=1 TO 11: ? BT(2,T): NEXT T
4290 POKE 82,2: ?
4300 POSITION 17,16: ? "EXTRAS": ? EX: TE$=N1$: SC=S1
4310 IF BAT=2 THEN TE$=N2$: SC=S2
4320 ? : ? TE$: ? WERE ": SC:
4330 IF OUT=10 THEN ? " ALL OUT ": GOTO 4350
4340 ? " FOR ": OUT: " WICKETS"
4350 ? " FROM ": OVER: ", ": BALL: " OVERS.":
4360 POSITION 0,22: ? " PRESS ANY KEY FOR BOWLING ANALYSIS "
4370 GET 1,A
4380 POKE 82,0: ? : ? CHR$(125): POKE 710,68: POKE 712,68: POKE 709,12: POKE 752,1: ? :
TE$=N1$
4390 IF BAT=1 THEN TE$=N2$
4400 POSITION 5,14: ? "BOWLING ANALYSIS FOR ": TE$
4410 IF BAT=1 THEN 4440
4420 ZZ=1: FOR WW=0 TO 5: POSITION 0, WW+3: ? WW+1: ? " : POSITION 4, WW+3: ? B1$(ZZ, BP1(
WW)): ZZ=BP1(WW)+2: NEXT WW
4430 GOTO 4450
4440 ZZ=1: FOR WW=0 TO 5: POSITION 0, WW+3: ? WW+1: ? " : POSITION 4, WW+3: ? B2$(ZZ, BP2(
WW)): ZZ=BP2(WW)+2: NEXT WW
4450 POSITION 18,1: ? "OVERS": POKE 82,20: ? FOR T=1 TO 6: ? BW(1,T): IF T=BOW AND
BALL <> 0 THEN ? " ": BALL:
4460 ? : NEXT T
4470 POSITION 27,1: ? "M": POKE 82,27: ? FOR T=1 TO 6: ? BW(4,T): NEXT T
4480 POSITION 31,1: ? "R": POKE 82,31: ?
4490 FOR T=1 TO 6: ? BW(3,T): NEXT T
4500 POSITION 35,1: ? "W": POKE 82,35: ? N) $4510 FOR T=1 TO 6: ? BW(2,T): NEXT T << 45
20 POKE 82,0: ? $F24530 POSITION 0,20: ? " PRESS ANY KEY TO CONTINUE
4510 FOR T=1 TO 6: ? BW(2,T): NEXT T
4520 POKE 82,0: ?

```



# PROGRAMS

4530 POSITION 0,20:7 PRESS ANY KEY TO CONTINUE  
4540 GET 1,A:RETURN

## NOTES ON LISTING

ALL CHARACTERS IN THE PRINT STATEMENTS IN  
LINES: 440, 550, 1180, 1200, 1230, 1260, 1290, 2360, 2390, 2460, 2600, 2610, 2650, 2660,  
3030, 3060, 3200, 3370, 3380, 3540, 3550, 4360, 4530  
SHOULD BE TYPED IN INVERSE VIDEO.

LINE 4090 :FSH#="hhhhHINV 'JPLINV SPCJCTRL .JLINV -JCTRL .JLINV RJeCTRL TJLINV  
V CTRL MJECTRL VJLINV PJLINV CTRL M)  
CTRL JLINV TJLINV CTRL HJLINV PJLINV JLINV JLINV PJLINV M)  
BLINV JCTRL AJLINV PJLINV JCTRL .J"



## Comet Halley by N Cabric

Observations of comets, when they are far from the sun and of low brightness, can be a tricky problem. The ephemeris data are often given with a large time step, while the comet moves on the starry background with an amazing speed. The interpolation of data of comet position on the sky, and afterwards the recalculation of these positions for a given place on the Earth, is a difficult mathematical problem which requires a good knowledge of spherical trigonometry.

This program enables you to calculate all relevant data about Comet Halley at a given moment and at any location on our planet. The program is written in Hu-Basic for the Sharp MZ-700, which is well-suited for such problems due to its accuracy (17 significant digits). Only the most common instructions of the Basic are used, so the program should be adaptable to almost any other personal computer. In principle, any computer with a 10-digit Basic should give correct results.

The mathematical function LOG in Hu-Basic gives the natural (and not the decimal) logarithm of a number.

Some Basics do not have the instruction PRINT USING, which is often used in this program. This problem can easily be solved by a simple replacement of this instruction and format string with the common PRINT. For example, the line 530 should be written as PRINT IS;JM.

The orbital elements of Comet Halley are given in lines 230-270. It is possible to determine the position of any other comet by putting in its orbital elements.

The symbols have the following meanings: DQ — perihelion distance in AU (one AU is about 150 million kilometers); DEC — eccentricity; DW — argument of perihelion (in degrees); DO — longitude of ascending node (in degrees); DI — inclination (in degrees); and DEPOCH — epoch: that is, the moment of perihelion passage of the comet in Julian days. The quantity DEG converts degrees into radians and is defined in line 100.

If the orbital elements of other comets, asteroids or planets are inserted, the program will give their positions. In the case of a planet or an asteroid, it would be necessary to use other formulae to calculate the brightness of the objects, instead of those given in lines 1690 and 1700.

The position of the observer is entered into the program in line 180. The listing already contains the geographical position of Sydney. Here we have: DLA — geographical longitude (in hours); DFI — geographical latitude (in degrees); and IZO — the time zone number, or the time difference between the place of the observation and Universal Time (the time of the Greenwich meridian). Fig 1 contains this data for 10 cities around the world.

Strictly speaking, this program gives exact positions of comets three-four months before and after the perihelion passage (for Comet Halley, this will happen on 9 February 1986). The motion of comets is strongly perturbed by the great planets, especially Jupiter. These influences have not been taken into account in this program.

City	DLA	DFI	IZO
Madrid	0.2467	40.45	0
Moscow	-2.5111	55.8333	3
Munich	-0.7667	48.15	1
London	0.0056	51.5	0
New York	4.9333	40.75	-5

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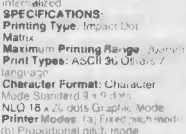
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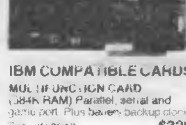
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San Francisco	8.1611	37.6667	-8
Sydney	-10.08	-33.9167	10
Tokyo	-9.3167	35.8	9

Fig 1

