# Australian Personal Computer

'85 PC AWARD: THE WINNERS!

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**AUSTRALIA'S TOP SELLING COMPUTER MAGAZINE**

## THE BIGGEST SPLASH YET?
## Exclusive: Commodore's Amiga tested

NOW WITH 80286 & Z80H

# Universe

## Security and speed
## Software compatibility, and

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.

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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.

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**Tough**
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**Stays Cool**
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**Flexible**
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**Expandable**
20 slot shielded S100 buss. Obsolescence proof using IEEE 696 S100 cards.

### Speed and Security – essential to your business

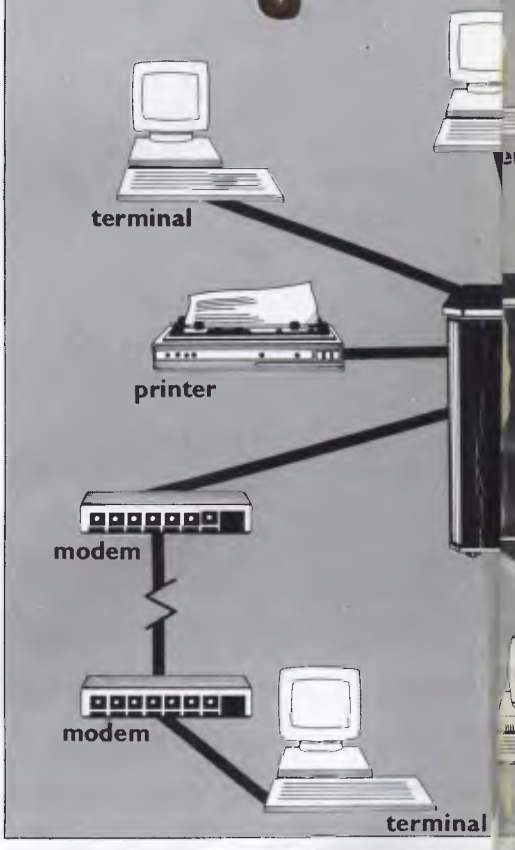
Most networks are slow and insecure. Universe shines here, with full multilevel security enhancements normally found on well engineered minicomputers. Universe is engineered from the ground up to provide facilities essential for the smooth running of a large multiuser system.

### 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

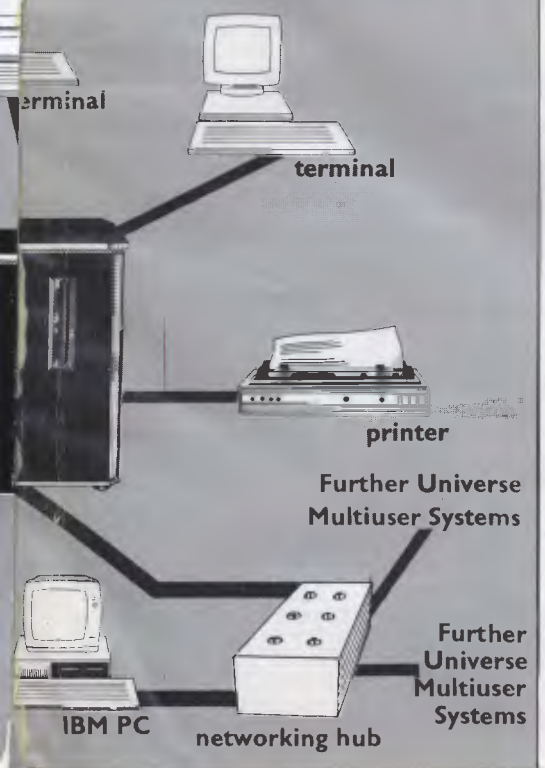
## of a minicomputer.
## reliability of a supermicro.

**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 Winchesters 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

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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.

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AED

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# APC

# Contents

**Volume 6, Number 8, August 1985**

## REGULARS



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## FEATURES



## BENCHTESTS AND REVIEWS

# When you can't afford mistakes.

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are statistically checked to make sure the quality is 'built-in' every step of the way.

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There really is a difference.

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**Eighty exhibitors had their wares on show at PC'85, the fifth Australian Personal Computer Show in Melbourne. For those of you who didn't get along, here's what you missed.**

# Five down . . .

For thirty six hours tens of thousands of visitors poured through the doors of Melbourne's World Trade Centre to look at the latest in computers and software. The occasion was PC'85, the fifth *Australian Personal Computer* Show, and a personal computer Show it was too.

Passing through the portals you were faced with massive IBM and Apple stands — that was the stature of the Show. All the big non-mainframe names were there, except uncle Jack and his new Ataris. Under one roof you could see just about every personal computer that might tempt you, plus most of the major peripherals and software packages for those PCs.

More than ever the emphasis was on the business user, with under eighteens tolerated, just. Many exhibitors would have been happier to have the Show open during business hours only! Is anyone game to organise a Show for kids?

Human Edge Software launched a program at the Show that might help organisers cater for kids with a little more understanding. Mind Over Minor is a psychological profile package that aims to help adults better relate to children. Answer questions about the child's behaviour and an eight page printout tells you how the subject should be treated. It doesn't give the child any advice about dealing with parents.

Adults couldn't be blamed for acting like kids in a toy-store — there was so much good gear on show. Better-heeled executives made a beeline for IBM's stand to check out the AT. We've read report after report on it; here was a chance to see it in the flesh, and hear about the September delivery dates.

For those who couldn't wait until then, plenty of other companies were showing AT-compatible machines, offering more features or a lower price, or both. President had a stand almost directly across from IBM. Their AT attracted considerable attention, offering AT features at a few thousand dollars less than the IBM. Upstairs there was the Tava compatible, running at an optional 8.0MHz, compared to the 6.0MHz of the IBM. Kaypro had three AT compatibles on offer and Televideo were selling their AT-clone off the stand. The AT bandwagon is rolling along quite nicely.

Portables were the other area of major attention. Hewlett-Packard gave pride of place to the prize-winning Portable Personal Computer. Epson stole a march on them, picking up the trophy in the Executive-Lapheld category of the inaugural '85 PC Awards with their PX-8. Epson standpersons soon sported rosettes announcing this fact.

Toshiba had their T1100 on show and on sale at the Copispec stand. They sold their entire stock — not surprising considering the specifications of the computer. It is MS-DOS compatible with an 80 column, 25 line LCD display, RGB output, built-in 3.5in disk drive, 256k RAM and weighing 4.1kg. Copispec also threw in either Open Access or a monitor as a Show special, making the T1100 hard to resist at $3,000. Even Dick Smith Electronics, due to get their share of T1100s very soon, were trying to buy them at the Show!

Archives Computers has a brand new Morrow Pivot 2 in from the States. Again portable, it had two 5¼in disk drives. MS-DOS compatibility, New Word, an electro-luminescent 80 column, 25 line display, built-in modem, serial, parallel and IBM expansion ports, 640k RAM and weighed 6kg.

Just opposite was another MS-DOS portable, the Kaypro 2000. It had a 3.5in disk drive, LCD display and looked very, very smart. Kaypro, with the 2000 and the 286i AT compatibles has taken a big leap forward from luggable CP/M machines. Their executives reckon 1986 will see Kaypro back as a major force.

Epson had just the printer to suit all these briefcase micros, the P-80X. Small, battery or mains operated, using plain or thermal paper and printing across 80 columns, it is claimed to be the smallest 80 column printer available.

Not only computers and printers were small. Two pocket television receivers attracted plenty of attention. That on the Epson stand was a colour model with a two inch LCD screen, around three by six inches in size and powered by AA batteries. The price is expected to be around $600. Technology Corporation of Australia had the Sinclair pocket TV on show too — the size of a transistor radio, almost as light, black and white and expected to cost around $300. Reception in the Trade Centre was not good, so Epson cheated a little by running their TVs off a video recorder.

TV crews covered the Show and one of the items that attracted their attention was Melbourne House's new game, "A View To Kill". Based on the Bond film of the same name, it is a three part arcade game developed in England by Domark. You play 007 of course. The Way of the Rxploding Fist was the other new Melbourne House game — a kung fu/karate challenge that went straight to number one in the UK.

Both these games ran on the Commodore 64, and also on the Commodore C128. That was on show for the first time, and was a real crowd puller. *APC* readers would have read all about it, and all it was doing was running an auto-looping program that showed off the windowing and graphic capabilities. The 350k 1571 5¼in disk drive was on show too. It supports CP/M files, bridging the gap between home and office (if it's an old fashioned CP/M office).

Commodore's stand was

notable for its array of ergonomic chairs. Watching people trying to sit in/on them was quite amusing. Those interested in buying such chairs could get more details from the Goodman Cannington stand.

Two micros on show were able to offer both MS-DOS and CP/M compatibility. The Seequa XT, on The Computer Junction stand, had been seen before. It comes with WordStar, SuperCalc 3 and other software. On the Epson stand was the brand new QX-16, an MS-DOS and CP/M micro, priced at around $4,500 with twin floppy disks and monitor.

Among other new MS-DOS micros was the up-market Canon AS-300 with an integrated software suite called Super-Canonbrain, the President JR, a minimum spec PC-clone that's portable and inexpensive ($1,720 including tax), the home-oriented QX-11 from Epson, the NCR PC4 and the much-advertised Commodore PC-10.

Many MS-DOS computer users were intrigued by the voice interface on the AWA stand. The Keytronic KB-5152 keyboard accepted up to 160 different spoken commands, each up to 60 characters long, and acted as if the commands had been typed in at the keyboard. You have to train the software to recognise your voice, but the system seemed to be working pretty well.

Another interesting peripheral was the home-grown Pulsar Electronics Gigadisk — a laser disk system holding 1,000Mb, or one Gigabyte of data. It is compatible with most computers.

Laserdisks were at the heart of a computer education system from Syslink. Courses on products such as Lotus, dBase, WordStar and so on come on laserdisks which are played in a Learning Center. Students go at their own pace and the distributors assert that this form of teaching has a very high success rate.

The Computermat sessions — one hour lectures on micros, word processing, spreadsheets and so on — were sparsely attended. Two reasons were given for that. The main one was that people didn't want to sit in a theatrette for an hour; the other was that most visitors were already computer literate. No sessions were held on the first day as the software had not arrived from Sydney. It is unlikely that Computermat sessions will feature in future Shows.

Business software drew hordes of people seeking hands-on demos of the latest packages. Arcom Pacific was kept busy demonstrating GEM and Samna programs, Samna Word III and Samna Plus being released in turbo-charged Version 3.0 forms. Microsoft had more academic releases — Xenix compilers for Pascal, Fortran, Cobol and Basic programs written under MS-DOS. With the compilers most 'well behaved' programs can be converted to run under a Xenix multi-user operating system.

Microsoft also had Excel on show. It is a number crunching program for the Fat-Mac with excellent graphics capabilities. Using the Mac's facilities to good effect and with abundant power, it is a serious piece of software with a high price tag.

Also new for the Mac is Omnis 3 from Software Corporation of Australia. A sophisticated database system with a sublanguage to aid file creation, block off options to certain users, present all or some of a file, change screen presentation and much more, it is probably the most advanced database for the Mac yet. SCA also released Multimate Advantage, a PC word processing package, Touch, a PC keyboard tutor, Printmaster, a PC graphics and typography package, Reflex, an analytical database, Forte PC to mainframe linking packages, DEC and Data General terminal emulators, Masterflight PC hard disks and the Data Express PC modem. The SCA press pack was a substantial affair!

New printer technology was much in evidence. Apple had the Laser Printer up and running. Canon had their laser printer, the LBP-8AI, and the BJ-80 bubble jet printer. Epson had the all-but-silent SQ2999 ink-jet printer going through its paces. No wonder de Vere Computer Accessories was selling acoustic hoods at bargain prices. Of the more conventional printers, there were four new dot matrix models from Citizen on the Datronics stand, an Epson LX-80 and LX-90 and an NEC Spinwriter Elf from NEC.

MSX made yet another debut, with 64k computers from Sony, Toshiba and Mitsubishi, plus a good range of peripherals. Students from the Royal Melbourne Institute of Technology spent the days writing graphics programs on the MSX computers, though an electrical power surge put a few thousand dollars worth of MSX gear out of action on the first night.

On the Tandy stand, visitors could see STARS in action. The acronym stands for Scholastic Text and Retrieval System. Sydney firm Computing 2000 Corporation, has put the MacQuarie dictionary and 2.5 million reference articles on a mainframe. Subscribers can search this data base for any subject in just two seconds. CTC maintain that they have beaten IBM to the goal of having an on-line dictionary and are trying to sell the system abroad.

Other stands gave visitors the opportunity to check out the latest books, examine photocopiers and typewriters, investigate the activities of local user groups or even just admire the Barson racing car in the Foyer. There was something for everyone. If you missed the Show, PC'86, the sixth *Australian Personal Computer* Show is in Sydney, 12th to 15th March, 1986. Be there.
*Kester Cranswick*

# APC Awards

Choosing the eight winners in the inaugural PC'85 awards was not an easy task. The sixteen independent judges examined a host of contenders and had to make some difficult decisions. The prizes were presented by Olympic swimmer turned businessman John Konrads at the fifth *Australian Personal Computer* Show. Backed by


# SAMNA WORD III SAMNA+

If you think keeping up with the latest fashion is hard work — you should try computers. For a start, word processors that only word-process are dead. The in-word today is office automation; individual personal computers doing a whole range of tasks. Word processing, project planning, spreadsheets, to name a few.

Byte Magazine (the computer industry guru) said "SAMNA Word III is the best..... I'd rather work with SAMNA Word III than with a dedicated word processor".

**SAMNA Word III** runs on the IBM Personal Computer* and lets you produce work you can be proud of. High quality, well-laid-out documents. Fast, easy to learn and simple to use. Just imagine, centering a title by using just 2 keys. Or being able to zoom out and look at a page even before its printed.

There's an Anglo English dictionary to help you with those difficult words; and your document index can be automatically produced. There's so many good things about SAMNA Word III, why not ask for a demo at your local computer store, or complete the clip coupon below.

ARCOM Pacific is the leading business micro computer software distributor in Australia and New Zealand. We'll help you stay in touch with computers.

For an even more versatile office tool, **SAMNA+** integrates multiple spreadsheets with SAMNA Word III. Gareth Powell, Computer Editor, Sydney Morning Herald said, "In a sense SAMNA+ rivals Lotus 1-2-3..... it includes a database of sorts plus spreadsheets. The great difference is that it has been designed principally for people who manipulate words".

This means you can use your word processing skills to layout and manipulate the spreadsheet. Multiple spreadsheets can easily be handled and wide documents can be folded to compare different columns of numbers. Furthermore, results in a table can automatically update conclusions in the text.

The Word Base Manager in SAMNA+ gives you the ability to search many or all of your documents for specific information, e.g. find a letter sent to a client some weeks ago, or list all the references to a specific subject. It is an incredibly powerful facility, only seeing is believing. Why not ask for a demonstration at your local computer store, or use the clip coupon below.

*SAMNA Word III and SAMNA+ work on the IBM PC, PC-XT, AT, PC 3270 and close compatibles.

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*A close-up of one of the Awards*

*APC*, *The Bulletin*, *Australian Business* and *Personal Computer Games*, the awards are well on their way to being established as the premier awards on the Australian computing scene. This year's prizewinners were . . .

## *Business Hardware — North Star Dimension*

Excellent value for money was what swung the balance in favour of the North Star Dimension computer system in this category. A 16-bit computer with MS-DOS compatibility, resource sharing capability and available in 5Mb, 10Mb and 15Mb configurations, the North Star met all the judges' criteria for a medium-sized business computer, against competition from Apricot, Sperry, Macintosh, NEC, NCR and Ericsson.

## *Executive/Lapheld Computer — Epson PX-8*

In this fiercely competitive category the CP/M compatible Epson PX-8 was judged the winner. The judges were impressed by its portability, good screen displays, ROM software and terminal facilities, 64k RAM and good documentation. Supplied software includes WordStar, SuperCalc, Portable Cardbox, Basic, a scheduler and CP/M utilities, for around $1,300. Other contenders were the HP110 and Grid Compass.

## *Home Computer Hardware — Commodore 64*

Although the Commodore 64 is not the Rolls Royce of home computers, it offers what every enthusiast wants — raw power. Boasting a powerful sound chip, flexible memory configuration, full featured graphics and an inexpensive yet practical range of peripherals, the 64 just managed to sneak home ahead of the Amstrad CPC 464.

## *Personal Computer Business Software — Sybiz Plus*

This category attracted the most entries. The overall winner was Sybiz Plus, a user friendly accounts package. Among its chief rivals were Open Access, dBase II and FBS. Sybiz Plus proved to be flexible, well integrated, functional and offered a good price/performance ratio, as well as satisfying the basic criterion of improving business efficiency.

## *Educational Software — Dirigible and Burst*

An important category this, and won by Dirigible and Burst from Systems Research in Perth. It scored very highly in its creativity, attention-holding, user motivation and documentation. The fact that it was acceptable to a wide age bracket was the clinching point. Dragonworld, Sound Odyssey and MacPascal also caught the judges' attention.

## *Games Software — Impossible Mission*

Impossible Mission is a superb package which combines a supremely original concept with undoubtedly the most impressive animation and voice synthesis ever devised on a home computer. It is an entertaining and addictive game that will surely remain a standard by which others will be judged.

## *Documentation — Ericsson PC*

This unusual but important category attracted few entries, and many fell at the first hurdle. Overall, the documentation supplied with the Ericsson Personal Computer was judged the best. Attractive packaging, durable finish, clear layout and copious use of diagrams were telling factors. The book opened flat, was well indexed and was ideal for the average user. The judges did remark that documentation still has a long way to go.

*Winners of the 8 Awards and the presenter, John Konrads*

## *Innovative Product of the Year — Apple Laser Printer*

This award was decided by *Australian Personal Computer* readers. They had no hesitation in presenting the award to Apple — not for the much acclaimed Macintosh, but for the Laser Printer. Too often peripherals are ignored. With the Laser Printer, Apple has made available the highest level of technology to everyday users of office automation.

# Answers to the thirteen most asked questions about Sony's new Model 10.

- ☑ It has full communication capability.
- ☑ It connects to a mainframe (via RS-232-C).
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- ☑ It has the right ergonomic qualities and features.
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- ☑ It has a reputation for being the easiest to use.
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# NEWSPRINT

**Reshuffling at Apple, news on networks, ThinkTank released for the IBM PC and Digital Research sabotage GEM. All this and more in this month's Newsprint.**

## Apple reorganisation

You can forget all about the idea of seeing a fast Macintosh, or a colour Macintosh, this year. The project has been put on ice. The reason: personnel changes at the top level.

My contacts in the software business say they are pretty pleased to see Steve Jobs, founder of Apple, forced to take a back seat in the struggle with the man he hired, John Sculley.

The phrase used by one (who obviously wants to stay anonymous) was: "The folks in charge don't include some whose egos were rather too involved in their work," and he meant Jobs.

On the other hand, the news is not really all that good, because the "ego" of Jobs was heavily involved in the Macintosh.

It remains true that Apple's fortunes were built on the Apple II, and that without it, the corporation would be lost. Even today, most of the money that flows in, comes from the IIe and IIc. And the machine still needs development.

But if the company has a future, that future lies with the Macintosh. And a full halt has been called in Macintosh development, now that Jobs has been relieved from control of that.

A Macintosh with more memory — both disk and RAM — was due out in September. That has been postponed, indefinitely.

And the colour Macintosh, scheduled for February, is equally abandoned — not permanently, but for some time.

This has got to be a mistake. The Atari ST has both speed and colour advantages over the Mac (see June's *APC*), and the Commodore Amiga (reviewed in this issue) has even more of both. Apple invested a fortune in getting the first low-cost icon machine into the market, and it has a whole year's start on those two, especially in software.

But this is not the time for Apple to go to sleep! Getting software started on the Macintosh lines was hard. Getting versions of things already written for the Motorola 68000 and icons, onto another machine with the Motorola 68000 and icons, isn't more than about two months' work.

I don't expect the Amiga to be fully debugged until Christmas. The Atari ST may well take longer. But even so, at the prices those two will be selling for, a lot of potential customers are bound to be tempted, and the only thing that can keep Apple right in front, is hard work.

In public, of course, Apple is saying that "nothing has changed" and that if it looks necessary to compete with Atari or Commodore, it will respond.

But the truth is that software houses are NOT going to carry on burning the midnight oil on colour versions of their Macintosh software, if the company isn't fully committed to getting the colour Mac out.

And everybody who has ever used Mac is agreed that the thing is wonderful, but slow, and short of disk space. Included in those people are software authors.