```

10 REM *****
20 REM *
30 REM * COMET HALLEY *
40 REM *
50 REM * N. Cabric 1985. *
60 REM *
70 REM *****
80 CLS:DEFDBL D:DEFINT I=M
90 D0=10-30:DLN=1/LOG(100)
100 DEG=57.2957795138:DN= .99726956642350
110 DPI=3.1415926535897930:DP12=23DPI
120 DEF FND(DX)=D1-24*INT(DX/24)
130 DEF FND(DX)=DX-DP12*INT(DX/DP12)
140 REM
150 REM GEOGRAPHICAL COORDINATES
160 REM AND TIME ZONE
170 REM
180 DLA=.0056:DF1=.5/DEG :LZ0=0
190 REM
200 REM ORBITAL ELEMENTS
210 REM OF COMET HALLEY
220 REM
230 D0=.38710240:DE0=.96727510
240 DM=111.846948/DFG:DO=58.144168/DEG
250 DT=162.239338/DEG:DEPOCH=2446470.94629#
260 DAC=D0/(1-DE0)
270 DNC=.01720212218730/DAC/SQR(DAC)
280 REM
290 REM INPUT
300 REM
310 CURSOR,0:PRINT" COMET HALLEY "
330 INPUT" YEAR. ";MY
340 INPUT" MONTH. ";M
350 INPUT" DAY. ";MD
360 INPUT" HOUR. ";MH
370 INPUT" MINUTE. ";MI
380 REM
390 REM MAIN PROGRAM
400 REM
410 DL=MH+MI/60:GOSUB 1150:PRINT
420 DL=FND(DL):DTU=DL-LZ0
430 GOSUB 1870:D4=DL:D5=0:GOSUB 900
440 PRINT"DATE. ";PRINTUSING"###.###;M;M;
450 PRINTUSING"###.###.###;M;M;
460 PRINTTAB(20);"TIME. ";
470 PRINTUSING"###.###;M;M;PRINT
480 DJ=DJ-LZ0/240:DL=0
490 GOSUB 1220:D4=DA:D5=DD:GOSUB 900
500 PRINT"RIGHT ASCENSION (h min).";
510 PRINTUSING"###.###;M;M;
520 PRINT"DECLINATION (o)";
530 PRINTUSING"###.###;M;M;
540 PRINT"GEOCENTRIC DISTANCE (AU).";
550 PRINTUSING"###.###;D6
560 PRINT"HELIOCENTRIC DISTANCE (AU).";
570 PRINTUSING"###.###;D5
580 PRINT"TOTAL MAGNITUDE. ";
590 PRINTUSING"###.###;D1
600 PRINT"NEAR MAGNITUDE. ";
610 PRINTUSING"###.###;D2
620 PRINT"SUN-EARTH-COMET ANGLE (o).";
630 PRINTUSING"###.###;DPS1
640 DJ=DJ-DTU/240:GOSUB 1080
650 GOSUB 1750
660 PRINT"ALTITUDE (o).";
670 PRINTUSING"###.###;AL
680 PRINT"AZIMUTH (o).";
690 PRINTUSING"###.###;AZ
700 DJ=DJ-LZ0/240
710 IF ABS(DJ-DB) < .0001 GOTO 840
720 GOSUB 1220
730 PRINT:PRINT"RISING (h min).";
740 GOSUB 1970
750 IF K=1 THEN TR=0:TS=24
760 IF K=2 THEN TR=-1:TS=1
770 IF TR<0 THEN PRINT" --- :GOTO 800
780 D4=TR:D5=0:GOSUB 900
790 PRINTUSING"###.###;M;M;
800 PRINT"SETTING (h min).";
810 IF TS<0 THEN PRINT" --- :GOTO 840
820 D4=TS:D5=0:GOSUB 900
830 PRINTUSING"###.###;M;M;
840 DB=DJ-GOTO 310
850 REM
860 REM TRANSFORMATION INTO
870 REM HOURS & MINUTES AND
880 REM DEGREES & MINUTES + ARC
890 REM
900 IM=INT(D4):IM=(D4-IM)*60
910 IF IM=60 THEN IM=0:IM=IM+1
920 IZ=SGN(D5):D=ABS(D5*DEG)
930 IS=INT(D):JM=(D-IS)*60
940 IF JM=60 THEN JM=0:IS=IS+1
950 IS=IZ*IS:RETURN
960 REM
970 REM EQUATION OF KEPLER
980 REM
990 D=DM
1000 DU=D+(DM-D+DE*SIN(D))/(1-DE*COS(D))
1010 IF ABS(DU-D) > .0001 THEN D=DU:GOTO 1000
1020 DV=2*ATN(SQR((1+DE)/(1-DE)))*TAN(DU/2)
1030 RETURN
1040 REM
1050 REM SIDERAL TIME AT GREENWICH
1060 REM AT Oh UT
1070 REM
1080 DT=(DJ-24150200)/36525#
1090 D=(.000001075#*DT+100.0021359#)*DT
1100 D=D+.276919398#:S0=24*(D-INT(D))
1110 RETURN
1120 REM
1130 REM JULIAN DAY NUMBER
1140 REM
1150 IF M<3 THEN MY=MY-1:M=M+12
1160 DJ=1720981.5#*INT(365.25#*MY)
1170 DJ=DJ+INT(30.6001#*(M+1))+DL/24+MD
1180 RETURN
1190 REM
1200 REM SUN
1210 REM
1220 D9=DJ-DL/240:DT=(D9-24150200)/36525#
1230 D=(.000005279621#*DT+628.331950904#)*DT
1240 DLS=FND(D+.4.881627972896374#)
1250 D=(.000000057596#*DT+.00000261799#)*DT
1260 DM=FND((D+628.30194573#)*DT+.2565835#)
1270 D=(.00000000678#*DT-.000000286234#)*DT
1280 DEP=(D-.000227111#)*DT+.4093197444571#
1290 D=(.000000126#*DT
1300 DE=(D+.0000418#)*DT+.01675104#
1310 GOSUB 990
1320 D=FND(DLS+DV-DM)
1330 DRS=1.00000021#*(1-DE*COS(DU))
1340 DRS=DRS*COS(D):D=DRS*SIN(D)
1350 DYS=D*COS(DEP):DZS=D*SIN(DEP)
1360 REM
1370 REM C M E T
1380 REM
1390 DF=COS(D0):DG=SIN(D0)*COS(DEP)
1400 DH=SIN(D0)*SIN(DEP)
1410 DP=-SIN(D0)*COS(D1)
1420 DC=COS(D0)*COS(D1)*COS(DEP)
1430 DQ=D-SIN(D1)*SIN(DEP)
1440 DD=COS(D0)*COS(D1)*SIN(DEP)
1450 DR=D+SIN(D1)*COS(DEP)
1460 DA2=SQR(DP*DF+DP*DP)
1470 DB2=SQR(DG*DG+DQ*DQ)
1480 DC2=SQR(DH*DH+DR*DR):SD=SGN(SIN(D0))
1490 DA1=ATN(DF/DP):DB1=ATN(DG/DQ)
1500 DC1=ATN(DH/DR)
1510 IF COS(D0)<0 THEN DA1=DPI-DA1
1520 IF SD*DB1<0 THEN DB1=-DB1+DPI
1530 IF SD*DC1<0 THEN DC1=-DC1+DPI
1540 DM=DNC*(D9-DEPOCH)
1550 DE=DEG:GOSUB 990
1560 DS=DAC*(1-DE*COS(DU)):DFC=DM+DV
1570 DX=DS*DA2*SIN(DA1+DPC)
1580 DY=DS*DB2*SIN(DB1+DPC)
1590 DZ=DS*DC2*SIN(DC1+DPC)
1600 D1=D*DX+D2=D*DY+D3=D*Z+DZ
1610 DG=SQR(D1*D1+D2*D2+D3*D3)
1620 DA=DEG/15*ATN(D2/D1)
1630 D=D3/DG:DD=ATN(D/SQR(1-D*D))
1640 IF D1<0 THEN DA=DA+12:GOTO 1660
1650 IF D2<0 THEN DA=DA+24
1660 D=.5*(DRS*DRS+DG*DG-DS*DS)/DRS/DG
1670 DPS1=DEG*ATN(SQR(1-D*D)/D)
1680 IF DPS1<0 THEN DPS1=DPS1+180
1690 DM1=.5*(S*LOG(D6)+1.3.1*LOG(D5))*DLN
1700 DM2=.5*(S*LOG(D8)+10*LOG(D8))*DLN
1710 RETURN
1720 REM
1730 REM HORIZONTAL COORDINATES
1740 REM
1750 Z=15/DEG#FND(90+DTU/DM-DLA-DA)
1760 D=COS(DF1)*COS(DD)*COS(DZ)

```

# PROGRAMS