Talking about "Steve Jobs taking on a more global role in new product innovations and strategies" is polite flannel for saying that things had to change. Many in the business believe that, and who knows? It may be true.

But sacrificing the lead Macintosh has in the icon-market is not going to pacify the gods who say: "The Apple II is nearing the end of its life," because that time is coming.

Even if the 6502 chip were useable in reliable multi-tasking (and it isn't) it has reached the effective speed limit of its design already. Even if it could address a megabyte of memory, as the IBM PC chip can, it wouldn't be possible to standardise on a system, at this stage in the market, for software houses to use the extra.

But worst of all, the 6502 has no big brother, and the 8088 has the 80286, already out in the market. There is very little difference between the IBM PC and the Apple IIe, apart from that — but that is enough.

*Guy Kewney*

## Xenix vs Unix

Olivetti is 25% owned by AT&T, the American phone giant. AT&T owns Unix, and sells a big micro worth $25,000, called the 3B2, while Olivetti sells an IBM PC compatible called the M24.

In exchange for having AT&T sell the M24 in America (under the title PC6300) Olivetti is now going to sell the 3B2 in Australia.

What is going to slow them down, I think, is the fact that AT&T owns Unix.

Somebody has to decide whether AT&T will make more money from selling an operating system to lots of different Unix systems builders, or by building systems that use Unix.

AT&T insists that the 3B2 is a wonderful opportunity for the dealer, and can be used as a Unix machine, or a local area network controller, file server and so on — or both. And when the software is all ready and polished and slick, I think he's right.

But AT&T's "determination to be a force in dp" could be likened to Intel's determination to be a leading force in microprocessors.

Intel sells the 8086 family, and also builds systems that use the chip. But, very sensibly, it doesn't sell imitation IBM PCs. It does pretty well with a pricey range of boards and boxes for people who want to build a system of their own, but only want a hundred, or so (even fewer) for specialist purposes.

Can AT&T really command both the Unix hardware market, and sell an exactly similar Unix to rival hardware builders? And can it sell the microprocessor chip — a 32-bit design — that is inside the 3B2?

From America, the general feeling is that the M24 had flopped. Inside Olivetti, they say that in fact it's done much better than they forecast.

It's true that in Australia, the M24 is looking like the number one rival to the original PC. We'll just have to wait and see if AT&T sticks it out in the hardware business in America.

*Guy Kewney*

## Osborne again

At $2,995, Osborne's little IBM-compatible portable, with two disks is enough to make even the Osborne name seem irrelevant to people who are afraid that the company can't really have recovered from bankruptcy.

The machine has been upgraded since this model first was touted (you saw it in our October issue) but the original version remains a good bet as a travelling machine, if you can afford something better than a Tandy 100.

It's only limitations are the

# Everybody's talking about the CBA accounting package.

**Proven Multi-User on most standard MS-DOS systems**

## Simply because there's so much to be said for it:

CBA is the accounting package tailored to small to medium size business requirements. It's inexpensive, and yet it's suitable for multi-user operations as well as single. It's compatible with the most popular PC's, AT's and Local Area Networks.

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16-line LCD screen (which is, however, a 16-line "window" to a virtual 25-line display), and the fact that it isn't very easy to read in dim lighting.

But it does have the ability to plug into an ordinary CRT display, with the full 25-line PC-DOS/MS-DOS display showing.

Prices start at the $2,995 mentioned for a 256k version, with two disks, and with the external display adaptor, plus 512k, the price rises to $4,535.

And by comparison with the "second generation" versions of the Tandy 100 — well, there is no comparison. The only really serious rival will be the Interquadram Datavue, when they get an Australian version together.

Details from Osborne Australia on (02) 290 1122.

## Translate Basic to Pascal

The problems of writing in Pascal are made far worse if you're a trained Basic programmer — because the two languages don't think alike. So a translator program, to take your Basic (Applesoft version) programs and rewrite them in Pascal, might not seem optimal.

However, Woodchuck Industries has produced such a translator, in the belief that people will be able to sell their software on other machines.

Today, P-Tral costs $US125, and when it is fully debugged (in the autumn) the price will double. Existing customers will be charged an extra $25 to get the bug-free version.

What makes the translator unusual is that while it works on your Applesoft code, it stops and asks you for suggestions when it comes up against problems — so you probably develop some Pascal skills as the thing goes on.

For example, it may request a new variable-name, if the Basic version isn't acceptable in Pascal.

They also claim that your Pascal code will run around three to ten times faster than the Basic, using Apple Pascal 1.1.

Details on 0011 212 924 0576 in the US.

*Guy Kewney*

## QuickMac

The theory behind this RAM-disk software for the Macintosh is: you don't need all that 512k of memory, so use some of it as an imaginary, fast disk.

At $US34, you might think it's cheap enough not to gripe, but I do. I know that Mac is unreasonably slow at using its disks, and I also believe that this product is rather cleverer than Assimilation Process's Mac Memory Disk, in deciding how much memory to sacrifice to the imaginery disk.

But many programs for Mac use more than half the memory anyway, and you may find that the overall speed increase is roughly what you'd expect for $US34. What we really want is 512k of memory, plugged in to the second disk slot. But that would cost . . .

Details on 0011 602 224 5944 in the US from Symmetry Corporation, which makes its appearance with this announcement. More software, they say, will follow.

*Guy Kewney*

## More Networks

At last, I have found a local network system which can link all other local area nets together.

It is a system called Banyan, launched by a new company, one of several really impressive networking announcements at the Comdex fair in Atlanta, but on a level of cleverness that isn't matched by any of the others.

A Banyan is a swamp-growing tree, which sends out new trunks to hold its wide-spreading branches out of the water — it looks more like a local area net than anything you could find growing.

The network seems able to link any type of computer to any other — and to provide proper "file server" facilities across the network, not just a shared disk system. But better than that, it can reconcile two completely disparate local nets.

It can link a "star" network of IBMs to an Ethernet, to a host mainframe, to a token-passing ring-main net, to a Corvus network, using synchronous or asynchronous protocols. It can even support the different file structures of MS-DOS, Unix, Macintosh, minicomputer operating systems, and mainframes.

The company was set up in late 1983, and has had its products under test in the Boston Bank and World Bank — to both of whom it has now sold very large multi-network networks.

The central box on which all this cleverness is based is a Unix-driven micro with a Motorola 68000 in it.

This is almost the ideal application for a Unix machine — it needs to be served by experienced programmers, who can write their stuff in "C" language and pass the job onto the next person.

The box includes an ordinary IBM PC bus — into which IBM network cards can be plugged.

The "heart of the Virtual Networking Systems (VINES) software" as Banyan puts it, is the StreetTalk "location independent naming system".

This "provides an efficient way to identify objects within the network, such as information, applications, peripherals, protocols, or other computing resources distributed throughout single or multiple locations".

The World Bank system apparently includes 32 Banyan boxes, each linked to each other, and each supporting a complex local network (already existent, in some cases) inside the organisation.

Banyan is contactable at 135 Flanders Road, Westboro MA 01581, on 0011 617 366 6681.

To Banyan, the annoucement by IBM of its PC Networks software was not even a surprise, let alone a challenge.

To other micro networks at Comdex, however, the IBM announcement was the talk of the show.

The pioneering 3Com, for example, which linked up with the Microsoft Networks announcement in late 1984, has now adopted the IBM version (which shares some central assumptions with the Microsoft product) — as a "strategic direction". The company announced its Macintosh network, EtherMac, at the show, but rushed together a statement talking about "product strategy" and its intentions to support IBM's "de facto standard" during this year.

The address for 3Com is 1365 Shorebird Way, Mountain View CA 94039, phone 0011 415 960 9451.

*Guy Kewney*

## And more

Low cost is the central feature of the Racore-Net announcement. The Racore network is unique — it's network hardware put together to run special software. The special software, of course, is IBM's PC Network software, plus PC-DOS 3.1.

The important point, however, is cost: a four node Racore network should add a total of $US1,000 to the four PCs or XTs or ATs, or whatever, they say.

Racore uses token passing ring architecture, with a two megabit per second data transfer rate, which is all

# What makes Macintosh tick. And talk.

The brain of the Apple Macintosh uses a blindingly fast 32-bit MC680000 microprocessor. Far more powerful than the 16-bit 8088 found in current generation computers.

*The 16-bit 8088 microprocessor.*

*Macintosh's 32-bit MC68000 microprocessor.*

The heart is a revolutionary technology of windows, icons, pull-down menus and mouse-commands.

Which makes the 32-bit power not only more useful but easier to learn.

Another miracle of miniaturisation is Macintosh's built-in 90mm (3½") microfloppy disk drive. Its 90mm disks store more than conventional 135mm (5¼") floppies – 400K. So while they are big enough to hold a desk-full of work, they are small enough to fit in a shirt pocket.

*Standard 135mm (5¼") floppy disk.*

*Macintosh's 400K 90mm (3½") disk.*


And, thanks to its size, if you can't bring the problem to a Macintosh, you can always bring a Macintosh to the problem. (Macintosh actually weighs less than 9 kilos.

*Small footprint. Macintosh is ⅓ the size and volume of the IBM PC.*

And speaking of talking, Macintosh has a built-in polyphonic sound generator capable of producing high-quality speech or music.

All it takes to get it talking is special Macintosh speech generating software.

On the back of the machine, you'll find built-in high speed RS232 and RS422 AppleTalk/serial communication ports. Which means you can connect printers, modems and other peripherals without adding $250 cards.

It also means that Macintosh is ready to hook into a local area network. (With the AppleTalk Personal Network, you'll be able to connect up to 32 computers and peripherals.)

Should you wish to double Macintosh's storage with an external disk drive, you can do so without paying extra for a disk-controller card – that connector is built-in, too.

And, of course, there's a built-in connector for Macintosh's mouse, a feature that can cost up to $500 on computers that can't even run mouse-controlled software.

Of course, the real genius of Macintosh isn't its serial ports or its polyphonic sound generator.

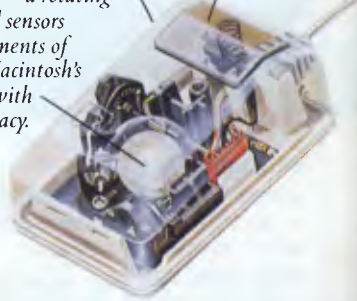
The real genius is that you don't have to be a genius to use Macintosh.

You just have to be smart enough to buy one.

*Some mice have two buttons. Macintosh has one. So it's impossible to push the wrong button.*

*The Mouse itself. Replaces typed-in commands with a form of communication you already understand – pointing.*

*The inside story – a rotating ball and optical sensors translate movements of the mouse to Macintosh's screen pointer with pin-point accuracy.*



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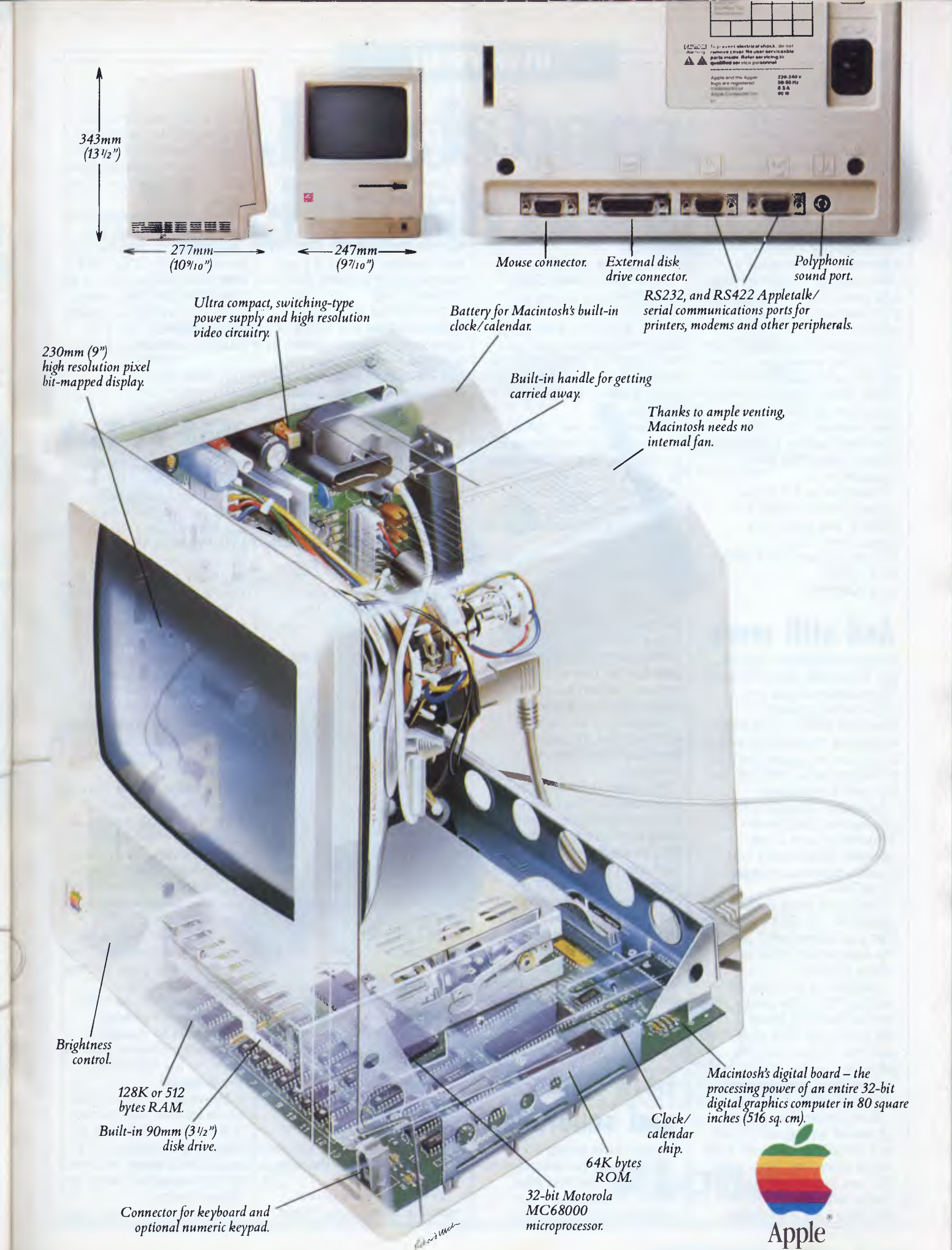
343mm (13½")
277mm (10⁹/₁₀")
247mm (9⁷/₁₀")
Mouse connector.
External disk drive connector.
RS232, and RS422 Appletalk/ serial communications ports for printers, modems and other peripherals.
Polyphonic sound port.
Ultra compact, switching-type power supply and high resolution video circuitry.
Battery for Macintosh's built-in clock/calendar.
230mm (9") high resolution pixel bit-mapped display.
Built-in handle for getting carried away.
Thanks to ample venting, Macintosh needs no internal fan.
Brightness control.
128K or 512 bytes RAM.
Built-in 90mm (3½") disk drive.
Connector for keyboard and optional numeric keypad.
32-bit Motorola MC68000 microprocessor.
64K bytes ROM.
Clock/ calendar chip.
Macintosh's digital board – the processing power of an entire 32-bit digital graphics computer in 80 square inches (516 sq. cm).
Apple

fairly unexciting — and that's what they planned.

"It's designed to teach network users the 'control-alt-delete' of networking," said the new company's boss, Rod Crisp — a reference to the way an IBM family machine is reset — "it uses what will become a new standard of networking, and gives them a chance to start learning their way around it."

His network controller fits into a long expansion slot in the PC, and requires at least 256k. Well, frankly you need twice that for serious PC use, anyway. Up to 16 machines can be linked in a cluster, with 250 feet between node.

Racore is at 10 Victor Square, Scotts Valley CA 95066, just round the corner from Victor (Sirius). Phone 0011 408 438 7255.

*Guy Kewney*

## And still more

A more ambitious network, the ThinkLink, from Tangent Technologies, uses the enormously powerful Motorola 68010 (the bigger brother of the 68000, which in turn is the bigger brother of Sinclair's QL, 68008) to run very fast indeed.

However Tangent's most impressive contribution to networking was a link between IBM micros and Apple's Macintosh-based AppleTalk.

The main thing about AppleTalk, on IBM micros, is that you (potentially) can use the wonderful Apple LaserWriter printer.

MacBridge not only connects a PC to the printer, but lets several PCs share it, in the same way that AppleTalk lets Mac share it. At the price of a printer, that's essential, or nobody would ever buy one.

Even better, Tangent has produced a program to convert WordStar files into Post Script command files, so that you can do wonderful things with WordStar. You can even take a WordStar document, instruct Post Script to slant it 15%, put a box round it, and print it over the top of another document.

Apple is planning a vaguely similar card, but it won't have the Post Script interface.

Tangent is at 5720 Peachtree Parkway, Suite 100, Norcross Georgia 30092, on 0011 404 662 0366. But there's no panic about this, until Apple gets the rocks out of the bag containing the LaserWriter and ships some over here to Australia.

There were many other networking announcements at Comdex, but they all failed to qualify for serious consideration, because the people behind them had clearly no prior knowledge of IBM's PC networks announcement, or even, for that matter, current knowledge.

They all had a good positive-sounding quote, about how "IBM's entry into networks makes it respectable for the rest of the market," which couldn't really convince anybody.

However, I do want to mention one in passing, because it involves no hardware.

It's called Lan-Link, from Intercompany Communications Technology, and it uses software to connect PCs through their serial port. And even though, on investigation, I know you'll discover that their system will only work if you buy one of their disks as a file server, I still reckon the claim of "software-only" is probably valid — because you'll probably need a new hard disk anyway.

*Guy Kewney*

## GEM again — and sabotage

Everybody is raving about GEM, except the people who are getting the first Atari 520ST machines. It is a software product which turns your IBM (normally) into a Macintosh-alike, with an icon-micro display.

The version on the Atari, of course, doesn't appear to be fully debugged, and I'm still trying to find somebody who will confirm Digital Research's claim for GEM on that machine — that it (and the operating system) will do multi-tasking.

On the IBM PC I've discovered a little fact about GEM which nobody seems to know — that is, that DRI has sabotaged it. Not seriously, just commercially.

What they've done is to produce GEM in specially tailored packages, so that the IBM PC version won't run on the Olivetti M24, or the Zenith 150, or the Eagle, or any other lookalike. Conversely, you can't take the Zenith version and run it on an IBM.

Try it, and it says, haughtily: "This version of GEM will not run on this computer", and dumps you back into C>

Digital Research, a little sheepishly, explained that they'd done this on purpose. "It allows our OEM customers," they said unconvincingly, "to sell a specially configured product." It also, I suppose, cuts down piracy . . .

What makes it funny is that some reviewers seem to have been given specially "patched" GEM disks which run on any computer at all. So they were unaware of the problem — which I'd not have discovered myself had I been a little less careless in describing my Zenith as an IBM XT.

It's the first program not to run, so I was curious. Zenith didn't know about it, so I phoned DRI, who promised to send me a patched version.

"We include calls to the specific BIOS chips of each machine, which all differ slightly," said an official. It isn't necessary at all, it's just done to make sure the program won't run.

Of course there is one possible other factor. Apart from a few programming languages, this is the first Digital Research program which doesn't require a version of CP/M to run. It runs under PC-DOS.

And Digital Research has been warning us all, for years, that PC-DOS is "not related to MS-DOS", and that true compatibility is provided only by Concurrent DOS . . . but that's probably quite irrelevant, I'm just being mischievous. Aren't I?"

*Guy Kewney*

## Think PC Tank

It's enthusiasm time again.

My input into this issue of Newsprint comes to you from yet another editor — this time, ThinkTank on the IBM PC. Well, to be accurate, on the Zenith imitation XT, but that's as near as makes no difference.

This is the nicest thought organising program I've used. It goes well beyond the Macintosh version of ThinkTank 512, which I raved about in the past — because of its colour, its replication, its smart printing abilities, and its data transfer abilities — among many features.

The program is a development of what is called a folding editor, but used as Living Videotext use it, it becomes very much more. Most users never actually realise that it can be used as a simple editor, using it instead to structure thoughts, plan schedules, organise new routines, and otherwise keep tab of their organisational life.

As usual with complex programs, it's almost impossible to describe. Unusually, it's very easy to learn, to the full power of the program.

However, I'll try to give some idea of what version 2.0 on the IBM is like, by asking you to compare it with one of those lectures which computer people are always giving.

You may never have sat

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through a computer expert's tutorial, but if I say that "it's always a question of drawing boxes, and linking them with arrows," perhaps you'll know what I mean.

The normal end of such a tutorial session is a series of words, all over the board, linked with lines like a spider's web, overloaded with flies. It's a neat way of explaining things in outline, but somehow, when you come to look at it all later, you can't remember which box was drawn first, and which others had the arrows coming out of them.

ThinkTank gives you a single word, the outline headline. Type the "plus" sign, and it will expand itself, to show the sub-headlines. Move the cursor onto one of those sub-headlines, and you can expand them, into sub-sub headlines.

Better than that, however, is the fact that you can also expand them into large explanatory documents.

Take an example — that always makes things easier. Your main headline might be "Tuesday" — a day which involves several complex tasks.

Expand it and you might find four sections — "Before Work" and "Morning at Office"and "Lunch at client XYZ" and "afternoon in seminar".

Expand any of those, and you can put in (and find later) the structure of each session. It doesn't matter what order you remember them in, because you can put a headline anywhere, and move it anywhere else.

Things that happen nearly the same, can be copied. So if your presentation over lunch will be much the same as your introduction for the afternoon seminar, you can copy the one, rename it, and modify it slightly.

Modifying it is easy — you have full word processor powers — find this string, change it to that string, and so on. Easy to change all references, for example, from XYZ Inc to Pty Ltd.

For things which were exactly the same, you can "clone" the outline.

This started out, according to the Living Videotext people, as a mistake — a "bug" — the idea was to have identical copies, but not to have them work as clones. Clones (in folklore) are so alike that they all change simultaneously, and so it is with these. If you remember to add a new joke in your presentation to one client, all clones of that outline will now have "new joke" in that place. If you delete something, it will disappear from all clones, too.

When they came to fix the bug, all the test users protested that it was the most useful feature in the new version of the program.

Of course, I'm more concerned with planning my output as a journalist than with planning a day's work, but the similarities are strong. The effect is that where your average administrator produces a complex network of things to do, and sub-heads of how to do them, I produce a relatively simple outline — Newsprint in four parts, for example.

To edit the stories, I can use the ThinkTank controls. These involve fairly obvious menu prompts on the bottom of the screen — but you can always type the control codes in direct. To edit a document attached to a headline, for instance, you type F10 (to get the menu) ED (for Edit Document). To edit the headline, you'd type EH. But if you can't remember that, just tap the space bar until you see the right selection at the bottom, and hit return.

To edit the text, the IBM arrow keys can be used — but there's a big plus — WordStar keys.

These were an addition at my own prompting, so I'm proud of them. I was rabbiting on to David Winer at Living Videotext about how stupid Microsoft and Apple had been, to ignore WordStar cursor controls when so many people can do them in their sleep. Winer went all thoughtful — and a couple of months later, when my review copy arrived, his note mentioned that he'd taken the thought seriously. "You weren't the only one to ask for it," he added, "but we hadn't taken it seriously till them."

The result is that I can get to the top of the document with control–Q, R, and the bottom with control–Q, C. I can delete the next character with control–G, or the next word with control–T — all things I do in my sleep.

If you're not WordStar trained, you tell the program to ignore these keys, and it does.

The use of colour is a definitive plus over the Macintosh version: you select your own favourites, and they appear. Text being edited is one colour, text selected is different. And an outline shows up in your favourite colour with all connected sub-headlines in the same shade.

As a word processor, the program lacks only one thing: the ability to format paragraphs to different widths.

This hardly matters if you own an ordinary word processing program, because ThinkTank will create a text version of any outline, and prepare it for your own word processor — even for WordStar, with "soft carriage returns" and all the other things.

Within ThinkTank, you can embed control characters to turn your printer's special features on — bold face, underline, expanded, condensed and so on.

Any headline (plus associated document) can be printed, with attached sub-headlines, to whatever depth you choose. Or the whole document can be printed.

And when the document is printed out, your recipient will be delighted to find that the date is printed at the top of the page, and an index is attached, showing which page (numbered, of course) has each headline, and which are headlines attached to superior headlines.

Finally, I have to put in a word for a very under-rated feature — speed.

From the top to the bottom of quite a large outline takes a split second. From the top of a large document to the end, is instant. Going back also, is instant.

In other words, you can actually use this program to READ stuff you've written, as fast as if you were flicking pages in a book.

I wish I could think of something about ThinkTank which I didn't like. Well, I suppose I can. It's the cut-and-paste routine. For instance, I had to get some information from my Spotlight index for this story. To get it here, however, I had to get out of this document, and create a new headline with the "files" command. Then had to edit that headline's document, cut it with the selection menu. Then I had to get out of the editor, and switch to this headline. Then I had to get the Paste menu, and stick it in. Still — it worked.

*Guy Kewney*

# Multi-user business

A multi- or single-user accounting package, suitable for small to medium size business operations, is now available from micro systems specialist, Intelligence Australia. Known as CBA (Commercial Business Application), the system is compatible with IBM, NEC, Apricot, Sperry and Olivetti. It runs on 3.1, CP/M-86 and Xenix.

CBA is written in Dataflex, and includes a report generator for any of the system's integrated modules, the option of changing either the system's input or output through the use of the gateway facility, and aids to facilitate user operation and understanding. CBA has on-line help screens and tutorial documentation, enabling

# Wouldn't it be cheaper for only one printer to serve 3 PC's? Simultaneously? Even while the host computer performs other functions?

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# Barson on top of it

In a dramatic slap in the face to industry prophets of doom, all of the available shares in Barson Computers (distributor of Apricot, Sirius and BBC computers among others) were sold within a few hours of their being on offer. And these 50 cent shares are expected to reach a staggering $2.00 when they become available on the Sydney and Melbourne stock exchanges' main boards (which should be by the time you read this), reflecting the level of confidence Australia has in the microcomputer industry in general and Barson Computers in particular.

Do we have any quotable quotes from the man himself, Julian Barson? What about "This is just the beginning . . . "

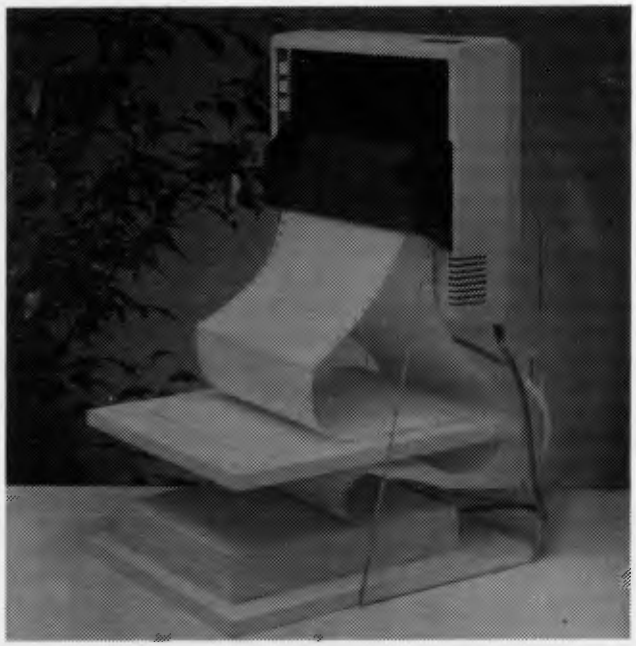
# Basic program generator

Infosol has announced a "businessman's program builder". Sycero, as it is known, is not a database as ISS is quick to point out, but a program generator. It enables users to build database files, create indexes for them and build programs to manipulate the data.

Sycero generates programs in MS-Basic, BasicA or GW-Basic (according to the host machine) which may then be run interpretively or as a compiled program. These applications are stand-alone, that is, they don't require Sycero in order to run and can be run on any machine supporting the same Basic and MS-DOS or PC-DOS. Watch for a test in a future issue of *APC*, meanwhile details on (02) 43 1316.

*Apple Computer Australia has released a datamodem and software bundle for Apple Macintosh and IIc personal computer users who wish to access Australia's growing array of videotex services.*

*Bundles for both the IIc and Macintosh will be priced at $795 (including tax). Both bundles are based on the Apple Modem 1200 — a 300bps and 1200/75 Prestel full duplex datamodem with Hayes Smartmodem compatibility. The videotext terminal emulation software normally retails for around $100.*



*Out of the "Why didn't I think of that myself" basket comes an Australian product from Sylex.*

*'Le Stand' — what a great name — obviously saves a huge amount of desk space, presents the printout right in front of the user (albeit upside down* — Now we're not going to start all over again on that 'confused looking young lady' business — Ed), *provides a neat feeding and restacking of paper and reduces cable interference in paper passage.*

*Le Stand retails for between $69 and $89 depending on printer size. Call (02) 647 2888 for details of your nearest retailer.*

# Press release pandemonium

In the July issue of *APC* (this section, page 11), we published part of a press release announcing "a cheapish dot-matrix printer" from Epson. While readers expressed their amusement at our claim of the press release being one that "would have won the 'Worst Printed Media Release' award for this year", others (notably Epson, of course) were not amused.

Anyhow, we're sorry, because Epson and the PR agency that issued the press release have parted company.

We understand the press release we singled out was one of the first issued by Heininger Media, the said PR agency, on behalf of Epson's Australian subsidiary.

Heininger Media has been operating as a high-technology public relations consultancy for only four months and started with the basic journalistic tools of typewriter and telephone. In that time it has secured public relations contracts with several of Australia's leading computer and software suppliers and has also prepared a number of free-lance press releases.

Deciding not to accept the free use of equipment supplied by clients, Heininger Media has since leased word processing and photocopying equipmnent to service those clients. And we can now assure you that Heininger sends out press releases on a new all-bells-and-whistles word processor: we know, we've received one; but they probably won't get published as often . . . there's nothing to pick on.

# Epson QX-16

Epson has entered the 16-bit league with the QX-16, a sturdy if standard machine which boasts IBM compatibility and a friendly user interface. But are these features enough to ensure Epson's success in this PC-dominated market? Peter Bright has the answer.

Epson made its name in microcomputing as purveyor of printers to the masses, then made its break in producing micros with the 8-bit QX-10. This was widely regarded as one of the nicest CP/M-80 machines around. However, it was overpriced, and was launched at a time when 16-bit machines were establishing their supremacy.

Now Epson has launched its own 16-bit machine which boasts IBM compatibility, an 8088 processor and Epson's unique Taxi friendly user interface.

## Hardware

Physically the Epson QX-16 is very similar to the older QX-10 8-bit machine. The main unit is 20 ins wide by 13 ins deep by 4 ins high. While the unit is quite broad this gives it a pleasing low-line appearance which reduces its visual impact on your desk. The casings are constructed from high-quality plastic with rounded edges on most of the surfaces to further enhance the lines of the unit.

The overall colouring is also standard Epson — predominantly cream with touches of grey on the disk drives, monitor and some of the keys.

The front panel houses the twin half-height 5¼in disk drives, the DIN keyboard socket, the reset switch and a little red power-on LED. The power switch lives at the right-hand side of the back panel.

On the rear panel from left to right we have: power-in, monitor-out, eight system DIP switches, speaker volume control, a Centronics printer port and an RS232 serial port. There are also four covers which may be for expansion cards — we'll find out later.

*'Overall, the construction quality of the casings and the PCBs is very high. The casings feel solid, and the PCBs look well . . . '*

It isn't immediately obvious how to get inside the QX-16, but it is, in fact, a two-stage affair. Most people want to get inside their machine to fit a new expansion card. To make this as easy as possible, the QX-16 has a special hatch which you can remove to gain access to the expansion slots. When you have removed this cover, you also gain access to two of the four screws which hold the main cover in place. The other two are below the lever-off caps on the top of the main casing.

When you have removed the four screws, you have to undo an earth strap before you can lift off the top casing and disk drives as one unit.

Despite the size of the system box, the internal electronics are tightly packed. The disk drives live in the top casing while the bottom casing houses the digital electronics and the power supply. The main PCB runs along most of the width of the system box, stopping just short of the power supply circuitry. Two extra heavily-shielded PCBs piggyback onto the main board; one of these handles the display via two very small, densely-packed, surface-soldered custom chips.

The main PCB also acts as a motherboard for up to three plug-in expansion cards. Strangely, the casing has space for four cards but the PCB has only three slots. On the review machine one of these slots was in use, leaving two available for future use. If you need the


*The keyboard sports an impressive 105 keys grouped in a fairly standard manner*

extra space, one of the cards is only used by the Z80 processor so can be removed when you are running 16-bit software.

The QX-16 comes with two processors: an 8-bit NEC Z80 and 16-bit 8088-2. In addition to running modern 16-bit software, it can also run general-purpose CP/M-80 software and programs written for Epson's 8-bit QX-10.

The base model QX-16 comes with 256k of RAM which is internally expandable to 512k. It also has 24k of ROM.

Overall, the construction quality of the casings and the PCBs is very high. The casings feel solid, and the PCBs look well made with no signs of last-minute patches. Although everything inside the system box had obviously been well screened for RF emissions, some noise was still audible on my radio.

The review machine was supplied with twin half-height 5¼in floppy disk drives which can work in two modes — either 360k IBM compatible or 720k native mode under MS-DOS. 10Mbyte versions of the machine will be available in due course.

The review system was supplied with a green-on-black monochrome monitor which plugs into the back of the main unit via a short cable and a couple of DIN plugs. In monochrome mode, the QX-16 displays 80 characters by 25 lines and 640 x 200 pixels in IBM mode, or 640 x 400 pixels in native mode. This is put to very good use by the Taxi software. Also, like Epson's older 8-bit machine, the QX-16's graphics are 'soft' and can be specially programmed.

Colour is achieved by plugging a colour monitor into the same port on the back of the system box. The Epson's colour graphics specifications are exactly the same as those on the IBM PC.

As it stands, the system character set on the QX-16 is the best I have seen on any micro. Each character is extremely well formed and easy to read without becoming bloated like the characters on the IBM PC. The letter 'G' is especially good!

*'Like the other friendly systems, Taxi makes heavy use of windows, icons, mice and pull-down menus . . . Epson hasn't gone quite as far as GEM . . . '*

The monitor is a good-looking unit with power and brightness controls at the front, and vertical hold and contrast controls at the back. Its display is generally good, but despite using long-persistance phosphor onscreen, there was still some evidence of flicker on displays where most of the pixels are switched on.

The keyboard is decidely non-IBM compatible. It is a very slim unit, but it covers a large area. It has two adjustable feet on its underside which allow you to type flat (very comfortable) or at 15 degrees (like typing on a cliff face). It connects to the main unit and two DIN plugs.

Even if the processing power of the QX-16 doesn't win you over, Epson is certainly going for a win in the keyboard stakes with an impressive tally of 105 keys. These include a big red button marked 'STOP' in the top left-hand corner. The last time I saw one of these was on the system console of an IBM System 370 mainframe at college — a friend pushed it just to see what would happen . . .

Luckily the effects of pushing the QX-16's STOP button range from midly boring to nothing at all.

The rest of the keys are grouped in a fairly standard manner, although the individual positioning is rather idiosyncratic. Most of the space is occupied by the main qwerty typing area; to its left are three keys which set and release tabulations and margins. The margin key doubles as the ESCape key.

To the right of the qwerty typing area are the editing keys with the usual cursor keys, plus INSERT, DELETE FORWARD, LINE and WORD keys. To the right of this is the numeric keypad which features all the usual arithmetic operators.

Running along the top are 17 programmable function keys and the STOP key.

All the keys auto-repeat very fast, resulting in a supersonic DELETE key which happily outran my reactions and ate hundreds of words I wanted to keep.

As mentioned, although the general layout of the keyboard is fairly standard, the individual placement of keys is sometimes rather odd. The main culprit is the ALT key which hides down by the space bar next to the CTRL key. It also took me quite a while to realise that the escape key is marked 'MARGIN RELEASE'.

The final oddity is that the QX-16 keyboard differentiates between SHIFT LOCK and ALPHA LOCK. Both, incidentally, are on the same key, which may be confusing. If you select ALPHA LOCK, you get what I usually refer to as 'shift lock': that is, you get capital letters but the numbers on the top row remain the same.

To select SHIFT LOCK you simultaneously press one of the SHIFT keys and the ALPHA LOCK key. This gives you capital letters, but instead of giving you numbers on the top row, you get '!', '&', and so on.

This is probably what all you typists out there prefer, but I prefer the normal computer version.

The feel of the QX-16 keys is quite soft but still positive. This isn't to my taste; I prefer the IBM PC or Apple Macintosh feel, but I know many people will appreciate this keyboard.

## System software

When you first switch on the QX-16, it displays the not-particularly-friendly message: 'IPL Version 3.0A Testing RAM'. It then sits around for a while pretending to be doing something useful before it asks you if you would like to put a disk into the drive. When you do this it says: 'Power on self test in process' and tries to amuse you by flashing the keyboard LEDs. Eventually it boots the operating system.

The QX-16 cleverly decides which processor to use. If you put a CP/M-80 boot disk in the drive, it automatically uses the Z80; if you use an MS-DOS

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*The monitor has a good display and standard controls*

2.11 disk, it uses the 8088.

Assuming that most people buy a 16-bit machine to run 16-bit software, I'll concentrate on MS-DOS and its applications. In the case of the QX-16 this means MS-DOS version 2.11 with some special help from a utility called Taxi.

1985 is very much the year of the friendly user interface. No longer is the Apple Macintosh the lone voice in the dark of the mass market. Now the big software guns appear to have cottoned on to the fact that there may be more to life than A> prompt. The first on the market was Digital Research with its GEM user-friendly user interface. This sits on top of the operating system and gives a graphical user interface which is reminiscent of the Macintosh. GEM has the potential to run on a wide range of machines, and currently can be found on the Atari 520ST, ACT Apricot and IBM PC.

Next is Microsoft with its oh-so-long awaited Windows package. This isn't quite as friendly as GEM, but it does give the operating system lots of bolt-on goodies in the way of multi-tasking.

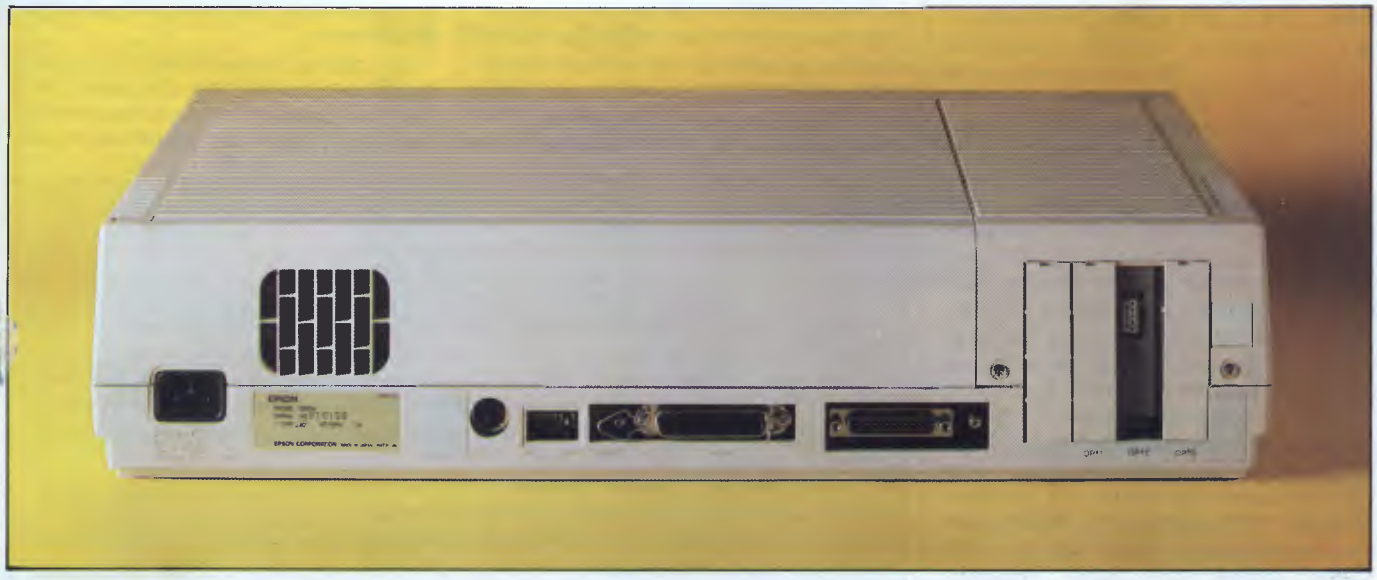
Instead of licencing GEM or Windows, Epson in England developed its own user-friendly user interface package, Taxi. Since the QX-16 is exported directly from Japan to Australia, Taxi is not yet available in Australia. Epson Australia is evaluating the system and hope to make it available for the Australian market. It will be available as an optional extra, and no price has been announced.

When Taxi is first booted, you are greeted with a black cab. This doesn't stay on the screen for long.