```

1770 D=D+SIN(DFI)*SIN(DD)
1780 AL=DEG*ATN(D/SQR(1-D*D))
1790 X=COS(Z)*SIN(DFI)-TAN(DD)*COS(DFI)
1800 Y=SIN(Z)*AZ=DEG*ATN(Y/X)
1810 IF X<0 THEN AZ=AZ+180:GOTO 1830
1820 IF Y<0 THEN AZ=AZ+360
1830 RETURN
1840 REM
1850 REM CALENDAR DATA FROM JULIAN DAY
1860 REM
1870 D=INT(DJ+.5):A=INT((D/36524.3)-51.1226)
1880 A=D+1+A-INT(A/4):B=A+1524
1890 C=INT((B/365.25)-.3343):S=INT(365.25*C)
1900 E=INT((B-S)/30.61):M=D-B-S-INT(30.61*E)
1910 M=E-1:MY=C-4716:IF M>12 THEN M=M-12
1920 IF M<3 THEN MY=MY+1
1930 RETURN
1940 REM
1950 REM TIME OF RISING AND SETTING
1960 REM
1970 TK=-99:D7=DA:D6=DD
1980 GOSUB 2170:IF K>0 GOTO 2120
1990 T=DN*FNH(DA-TT-SO+DLA+IZO)
2000 DT=ABS(T-TK)
2010 IF TK>0 AND DT>22 THEN T=-1:GOTO 2040
2020 IF DT<.01# THEN GOTO 2040
2030 DL=T:GOSUB 1220:TK=T:GOTO 1980
2040 TR=T:TK=-99:DA=D7:DD=D6
2050 GOSUB 2170:IF K>0 GOTO 2120
2060 T=DN*FNH(DA+TT-SO+DLA+IZO)
2070 DT=ABS(T-TK)
2080 IF TK>0 AND DT>22 THEN T=-1:GOTO 2110
2090 IF DT<.01# THEN GOTO 2110
2100 DL=T:GOSUB 1220:TK=T:GOTO 2050
2110 TS=T
2120 RETURN
2130 REM
2140 REM THE HOUR ANGLE CORRESPONDING
2150 REM TO THE TIME OF RISE OR SET
2160 REM
2170 CT=-.01018091142#-SIN(DD)*SIN(DFI)
2180 CT=CT/COS(DD)/COS(DFI):K=0
2190 IF CT>1 THEN K=2:RETURN
2200 IF CT<-1 THEN K=-1:RETURN
2210 TT=DEG/15*ATN(SQR(1-CT*CT)/CT)
2220 IF CT<0 THEN TT=TT+12
2230 RETURN

```

Example No:1  
DATE :27.11.1985. TIME : 21 15

RIGHT ASCENSION (h min): 1 37  
DECLINATION (o '): 15 51  
GEOCENTRIC DISTANCE (AU): 0.62  
HELIOCENTRIC DISTANCE (AU): 1.53  
TOTAL MAGNITUDE : 6.4  
NUCLEAR MAGNITUDE : 8.3  
SUN-EARTH-COMET ANGLE (o): 142  
ALTITUDE (o): 54  
AZIMUTH (o): 2

RISING (h min): 13 53  
SETTING (h min): 4 57

Example No:2  
DATE :15. 1.1986. TIME : 17 30


RIGHT ASCENSION (h min): 21 46  
DECLINATION (o '): -5 27  
GEOCENTRIC DISTANCE (AU): 1.42  
HELIOCENTRIC DISTANCE (AU): 0.79  
TOTAL MAGNITUDE : 4.4  
NUCLEAR MAGNITUDE : 7.2  
SUN-EARTH-COMET ANGLE (o): 32  
ALTITUDE (o): 18  
AZIMUTH (o): 54

RISING (h min): 8 33  
SETTING (h min): 19 47

Example No:3  
DATE :11. 4.1986. TIME : 0 0

RIGHT ASCENSION (h min): 14 49  
DECLINATION (o '): -46 59  
GEOCENTRIC DISTANCE (AU): 0.41  
HELIOCENTRIC DISTANCE (AU): 1.33  
TOTAL MAGNITUDE : 4.7  
NUCLEAR MAGNITUDE : 6.8  
SUN-EARTH-COMET ANGLE (o): 136  
ALTITUDE (o): -10  
AZIMUTH (o): 344

RISING (h min): -- --  
SETTING (h min): -- --



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## CS-Bureau

by Patrick Coleman

This program provides a desk-top environment in which software can be written. The features include windows, icons, a pointer and a pull-down menu. The commands available and their syntax are as follows:

**PROCScreen — no parameters**

This draws up the standard screen for CS-Bureau, under which most tasks should be run. It shades the screen, and creates a title bar and work windows.

**PROctitle (<width>,<title>)**

<width> should be a number giving the width of the current window. <title> should be a string giving the title to be placed at the top of the current window.

**PROCinput (<X>,<Y>,<length>,<characters>)**

<X> should be a number representing the x coordinate of input. <Y> should be a number representing the y coordinate of input. <length> should be a number giving the maximum length of input. <characters> should be a string of the characters that can be input.

This should be used in place of the Basicinput command as it allows better error-trapping capabilities. The input is

stored in ret\$ on return from the routine. For example, PROCinput (10,10,5,0123456789) will input a string of up to five characters in length, consisting only of numbers.

**PROCdb1 (<X>,<Y>,<string>)**

<X> should be a number giving the x print coordinate. <Y> should be a number giving the y print coordinate. <string> should be the string to be printed.

This prints a string of double-height characters at (x,y).

**PROctime (<A>,<B>,<C>,<D>)**

<A>,<B>,<C> and <D> should be numbers giving standard screen coordinates as in the *User Guide*.

This procedure prints the time at the right-hand side of the title bar of a window, and should only be used with the standard CS-Bureau screen. The <A>,<B>,<C> and <D> parameters give the coordinates of the text window to return to after the time is printed.

**PROCwindow (<A>,<B>,<C>,<D>)**

<A>,<B>,<C> and <D> are screen coordinates as before. This procedure produces a window at the specified coordinates.





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# PROGRAMS

**PROtime\_\_set** — no parameters  
This should be called when in the standard CS-Bureau format. It asks the user to enter the hours, minutes and seconds of the current time, and sets TIME accordingly.

**PROCmove**  
(*<size>*,*<source>*,*<dest>*)  
*<size>* should be a number representing the number of bytes to be moved. *<source>* should be a number giving the address of the first byte to be moved. *<dest>* should be a number giving the address to which data is to be moved.

This procedure is a machine code routine to move chunks of memory around; it is written for the production of pull-down menus. The portion of the screen to be covered by the menu should be saved, the menu printed, and when an option has been chosen, the piece of moved memory should be moved back. This obviously has many more uses. Care should be taken that the program in memory is not overwritten.

**FNschr** (*<X>*,*<Y>*)  
*<X>* should be a number representing the x coordinate of the cursor. *<Y>* should be a number representing the y coordinate of the cursor.

This function reads the ASCII code of the character at the given cursor position. For example, character%=FNschr(5,5).

**PROCmouse**  
(*<X>*,*<Y>*,*<A>*,*<B>*,*<C>*,*<D>*)  
*<X>* should be a number representing the start coordinate. *<Y>* should be a number representing the finish coordinate. *<A>* should be the least value the cursor can be moved to horizontally. *<B>* should be the greatest value the cursor can be moved to vertically. *<C>* should be the greatest value the cursor can be moved to horizontally. *<D>* should be the least value the cursor can be moved to vertically.

This procedure produces a pointer cursor on the screen which is controlled by the cursor keys and Return. The coordinates of the cursor after Return has been pressed are held in X% and Y%.

**PROCinit** — no parameters  
This creates all the user-defined graphics used by CS-Bureau, assembles the machine code, and sets the time to six o'clock. It must be called before any other routines are used.

**PROCass** — no parameters  
This assembles two machine code routines: one to shade the screen; and the other to set up the move routine. The shading routine can be called by CALL shade.

CS-Bureau is approximately 4k in length and must be used in mode four. This leaves about 14.5k for a Basic program.

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```

30005REM *****
30005REM ** COLES SOFTWARE **
30010REM **
30015REM ** CS-BUREAU V5 **
30020REM **
30025REM ** A desktop enviroment **
30030REM ** for the Acorn Electron **
30035REM ** and BBC B micro. **
30040REM **
30045REM ** COPYRIGHT 1985 **
30050REM *****
30055
30060DEFPROCscreen
30065#FX19
30070X=0:Y%=0:VDU23,1,0;0;0;19,7,0;:CALLshade:PROCwindow(1,2,38,2):VDU31,1,
0,224:PROCwindow(1,28,38,5):VDU19,7,7;0;
30075ENDPROC
30080
30085DEFPROCTitleIwidth%,title$)
30090LOCALw%,len%
30095w%=width%:len%=LENTITLE$:IFwidth%MOD2=1 width%=width%+1:IFlen%=width%ORlen%
=width%-1 PROCT3 ELSEIFlen%<width%-8 PROCT1 ELSEIFlen%>=width%-8 PROCT2
30100PRINTTAB(0,1)title$TAB(0,2)STRING$(w%,"_")
30105ENDPROC
30110
30115DEFPROCT1
30120title$=CHR$225+CHR$226+CHR$227+STRING$(width%-6-len%)DIV2,CHR$228)+title$+
STRING$(width%-len%)DIV2+1en%MOD2,CHR$228)
30125ENDPROC
30130
30135DEFPROCT2
30140title$=STRING$(width%-len%)DIV2,CHR$228)+title$+STRING$(width%-len%)DIV2+
1en%MOD2,CHR$228)
30145ENDPROC
30150
30155DEFPROCT3
30160ENDPROC
30165
30170DEFPROCinput(x%,y%,len%,ch%)
30175LOCALcount%,key$
30180ret$="" :count%=0
30185REPEAT
30190REPEAT
30195key$=GET$
30200UNTILkey$=CHR$13ORkey$=CHR$127ORINSTR(ch$,key$)
30205IF INSTR(ch$,key$)ANDcount%<1en% PROCchr ELSEIFkey$=CHR$127ANDcount%>0 PROCD