Like the other 'friendly' systems, Taxi makes heavy use of windows, icons, mice and pull-down (or in this case pop-up) menus. However, Epson hasn't gone quite as far as GEM in terms of user interface.

In the case of Taxi, there are a maximum of two windows on the screen at one time. Both windows are fixed in terms of size and position onscreen, primarily because it takes a lot of calculation to track and resize multiple windows so the speed overhead can be quite high. Also, for much the same reason, it isn't possible to drag icons around the screen as you can with GEM or the Mac. This makes copying files less intuitive, but it does make the system fast.

The first things you see on the screen (when the picture of the taxi has gone) are two disk icons running down the left-hand side of the screen. It must be said that the quality of the icon drawings is very high, certainly much better than say, GEM on the IBM PC. A nice touch is that the disk icons show the actual names of



*The rear panel has space for four expansion cards but the PCB will only support three*

the disks rather than just the drive letters A or B.

To open an icon, you use the mouse to move the pointer to the desired disk and hit one of the mouse buttons; this opens a window which shows icons representing the files and directories on the disk.

Sub-directories are represented by a picture of a filing cabinet, general executable files by a piece of paper tape. All Taxi system files are stored in a sub-directory called 'Garage', represented by a picture of a garage. When asked why, I was told that taxis live in garages . . .

To run an applications program you first double-click its icon; this writes the name of the program to a command line at the top of the screen. You can then add any necessary parameters to the command line. You then use the mouse to move the pointer to the command line and click the mouse again, and the program will be run. This can be rather long-winded, but it does give you the flexibility of being able to add parameters.

Whenever an error occurs, a dialog box is displayed in the middle of the screen telling you what has gone wrong and what to do about it.

*'The QX-16 is a pleasant, fairly compatible machine which is being marketed as part of a competitive package. The friendly user interface is useful.'*

As well as having icons and windows, Taxi also provides a pop-up menu which runs along the bottom of the screen. This has five headings: Disk, File, Window, Help and Accessories.

Disk has two options — 'Change' and 'Rename'. Change tells Taxi that you want to change the disk in one of the drives, but it isn't strictly necessary to use this because Taxi will re-read the name eventually. Rename allows you to change the name of a disk.

File contains the options 'View', 'Print', 'Make', 'Copy', 'Rename', 'Remove' and 'Run'. View lets you see the contents of a text file on the screen; Print lets you print it; and Make lets you create a new sub-directory. Copy will copy a file from one window to another, so you need to have the right windows open before you can use it. Rename renames a file; Remove deletes a file; and Run is the same as double-clicking an icon.

Window contains the following options: 'Where' displays the MS-DOS pathname of the current window; 'Tidy Up' rearranges the icons in a window; 'Switch' transposes the active and inactive windows; 'Open' opens a file; 'Close' closes the active window; 'Desktop' closes all the sub-directories in the current window and then closes the window; and 'Close All' closes both windows.

Help has two options: 'Describe' prints a predefined text about a program file, and 'Get Info' displays statistics about the disk or file selected.

Accessories is probably the most useful of the pop-up menus. It contains utilities for installing printers and useful accessories such as a calculator, clock calendar and note pad. These are all selected using the mouse, and are displayed onscreen over whatever else might be there. The Accessories heading also includes an Othello game so you can while away the hours.

Taxi differs from GEM in that GEM stops as soon as you call an applications program. It doesn't matter how friendly GEM is, if you run WordStar you are stuck with the WordStar commands.

Taxi is different in that it goes some way in allowing you to modify standard applications programs. This is possible because part of Taxi is co-resident, it stays in memory when you load the applications program. This allows Taxi to exercise some control over the applications program while it is running.

You can usually modify the appearance of a program in two ways. Firstly, you can use the mouse to move the cursor; and secondly, you can install your own pop-up menu on the 25th line of the display.

If you want to alter a standard package in this way, you have to install it into Taxi by creating an .INF file for the program. This describes the icon to be used for the program as well as the system details needed to control it. I had hoped to be able to play around with installing applications programs, but unfortunately the manual refers users to their dealer and I couldn't fine a utility that would let me edit an .INF file.

## Applications software

Luckily, Epson supplied three packages for which it had written the necessary .INF files. These were Enable — an integrated program, GW-Basic and good old WordStar.

WordStar is a good test of this kind of thing as it is notorious for not liking simulated keyboard input — it usually can't keep up. Epson overcame this problem by using the new revised and presumably faster WordStar 3.4.

WordStar usually displays its own function key assignments on the 25th line of the display which, of course, is where Taxi wants to display its pop-up menu. To get around this, the middle button on the mouse is used to select the Taxi pop-up menu which, in turn, has an option to return to WordStar's own status line display.

Mouse control of the cursor works well. WordStar's usual habit of not keeping pace is signalled by exclamation marks all over the screen. There was certainly no sign of this, even with the most vigorous mouse movement.

Having said that, I don't think the mouse was any great improvement over the cursor control in this case. The problem is that packages which weren't specifically designed for use with a mouse can't handle the quick diagonal movements you often want to make. A bottom-left to top-right movement ends up as up-a-line, right-a-bit, up-a-line, right-a-bit-more, and so on, which can be exasperating.

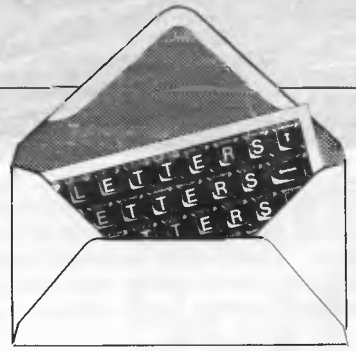
The pop-up menus were more successful and could make life easier for a first-time user, although being used to WordStar I didn't use them very much.

## In perspective

In terms of hardware, there is nothing unusual about the Epson QX-16. It is a fairly standard IBM-compatible machine. But in terms of packaging, the machine is quite different.

An interesting point is Epson's probable decision to go it alone with the Taxi user interface rather than licence GEM from Digital Research or Windows from Microsoft. I'm not sure if this is a good idea from a marketing point of view.

At present the decision doesn't lock Epson out of any IBM software, but if software houses write for the GEM or Windows environments in the future, it could be a problem. I can't see major software houses rewriting their software for the Taxi environment for what, after all, is just an IBM-compatible machine.



# LETTERS

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.

## Oh no, not again!

I am typing this on my week-old Amstrad CPC 464 (called 'Arnold', I believe) and I am hooked! The printer is borrowed but the word processor is the free one with the machine, and it is good enough for my typing.

I am also becoming hooked on *APC* and I like the artwork — especially April, page 55 — but my wife wants to know where the bowl of petunias and the whale went? She must have been hitch-hiking again.
*JH Taylor*

*The mice nibbled away the petunias and whale — much to the annoyance of the illustrator Eddi Gornall. These scientific mice just have no respect for art.*

## Pin trouble

I would like to issue a few words of warning to other readers. I have just bought a Canon PW-1080A printer to attach to my Apricot PC but found that everything I printed was double-spaced. After much headscratching, I compared the Canon interface description with that for my old Centronics printer. The answer is that the Centronics and the Apricot expect pin 14 of the interface to be ground, but the Canon (and, presumably, the similar Taxan/Kaga model) uses pin 14 as 'auto line-feed'.

When this pin is held low (ground) the printer performs a line-feed after a carriage return. The solution is simple: do not connect pin 14 of the Centronics interface of this type of intelligent printer.

This seems to be the only conflict at this time, but I'm sure there will be others in the future. What price standards?
*J Hurwitt*

## VZ bug

I hope you haven't completed a review of the Dick Smith VZ-300 because it has a bug in the firmware (the same as the VZ-200).

If one RUNs, (then INPUTs 29), the following series of statements, the computer will crash.

```
10 N = 1 : INPUTS : FOR
   A = 1 TO S : N = N +
   1/(1 + A) : ? N; :
   NEXT : RUN
```

I first became aware of this fault at the 4th *APC* Show held at Centrepoint in Sydney earlier this year and informed Dick Smith. However, when I repeated the test on a new VZ-300 the results were the same. Dick Smith is therefore selling the VZ-300 with bugs.
*W Tritscher*

## Atari links the new and the old

I have read a great deal about the forthcoming Atari computers. Will they be compatible with my current Atari peripherals or will a new range of add-ons be released for the new models?
*S Mackenzie*

*The XE range of machines will certainly be compatible with your old Atari equipment and software. Compatibility with the more advanced ST models is open to doubt. However, Atari has announced a whole new line of add-ons for the new computers.*

*Although Australian availability and prices are not available, the following is a partial list of the equipment Atari had on show at the CES show in the US earlier this year.*

- *A new monochrome monitor for the current Atari XLs and new XEs which comes with a built-on 80-column adaptor so that every Atari machine can display the wider screen standard in business applications.*
- *A 300 baud modem and a series of eight printers was also revealed covering just about every printing capability and price range imaginable.*
- *Two monitors for the ST range, one black and white, the other an RGB colour unit.*

## Limited use for Amstrad monitor

Being thoroughly hooked on computers I now have a Commodore 64, Spectrum Plus and an Amstrad with colour monitor. Is there any way I can use the Amstrad monitor with the other two computers? This would obviously be of great benefit but I have no idea of how to go about it.
*C Smith*

*Practically speaking, no you can't hook up the monitor with the Spectrum or the 64. Amstrad's monitor is an RGB model which neither of your other machines supports. They provide a different output signal called composite video.*

*One possible solution would be to buy a Commodore 1701 monitor and you should be able to make up a cable that will work with your Spectrum.*

## Printers, problems and praise

I have previously written to you regarding the problems I had correctly connecting the Spectrum Interface 1 with the Brother HR-5 printer, and would now like to inform you that Brother's service department sorted out the difficulties. Some of the wires from the RS232C port from the printer's side have to be linked together before it will work correctly. The correct linkage is:

| ZX IFI | HR-5 |
|---|---|
| 2 | 2 |
| 3 | 3 |
| 4 | 20 |
| 5 | 5 |
| 7 | 7 |

The 4, 6 and 8 wires should be linked on the Brother's side.

Although this printer and the Spectrum are normally linked via an extra Centronics interface, it seems a good idea for those who normally have the ZX Interface for their Microdrives to obtain normal-sized printing using the HR-5 with the RS232C interface.

Furthermore, the HR-5 switches should be set to eight bits and the Spectrum baud rate to 300 (FORMAT "t";300 : OPEN #4;"t" : REM for text: FORMAT "b" ;300 : OPEN#5;"b" : REM for control characters). Text

# LETTERS

can then be printed using the fourth channel (PRINT#4; "text";), control characters (underlining or emphasised characters using the fifth channel (PRINT'#5;CHR$;), which is rather more complicated than the method mentioned in the manual.
*H van de Pol*

## Bothersome bug

We have found a bug in PC-DOS/MS-DOS version 2.1 when copying more than 255 files using the wild card option (*).

If you attempt to copy files from one sub-directory to another, on a hard disk machine, using a command such as COPY *.* or COPY *.EXT and this results in more than 255 files being copied, the 256th file is not copied. This also applies to the 512th file (and probably all multiples of 256). The screen message tells you that the file is being copied, but this is not so.

The file count is reset to zero after 255 files and restarts counting from one as more files are copied. Therefore, when copying is complete, the screen message 'File(s) copied' gives you the true number of files copied — 255.

Since finding this fault two months ago, we have scanned the computer press to see if anyone else has reported it. Having noticed with some surprise that no-one seems to have found it, we felt that we should report it to you.
*W Clewlow*

*You're right — small though it may be, it's there in DOS 2 and 2.1. If it's any consolation, IBM says it's been fixed in DOS 3.0.*

## Mail order mess up

I write to you so that others may become aware of my problems with an American Mail Order Computer Company (so they may not have similar problems).

I placed a mail order from Sydney on August 17, 1984 shortly before returning to New Zealand. The bank draft was banked by the company on 31 August, 1984, therefore confirming my order was received. I have since written to the company a further three times without any reply whatsoever. The last letter was registered and a card was returned to us confirming this was received. I would be interested to hear if any others have had similar problems.
*John Adams*
*100 Harris Street*
*Pukekohe*
*South Auckland*
*New Zealand*


*'Fine, fine — now, wave the claws around a bit . . .'*

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As far as IBM compatibility is concerned, the QX-16 willingly booted PC-DOS out of the box and ran Lotus 1-2-3 quite happily.

## Documentation

The documentation supplied with the system was very pre-production — it consisted entirely of photo-copies of the drafts of the manuals. These were quite helpful, but it would not be fair to discuss them in detail as they will change when they are printed.

## Prices

The QX-16 will sell for $3,614, excluding tax. The system includes 256k RAM, twin disks, a monochrome monitor, the system software: MS-DOS, multi font CP/M and multi font Basic. Epson will also carry support for the multi font card.

## Conclusion

The Epson QX-16 is a nice machine; not wonderful, just nice. The hardware is well built if unspectacular in terms of its performance.

## Technical specifications

| | |
|---|---|
| Procesor: | Zilog Z80, Intel 8088 running at 5.3MHz |
| RAM: | 256k expandable to 512k onboard |
| ROM: | 24k |
| Mass storage: | Twin 360/720k 5¼in floppy disks |
| Keyboard: | 105 keys typewriter style |
| Size: | 50cms x 33cms x 10cms |
| I/O: | RS232, Centronics, three expansion ports |
| DOS: | CP/M-80, MS-DOS version 2.11 |

The QX-16's main claim to fame is its Taxi friendly software, which again is useful rather than wonderful. As far as its user interface is concerned, it is closer to Microsoft's Windows than to Digital Research's GEM. Like Windows it doesn't go in for processor-intensive graphics, but unlike Windows it doesn't have multi-tasking.

The QX-16 is a pleasant, fairly IBM-compatible machine which is being marketed as part of a competitive package. The friendly user interface is useful. The fact that it is non-standard need not be a problem because no standard has yet emerged.

END

## Benchmarks

| | |
|---|---|
| BM1 | 1.4 |
| BM2 | 4.7 |
| BM3 | 10.1 |
| BM4 | 10.4 |
| BM5 | 11.4 |
| BM6 | 20.1 |
| BM7 | 31.3 |
| BM8 | 33.1 |
| Average | 15.37 |

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

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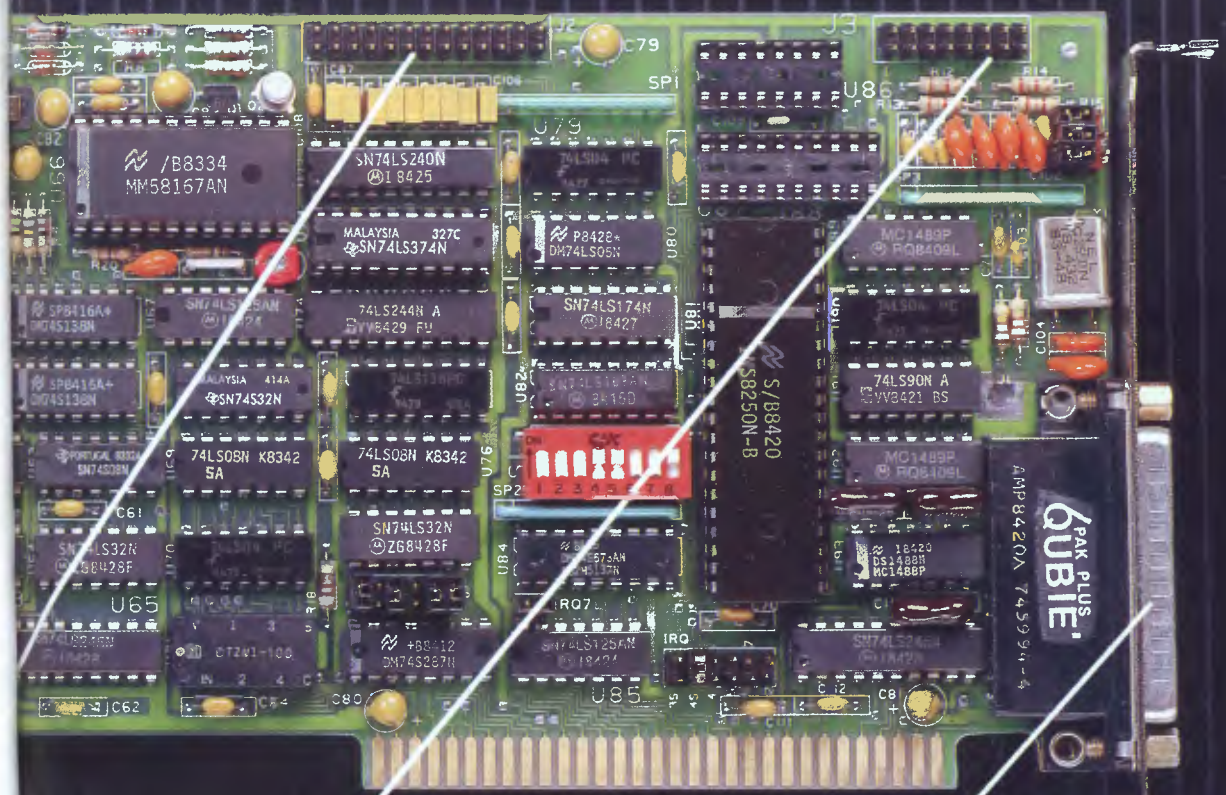


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# Business begins at home

**At last — the definitive way to make sure you don't overspend. Impossible? Bob Hinton shows you how, using Calc Result on the Commodore 64.**

Only a small minority of people who buy a micro for business purposes will immediately plunge happily into programming in Basic. Most will turn first to applications programs — word processors, spreadsheets, and database managers. I believe this is also true for a growing proportion of home computer users.

In practice I found that I had to put in a lot of hard work before I could make use of the programs. Probably the best way to learn is to work through a practical example. There are usually several of these in the Calc Result manuals and they are certainly useful, but I learned more about Calc Result and how to display some of its results from the exercise described here.

HOUSEHOLD BUDGET

January

INCOME

| Item | Estimate | Actual | Diff'nce |
|---|---|---|---|
| Salary | 1200 | 1200 | 0 |
| Expenses | 50 | 75 | 25 |
| Total Income | 1250 | 1275 | 25 |

EXPENDITURE

| Item | Estimate | Actual | Diff'nce |
|---|---|---|---|
| Mortgage Repayment | 180 | 180 | 0 |
| Water Rates | 30 | 30 | 0 |
| Municipal Rates | 60 | 60 | 0 |
| Insurance | 20 | 20 | 0 |
| Housekeeping | 500 | 525 | 25 |
| Bankcard | 100 | 94 | -6 |
| Entertainment | 30 | 37 | 7 |
| Personal Expenses | 150 | 150 | 0 |
| Gas | 50 | 43 | -7 |
| Electricity | 55 | 56 | 1 |
| Contingency | 60 | 21 | -39 |
| Total Expenditure | 1235 | 1216 | -19 |

MONTHLY SUMMARY

| | |
|---|---|
| Estimated result: | 15 |
| Actual result: | 59 |
| Variation from estimate: | 44 |

*Fig 1 January income and expenditure*

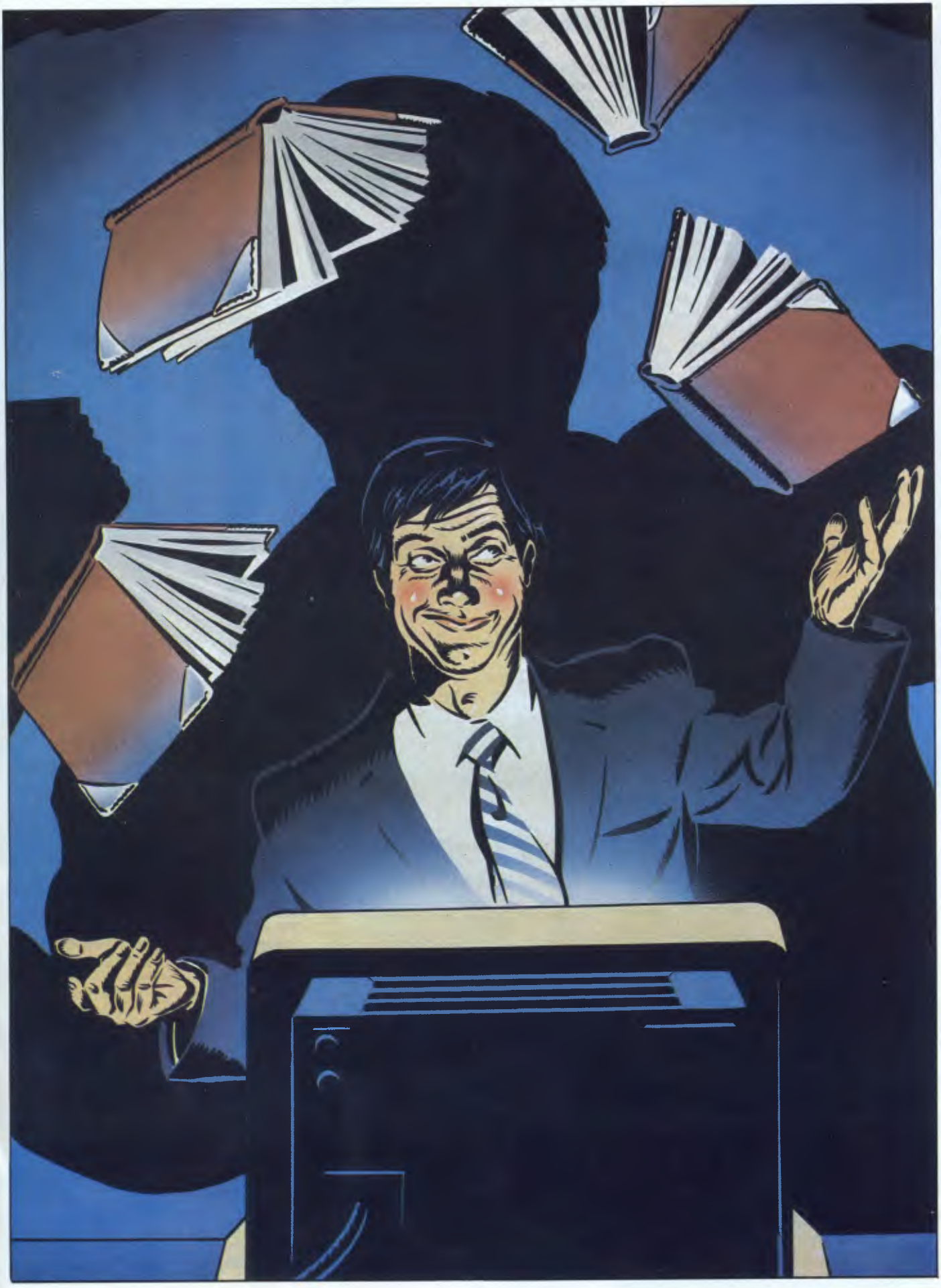
## Anticipating risks

The exercise is not very sophisticated, but it should be useful to anyone who needs to live within his income and who wishes to have reasonable warning of the risk of failing to do so. For this I wanted a system which could:

- list planned spending month by month;
- compare it with likely income;
- compare it with actual spending as it occurred;
- forecast the peaks and troughs of over and under-spending likely over the course of the year; and
- warn when spending is beginning to overshoot this forecast and so prompt action to avoid disaster.