```

# PROGRAMS

```

e1
30210PRINTTAB(x%,y%)ret$:
30215UNTILkey$=CHR$13
30220ENDPROC
30225
30230DEFPROCchr
30235ret$=ret$+key$:count%=count%+1
30240ENDPROC
30245
30250DEFPROCdel
30255VDU31,x%-1+LENret$,y%,32:ret$=LEFT$(ret$,LENret$-1):count%=count%-1
30260ENDPROC
30265
30270DEFPROCdbl(x%,y%,a$)
30275LOCALa%,c%
30280FORa%=1TOENa$:c%=49152+(ASC(MID$(a$,a%,1))-32)*8
30285VDU23,229,7c%,7c%,?(c%+1),?(c%+1),?(c%+2),?(c%+2),?(c%+3),?(c%+3),23,230,?(
c%+4),?(c%+4),?(c%+5),?(c%+5),?(c%+6),?(c%+6),?(c%+7),?(c%+7),31,x%,y%,229,31,x%
,y%+1,230:x%=x%+1:NEXT
30290ENDPROC
30295
30300DEFPROCtime(a%,b%,c%,d%)
30305LOCALh$,m$,s$,h%,a%
30310h$="" :m$="" :s$="" :VDU28,1,2,38,2:h%=(TIME DIV360000)MOD12:m%=(TIME DIV6000)MOD60
30315IFh%=0:h$="12" ELSEIFh%<9:h$="" :STR$h% ELSEh$=STR$h%
30320IFm%=0:m$="00" ELSEIFm%<9:m$="0"+STR$m% ELSEm$=STR$m%
30325PRINTTAB(26,0);"TIME: ";h$+" : ";m$ : ";s$ : ";VDU28,a%,b%,c%,d%
30330ENDPROC
30335
30340DEFPROCwindow(a%,b%,c%,d%)
30345VDU18,0,128,24,a%*32-4:1023-(b%+1)*32:(c%+1)*32:1023-d%*32+4:16,24,a%*32+B:
1023-(b%+1)*32-8:(c%+1)*32+B:1023-d%*32-8:16,17,135,17,0,24,a%*32:1023-(b%+1)*32
:(c%+1)*32:1023-d%*32:28,a%,b%,c%,d%,12
30350ENDPROC
30355
30360DEFPROCtime_set
30365LOCALh%,a%,s%
30370CLS:PROCtitle(38," TIME SET"):PRINTTAB(1,6)"Enter hours (1-12): [ 1]"
REPEAT:PRINTTAB(26,6) " ":PROCinput(26,6,2,"0123456789"):UNTILVALret$=0ANDVALret
$<=12:h%=VALret$
30375PRINTTAB(1,9)"Enter minutes (0-59): [ 1]":REPEAT:PRINTTAB(26,9) " ":PROCi
nput(26,9,2,"0123456789"):UNTILVALret$<=59:m%=VALret$
30380PRINTTAB(1,12)"Enter seconds (0-59): [ 1]":REPEAT:PRINTTAB(26,12) " ":PRO
Cinput(26,12,2,"0123456789"):UNTILVALret$<=59:s%=VALret$
30385TIME=100*s%+6000*m%+360000*h%:PROCtime(1,28,38,5):CLS
30390ENDPROC
30395
30400DEFPROCmove(size,source,dest)
30405X%=0:Y%=0:SIZE=size:SOURCE=source:DEST=dest:CALLmove
30410ENDPROC
30415
30420DEFN$chr(x%,y%)
30425VDU31,x%,y%:AX=135
30430=(USR(&FFF4)&AND&FFFF)DIV&100
30435
30440DEFPROCmouse(x%,y%,a%,b%,c%,d%)
30445X%=0:Y%=0:GCOLOR,0:VDU5:#FX11,1
30450#FX12,1
30455REPEAT
30460PROCmove(B,FNsta(x%,y%),22000):PROCmove(B,FNsta(x%,y%+1),22008):#FX15,0
30465PROCprint:REPEATUNTILADVAL(-1)<0
30470PROCmove(B,22000,FNsta(x%,y%)):PROCmove(B,22008,FNsta(x%,y%+1))
30475IFINKEY=122 IFX%<c% x%=x%+1 ELSEIFINKEY=26 IFX%>a% x%=x%-1
30480IFINKEY=42 IFY%<b% y%=y%+1 ELSEIFINKEY=58 IFY%>d% y%=y%-1
30485UNTILINKEY=74
30490VDU4:#FX12,0
30495X%=x%:Y%=y%:#FX15,0
30500ENDPROC
30505
30510DEFPROCprint
30515MOVEFNpos(x%),1023-FNpos(y%):VDU231:MOVEFNpos(x%),1023-FNpos(y%+1):VDU232
30520ENDPROC
30525
30530DEFN$pos(p%)=p%*8*4
30535DEFN$sta(x%,y%)=22528+y%*320+x%*8
30540
30545DEFPROCinit
30550PROCass:VDU23,224,24,60,60,126,0,126,60,0,23,225,252,0,252,0,252,0,23
,226,255,129,129,129,129,255,0,23,227,63,0,63,0,63,0,23,228,255,0,255,0
,255,0,255,0,23,231,0,128,192,224,240,248,252,254
30555VDU23,232,255,252,248,216,140,12,6,6:TIME=100*0+6000*0+360000*6
30560ENDPROC
30565
30570DEFPROCass
30575DIMspace% 35:FORpass%=0TO25STEP2:P%=space%:(OPTpass%:.shade:LDA#22528MOD256:
STA#70:LDA#22528DIV256:STA#71:LDA#10241DIV256:LDY#0:.loop:LDA#170:STA(&70),Y:EOR
#255:INY:STA(&70),Y:INY:BNE1oop:INC#71:DEX:BNE1oop:RTS:JNEXT
30580SIZE=&70:SOURCE=&72:DEST=&74:DIMmove 40:FORi%=0TO25STEP2:P%=move:(OPTi%LDY#0
:LDSIZE+1:BEQ1i:.1:LDA(SOURCE),Y:STA(DEST),Y:INY:BNE1INC:SOURCE+1:INCDEST+1:DEX
:BNE1:.1:LDSIZE:BEQdo:.1:LDA(SOURCE),Y:STA(DEST),Y:INY:DEX:BNE1i:.do:RTS
30585JNEXT
30590ENDPROC

```

# MICROMASTER

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## Time Sub by Peter Blyth

**MICROTEx**  
666

Still keying in programs? Forget it!  
This program is available for  
telesoftware downloading on  
Microtex 666 (page \*66614#.)

Time Sub is a fast machine language and Basic program for the Commodore 64. It is loaded in two sections. The first program loads in almost 3k of machine language and sprite data. The data is

stored in strings 60 characters long. Included for each line is a checksum. Type out the data lines exactly as they appear and if an error is detected it may direct you to the wrong line. Line number





# PROGRAMS

```
135 DATA 0000200000700000F80000F80000F800007000002000000000000000000, 1032
136 DATA 00000000000000FF000000000000000000000000000000000000000003, 258
137 DATA FC000AAA003659C05659503555C00FFF00030C000C030000000000000000, 1652
138 DATA 00000000000000000000007F00000000000000000000000000000000001000, 143
139 DATA 800800400E0063FFE87FFFFF71FFF0600C004008008000000000000000000, 2353
140 DATA 00000000000000000000000000000000000000000000000005800000000114000052, 191
141 DATA 0000A80000A00000F400005C00007C00007C00003800000000000000000000, 981
142 DATA 000000000000000000000000000000000000000000000000080000000000000000, 128
143 DATA 0A0000A80002A8000AAA000AAA0003A6000AAA000AAA000AAA0000228000, 2380
144 DATA AA200020A0008A0000008000222000000000000000000000000000000000, 726
145 DATA 000000000000000000000000000000000000000000000000000000000000, 0
180 DATA END,0,END,0,START
190 REM
193 REM MACHINE LANGUAGE
196 REM
200 DATA A9008D7003AD01DC290F8D4003EAD40032901C901F00EAE4103CAE092F0, 3109
201 DATA 038E4103EAEAEAD40032902C902F007AE4103E88E4103EAEAEAD400329, 3315
202 DATA 04C904F00CAE4203CAE01AF0038E4203EAEAEAEAD40032908C908F00BAE, 3469
203 DATA 4203E8E0E2F0038E4203EAEAEAD1FD04D1ED02901C901D0048D7003EAD, 3753
204 DATA 41038D01D0AD42038D00D0EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 4252
205 DATA EE4803AD48032D49038D4803C900F0034C2041A000CC5003AE032E5103AD, 2751
206 DATA 51038D04D0AD52038D05D0AD76032904C900F01E8C04D08C50038C7603CE, 2901
207 DATA 4E03A901CD4E0310078D5003C901F0048D4E03EACC5303F035CE5403AD54, 2819
208 DATA 038D06D0AD55038D07D0AD76032908C900F01D8C53038C06D08C7603CE4E, 2913
209 DATA 03A901CD4E0310078D5003C901F0038D4E03AE4A03E88E4A03E004F0044C, 2626
210 DATA 9640EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 4855
211 DATA AD5B03C900F053EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 4226
212 DATA 038D50038D00D0AD5C038D0CD0AE4F03EAEAEAEAEAEAEAEAEAEAEAEAEAE, 3671
213 DATA FE07E0163012A9008D4F038D5B038D0CD08D0DD0C901D006A200E000F04C, 3041
214 DATA EAEAEAE4B03AD4B032D49038D4B03C900D03AAE5003E000F0198D4F03A201, 2974
215 DATA 8E5603AE51038E5C03AD520369108D5D03D01BEA8E4F03AE53038E5B03AE, 2710
216 DATA 54038E5C03AD550369108D5D03EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 3459
217 DATA 03F01FE8EC4103F019E8EC4103F013E8EC4103F00DE8EC4103F007A000C0, 3794
218 DATA 00F004EAEAE4F03AD4F03C900F003EE24D0EAEAEAEAEAEAEAEAEAEAEAEAE, 4883
219 DATA EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 3912
220 DATA AD42038D0603EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 3685
221 DATA 2FA200EE64038E5F03EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 3179
222 DATA 11AE42038E6003A2018E5F038E1103EAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 4458
223 DATA 5703E000F02DEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 3207
224 DATA F036A2008E57038E0AD0EE6503EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 3969
225 DATA 8D4C03C900D013A2018E5703A20A8E5803AE41038E5903EAEAEAEAEAEAE, 3424
226 DATA 606060EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 6606
227 DATA A000AD4403C900F05AAE4703E000F01EEAE88E4703A9E78DF907E01A306E, 3564
228 DATA E8C44038C47038C02D0C000F060EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 3469
229 DATA 8D02D0A9E88DF907E019D00B8C44038C02D0C000F03AEAD71032902C902, 3428
230 DATA D030EE4703F02BEAEAEAEAD01DC2910C910F01F8C4703C88C4403AD420369, 3464
231 DATA 008D4503AD4103E91029FE8D4603A9008D7303EAEAEAEAEAEAEAEAEAEAE, 3938
232 DATA EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 5248
233 DATA 6D64036D64036D65036D65036D65036D65036D65036D6503A2008E62038E63038E, 2280
234 DATA 64038E6503EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 3385
235 DATA 03C93A300BE90AEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 3269
236 DATA 03C90010F3EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 3766
237 DATA EA8D6903AD6A03C93A3005E90A8D6A03EAEAEAEAEAEAEAEAEAEAEAEAEAE, 3419
238 DATA 3E07AD68038D3F07AD67038D4007AD66038D4107A9308D4207EACE6603EA, 2752
239 DATA EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 6606
240 DATA EAEAEAEAE4403E000F066EAEAE7303E000D028A9008D04D48D05D4EAEAA901, 4033
241 DATA 8D7303A20F8E18D4A2218E04D4A20C8E05D4A20B8E06D48D00D4EAEAEAE47, 3499
242 DATA 03E000D09AE46038E01D4F027EAE001D022EAA9008D04D48D05D48D7303, 3403
243 DATA A90F8D18D4A9818D04D4A9038D00D4A9088D01D4EAEAEAEAEAEAEAEAEAE, 4171
244 DATA EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 4757
245 DATA 8E0BD4A2038E0CD4A2008E0DD4A28C8E07D4A2038E08D4EAEAEAEAEAEAE, 4149
246 DATA 03AD72032D74038D7203C900D028A2008E12D48E13D4EAA9088D18D4A911, 3045
247 DATA 6D12D4A92A8D13D4A9048D14D4A90C8D0ED4A9198D0FD4EAEAEAEAEAEAE, 4110
248 DATA EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 4871
249 DATA 20B04220204320B04420D043EE25D0EAA9A0AC4E03990004990104AD5003, 2858
250 DATA C900D010AD5303C900D009A9028D7003EAEAEAEAEAEAEAEAEAEAEAEAEAE, 4191
251 DATA C8CC7503D0F5EAEAEAE7003E000D02DAD1ED08D7103290C4D76038D7603AD, 3565
252 DATA 04D0A000C900D0048C5103EAD06D0C900D0058C5403EAEAEAEAEAEAEAE, 3762
253 DATA EA6060EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 6606
254 DATA EAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAEAE, 6882
```



# PROGRAMS

```

440 FORO=1TO1000:NEXT:GOTO600
490 REM          LEVEL COMPLETE

500 PRINT"XXXXXXXXXXXX";TAB(10);"L 2BONUS":SC*500
505 POKESD+4,0:POKESD+5,0:POKESD+24,5:POKESD+4,33:POKESD+5,63:POKESD+6,8
507 POKESD,200:POKESD+1,40
510 FORO=1TO50:POKE869,SC:SYS4*4096+3*256+13*16:POKESD+1,PEEK(SD+1)+2:NEXT
520 S$=CHR$(PEEK(874))+CHR$(PEEK(873))+CHR$(PEEK(872))+CHR$(PEEK(871))
525 S$=S$+CHR$(PEEK(870))+ "0":S=VAL(S$)
530 IFS<RTTHEN550
535 MA=MA+1:IFRT<RVTHENRT=RV:GOTO550
540 IFRT<RXTHENRT=RX:GOTO550
545 RT=RT+RX
550 GOTO50

590 REM          INTERLUDE
600 FORO=A+2TOA+16:POKE0,0:POKESD+24,0:POKE198,0:POKE2040,230:POKE1738,48
605 SYS4*4096:POKE833,PEEK(833)+(PEEK(833)>230)
610 GETA$:IFA$(">") THEN605
620 GOTO700

690 REM          START
700 K=2:POKE657,128:POKE53272,21:GOTO50
710 A$="":FORO=1TO30:A$=A$+" ":NEXT
712 A$=A$+" *** POLARIS ***      REPORT TIME CAPSULES ARRIVING ... UNKNOWN "
714 A$=A$+"... WARNING HOSTILE ... DESTROY FROM SUBMARINE BASES ... STOP ..."
718 FORO=1TO30:A$=A$+" ":NEXT
720 FORO=1TOLEN(A$)-30:FORP=0TO1:POKE646,P:PRINT" ";MID$(A$,0,28):NEXT
725 GETP$:IFP$(">") THENNEXT:GOTO720
730 GOTO40

READY.

```

## KEY TO CURSOR CODES USED IN PROGRAM BASICT.S

- '␣' : (SHIFT/CLR HOME)
- '␣' : (COMMODORE/4)
- '␣' : (SHIFT/CURSR UP)
- '␣' : (CURSR UP)
- '␣' : (SHIFT/CURSR LEFT)
- '␣' : (CURSR RIGHT)
- '␣' : (CLR HOME)
- '␣' : (CTRL/RVS ON)
- '␣' : (CTRL/RVS OFF)
- '␣' : (CTRL/4 (CYAN))
- '␣' : (CTRL/1 (BLACK))
- '␣' : (CTRL/2 (WHITE))
- '␣' : (CTRL/3 (RED))
- '␣' : (CTRL/8 (YELLOW))
- '␣' : (COMMODORE/7 (L.BLUE))





## Hi-res Helper by R Crawford

**MICROTEX  
666**

Still keying in programs? Forget it!  
This program is available for  
telesoftware downloading on  
Microtex 666 (page \*66614#.)

This machine language program provides a set of ampersand utilities for use with Applesoft hi-res graphics. The routines can be loaded from immediate mode, in which case a message will be output, or from within a program, which will suppress this message. The following four utilities are provided:

**&HPLOT X,Y** — This follows the same format as the Applesoft command (also allowing **&HPLOT TO...**), but will accept values for X and Y in the range — 32768 .. +32767. Points outside the current Viewport (see below) are not plotted, and only the portion of lines within the Viewport are plotted. Note that the **&HPLOT** uses the Applesoft HPLLOT cursor as temporary storage, and this may cause unpredictable results if Applesoft HPLLOT is used while **&HPLOT** is being used.

**&VWPRT XL,YT,XR,YB** — This command allows you to set the Viewport to any rectangular area contained entirely

on the screen. The rectangle has XL,YT as its top left corner, and XR,YB as its bottom right corner. The Viewport is initially set to cover the entire screen, ie,

XL = 0, XR = 279, YT = 0, YB = 191

If the values supplied in the command line are outside the ranges

0 <= XL <= XR <= 279,

0 <= YT <= YB <= 191, then an **?ILLEGAL QUANTITY ERROR** will result.

**&BRDR** — This command draws a white border around the edge of the current Viewport. It does not affect the current HCOLOR (which must be specified before any plotting, as usual).

**&SCRN(X,Y,A)** — This command assigns the current status (0 = OFF, 1 = ON) of the pixel with co-ordinates X and Y to the numeric (real or integer) variable A. If the point X,Y is outside the screen, an **?ILLEGAL QUANTITY ERROR** will

result, and if A is not a numeric variable, a **?TYPE MISMATCH ERROR** will result.

The program requires at least a 48k APPLE II. Type in and save the Applesoft program if you have a disk drive. If you don't, you should change line 35 to 35 CALL 37120

and save the program to tape. If you make any mistakes with the data lines the program will tell you. People with drives can then RUN the program, which will create a Binary file which can be BRUN. You can then delete the loader program, or keep it for emergencies. People without disk drives must load and run the Applesoft program each time they wish to use the routines, or include it as a subroutine in their program.

Note that the program resets the value of Basic Himem, so if you use MAX-FILES, HIMEM, or FP, 'Helper' will have to be re-run.

• ILIST

```

5  ONERR GOTO 30
10 A = 37120:L = 1220:C = 0
20 S = 0: FOR I = 1 TO 50: READ M
   : POKE A + C,M:C = C + 1:S =
   S + M:S = S - 256 * (S > 255
   ): NEXT I: READ M: IF S = M THEN
   20
25 GOTO 40
30 S = S - M:S = S + 256 * (S < 0
   ): IF S < > M THEN 40
35 PRINT CHR$(4)"BSAVEHELPER,A
   37120,L1220"
37 PRINT "OK.": END
40 PRINT "ERROR IN " PEEK (123):
   END
100 DATA 173,0,224,162,58,160,14
   9,201,76,208,39,160,2,185,72
   ,145,153,245,3,136,16,247,16
   9,0,133,111,133,115,169,145,
   133,112,133,116,166,118,232,
   240,7,165,51,201,221,240,1,9
   6,162,91,160,149,183
101 DATA 134,5,132,6,160,0,177,5
   ,8,200,9,128,32,237,253,40,1
   6,244,108,252,255,96,76,75,1
   45,201,215,240,57,201,147,20
   8,3,76,11,146,162,192,142,11
   4,145,162,149,142,115,145,16
   2,0,205,187,176
102 DATA 149,208,10,169,187,141,
   114,145,169,149,141,115,145,
   189,255,255,8,41,127,32,192,
   222,232,40,16,243,173,114,14
   5,201,187,240,64,76,215,148,
   32,192,222,32,185,246,133,22
   6,134,224,132,225,169,44,29
103 DATA 32,192,222,32,227,223,1
   33,133,132,134,36,17,80,5,16
   2,163,76,18,212,169,41,32,19
   2,222,32,94,148,162,0,164,22
   9,177,38,37,48,240,1,232,138
   ,32,147,235,165,18,76,99,218
   ,32,185,246,190
104 DATA 142,52,149,140,53,149,1
   41,54,149,169,44,32,192,222,
   32,185,246,205,54,149,144,40
   ,204,53,149,144,35,208,5,236
   ,52,149,144,28,142,42,149,14
   0,43,149,141,46,149,173,52,1
   49,141,40,149,173,140
105 DATA 53,149,141,41,149,173,5
   4,149,141,44,149,96,162,53,7
   6,18,212,32,177,0,201,193,24
   0,28,32,121,148,169,0,170,16
   8,32,17,244,32,159,148,173,5
   6,149,208,3,32,82,148,32,183
   ,0,201,193,255
106 DATA 208,215,32,192,222,32,1
   59,148,173,56,149,141,57,149
   ,32,110,148,32,159,148,160,3
   ,185,48,149,153,52,149,136,1
   6,247,173,57,149,45,56,149,2
   08,212,160,1,185,56,149,208,
   24,136,185,56,149,74
107 DATA 208,18,32,94,148,173,52
   ,149,174,53,149,172,54,149,3
   2,58,245,76,39,146,132,5,41,
   3,208,3,32,28,148,160,0,166,
   5,189,56,149,41,2,208,17,200
   ,189,56,149,41,1,208,9,200,1
   89,192
108 DATA 56,149,41,8,208,1,200,1
   52,10,170,134,6,189,40,149,5
   6,229,224,168,189,41,149,229
   ,225,32,242,226,32,77,148,17
   3,54,149,56,229,226,168,173,
   55,149,229,227,32,242,226,16