The heart of the system is the chart showing the income and expenditure for each month of the year. The chart for January is shown in Fig 1, the other months following the same basic pattern. Both income and expenditure have information in four columns. Alongside each item of income is the estimate of what it is likely to be, and next to that a column to record the actual income when received. The end column records the difference between the two. Items of expenditure are treated in the same manner.

All the columns are totalled and income is compared with expenditure to produce the monthly summary figures at the bottom. The summary shows how



well or badly you have done over the month, but more importantly it forms the basis for the chart in Fig 2 which builds up the picture for the year as the figures for each month are transferred to it.

At the start of the year, the estimate for each month can be fed into the top line of Fig 2 for the whole 12 months. This automatically produces a line of figures in the fourth line ('Estimated to date') which tells you how you are likely to stand overall at each stage of the year. A + sign indicates that your income is estimated to exceed expenditure at that stage; a – sign means you are likely to spend more than your income.

This highlights the times in the year when you might have cash-flow problems, and by warning you in advance enables you to do something about it: for example, plan economies, earn extra income, withdraw savings or defer payment of bills.

As the year goes by, the actual result for each month is transferred from the monthly summary to line two, and this in turn automatically produces the row of figures in line five ('Actual to date'). This builds up a picture of the year to compare with the expected figures in line four. It will tell you whether your planned efforts to avoid disaster are working, or, if there seemed to be nothing to worry about at the start of the year and your control has been slack, this line will act as a warning as, for the months yet to come, it projects the new pattern now developing from the actual results.

In case you should want an overall assessment of whether it will be a good year or a bad one, the year-end forecast is added at the bottom.

## The monthly chart

After loading Calc Result, the first thing to do is to adjust the width of the columns to suit the chart. Making the columns nine characters wide allows room for the words of the items. This gives more than enough space for most people's monthly income!

The widths are adjusted by the following sequence of keystrokes: f7 G C 9.

The following are the cell references in sequence and the content to insert:

C1 HOUSEHOLD (remember to start with a space to indicate that you are typing a label).

D1 BUDGET (type an *extra* space before the 'B').

C2 f7 – = (this fills the cell with '=' signs).

D2 = = = = = = = (you don't want this cell completely filled).

A3 January

A4 – – – – – – – (this is the first of several labels used to underline minor headings).

C4 INCOME

C5 – – – – – –

A6 Item

C6 Estimate

D6 Actual

E6 Diff'nce

A7 – – – –

C7 – – – – – – – –

D7 – – – – – –

E7 – – – – – – – –

A8 to D13 Type your income categories in columns A and B, with the estimates in column C and the actual amounts in column D.

E8 D8 — C8 (ie actual — estimate).

Once entered, replicate this formula into cells C9 to C41, using relative references (so E9 contains D9 — C9, and so on).

C,D,E14 f7 – – (it's not worth replicating a 3 keystroke expression).

A15 Total Inc

B15 ome

C15 SUM(C8:C13) then replicate the expression into cells D15 and E15 (relative references)

C,D,E16 Replicate C,D,E14 into these cells.

C18 EXPENDITU

D18 RE

C19 f7 – –

D19 – –

A20 to E21 Replicate A6 to E7, but you must do it one row at a time.

A22 to E41 Type your expenditure categories along with the estimated and actual amounts.

C42 to E42 f7 – –

A43 Total Exp

B43 enditure

C43 SUM (C22 : C41) then replicate into cells D43 and E43 (relative references).

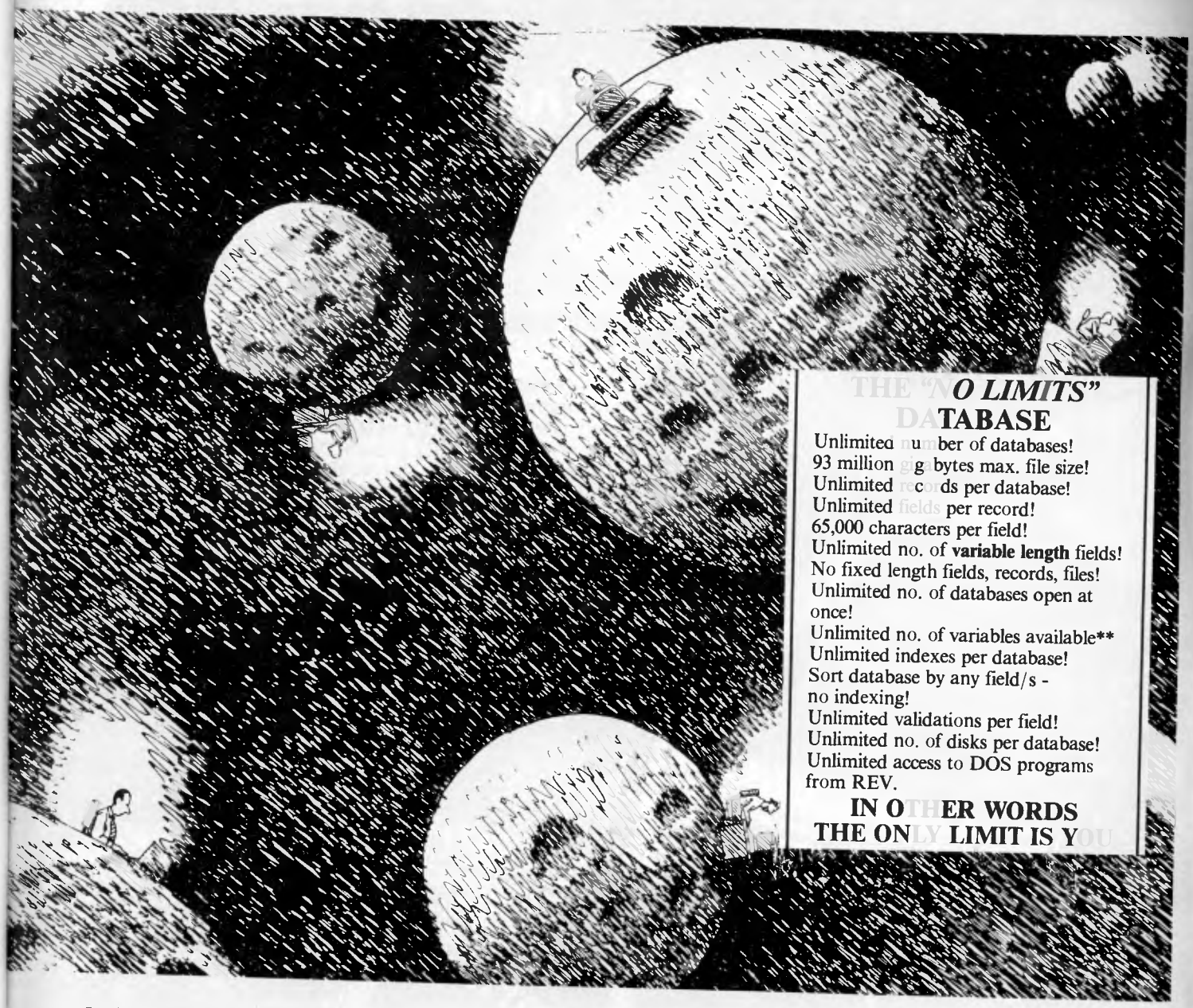
| 1984 | January | February | March | April | May |
|---|---|---|---|---|---|
| Estimated result | 15 | -20 | -109 | 44 | 106 |
| Actual result | 59 | -49 | -87 | -23 | 126 |
| Variation | 44 | -29 | 22 | -67 | 20 |
| CUMULATIVE | | | | | |
| Estimated to date | 15 | -5 | -114 | -70 | 36 |
| Actual to date | 59 | 10 | -77 | -100 | 26 |

| | June | July | August | September | October |
|---|---|---|---|---|---|
| Estimated result | -73 | 112 | -150 | 126 | 23 |
| Actual result | -33 | 134 | -120 | 126 | 23 |
| Variation | 40 | 22 | 30 | 0 | 0 |
| CUMULATIVE | | | | | |
| Estimated to date | -37 | 75 | -75 | 51 | 74 |
| Actual to date | -7 | 127 | 7 | 133 | 156 |

| | November | December |
|---|---|---|
| Estimated result | -58 | 44 |
| Actual result | -58 | 44 |
| Variation | 0 | 0 |
| CUMULATIVE | | |
| Estimated to date | 16 | 60 |
| Actual to date | 10 | 54 |

| YEAR END FORECAST | |
|---|---|
| Original Estimate | 60 |
| Current Forecast | 54 |
| Performance Forecast | -6 |

*Fig 2 Building up a picture of the budget for a year*

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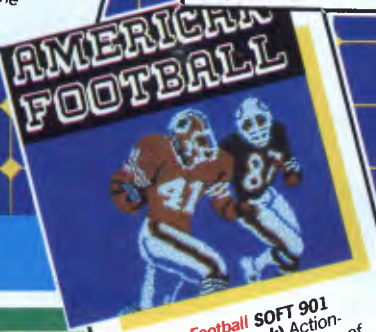
**5-A-Side Soccer** SOFT 191
Sharpen your skills for this big league screen adaption of the world's favourite football game. You might think 5 is too few players for a full-size game — but wait till you try to co-ordinate the team.

**Snooker** SOFT 190 **(Keyboard or Joystick)** A fine game of judgement and skill featuring super-real snooker simulation. All the colours, the tricks and complete range of spins. There's even a sliding score frame. But sorry, no chalk. OK your break.


**3D Stunt Rider** SOFT 183 **(Keyboard/Joystick)** You're there. Seated firmly in the saddle of your powerful 500cc super bike. Don't lose your nerve as you race towards the jump. There are nasty obstacles in your way. Can you leap to safety on the other side?

**Crazy Golf** SOFT 149 **(Keyboard/Joystick)** Use your judgement to negotiate a series of 18 difficult holes in this crazy electronic game. You must adjust the strength and direction of every shot — or be prepared to end up well and truly bunkered.




**American Football** SOFT 901 **(Keyboard or Joystick)** Action-packed plus! You're in charge of your own team and you'll soon grasp the strategy, the plays and ploys to make your team-machine invincible. Warning — you don't get time out for injury.

**AMSTRAD**

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**AWA-THORN**

C,D,E44 f7 – –
A46 MONTHLY S
B46 UMMARY
A47 f7 – –
B47 – – – – – –
A48 Estimated
B48 result: (with a space before the 'r'.)
D15 C15 — C43
A49 Actual re
B49 sult:
D49 D15—D43
A50 Variation
B50 from est (with a space before the 'f').
C50 imate:

At this stage the basic monthly grid is complete. It's a good idea to tidy things up by blanking the unused cells in column E between rows 8 to 13, and 22 to 41. In my example, that's cells E10 to E13 and E33 to E41. Another improvement is to right-justify cells C6 to E7 and C20 to E21. A side-effect is that it makes the INCOME and EXPENDITURE headings stand out.

You should have been saving your chart as you developed it, but this is a good time to save it again!

Now you use the copy facility (f7 E C) to take the whole chart to a new location with A53 as the top left-hand corner; this gives you the chart for February. Then copy the whole of what you now have to the location A105, and you have added March and April also. Unfortunately, the Calc Result spreadsheet just isn't big enough to take a whole year's charts. Still, four month's charts are fairly convenient to work with.

To create your charts for the whole year, save the current version in its present form before making any further entries of income and expenditure items. It can be loaded to form the basis for the May/August and September/December charts when you come to do these.

All that remains now is to make the remaining income and expenditure entries for the first four months. When you do this at the start of the year, you must put in the Actual columns the same figures as you put in the Estimates column, or, put in the Actual column balancing figures equal to the totals in the Estimates column under both Income and Expenditure. When we come to the Cumulative chart, these figures will have to be entered for all the months of the year at the outset if the year-end forecast is to be revised each month as the year goes by.

Don't forget to change the month title on each chart, then save the complete chart with a new file name to distinguish it from the basic one already saved. Load the basic file again, and complete and save May/August followed by September/December to complete the year.

## The cumulative chart

Until such time as a spreadsheet leaves you with enough space to hold a whole year on the spreadsheet at once, the chart shown in Fig 2 will have to be created separately and the figures individually entered from the monthly summaries.

The headings and other text are created in the same way as the monthly chart. The column headings and figures are lined up at the end as before.

The most important point for simplifying your task with this chart is to create the top section (January to May) and then replicate many of the rows for June to October and November/December. Most of the work only has to be done once, apart from a few adjustments. The following are the main points:

A4 f7 – – (then replicate across the row)
C9 C7–C5 (then replicate)
A16 f7 – = (then replicate)
C13 and C15 Enter C5 and C7 respectively.
D13 C13+D5
E13 D13+E5 . . . continue pattern for F13 & G13.
D15 C15+D7 . . . in similar pattern for E15–G15.

This completes the top section which is copied as already described for the later months. The adjustments are:

C27 G13+C19 (This picks up the preceding cumulative figure for May from G13 and the rest of row 27 adjusts automatically).

By the same token we get:

C29 G15+C21 C42 G27+C34 and C44 G29+C36

All that remains is to add the year-end forecast, the first two items of which are simply the two cumulative figures for the last year of the month, the third being the difference between them. We therefore get:

C50 D42 C52 D44 and C54 D44–D42

If you want to check on the accuracy of the last figure, you can total up the figures in the variation row 9 with an entry at H9 of sum(row) (from C to G). If you do this before you copy it will be repeated at H23 , otherwise you will have to enter it again there and, in any case, at H38 . Total these figures with the entry of sum(col) at H39 . If you then enter H39 at C56 , you should see the same figure appear as at C54. If not, something is wrong!

Save the cumulative chart for updating.

It's a pity that Calc Result can only plot simple bar charts, as these are unsuitable for presenting data that fluctuates either side of zero. A line graph would illustrate the figures much more clearly.

## General tasks

At the start of the year you will have the chore of entering all the data for the first year in each monthly chart, but then you have broken the back of it for future years because the pattern usually stays much the same. Don't forget to put the same figures in the Actual column (or a balancing total) so that the monthly summary gives you a figure to put in the 'Actual to date' line of the Cumulative chart. Without this, you will have no revised forecast for the year-end as the months go by.

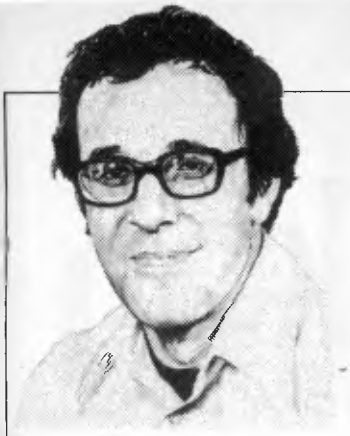
Similarly, create the chart in Fig 2 at the start of the year, putting the Estimate figures in the Actual result row at this stage. They will be replaced by the real figures at the monthly updates.

At the end of each month, peruse your records of expenditure for that month and fill in the details of Actual expenditure item by item on the chart for the month. I use my cheque book stubs for the manual record of most of this information, even if payments have not necessarily been by cheque. From the monthly summary you then have two figures for updating the performance chart.

In the examples shown here, the person whose budget is shown in part on these pages began to use the system around April when he suddenly realised his expenditure was racing away from income. Since then he has reined it back, so that by the end of August he will be back on target and set fair for the rest of the year.

END

# YANKEE DOODLES



**If at first you don't succeed, attempt a comeback. Our US correspondent reveals the desk-top resurrection of DEC, and presents other American news and views.**

## Over the Rainbow

After a disastrous foray into the personal computer market with its Rainbow (over-designed, late, not IBM compatible, expensive, poorly distributed), DEC is attempting a powerful comeback — in more ways than one.

Replacing the Microvax I, the company has introduced the Microvax II, a desk-top version of the VAX 11/780, star of DEC's minicomputer line. Base price of the Microvax is about $US20,000, approximately one-fifth of a full-size VAX. The Microvax II is available as a low-end machine in the 32-bit VAX line and as a network workstation, and will support up to 16 users in a network at a performance level of about 90 per cent of a VAX 11/780.

The Microvax II uses two chips — a 32-bit 78032 microprocessor and a 78132 floating point unit. The mpu uses pipelined architecture and has four gigabytes of virtual storage space.

Almost more interesting than the Microvax II is the announcement of a 600Mbyte read-only optical disk storage device — the first compact disk system to be marketed commercially.

The price is an attractive $2195 which includes the disk reader, controller and cables. At this point, DEC has no plans to market the system as a peripheral for other computers. Too bad.

## Worms in the Apple

Amid growing dissatisfaction among its independent local retailers, Apple has decided to disband its three-and-a-half year old national accounts sales operation. Lately, the 100-man sales and support group has mainly been concentrating on trying to sell the Macintosh to large corporations in direct competition with IBM, and has scored some notable successes. But while 20 to 30 per cent of Apple's sales came through this unit, dealers felt betrayed due to their diminished margins and questions about Apple's market intentions following the withdrawal of the Macintosh XL.

Enzo Torresi, senior vice president of the Businessland chain of stores, expressed a common view among dealers. He said: 'Apple has laser technology, a local area network, integrated packages, a database server, and a lot of reasonable, well-done, user-friendly software. But is that sufficient in an IBM-dominated market?

Apple's success, said Torresi, lies in how well it can motivate the existing dealer channel in presenting an alternative to IBM. 'That's the challenge where DEC, Xerox, TI and Burroughs failed. With the disbanding of its national accounts program, Apple seems to have heeded these views and has again put its local dealers in the forefront of the market battle.

Also with Apple, the company announced it would kill a program to manufacture 20Mbyte 5¼in hard disk drives, and that it would postpone the release date on a Mac file server to the year end as opposed to the October availability promised earlier.

Jean-Louis Gassee, former general manager of Apple France, has been appointed as marketing director of the Macintosh division. He replaces Mike Murray who becomes a director of business development, a new post.

Meanwhile, Apple chairman Steve Jobs will spend a month or so in France — on holiday, perhaps?

## The second time around

Reorganised and directed by an entirely new management team recruited from Atari and NEC, Spectravideo recently unveiled a series of CP/M and MS-DOS computers at a New York press conference.

The event marked the official re-introduction of the company since writing off and restructuring approximately $2.6 million of past debt, and becoming a majority holding of Bondwell Holding Ltd of Hong Kong. It's the Bondwell name that appears on all the machines, as it does in Australia where Dick Smith Electronics is the importer.

The company has announced four entries in the CP/M arena. Most interesting is the Bondwell 2, an 11lb lap-top portable with built-in 3½in disk drive, 25-line x 80-character LCD display, and bundled software from MicroPro. The machine is priced under $US1,000 and is marked for September delivery.

Three other CP/M machines fall into the transportable category — the Bondwell 12, 14 and 16, all of which are currently available.

The Bondwell 34 and 36 are MS-DOS machines and are said to be IBM compatible. The 34 has 256k, dual 5¼in disk drives and the usual interfaces; price is $US1,795. The Bondwell 36 substitutes a 10Mbyte hard disk for one of the floppy drives in the 34, and is priced at $US2,995.

'Marketing', explained John Constantine, president of the new company, 'will be largely locally based because our present dealer network is widely scattered throughout the country.'

To date, no Hong Kong manufacturer has been successful in the US market (except as a second-source OEM supplier). Will SpectraVideo be the exception? Much as I like the company, I would have to say 'not a chance'.

## Coming soon

In the coming months, I intend to go out on a limb and make some projections on those companies who will and will not make it in the personal computer market — not only in the US, but worldwide. I'm also going to give you the 12 worst computers that have ever been unleashed on an unsuspecting public. And if that isn't enough, I'll also make a prediction as to which countries will be most influential by the Year 2000. This is something that almost everyone else did in the magical year of 1984, but now, I'll give you the *real truth.* Stay tuned!

## Random bits

In an effort to revive an ill-fated deal with Apple Computer, Cullinet Software has supplied Apple's MIS group with a program to connect Mac computers to Apple's IBM mainframe. Cullinet hopes that Apple executives will use the system and will like it enough to bring it to market . . . Informatics General also has a micro/mainframe link called Micro/Answer Toolkit, through which micros can access IBM mainframe files and databases . . . Data General has upgraded the LCD screen on the Data General One (for the second time), made available a five-slot expansion chassis, and cut prices by 15 per cent in an effort to boost flagging sales . . . Morrow has also upgraded the screen on its Pivot portable to a 25-line unit and dropped the price by $1000 . . . PC compatible vendors have introduced a tidal wave to take advantage of the shortage of IBM PC/AT computers. NCR has introduced the PC8; Compaq, the Deskpro and Portable 286; Zenith, the Z-200; ITT, the Xtra XP; and Corona, the ATP-6-OD . . . Acknowledging that the PC6300 (known as the Olivetti M24 in Australia), has not sold well, AT&T's James Edwards said: 'We decided that going head-to-head with IBM was stupid.' AT&T's new strategy will focus on communications and local area networks . . . Microsoft has introduced Excel, a spreadsheet for the Macintosh that the company hopes will break Lotus' stranglehold on the spreadsheet market. It is said to have advanced capabilities in size, speed, interactivity, multiple window displays, graphics and formatting.

BANKS' STATEMENT

# Picture talk

**Martin Banks muses on the impending significance of graphics and networks in the small-business market.**

As I sit here in front of my machine, it is the middle of June. I mention this for no other reason than that by the time you read this, it will be August and the world will probably have changed.

For a start, we'll be a lot nearer the day (which I'm sure you've all been waiting for) when you can actually buy Microsoft's Windows and IBM's Topview. Both packages are relevant to my first theme — graphics front ends to applications programs. My second theme is networking, especially small, tolerably cheap networks. These two mark what is likely to be the dominant thrust in the small business marketplace, and any manufacturer of hardware or software which does not have at least a stated position on them may well have no position at all in the near future.

The reason that these two are going to be significant has nothing specifically to do with them being explicitly used together, though this will almost certainly be the case. Rather, it is that they represent a growing industry trend to make all this clever technology do something that the user can not only understand, but can see a simple reason for using. Of such philosophies are sales made.

It is the potential arrival of MS-Windows that is prompting my interest in graphics. According to Bill Gates, who, as boss of Microsoft really should know, Windows is going to be the greatest graphical thing since sliced bread. Users and software authors will be able to do things with it that will make you thrill with excitement. The trick, as first developed by Xerox in the US and followed by Apple with the Lisa (sorry — the Macintosh XL) and the Mac itself, is to put graphics at the human interface to an applications program. This has the remarkable effect of making the program understandable in operation and easy to use.

I appreciate that some computing devotees will find such an idea heretical, but the users like it. There is no reason why someone can't walk up to an applications program that has not been encountered before and rapidly get it going in a usable fashion; that is what these graphics front ends can do.

Digital Research was quick to spot the opportunity and produced GEM (Graphics Environment Manager). This adds the same type of Macintosh facilities to a wide range of machines, not least of which is the IBM PC. GEM, though disparaged by Microsoft's Bill Gates when compared to the upcoming Windows, has one distinct advantage — it is available and working. For those who had one particular reservation about the Macintosh, GEM can also work in colour.

The sneaky Japanese have now got in on the act too — Epson recently launched its QX16 PC-compatible machine. As hardware, it is a fairly average box with not too much to distinguish it from the general PC throng. But it has one special feature — a graphics front end called Taxi, a package developed by Epson UK and currently on sale only in Europe. If it is pushed hard in Australia as well it could prove quite a sales aid in that important market. Taxi offers the usual Macintosh facilities and can be added to any standard MS-DOS applications package in about a day. (It should only take a beginner a couple of days to fit up a package, according to the company.)

Once seen, the advantages of all these graphics front ends are obvious, and you begin to wonder why you ever felt at home with the dear old A> prompt as the only intro to anything.

With a bit of lateral thinking, however, graphics can be taken much further than just as a helpful front end to applications: it can become the application itself. For example, I recently saw a demonstration of a Macintosh program which is ideal for any small publisher. Called Pagemaker, it allows the operator to take words prepared on any Mac-oriented word processing program and paste them down onto a 'page' format onscreen. Headlines can be written, typefaces can be tried out, and different sizes and shapes of articles can be toyed with on the page until the user is happy with the result. When the job is complete, the idea is that the user will then fire the page round the AppleTalk network to the new LaserWriter, which is a clever (if expensive) box of tricks that can print fancier and better than most micro owners would feel they have a right to expect. (Pagemaker is not yet available.)

*'Getting the cost of networking down by using the latent intelligence of the hardware more wisely makes a great deal of sense, not least to the user who gets a cheaper network that is easier to work with.'*

Mention of AppleTalk neatly brings in theme two — networks. Currently, networks are an adequate solution for some people, but users have to be prepared to pay large amounts of money. AppleTalk is one of the first systems to attempt to keep the inter-connection costs low by putting most of the network's required intelligence in the hardware rather than the interface. The LaserWriter, for example, has a 68000 processor and 2Mbytes of memory built into it. The file server will be similarly equipped. The idea is that connection charges, for a simple twisted pair cable and a connector box, will be around the $90 per station mark.

This can be achieved by making use of the processing power available. For example, instead of trying to transmit a full bit-map to the printer, the network is used to send only enough data for the internal system of the printer, which uses the Linotype-developed PostScript language to reconstruct what required.

Getting the cost of networking do by using the latent intelligence of the hardware more wisely makes a great deal of sense, not least to the user who gets a cheaper network that is easier to work with.

# Commodore Amiga

Come the revolution there's going to be the definitive micro — low-cost, multi-tasking and the last word in business computing. Commodore's Amiga is it. Guy Kewney conveys his very favourable impressions.


Illustration by Tony Randell

I'm sure I'm in for a terrible disappointment with the Amiga, because no computer could quite live up to the effect this one has already had on me. Nonetheless, I've used it; I've asked all the questions I can think of, and on every count, it seems to be the machine I've been waiting for for the past two years, and which the industry stolidly refused to produce.

It does multi-tasking. It does colour. It uses a mouse and icons. It's fast. It has plenty of memory. It has cheap, large capacity disks. And it costs around $1,200 (in the US) without display but including one disk.

It has to be admitted, right at the start, that I wouldn't have been given the chance to assess this micro if I hadn't been conspicuously excited about the early rumours of what I had heard.

Commodore executives kept the publicity lid on this really new machine tight closed, and they succeeded to an amazing degree. As little as a month ago, many people who you would expect to know about background information were still passing around wholly stupid rumours. And getting official information, which I had to have, wasn't easy.

In the end, officialdom and I played a funny little game in which the company would reveal a little more, and I'd make more excited squeaks of enthusiasm, and the company would open up a bit more, and I'd get more excited, until we agreed that, given my obviously positive attitude towards the Amiga, Commodore would be silly not to give me access to the machine.

That said, I'm sure this really *is* the micro I've been waiting two years for the world to produce. This is the business machine which any games programmer would give his eye-teeth to get hold of. This is the games machine which business software writers will be able to really make hum. And this is the machine which users will really love.

The Amiga is a multi-tasking micro (it can run several programs at once). It runs them very, very fast. It has graphics animation in colour, not just high-resolution pictures. It has sound capabilities the match of most synthesisers — it is Fairlight data compatible (if that means nothing to you, read on). It can have more useful memory than anyone will plug in for a couple of years, and it will be expandable.

And, to cap it all, it isn't expensive. It runs nearly 10 times as fast as the Macintosh for less than half the price.

All we have to do now is wait for the software to roll in. I expect it to do so, but I have to add that other people are more cautious about software developers' plans.

## Hardware

The Amiga is an icon micro like the Macintosh, with a colour display, mouse and keyboard.

The white system box is neat and compact, standing on four 5cm-high feet. The top of the unit is 11cm above the table, making the unit a thin 7cm high. It goes back 32cm, and the width from left to right is 44cm.

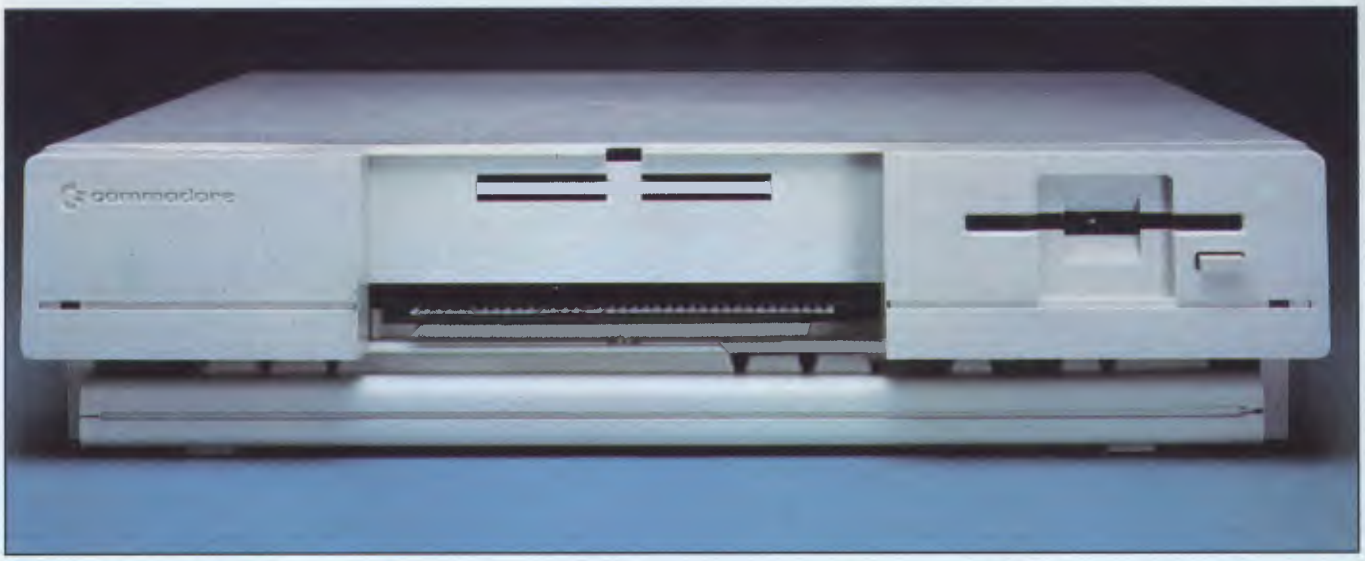
The keyboard is separate and includes cursor keys. It's a quality, full-travel keyboard, suitable for reasonably fast typing.

The mouse plugs into the main unit (the same socket can take two joysticks) and is a mechanical device, not an optical mouse. It has two buttons to save elbow grease. For anyone who has used a Macintosh, it will be sufficient to say that you use one button to pull down a menu, and then the other button to select various options, without letting the menu go. You don't have to pull it down five times to change five settings.

The 800k Sony-style (3½in) floppy disk drive is built in, another can be plugged in, and two more attached if they have their own power supplies. There is a memory expansion slot in the front to take 256k, bringing memory up to a 512k total, and the back panel includes all the standard slits and sockets with almost all of them capable of doing more than you would expect.

As it stands today it is expandable through a large interface slot, with options including a video frame grabber, a hard disk and extra memory. However, there is one special expansion feature planned and that is a 5¼in disk for around $500 or less, including IBM PC


*The Amiga has a full-travel keyboard suitable for fast typing*



*The front panel showing 3½in disk drive and expansion slot*

emulation. This is actually done in software.

The display can be one of a range of Commodore devices, or a wide range of alternatives. Commodore's own top-of-the-range screen has very high resolution (640 x 400 pixels) and will sell for over $300 (and be well worth it), but cheaper ones will work. It will even drive a television. Video-out can be RGB, RGBI (TTL level, IBM style), and there is also 'video-in'.

The processor is a Motorola 68000 running at 8MHz. Don't make any assumptions about performance based on that fact, because you'll be wrong. You'll be ignoring the work done by three specialised chips — Daphne, Agnus and Portia, but here's a bit of background first before I go into those processors in detail.

In many respects, there isn't an ideal processor for tomorrow's micro — not if it has to be 'symmetrical' and also 'protected'. But worse, even if you could find a safe micro like the Intel 80286, which is very well suited for multi-tasking, and which fits in with the Motorola 68000's nice, regular 32-bit registers, it would still have a simple problem: it would be arranged for data processing, not computing.

Computing involves lots of time-wasting processes that have nothing to do with the processing of data. One of the most important of these is displaying enough information for the user to know what's going on. Daphne, Agnus and Portia handle most of the work, leaving the central 68000 to get on with its processing.

Daphne does display animation and sprites, Agnus does animation graphics, and Portia is a peripheral scheduler and interrupt handler which also takes a lot of the disk control work.

These three chips have a shared access to the Amiga's memory. One of the most important functions they have is that of 'bit blitter', an idea which (like icons and the mouse) came out of

*The side panel has joystick and mouse ports*

Xerox's Palo Alto Research Centre (PARC) in California.

It's hard to explain a bit blitter's performance, except to say that it's fast. One software producer working on it tried to compare its speed with other machines, in terms of pixels changed per second. He said: 'If you say that the Sinclair QL can alter 60,000 pixels per second, you'll find that the Macintosh can run around twice that speed, with 110,00 pixels per second. But the Amiga's blitter takes a microsecond to perform any function, at a million pixels per second — and altering a single pixel is just one of its many functions.'

A 'blitter' is a bit-map image manipulator, a device which copies one large chunk of memory into another chunk of memory. While it is operating it doesn't block the memory from the processor, and the processor doesn't get in its way as they both have direct memory access through a multiplexer. The system clock makes sure that first the blitter, then the system components, can have access to the memory on alternate pulses.

Stripped of all this explanation, it means that the Amiga can draw a complex shape, fill it with colour and move it to a different place on the screen while changing its shape — and do it faster than your eye can see, at many times a second.

And all this time, your own Basic program can be running uninterrupted, at full speed, sorting through a database. And a complex tune can be played on dust-bin lids, all in perfect tune.

Incidentally, no-one has been able to tell me anything definitive about the naming of the chips, beyond the fact that some people call Portia, Paula, and some call Daphne, Denise.

Paula (Portia) also handles the disk control for floppy disks, which does mean that you have to be careful, when writing programs, not to tie the blitter up for too long if you want to read large amounts of data into the system and *vice versa* — don't tie up the disk for too long if you expect to run graphics.

Agnus includes the 'bit image manipulator', or bimer, or blitter. Most of its work, besides that, involves making sure that it knows which bit of the system memory it is using. It has 8Mbytes to choose from, including the 512k at the low end of memory, used for the screen.

But it also has some parts of the graphics control: it has the memory logic for the sprites, including vertical position compare logic; and it also has the light-pen registers and the video sync counters.

Although much of the control logic for floppy disks is handled by Portia, the blitter is used for transferring disk data from disk buffers to program and data storage in memory.

The designers were talked into adding another feature to Agnus which was not in the text books: the ability to draw lines. They had the registers on the chip, said one of the team, so why not put line-draw logic in, too? They did, and it draws lines faster than the Pluto graphics machine can — without interrupting the 68000 for an instant.

Daphne is the chip which controls colour, most of the sprite information and most of the 'bit-plane' control. There are five bit-planes (plus a sixth, which is very complex to use and very powerful) on which sprites are handled.

The sixth bit-plane is a 'hold and modify' plane which controls the colour of the electron beam as it scans from side to side in the video display. Using this bit-plane, it's possible to have something like 1000 different colours onscreen simultaneously.

There are two types of sprite — the Vsprites and the Bobs. Daphne controls Vsprites. These are 'virtual' sprites, which are always 16 bits wide and as high as you care to specify. They move fast because they are in hardware, but there are restrictions on their use.

For really complex animation, the Bobs (blitter objects) come into their own. These are slower than Vsprites, but give more colour and more options on shape and size.

The power of these Vsprites and Bobs can be gauged from the fact that Amiga includes, in the Basic manual, a few lines of code that make King Kong snatch at an aeroplane buzzing around him on top of his sky-scraper, and Fay Wray jump out of his hands into a cockpit . . . and that's the simple animation potential.

There are other types of graphic elements (GEL') concerned with animation. They are beyond the scope of this review (and of this reviewer's comprehension, frankly) but I can say that they will allow transformations of the sort seen in TV commercials, where a word gradually changes shape to become a razor or a motor car, or an office block . . .

I did my best to understand how many sprites and bobs you can have, and in the end found that every restriction was meaningless. For example, you might think that you can have only eight sprites because there are eight sprite processors. But the sprite processors are the things that *draw* the sprites and not the things that keep track of them — and furthermore, that's only the limit per horizontal scan line! On the next line, you can have eight more as long as they don't interfere with each other. And if you are prepared to calculate what they look like going past each, that doesn't matter either.

You can always decide that you want other sprites there, but you just don't want the sprite processor to draw them in for the moment. Nevertheless, software will keep track of where they are and report their collisions.

Combined with the bit-plane manipulation ability and the management of different screen formats, plus the fact that there are 'rasters' bigger than the display and 'viewpoints' smaller than the rasters, it makes working out the limitations very different.

'The limitation is the size of video memory', said one developer. 'That's restricted to half a megabyte.

I suppose, in 10 years' time, that will possibly seem restrictive, but not to a world which regards the BBC's 32k of screen memory as extravagant.

In addition to handling floppy disks, the third chip, Portia, is also concerned with sound. Theoretically there are only four sound channels. In fact, it's almost infinite because the sound channels produce a waveform, not a frequency.

The sound generation of Portia is similar to that of the Fairlight synthesiser. It stores a digitised waveform in a section of memory, and each (stereo) sound channel plays that waveform back.

But it can also transfer the waveform. It is possible, therefore, to get a digitised 'recording' of some sound or other, and process it, as the Fairlight does, to produce a whole scale of several octaves. The sound can be a trumpet, a clarinet, any instrument, or an orchestra, a choir, an organ with all the stops out, a dog barking, a bell, or anything with a definable pitch.

The chip takes that note and deduces all the others from it: you can hear a piccolo playing below the 16ft organ pipe, or a double bass playing at the upper limits of music, or a series of dustbin lids making beautiful harmony with the scratch of perfectly tuned tyres.

Speech synthesis is provided with this sound capability, and two ways of producing speech are offered. There is a pair of pre-recorded voices with American accents, male and female, which will turn text to speech. It's quite clever and, with software, can be persuaded to do realistic things such as raise and lower inflection as sentences are constructed.

Alternatively, there are phonemes. These are sufficient to generate almost any form of human speech from Russian to Xosa with quite convincing realism, but this does take more effort on the pro-

*The back panel showing I/O ports*

grammer's part.

The Amiga's expansion connector allows you to attach anything you like to the data and address lines of the multiplexer, up to a total of 8Mbytes. The system itself uses the other 8Mbytes of theoretical address space, but in such a way that it wouldn't be possible to have 8Mbytes of ROM. Several of the address lines are used directly for chip control.