```

# PROGRAMS

- |   |  |
|---|--|
| <p>9,0,168,32,127,8</p> <p>109 DATA 233,32,77,148,173,52,14<br/>9,56,229,224,168,173,53,149,<br/>229,225,32,242,226,169,0,168<br/>,32,102,234,32,77,148,164,22<br/>6,165,227,32,242,226,169,0,1<br/>68,32,190,231,32,82,231,166,<br/>80,165,81,164,5,254</p> <p>110 DATA 208,8,142,54,149,141,55<br/>,149,240,4,134,226,133,227,1<br/>64,6,185,40,149,190,41,149,1<br/>64,5,208,8,141,52,149,142,53<br/>,149,240,4,133,224,134,225,1<br/>85,56,149,41,3,208,3,32,28,1<br/>48,164,5,215</p> <p>111 DATA 240,57,165,225,72,173,4<br/>9,149,133,225,104,141,49,149<br/>,165,224,72,173,48,149,133,2<br/>24,104,141,48,149,165,227,72<br/>,173,51,149,133,227,104,141,<br/>51,149,165,226,72,173,50,149<br/>,133,226,104,141,50,149,185</p> <p>112 DATA 173,56,149,141,57,149,7<br/>6,153,147,173,53,149,72,173,<br/>49,149,141,53,149,104,141,49<br/>,149,173,52,149,72,173,48,14<br/>9,141,52,149,104,141,48,149,<br/>173,55,149,72,173,51,149,141<br/>,55,149,104,141,51,136</p> <p>113 DATA 149,173,54,149,72,173,5<br/>0,149,141,54,149,104,141,50,<br/>149,32,159,148,164,5,240,65,<br/>165,225,72,173,49,149,133,22<br/>5,104,141,49,149,165,224,72,<br/>173,48,149,133,224,104,141,4<br/>8,149,165,227,72,173,71</p> <p>114 DATA 51,149,133,227,104,141,<br/>51,149,165,226,72,173,50,149<br/>,133,226,104,141,50,149,173,<br/>56,149,72,173,57,149,141,56,<br/>149,104,141,57,149,76,75,146<br/>,173,53,149,72,173,49,149,14<br/>1,53,149,104,141,49,133</p> <p>115 DATA 149,173,52,149,72,173,4<br/>8,149,141,52,149,104,141,48,<br/>149,173,55,149,72,173,51,149<br/>,141,55,149,104,141,51,149,1<br/>73,54,149,72,173,50,149,141,<br/>54,149,104,141,50,149,76,75,<br/>146,165,225,72,165,5</p> <p>116 DATA 227,133,225,104,133,227<br/>,165,224,72,165,226,133,224,<br/>104,133,226,173,53,149,72,17</p> | <p>3,55,149,141,53,149,104,141,<br/>55,149,173,52,149,72,173,54,<br/>149,141,52,149,104,141,54,14<br/>9,96,162,0,76,35,235,153</p> <p>117 DATA 173,50,149,174,48,149,1<br/>72,49,149,76,87,244,165,28,7<br/>2,165,226,166,224,164,225,32<br/>,17,244,104,133,28,96,160,3,<br/>185,48,149,153,224,0,136,16,<br/>247,32,103,221,32,82,231,165<br/>,80,141,48,149,70</p> <p>118 DATA 165,81,141,49,149,169,4<br/>4,32,192,222,32,103,221,32,8<br/>2,231,165,80,141,50,149,165,<br/>81,141,51,149,96,169,0,141,5<br/>6,149,162,4,160,10,32,189,14<br/>8,162,10,160,6,32,189,148,16<br/>2,0,160,8,94</p> <p>119 DATA 32,189,148,162,8,160,2,<br/>189,41,149,217,41,149,240,5,<br/>48,11,56,176,9,189,40,149,21<br/>7,40,149,208,1,24,46,56,149,<br/>96,165,228,133,5,165,28,133,<br/>6,169,127,133,228,173,44,149<br/>,174,40,120</p> <p>120 DATA 149,172,41,149,32,17,24<br/>4,173,42,149,174,43,149,172,<br/>44,149,32,58,245,173,42,149,<br/>174,43,149,172,46,149,32,58,<br/>245,173,40,149,174,41,149,17<br/>2,46,149,32,58,245,173,40,14<br/>9,174,41,149,172,104</p> <p>121 DATA 44,149,32,58,245,165,5,<br/>133,228,165,6,133,28,96,0,0,<br/>23,1,0,0,191,0,0,0,0,0,0,2<br/>55,255,0,0,13,13,65,80,80,76<br/>,69,83,79,70,84,32,78,79,84,<br/>32,80,82,63</p> <p>122 DATA 69,83,69,78,84,32,73,78<br/>,32,82,79,77,46,13,141,13,13<br/>,32,32,32,32,32,32,32,32,32,<br/>32,32,32,32,72,73,45,82,69,8<br/>3,32,72,69,76,80,69,82,33,13<br/>,13,32,32,32,32,9</p> <p>123 DATA 32,32,65,77,80,69,82,83<br/>,65,78,68,32,82,79,85,84,73,<br/>78,69,83,32,73,78,83,84,65,7<br/>6,76,69,68,13,32,32,32,32,32<br/>,32,32,32,32,32,32,32,38,32,<br/>82,69,65,68,89,124</p> <p>124 DATA 32,70,79,82,32,85,83,69<br/>,46,13,141,86,87,80,82,212,6<br/>6,82,68,210,169</p> |
|---|--|



## Fighter Squad by Ian Jacobsen

**MICROTEX  
666**

Still keying in programs? Forget it!  
This program is available for  
telesoftware downloading on  
Microtex 666 (page \*66614#.)

At last Sega is represented in APC's pages. It's of shoot-'em-up brigade, consistent with the mood this time of the year.

Full instructions are in the listing.

```

10 REM *****
20 REM ***      BY      ***
30 REM ***      JAN JACOBSEN      ***
40 REM ***      (C) 1985      ***
50 REM *****
60 SCREEN 2,2:COLOR1,15,,15:CLS
70 RESTORE
80 COLOR1,10,(0,0)-(255,191),10
90 COLOR1,6,(136,8)-(224,60),10
    
```

# PROGRAMS

```

100 COLOR1,6,(130,168)-(255,191),10
110 LINE(130,168)-(255,191),1,B
120 LINE(143,80)-(247,152),1,B
130 LINE(136,8)-(231,60),1,B
140 COLOR1,15,(148,80)-(240,152),10
150 LINE(8,8)-(120,176),1,B
160 COLOR1,15,(8,8)-(115,176),10
170 CIRCLE(88,39),1,1,,,,BF
180 CIRCLE(75,38),1,1,,,,BF
190 CIRCLE(198,106),1,1,,,,BF
200 CIRCLE(206,106),1,1,,,,BF
210 CIRCLE(202,110),2,1,,,,BF
220 CURSOR134,170:PRINT"By Jan Jacobsen (C)
230 CURSOR134,179:PRINT" FROM S.A USER CLUB"
240 R=R+1
250 READX,Y
260 IFX=0THENREADX,Y:LINE(X,Y)-(X,Y)
270 IFX=-1THEN530
280 LINE-(X,Y)
290 GOTO240
300 DATA0,0,76,12,70,20,71,28,73,32,73,34,72,40,73,44,74,50,72,56,68,64,60,72,52,78,46,88,42,96,
40,100,40,112,42,120,40,128,38,136,35,138,32,138
310 DATA 2,124,32,150,36,151,40,150,44,149,48,148,52,146,55,159,56,160,86,174,84,170,80,166,68,1
56,64,154,62,145
320 DATA 72,147,79,143,80,156,84,160,108,166,116,166,112,162,90,154,90,136,92,132,96,124,102,116
,102,112,102,108,100,104,98,100,98,96,100,92,102,88
330 DATA 104,84,105,80,106,76,104,72,100,60,94,48,94,40,93,32,97,28,99,24,100,20,99,14,94,16,92,
18,88,23,84,25,83,20,80,16,76,13,76,12
340 DATA 0,0,44,114,42,120,42,123,48,132,52,146,0,0,58,94,60,96,64,100,66,104,66,108,66,120,64,1
28,62,140,62,145
350 DATA 0,0,75,17,74,20,73,24,76,28,78,29,79,28,79,24,77,20,75,17,0,0,81,19,82,24,83,29
360 DATA 0,0,84,64,85,68,85,72,85,76,84,81
370 DATA 0,0,94,17,92,20,89,24,88,29,0,0,92,20,90,24,87,28,93,25,95,21,0,0,87,35,84,39,84,45,0,0
,76,36,77,44,74,47,74,49,80,55,88,48,91,40
380 DATA 0,0,81,47,79,49,79,51,79,49,76,47,0,0,77,53,78,52,79,52,80,53,0,0,90,38,86,41,0,0,85,47
,82,49,0,0,85,49,82,51
390 DATA 0,0,68,64,66,76,68,84,70,88,71,92,73,96,74,100,76,116,0,0,80,79,78,88,79,100,79,112,78,
116,0,0,94,80,93,92,91,100,87,112,0,0,100,92,91,112,0,0,79,143,90,134,0,0,95,111,72,118,0,0
400 DATA 164,86,207,144,207,148,0,0,168,84,188,110,0,0,184,104,186,96,185,85,0,0,186,94,182,90,1
81,85,0,0,178,105,167,97,0,0,171,103,165,104,161,101,0,0,196,120,204,132,0,0,210,138,216,144,217
,148,0,0
410 DATA 213,140,216,138,220,132,221,128,220,124,213,112,211,108,211,105,214,104,216,102,216,100
,212,98,209,98,204,96,200,97,196,98,192,98,187,100,187,104,193,108,193,114,0,0
420 DATA 187,111,192,114,194,115,204,115,210,107,210,104,208,100,212,100,213,101,212,102,210,103
,0,0
430 DATA 185,117,190,117,197,122,204,120,208,118,0,0,213,134,209,138,204,137,202,137,0,0,216,128
,212,125,208,124,204,126,204,132,206,134,204,132,202,133,200,134,200,135,204,135,0,0
440 DATA 193,110,186,110,0,0,204,115,200,112,197,109,192,106,196,103,192,101,191,103,193,106,0,0
,186,111,184,114,183,114,184,115,186,115,0,0
450 DATA 140,12,140,28,144,28,144,24,148,28,152,28,148,20,152,16,152,12,144,18,144,12,140,12,0,0
460 DATA 156,12,156,28,160,28,160,24,164,24,164,28,168,28,168,12,156,12,0,0,160,16,160,20,164,20
,164,16,160,16,0,0
470 DATA 172,12,172,28,176,28,176,28,176,18,184,28,188,28,188,12,184,12,184,20,176,12,172,12,0,0
480 DATA 192,12,192,28,196,28,196,28,196,24,200,28,204,28,200,20,204,16,204,12,196,18,196,12,192,12,0,0
490 DATA 208,12,208,28,212,28,212,24,216,24,216,28,220,28,220,12,208,12,0,0,212,16,212,20,216,20
,216,16,212,16,0,0
500 DATA 144,36,144,48,156,48,156,52,144,52,144,56,160,56,160,44,148,44,148,40,160,40,160,36,144
,36,0,0
510 DATA 164,36,164,56,180,56,180,36,164,36,0,0,168,40,168,52,176,52,176,40,168,40,0,0
520 DATA 184,36,184,56,188,56,188,48,196,48,196,44,188,44,188,40,200,40,200,36,184,36,0,0
530 DATA 204,36,204,40,212,40,212,56,216,56,216,40,224,40,224,36,204,36,-1,-1
540 PAINT(141,13),1:PAINT(157,13),1:PAINT(173,13),1:PAINT(193,13),1:PAINT(209,13),1
550 PAINT(145,37),1:PAINT(165,37),1:PAINT(185,37),1:PAINT(205,37),1
560 FORT=1T0500:NEXTT:GOTO570
570 CURSOR15,180:PRINT"INSTRU Y or N"
580 AN$=INKEY$:IFAN$=""THEN580
590 IF AN$="Y"THENBEEP:GOTO 1550
600 IF AN$="N"THENBEEP:GOTO 680
610 FORT=1T0100:NEXTT:GOTO570
611 REM

```

```

620 REM *****
630 REM * STAR WAR C 1985 *
640 REM * BY *
650 REM * JAN JACOBSEN *
660 REM * ADELAIDE USER'S CLUB *
670 REM *****
680 C=12:MAG1
690 GOSUB1470:GOSUB1100:GOSUB1290
700 A=0:XX=102:YY=80:X1=0:Y1=0:RN=0:G=0:SD=0:MU=16:SC=0:MI=0
710 Y1=0:X1=INT(RND(1)*100)+50
720 RN=INT(RND(1)*15)+1
730 SPRITE0,(XX,YY),0,4
740 ONRNGOTO750,760,750,750,760,760,760,750,760,750,770
750 SPRITE1,(X1,Y1),4,15:G=1:SD=6:GOTO 780
760 SPRITE1,(X1,Y1),7,8:G=2:SD=7:GOTO 780
770 SPRITE1,(X1,Y1),12,10:G=3:SD=10

```



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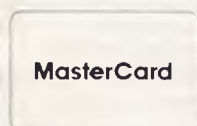
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# PROGRAMS

```

780 IN$=INKEY$:IFIN$=""THEN860
790 IN=ASC(IN$)
800 IFIN$=" "THENSOUND5,1,15:GOTO 930:GOTO 780
810 IFIN=29ANDXX>17THENXX=XX-20
820 IFIN=30ANDYY>15THENYY=YY-20
830 IFIN=31ANDYY<145THENYY=YY+20
840 IFIN=28AND XX<172THENXX=XX+20
850 SPRITE0,(XX,YY),0,4
860 X2=INT(RND(1)*3)
870 IFX2=0THENX1=X1+S0
880 IFX2=1THENX1=X1-S0
890 Y1=Y1+S0
900 IFMI>10THEN990
910 IFX1>=182ORX1<=160RY1>=160THENMI=MI+1:BLINE(40,180)-(70,190),1,BF:CURSOR 45,182:COLOR11:PRIN
TMI:GOTO 710
920 ONGOTO750,760,770
930 IF XX+8>=X1+4 AND XX+8<=X1+13 ANDYY+8>=Y1+4 AND YY+8<=Y1+13 THEN SPRITE1,(X1,Y1),16,6:GOTO 9
50
940 SOUND5,1,0:GOTO810
950 SOUND4,0,15:FORA=0TO80:NEXT: SOUND0:IFSD=6THENSC=SC+30:GOTO980
960 IFSD=7THENSC=SC+80:GOTO980
970 IFSD=10THENSC=SC+200:GOTO980
980 BLINE(175,165)-(195,191),1,BF:CURSOR175,180:COLOR10:PRINTSC:GOTO710
990 CLS:SOUND0:CURSOR90,95:PRINT"YOUR SCORE";SC:CURSOR95,70:COLOR15:PRINT"GAME OVER !"
1000 LINE(20,10)-(240,35),6,B
1010 CURSOR36,20:COLOR5:PRINTCHR$(17);"S T A R W A R S "
1020 PRINTCHR$(16)
1030 LINE(10,170)-(250,190),6,B
1040 COLOR14:CURSOR20,180:PRINT "KANKA Software (C)1985 By Jan Jacobsen"
1050 CURSOR52,130:PRINT"Do you want another game":COLOR7:CURSOR114,145:PRINT"(Y/N)"
1060 IFINKEY$="Y"THENGOSUB 1290:GOTO700
1070 IFINKEY$="N"THEN1640
1080 GOTO1060
1090 RESTORE1480
1100 SCREEN2,2:COLOR,1,,1:CLS
1110 LINE(20,10)-(240,35),6,B
1120 LINE(10,170)-(250,190),6,B
1130 CURSOR36,20:COLOR5:PRINTCHR$(17);"S T A R W A R S "
1140 PRINTCHR$(16)
1150 SPRITE0,(50,70),4,15
1160 SPRITE1,(50,100),7,B
1170 SPRITE2,(50,130),12,10
1180 CURSOR80,78:COLOR15:PRINT"S C O U T e 30 PTS"
1190 CURSOR80,108:COLOR7:PRINT"P A T R O L e 80 PTS"
1200 CURSOR80,138:COLOR10:PRINT"F I G H T E R e 200 PTS"
1210 COLOR14:CURSOR20,180:PRINT "KANKA Software (C)1985 By Jan Jacobsen"
1220 RESTORE1260:FORJ=1TO110:READF:SOUND1,F,14:SOUND2,F+1,14:SOUND3,F*2,14:FORDE=1TO30:NEXTDE,J
1230 READD
1240 IFD=0THENSOUND0:CLS:RETURN
1250 SOUND0,RETURN
1260 DATA 196,196,196,131,392,392,175,165,147,262,392,392,392,349,330,294,262,392,392,392,349,33
0,349,330,349,294,294,196,196,196,294,294,196,220,220,349,330,294,262,262,294,330,294,220,247,19
6,196,220,220,349,330,294,262,392,294,294,392,342,440,440,698
1270 DATA 698,659,587,523,523,587,659,587,440,494,392,392,523,466,415,392,349,311,294,262,392,78
4,196,196,196,262,392,392,349,330,294,523,392,392,392,349,330,294,523,392,392,392,349,330,349,29
4,294,294,294,0
1280 RETURN
1290 SCREEN2,2:COLOR,1:CLS
1300 FORP=0TO150:X=INT(RND(1)*200):Y=INT(RND(1)*170):E=INT(RND(1)*14)+2:PSET(X,Y),E:NEXT
1310 CURSOR140,180:COLOR10:PRINT"SCORE":CURSOR10,180:COLOR10:PRINT"MISS"
1320 COLOR6:CURSOR215,5:PRINTCHR$(17);" S "
1330 COLOR15:CURSOR215,25:PRINT" T "
1340 COLOR4:CURSOR215,45:PRINT" A "
1350 COLOR7:CURSOR215,65:PRINT" R "

1360 COLOR14:CURSOR215,105:PRINT" W "
1370 COLOR10:CURSOR215,125:PRINT" A "
1380 COLOR6:CURSOR215,145:PRINT" R "
1390 PRINTCHR$(16)
1400 FORCI=1TO20STEP1
1410 CIRCLE(25,25),CI,11
1420 NEXTCI
1430 LINE(215,0)-(245,155),4,B
1440 LINE(210,0)-(250,155),4,B
1450 PAINT(211,1),4:PAINT(246,1),4
1460 RETURN
1470 RESTORE1500
1480 FORA=0TO19:READRE$:PATTERNS#A,RE$:NEXT:RETURN
1490 GOTO1480
1500 DATAF0F0C0C0100010015,15000100C1C0F0F0,0F0F0383008000A8,A800800083030F0F
1510 DATA80C0E0A1E3A3E79E,9FE7A1E0A0E0C080,01030785C7C5E779,F9E7850705070301
1520 DATA0001021E3A57BAE7,0100000000000000,008040785CEA5DE7,8000000000000000
1530 DATA0000000000205089,47A77FA344990403,000000000040A91,E2E5FEC5229920C0
1540 DATA43A3081C1E3F3F7F,FF7F7F3F3F1D3800,08183A70F2E1FBFE,FFFEFBEC6829008
1550 SCREEN 1,1:CLS:PRINT "STAR WARS"