Products to be launched with the machine are already under development. The obvious ones are extra disks (to plug in the floppy disk expansion port) and extra memory (to go on the expansion port).

Tecmar, the IBM peripheral add-on specialist, is apparently planning to launch a 20Mbyte hard disk which includes two megabytes of RAM, plus a real-time, battery-backed clock and a couple of other odds and ends for around $1,000.

A genlock device is to be released by Commodore to read video signals in off video disk, or tape, or any video source, and match the sync of that video with the video display-out.

Apparently, this feature (automatic sync) is sophisticated enough on the bare micro: programmers report watching football on the display screen on which they're developing software (to the obvious detriment of the software project).

The genlock allows tilting of video frames, overlay, underlay and joint animation, along the lines of arcade games where a cartoon strip background plays and computer animated characters move around blanking out the background. This is all done in hardware on the Amiga.

One other feature which the blitter makes possible is a RAM disk. Normally this isn't quite the advantage it might seem, because although a RAM disk is faster than a floppy disk (or a hard disk) it normally requires the attention of the processor.

With the blitter finding memory and transferring its contents around, however, the RAM disk works as though it were a separate computer with its own memory, just waiting to feed information into the system.

## System software

The Amiga's operating system is a specially customised version of the Cambridge Tripos operating system. It was written for Commodore by Metacomco in England, which licences the software on the 68000.

The advantages of this operating system are greater than you'd expect from an almost totally unknown piece of technology. Tripos, for those who missed that bit of history, means a three-legged stool, a stool such as Cambridge undergraduates sat on when taking examinations (a few centuries back). It then became a joke name for a three-part degree at Cambridge, and because it ends in OS, was stolen as the name for a network operating system.

The network is the Cambridge Ring, a token passing network of high speed and reportedly high reliability. Tripos, therefore, is a highly debugged system of message passing. It assumes a multitasking system, and merely passes messages from process to process in order of priority.

To operate Tripos, the programmer merely has to assign priorities to the processes in such a way as to ensure that no low-priority process (from the user's point of view) hogs the machine.

AmigaDos includes Tripos, plus a very complex structure of other bits of system software. It's clearly beyond the scope of a machine review to try to provide guidelines for applications porgrammers so I'll skimp on the highly complex way that all the different parts of AmigaDos talk to each other, but it is worth covering some of the details of what they are meant to do.

There are several unusual innovative and powerful features of the disk filing system, but a few basics first: the floppy disk doesn't use sectors, but complete tracks; there is no 'directory track' as such; all storage 'blocks' are message packets; and there are no arbitrary limits to anything.

Having established those few ground facts, here are some of the implications. The DOS is an asynchronous filing system, suitable for a multi-tasking system. For every task it keeps a buffer for the disk, and writes to the buffer, not the disk. The buffer is in two parts: a track cache, and within that, block caches. Writing to the disk itself is a low-priority task, and will in any case wait for five seconds between buffer write and disk update.

This does make the system vulnerable to power failure, in theory at least. As far as an applications program is concerned, if it says 'close' a file, the DOS will report that it is closed as much as five seconds before the closed file is written to disk — or perhaps even longer if another higher priority application is doing disk work.

However, there are safety features built into the file structure which a. based on the requirements of message passing. And in fact, on analysis, the system is actually safer than a conventional system. Consider the directory of an AmigaDos disk: the essentially cunning feature of the filing system is the fact that blocks do not point only to the next block of the file. A block has a header which points to the next blocks in the file, and (more important) points back to the previous block.

According to Metacomco's Tim King, who wrote the AmigaDos, this has one powerful advantage. 'It means that,

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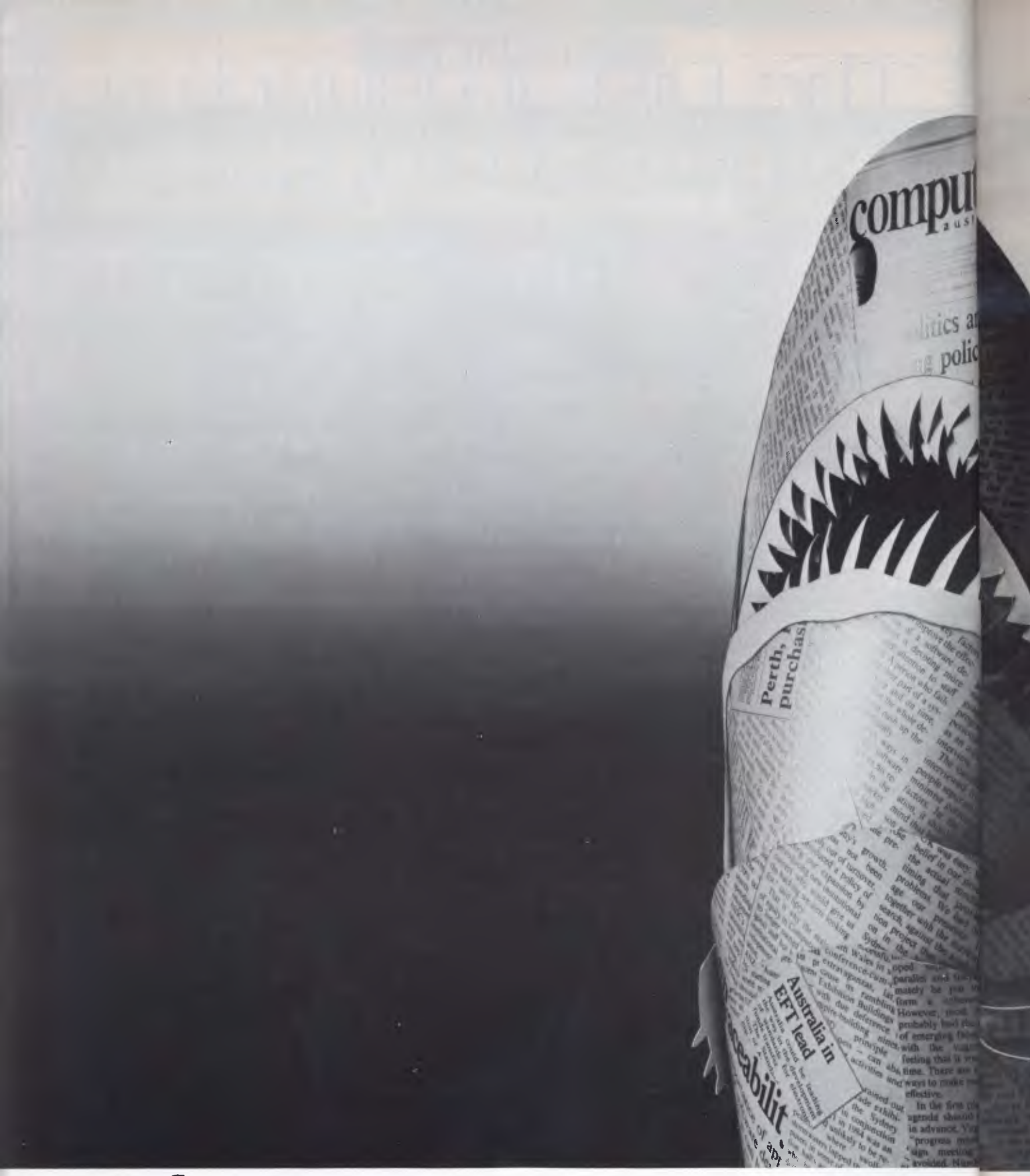


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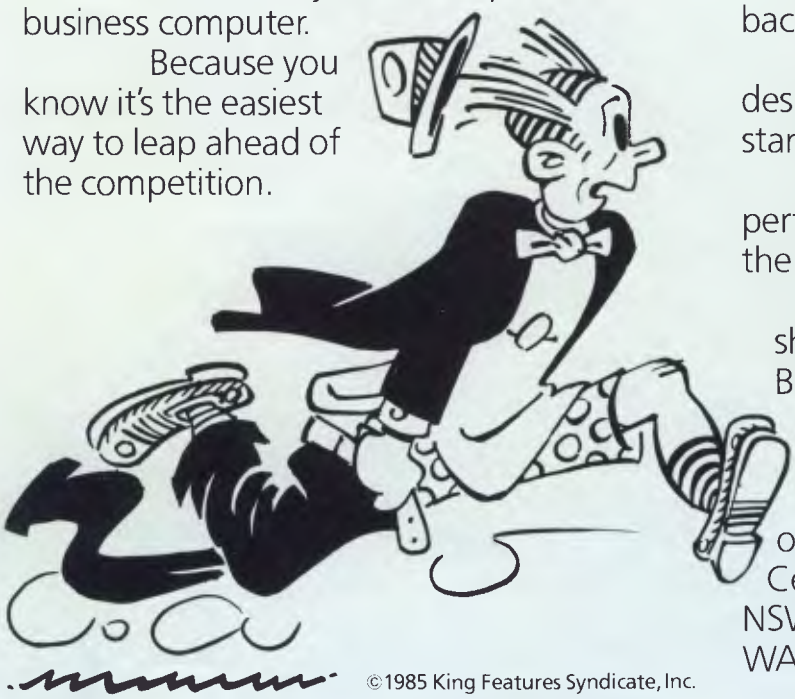

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given one good block, we can reconstruct most of the disk. From one block we can trace back to the core directory, in a central track on the disk (for safety), and from there can reconstruct all the pointers to all other blocks.'

In writing to disk, the DOS indicates whether a file has been modified, and unclosed files are flagged and usable. In contrast, of course, a disk file on a more conventional system which was being over-written at power-down would be lost for ever, and worse, would be corrupted.

The drawback is that the system doesn't pop up with a list of files when asked to list the directory. It has to do a search, using a hashing algorithm to find them first, and this can take a few seconds, with the data coming off the disk surprisingly slowly by CP/M standards.

Don't grumble. On CP/M or MS-DOS directories, the contents of the directory, if scrambled, can mean you will never trace a single file again. The directory is a data stream, which can be altered by any careless programmer or user, and has no inherent relationship to the data on the disk at all. But on AmigaDos, the data *is* the directory. And if you use a RAM disk, the directory listing will take microseconds.

The fact that the disk controller reads in a whole track, without sectors, will probably have important consequences for copy-protection. The 'invisible' information between sectors is often used to confuse disk filing systems. On this disk it's part of the data, and that explains why a double-sided Sony floppy can hold 880k without speed tricks, as on Macintosh.

Other points worth expanding on must include the fact that there are no arbitrary restrictions on anything. A directory can have as many sub-directories as you like, and each directory of a sub-directory can have as many entries as you like. A directory name can have up to 256 characters due to the name pointer being eight bits large, and that appears to be the only restriction. A file can be as big as the data in it: there isn't even a restriction on how many disks a file can be stretched over.

There are no 'types' of file. There is no end-of-file character, for example, because the file header blocks always specify exactly how long a file is. There are no 'sequential' or 'random' files — they can all be read sequentially or randomly.

Finally, a little quirk which I particularly like: DOS supports 'scatter loading'. This means that a 100k program can be loaded, even if there is no free block in memory bigger than 2k. As the program is loaded, all new jumps are calculated and inserted in the code. (This doesn't work, incidentally, with data space, which has to be allocated in contiguous blocks (unless an application is clever enough to do otherwise) by the operating system.)

When you switch on the Amiga, it requests the 'kick-start' disk. This isn't a permanent feature, but a way of debugging the enormous (192k or possibly more) amount of operating code in ROM.

For the first six months or so, this ROM will be supplied on disk. Commodore argues that it isn't possible to produce the Amiga in a fully tested form without some public feedback, so the first thing the machine will do is fill up a special section of RAM memory with this code, and then it will turn off the write-enable line. The RAM will become read-only, and, until power-off, the code will remain there (unlike the Atari, where pressing RESET will require the operating system to be entirely loaded again) until power-down.

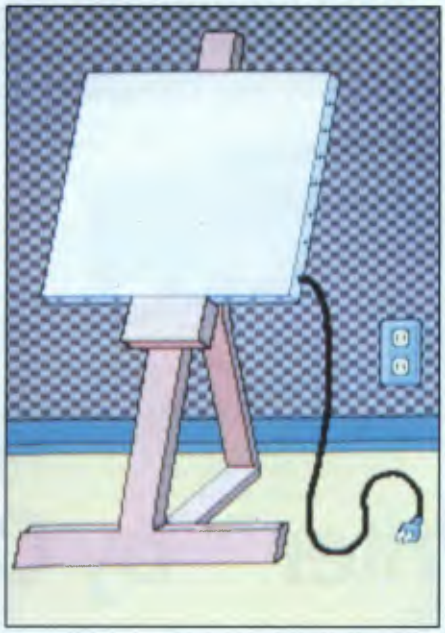
On the screen, after kick-start, will be a disk icon referring to the diskette you put in memory. There will also be a funny little icon with nothing on it but a 1> prompt. This is the 'command line interface' (CLI) option. Click it on with the mouse, and it turns the machine into an ordinary keyboard-driven micro, working rather like a Unix, or CP/M, or any ordinary computer system. To use this, you have to remember the system commands to get directories, start a program running, examine files, copy files, format disks, and so on.

Most users will never see this, and will drive the system with a mouse and the icons. But the option is there and is important, as you will realise when I describe the Basic.

The mouse-driven icons are collectively called the 'workbench', and this is a program which can be loaded. It is possible to have the Workbench running as one task alongside another program, or several others, or several workbenches. All you need is memory, and everything is optional.

The interface between application and user is a program called Intuition. Anyone who has seen a Macintosh working will recognise this at once as the way in which a programmer provides little command boxes, little response gadgets, and control bars. As with the Macintosh, Intuition can give you the ability to change the size or shape of a window. It gives scroll bars and put-away slots.

In addition, however, there is a 'gas-tank' option, showing how much memory has been used from the free



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space available. There is also a new control gadget, the above-below gadget, which uses the hardware that keeps track of bit-planes. It can tell which window is visible and which is hidden, but, unlike normal windowing systems, this one keeps writing to invisible windows.

For the untrained user, this is bound to be confusing as one assumes, naturally, that the active window is the one on top. But it isn't. You can have an active input window invisible, underneath another window displaying output. For example, you can order a word processor to load a file, then realise you don't have the right name. You open another window, ask for the directory, and as the right name comes past, type it in to the word processing window.

The Amiga is an 'open architecture' computer, with all information available from Commodore. Obviously some of the manuals will be cheaper than others, but one thing that will be well documented is the concept of a library.

Library functions exist in ROM, but you can create your own. These include all operating system control calls, which means that if a programming language doesn't have a feature, you can call a library routine. If the library routine doesn't exist, someone can write it, or you can do it yourself with the ADD LIBRARY call to the Exec, which itself does so many things that it's easier to say what it doesn't do, and that's any input or output. It's the primary software module for the system, controlling tasks, scheduling, memory allocation and 'devices'.

Exec is one of the library calls, and it is the one which is invoked at power-up. It's the only fixed-location routine in the whole system.

An understanding of the power of the Exec is essential to the writing of serious software for the Amiga, but I suggest that you get the system documentation if the idea of tasks, processes and devices interests you. It's of purely academic interest to the average user. However, it is worth pointing out that no part of the operating system or ROM routines is essential. Apart from Exec, every other piece of code can be dispensed with, and the simple bootstrap loader can be used to read in your own operating code. For such things as big games using lots of memory, this could save an enormous amount of space.

The previously mentioned command line interpreter has several interesting instructions which it will obey, which aren't found on other systems. Before listing some of these, it's worth pointing out that both the Workbench and the CLI are, like any other task, capable of running in parallel. One of the CLI comands is NEWCLI, which opens up a window with a new prompt in it. The first CLI window has a 1> prompt. The second has a 2>, the third a 3>, and so on.

But Workbenches can be started from the CLI, and CLIs from the Workbench, too. The only restriction, as with everything else on the Amiga, is the amount of memory you have plugged in. With the 20Mbyte disk, plus 2Mbyte memory coming from Tecmar, I don't expect many business users to be short of memory.

Commands which I like include SEARCH, EXEC, RUN, and COPY. SEARCH makes the question of long file names seem almost irrelevant. You can ask SEARCH to find a file in which a word, or phrase, or pair of disconnected words occur, almost as if you had a database manager. It would be foolish to search on a hard disk through all directories as it would take a while, but it will find it.

EXEC is the batch-file invocation. Unlike the .BAT or .SUB files we're used to, this includes complex IF and SKIP commands.

RUN invokes an application as a background task, which opens its own window and closes it when dismissed. To load an application normally, you'd type its name and it would run in the existing window.

But better than all these features is the help ability: type a command and a question mark, and the system will remind you of the inputs you have to put in and the ones you can leave out. Therefore, "COPY?" will give you FROM, TO/A, ALL/S, QUIET/SI, which will need the manual for interpretation the first time, but will be quite obvious thereafter. It's not the same as a pull-down menu, but it's close.

All commands, when specifying input and output, involve channel numbers (Amstrad users will recognise this) rather than hard devices. You can specify the printer as a channel and copy a file to it, or you can specify a particular window and copy it there.

Tripos is a network operating system. AmigaDos doesn't include a network operating section, but due to its structure, local networks of computers will need a trivial addition to the operating system, which already takes care of file-locking.

However, as there is no record-locking feature, any Amiga network will need a new version of the DOS, before multi-user networks are set up. Locking is controlled down to the block level, but for shared access, 'more granularity is needed,' conceded Tim King at Metacomco. This factor appears to be a simple oversight, and I gather it is correctable.

Multi-tasking is a problem for most

## *In perspective*

The Amiga, at $US1,500 for a colour system, is obviously going to be a business machine first and foremost. Its massive memory capacity means that people with $3,000 to spend will do so, getting a machine which $6,000 on an IBM wouldn't match, and which comfortably out-performs the Macintosh.

Anyone who is comparing this with the Atari 520ST will quickly decide that the only reason for buying the Atari is the price. If you can afford the Amiga, that is the one you will want.

For the next six months, the Macintosh will have the clear advantage of a growing and impressive software base. However, the news from within Apple indicates a level of unjustified complacency about the Mac. The Fast Mac is no longer being developed; and the Hard Mac is also on ice.

This is not the time for Apple to go to sleep. The Amiga has the price advantage. It is an open architecture machine, onto which anyone can attach anything. All the system calls will be published, and it is nearly 10 times as fast and has genuine multi-tasking, which the Macintosh won't have for at least another 18 months.

The only other problem Amiga faces is: can IBM tart up the PC 1 1 and the AT, with windowing and icons, in time to match its facilities? The theoretical answer is yes, but in practice, is there any sign of it? IBM is fiddling around with TopView, which isn't even as good as the small-time Desq and doesn't have graphics. It grows each time I hear about it, and gets slower and slower.

Microsoft Windows on the PC is Microsoft's watershed — the time has come to put up or shut up. It may pose a serious threat, but it doesn't have the raw computing power or even a fraction of it. Perhaps it will be good enough to keep users loyal, but will it attract new ones?

In the end, it comes down to innovation. The Amiga does things that other micros can't do. In the past, the computer market has always shown that genuine innovation creates new sub-markets, and I'll be astonished if the Amiga doesn't do exactly that — and many of them.

operating systems, simply because it takes such a long time to get it debugged. Tripos, says Metacomco, has been around long enough to be stable, but is new enough not to be outdated. I suppose, in a way, the very fact that it wasn't rushed out for a new micro, but bought off the shelf, allowed the developers to mature it without the pressure of having to deal with hundreds of thousands of angry users who wanted Version Two.

Time alone will tell whether AmigaDos is capable of withstanding a software crash in one application. My cynical soul tells me it won't be in the first week of availability that this question is finally answered.

## Applications software

The Amiga's Basic is Digital Research's Personal Basic. It was written for DR by Metacomco, and has now been upgraded to run on this machine and support its new features, so there are many new commands you won't find in Personal Basic any more than you would have found them in Microsoft Basic, of which Personal Basic is workalike.

Having said that it supports the machine's new features, I have given all the praise I am going to give. Microsoft, when it launched the Basic for the IBM, fell into a similar trap of rushing out a hopelessly inadequate, ill-prepared language. The company then had to sit down and write Advanced Basic (Basic-A) to take advantage of the steps the language had made since MBasic was written. So it is with AmigaBasiC (ABC). Its editor is ridiculous. There are obvious commands which it should have. It is at least two years out of date, and it isn't particularly fast.

The editor is a line editor. It's based on the Microsoft line editor, but it leaves out several of Microsoft's undocumented features. For example, control-A on Microsoft Basic will give you the previous command line, ready for editing. Not here: as with the CLI, you have to retype any command containing errors.

Metacomco says it wants a full-screen editor, and will do one. I can't wait. You can't even use the cursor keys when editing — very strange (undocumented) things seem to happen. This bug will be moved soon, I think.