```



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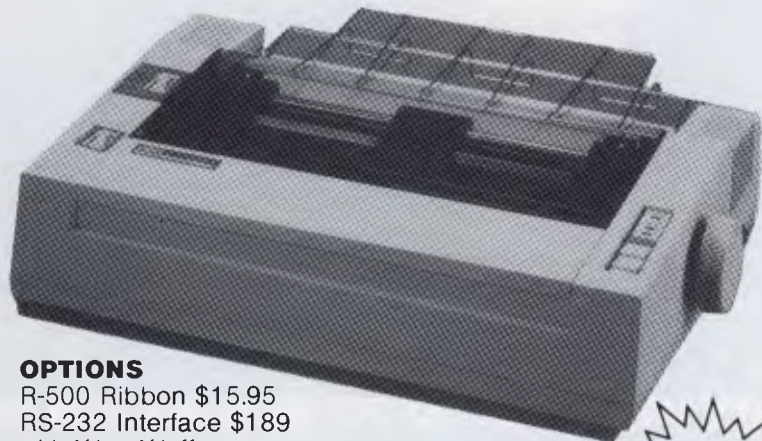
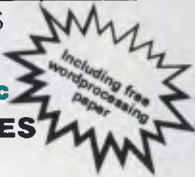
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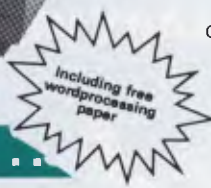
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Double width elongated (pica/elite) 40/48  
Compressed (pica/elite) 132/158  
Compressed and elongated (pica/elite) 66/79  
Superscript, subscript (pica/elite) 80/96
- Paper Feed Friction feed, Sprocket feed
- Paper Width Fanfold 4-10 inches  
Cut sheet 4-9 inches
- Copies 3 max.
- Interface Standard Centronics-style 8 bit parallel  
Optional RS232C with 2K buffer  
(X/ON-X/OFF and ETX/ACK protocol)
- Ink Ribbon Cassette (Service life: 3 mil characters)
- Head Service Life Over 100 mil characters



### OPTIONS

- R-500 Ribbon \$15.95
- RS-232 Interface \$189
- with X/on-X/off
- ETX/ACK

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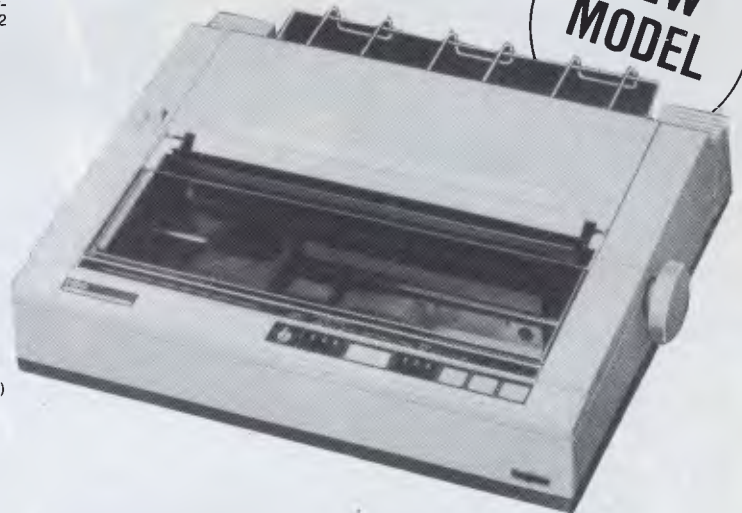
### FT-5100 FEATURES

- Print modes: Draft, Near Letter Quality-Pica (10 cpi), compressed, Near Letter Quality-Elite (12 cpi), Proportional Spacing Near Letter Quality
- Character sets: 96 ASCII characters, 96 Italic ACSII characters, 32 International characters (11 countries), 64 Block Graphics, 132 IBM-PC® special characters
- Dot configuration: 3/254 inch (0.3 mm) dot diameter
 

	Draft (PICA)	NLQ
Dot alignment (Hor. x Ver.)	9 x 9	12 x 18
Dot pitch (Hor.)	1/120" (0.21 mm)	1/100" (0.16 mm)
(Ver.)	1/2" (0.35 mm)	1/44" (0.18 mm)
- Character size
  - Ordinary characters: 0.078(W) x 0.095(H) in. (1.99 x 2.42 mm)
  - Superscript/subscript characters: 0.078(W) x 0.053(H) in. (1.99 x 1.36 mm)
- Number of characters per line (per inch (25.4 mm)):
 

Pica (Draft, NLQ)	80 cpl (10 cpi)
Elite (Draft, NLQ)	96 cpl (12 cpi)
Compressed	137 pcl (17 cpi)
Pica elongated	40 cpl (5 cpi)
Elite elongated	48 cpl (6 cpi)
Compressed elongated	68 cpl (8.5 cpi)
- Printing speed:
  - Draft-Pica 180 cps
  - Draft-Elite 180 cps
  - Near Letter Quality 33 cps
- Printing direction: Text printing: Bi-directional  
Bit Image printing: Single direction (left to right)
- New line time: Approx. 100 msec (with 1/6 inch (4.2 mm) line feeding)
- Paper feed: Tractor feed (with fanfold paper)  
Friction feed (with single sheet)
- Paper used: Fanfold paper Width: 4-10 inches (102-254 mm)  
Thickness (paper weight in kg): 34-55 kg  
Single sheet Width: 4-9 inches (102-229 mm)  
Height: 5-14.3 inches (127-363 mm)  
Thickness (paper weight in kg): 34-70 kg (only 1 sheet)
- Paper thickness: 1/100 in (0.25 mm) maximum
- Copies: Original and two copies
- Storage environment: -4°F (-20°C) to 140°F (60°C) temperature, 10-90% humidity
- Operating environment: 41°F (5°C) to 104°F (40°C) temperature, 20-80% humidity
- Head service life: 100 million characters with draft character printing
- Ribbon: Cassette seamless fabric ribbon  
Service life: Approx. 3 million characters with draft character printing
- Dimensions: 16.8(W) x 13.8(D) x 5.4(H) in. (427 x 350 x 137 mm)
- Weight: 19.6 lbs (8.9 kg)

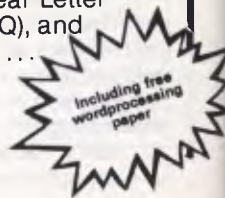
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# PROGRAMS

```

1560 PRINT "You are a member of the 'FIGHTER SQUAD'"
1570 PRINT "You are in your Fighter reday to blow up the EMPIRE Fighter"
1580 PRINT "The Fighter move randomly in a down direction and are petty hard to catch."
1590 PRINT "IF you let more than ten EMPIRE Fighter get away, you'll lose your job."
1600 PRINT "So hurry up! Jump into your space ship using the cursor key movements (up, down, left and right), and speed to it!"
1610 FORT=1 TO 1500:NEXT I:PRINT "Press any key to continue"
1620 IN$=INKEY$:IF IN$="" THEN 1620
1630 GOTO 680
1640 SCREEN 1,1:CLS:PRINT "BYE":STOP
    
```

*APC is interested in programs written in any of the major programming languages for all home and small business micros. When submitting programs please include a cassette or disk version of your program, brief but comprehensive documentation, and a listing on plain white paper — typed if you have no printer.*

*Please ensure that the software itself, the documentation and the listing are all marked with your name, address, program title, machine (along with any minimum requirements) and — if possible — a daytime phone number.*

*Check through the previous Program listings to see the kind of programs we prefer. As a rough guide, original ideas are always welcome, as are good implementations of utilities and applications. Obviously the programs should be well-written, easy to understand, and preferably not too long (remember that other readers have to type them in).*

*All programs should be fully debugged and your own original, unpublished work.*

*We prefer to receive programs with a maximum 80-column width printed in emphasised typeface.*

*We will try to return submissions if they are accompanied by a stamped addressed envelope of the appropriate size, but please keep a copy of everything. Programs are paid for at the rate of \$20 per page of published listing. Programs APC, 215 Clarence Street, Sydney 2000.*

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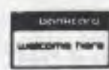
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