Metacomco doesn't contest most of these objections, and says solemnly that this 'is the opportunity we've wanted for some time, to develop our Basic,' and that it is aware of what it wants to do. For example, the company agrees that line numbers are an option for labelling purposes, not a necessity. It agrees that a mouse-driven machine ought to have a mouse-driven Basic editor, and it concedes that a system with a real-time clock and calendar ought to be able to read it.

The saving feature of the Basic is the command SHELL " ", into which any CLI command can be fed. The other is the library call command, which is available from every language on the system and looks infinitely more powerful than USR invocations. Between these two, the full power of the machine can be tapped from the silliest of programming languages.

The virtue of Basic, of course, is that it does give the beginner a chance to experiment with the sound and animation potential of the machine, but I hope the language will be improved very soon.

From Basic, all the Amiga's multitasking features are available to the user; the only restriction is workspace. However, one essential feature, if this isn't to be a problem for entry-level users, is control of the workspace size. At press time, it transpired that everyone thought it was possible to define the workspace, but no-one has actually done it.

The result is a 256k system with 40k of program space for Basic. That's irritating. What's annoying is that if you run four Basic tasks in four windows, you'll use up your memory because there's no way of telling Basic that you only need 2k for a silly little display routine — it gives you the full slab.

I understand that this will be corrected and Basic will get a parameter to set the workspace size, but I don't know when.

Languages other than Basic which will be available for the machine at launch (at a price) will include Metacomco's assembler, Borland's Turbo Pascal, Lattice C compiler and a version of Logo. The system is heavily C oriented, with most of the systems software written in that language, or hand-coded.

As an optional peripheral, a 5½in disk can be plugged in. This can obviously read IBM diskettes. What isn't obvious, and may be regarded as over-ambitious, is a program, bundled with the drive, that emulates an IBM PC. Commodore swears that it's good — good enough to run Lotus 1-2-3. 'It won't be a substitute for the proper way of doing it,' the company says, 'but if you're working in an office with people who have 1-2-3 disks, at least you'll be able to take their outlines and change bits and put then back.

Astonishingly, this should sell for under $US500. I hardly dare to believe it. I can confirm, however, that the box will *not* contain an Intel 8088 chip.

At the time of writing this review, it unfortunately wasn't possible to obtain hands-on experience of the business packages expected to be available at the Amiga's launch. These packages include an entry-level word processor similar to MacWrite. For an entry-level system it's reported to be quite sophisticated, and many people have said that it is actually the nicest editor they've seen. I can only pass on their opinion — unbiased because they are not Amiga employees, but not necessarily informed because they aren't all word processing experts.

Also available at the launch will be an entry-level paint-draw package. This is said to work at many times the speed of MacPaint, and it should, shouldn't it? A music synthesiser program, a speech control and editing program, and a spreadsheet are also expected. A database, however, is still 'an area of weakness', say the developers, and they are negotiating for one. Communications software is also likely. (None of these business packages will be bundled in with the price).

Games are also on the horizon, despite the fact that at $US1,200 minus the type of colour display you really need to appreciate this machine, you might think that it wouldn't really be used for games. Software producers aren't so sure of this. I've spoken to people who are doing games, and are simply totally wrapped up in the glory of what is possible.

The fact of the matter is that no games producer could resist the challenge or the opportunities offered by Amiga, and I expect them to come thick and fast in a year's time, when there are a half million or so Amigas being used in the US.

Similarly, new types of software should appear. When the Macintosh first arrived, people laughed at the idea of a mouse. Today, nearly 300,000 users are mousing away, and IBM uses are clamouring for one, too. And in the background, new types of software were appearing — databases with visual components, text processors with animation

## Benchmarks

| | |
|---|---|
| B1 | 0.75 |
| B2 | 2.07 |
| B3 | 4.53 |
| B4 | 4.87 |
| B5 | 5.60 |
| B6 | 10.39 |
| B7 | 7.84 |
| B8 | 11.33 |

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

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# Proceed with Logo

**Harvey Mellar stresses the importance of variables, procedures and recursion in his introduction to this Teach Yourself Logo series.**


Logo is becoming well known as a programming language in schools, but its success in this field has led to it being dismissed in some quarters as 'just turtle graphics' or 'just for kids'. This is a highly inaccurate view of a fascinating language, for while it is true that Logo is an ideal introductory language, it is also a powerful high-level language which is particularly suited to processing symbols rather than numbers.

Logo certainly began as an educational language, as did Basic. But whereas Basic came out of the Fortran-based scientific tradition and was designed to deal mainly with numbers, Logo comes from the Lisp artificial intelligence (AI) tradition and was designed to deal with more general symbols. The people involved with the early development of Logo in the late Sixties were also closely involved with AI research. They believed that AI had something to say about learning, and that Lisp-like languages were necessary if people were to write 'intelligent' programs. These languages were intended to be closer to the way in which people think than the more machine-oriented, high-level languages such as Fortran and Basic.

Imagine this scenario: an MIT (Massachusetts Institute of Technology) professor comes home after a hard day hacking at Lisp code in the AI lab, and meets his kids back from school. 'Hey Dad, we've been learning Fortran programming in our maths classes.' The MIT professor sees red, and begins to design a new language. Now this story has no historical truth, but I believe it does capture one of the ingredients that went into Logo's origins.

Logo was initially implemented on mainframes (there were only mainframes at that time). It was used in a variety of projects during the Seventies, mainly at MIT in the US. The projects involved such things as teaching programming to young children, learning mathematics in secondary school, exploring mathematical modelling for physics and maths undergraduates, and teaching AI at undergraduate level.

A Basic interpreter could be fitted into a few kbytes of ROM, but a logo inter-

preter needed around 30k as well as a fair amount of room to run in. While Basic had been easily implemented on micros, it was only with the appearance of larger memories that Logo on micros became feasible. 1980 saw the first microcomputer versions, and a language that had previously been restricted to a few universities and research labs suddenly became widely available.

Today, most micros have at least one full version of Logo. A number of Logo dialects now exists, the three most widespread being MIT Logo (the original), LCSI Logo (LCSI is a company set up by ex-MIT people including Logo's founder, Seymour Papert) and Edinburgh Logo, a less popular variety.

## The turtle

Start up a Logo system and you'll be presented with a 'turtle' in the middle of the screen; this is usually a triangular shape, although this varies — on the Atari it is actually a turtle shape. The turtle is an 'object' with which we can communicate. You can give it simple commands to move across the screen — FORWARD 50, or to turn — RIGHT 90. The turtle carries a pen and it draws a line as it moves. You can tell the turtle to lift up the pen so that it does not draw on the screen (PENUP) or put it down again (PENDOWN). With these simple commands we can draw shapes onscreen.

If you make a mistake, such as misspelling a command, Logo will complain. The error messages are clear and to the point. Logo takes error-reporting very seriously: it is not an afterthought, but an important part of the whole system. The turtle was originally a robot that responded to the drawing commands. We've seen how to give the turtle simple commands, but communication should be two-way. The turtle can provide information about itself: where it is on the screen, whether the pen is up or down, and so on. Try the PRINT HEADING command — Logo prints out the direction in which the turtle is facing (measured in degrees, with 0 considered as straight up the screen). It is this metaphor of the turtle as a communicating object that lies at the heart of Logo's success as an introductory programming language.

If you practise drawing a few shapes with the commands I have mentioned so far, you will quickly meet the need for a method of repeating a sequence of commands. For example, repeating four times the commands FORWARD 40 RIGHT 90 will produce a square. In Logo, you could shorten this by writing REPEAT 4 [FORWARD 40 RT 90]. The number after REPEAT is the number of times you want the commands obeyed. The commands themselves are written out within square brackets, which are used in Logo to mark out a 'list'. A list is just an ordered collection of symbols: that is, words, commands and numbers (or even other lists).

## Procedures

The commands I have presented so far are referred to as 'primitives'; they are part of Logo itself and are understood by the system as soon as it is loaded. Logo can also be taught new commands or procedures. You can define a procedure called 'square' by writing

```
TO SQUARE
  REPEAT 4 [FORWARD 40 RT 90]
END
```

You type this into a full-screen editor that is part of the Logo system. These editors vary slightly from machine to machine, so you will have to consult the manual as to how to use it.

We can now type SQUARE as a command, use SQUARE with other commands (for example, REPEAT 12 [SQUARE RT 30], or even use it as a subprocedure in the definition of other procedures:

```
TO TOWER
  REPEAT 4 [SQUARE FORWARD 40]
END
```

Logo treats these procedures exactly as if they were primitives (except that they will be forgotten when you switch off). The basic idea of programming in Logo is therefore one of extending the language by defining new procedures until it can deal with your problem. Forth and Lisp also have this type of 'extensibility'.

Some of the advantages of extensible languages include hiding nasty details within sensibly-named procedures, creating special environments for others to use (for example, for children's programming), and developing your programs in a top-down fashion.

Logo is an interpreted language (like Basic) so you can enter anything you like into a procedure definition. When you ask Logo to obey that procedure it goes word by word through the procedure, obeying the primitive commands as it comes to them, or looking up the definitions of any sub-procedures and then running them. Only if a procedure is not present at the time when Logo wishes to run it will it complain: you can write your top-level procedures using lower-level procedures that you have not yet written.

While top-down design of programs is a good thing, you may be glad to learn that Logo is also open to other methods of use. The most interesting programs are not written top-down, or bottom-up for that matter, but rather 'middle-out' (that is, by writing a program to solve an interesting bit of the problem and then expanding, adding and refining). Most Logo programs are written that way.

## Variables

The procedure SQUARE always draws a square of side 40 units. In this sense, SQUARE is rather like a primitive such as PENUP which only has one possible effect. Some other commands, such as FORWARD, are followed by a number which acts as an 'input' and determines the exact action to be taken. We can write a SQUARE-drawing procedure which requires an input in this way:

```
TO SQUARE: SIZE
  REPEAT 4 [FORWARD: SIZE RT 90]
END
```

To call this procedure we now type SQUARE 30 or SQUARE 60 in order to get squares of side 30 or 60 respectively. SIZE is called a 'variable' and it works in this way: whenever the procedure is called, Logo stores away the number following SQUARE in a 'box' and sticks the label SIZE onto it. Then, later, when Logo sees :SIZE, it finds the right box and replaces :SIZE by the value it finds there.

The variable used here is said to be 'local' to the procedure call: that is, as soon as the procedure has finished running, Logo forgets that it ever had a variable called SIZE. This way of using variables is very similar to the formal parameters in a Pascal procedure definition, but is rather unlike the way variables are used in Basic.

The reason for the colons (read them as dots) will be fully explained next month. For the time being, you can take it that a word with : in front of it must be the name of a variable. No : means that the word is the name of a primitive or of a procedure.

## Recursion

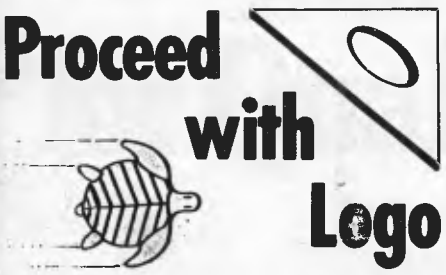
```
TO DAILY.GRIND
  WORK
  SLEEP
  DAILY.GRIND
END
```

Here we have defined a procedure in terms of itself. This is called 'recursion' and is widely believed to be a highly mysterious process. Not so! Look at this definition of a square:

```
TO SQUARE :SIZE
  FORWARD :SIZE
  RIGHT 90
  SQUARE :SIZE
END
```

When you type SQUARE 40, Logo looks up SQUARE in its list of known words, and the turtle goes forward 40

# Proceed with Logo



```
  FORWARD :SIZE
  SPIRAL :SIZE + 5
END
```

When Logo meets STOP in a procedure, it stops executing that procedure and returns control to the procedure that called it. If the procedure was called from the initial command mode ('top level') then command returns to there.

Here is another example which draws a series of shrinking squares, one on top of the other:

```
TO TOWER :SIZE
  IF :SIZE < 5 THEN STOP
  SQUARE :SIZE
  FORWARD :SIZE
  TOWER :SIZE — 5
END
```

LCSI uses a slightly different syntax for IF. In this version you write IF :SIZE < 5 [STOP], where the THEN is omitted, and the action is given as a list.

## *Example program*

Let's tie all these threads together by writing a program to draw the 'snowflake curve', which is a recursively-defined curve. Fig 2 shows how the curve is defined: an equilateral triangle forms the level 0 curve. Take each side, divide it into three parts, and construct an equilateral triangle on the middle section. This is the Level 1 curve. Now take each line in the drawing and repeat the process of division to get the Level 2 curve, and so on.

The start is easy enough:

```
TO SNOW :SIZE
  REPEAT 3 [FORWARD :SIZE RIGHT
    120]
END
```

draws the level 0 curve, but you now need to replace the straight side (FORWARD :SIZE) with a more complex shape which is dependent on the level. You will need two inputs, one for the size and one for the level. Your second attempt therefore is:

```
TO SNOW :SIZE :LEVEL
  REPEAT 3 [SIDE :SIZE :LEVEL
    RIGHT 120]
END
```

As to drawing the side, if it is level 0 then it is simply a straight line. Otherwise it is made up of four sections, each of one lower level.

```
TO SIDE :SIZE :LEVEL
  IF :LEVEL = 0 THEN FORWARD
    :SIZE STOP
  SIDE ( :SIZE / 3) ( :LEVEL — 1 )
  LEFT 60
  SIDE ( :SIZE / 3) ( :LEVEL — 1 )
  RIGHT 120
  SIDE ( :SIZE / 3) ( :LEVEL — 1 )
  LEFT 60
  SIDE ( :SIZE / 3) ( :LEVEL — 1 )
END
```

END

*This is part one of a six-part series. Logo is widely available for a large number of personal computers including the IBM PC, Commodore 64, Apple II, Atari and Spectrum.*

units and turns right 90 degrees. Logo then sees that it must now do SQUARE 40, so it looks up SQUARE and the turtle goes forward 40, turns right 90, at which point . . . The procedure will run forever, so after it has drawn the square and is retracing its steps, you stop the turtle (CTRL-G stops Logo in almost all versions).

That's a fairly unusual way of drawing a square, but what about the 'square spiral' shown in Fig 1? Think about drawing this starting from the inside. The turtle must first do FORWARD 5 RIGHT 90, and then carry on with the rest of the spiral. But the rest of the spiral is almost the same as the whole spiral, if you see my point. I'm suggesting that this shape — a spiral beginning with length 5 — is made up of two parts, FORWARD 5 RIGHT 90, followed by a spiral beginning with length 10. So, in Logo:

```
TO SPIRAL :SIZE
  FORWARD :SIZE
  RIGHT 90
  SPIRAL :SIZE + 5
END
```

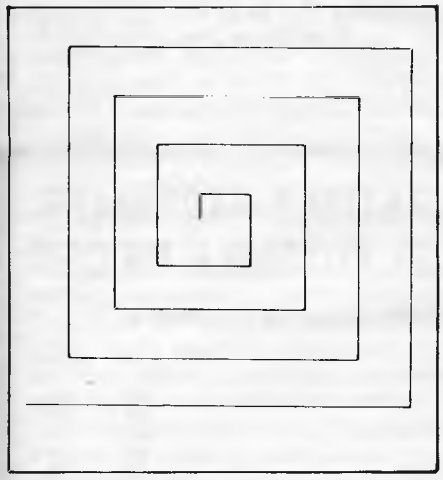


*Fig 1 A square spiral*

In this case, it is natural to describe the shape in terms of recursion; any other description would be rather artificial.

In attempting to understand how this procedure works, bear in mind that each time SPIRAL is called, a new variable called SIZE is created. Each value of SIZE is known only to that particular procedure call. Think of each procedure call as producing a copy of the original procedure, complete with its own library of local variables.

The alternative to recursion is to use 'iteration', which is the name given to repeating chunks of code using WHILE/WEND, REPEAT/UNTIL and FOR/NEXT loops, or even GOTOs. In Logo, REPEAT is used for very simple situations, but otherwise recursion is usually used in preference to iteration.

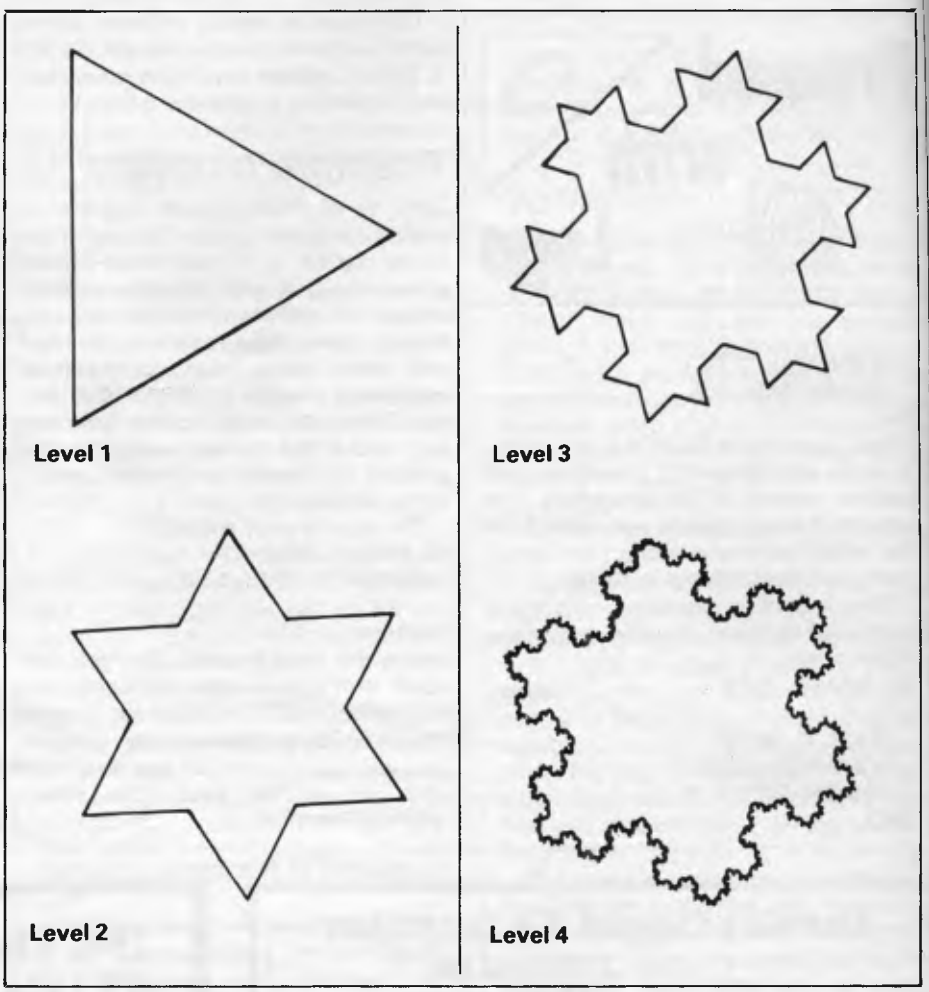



*Fig 2 The gradual development of the snowflake curve*

Two objections are often raised to the use of recursion: firstly, that it is difficult; and secondly, that it uses a lot of computer memory. The reason many people find recursion difficult may simply be unfamiliarity. Some computer languages (most versions of Basic, Fortran and Cobol) do not have recursion, and even languages that do (Pascal) never really encourage its use. There are, however, a great many problems in computing that are easily, and most naturally, expressed using recursion.

The problem over use of memory is a real one. Most versions of Logo alleviate this problem somewhat by efficiently implementing so-called 'end recursion' — that is, procedures in which the recursive call is in the last line. In this situation, recursion does not use any extra memory as it runs. It is often worth recasting procedures into an end recursive form if it is possible to do so.

The only way to get used to recursion is to use it. Turtle graphics is an ideal area in which to learn to think recursively. You may find it strange at first, but it won't be long before it is iteration that begins to seem slightly difficult.

Recursive procedures that carry on running until they are stopped by typing CTRL-G are of limited usefulness. A couple of recursive procedures from real life illustrate the solution to the problem of stopping:

```
TO ADJUST.SOUND
  IF LOUD.ENOUGH THEN STOP
  TURN.CONTROL
  ADJUST.SOUND
END

TO DRINK
  IF UNCONSCIOUS THEN FALL.OVER
    STOP
  SWALLOW.BEER
  DRINK
END
```

These are examples of 'stop rules' which are implemented using the familiar IF/THEN structure.

You can do exactly the same thing in Logo, so to stop the spiral program as soon as the length of the side exceeds 100, write:

```
TO SPIRAL :SIZE
  IF :SIZE > 100 THEN STOP
```

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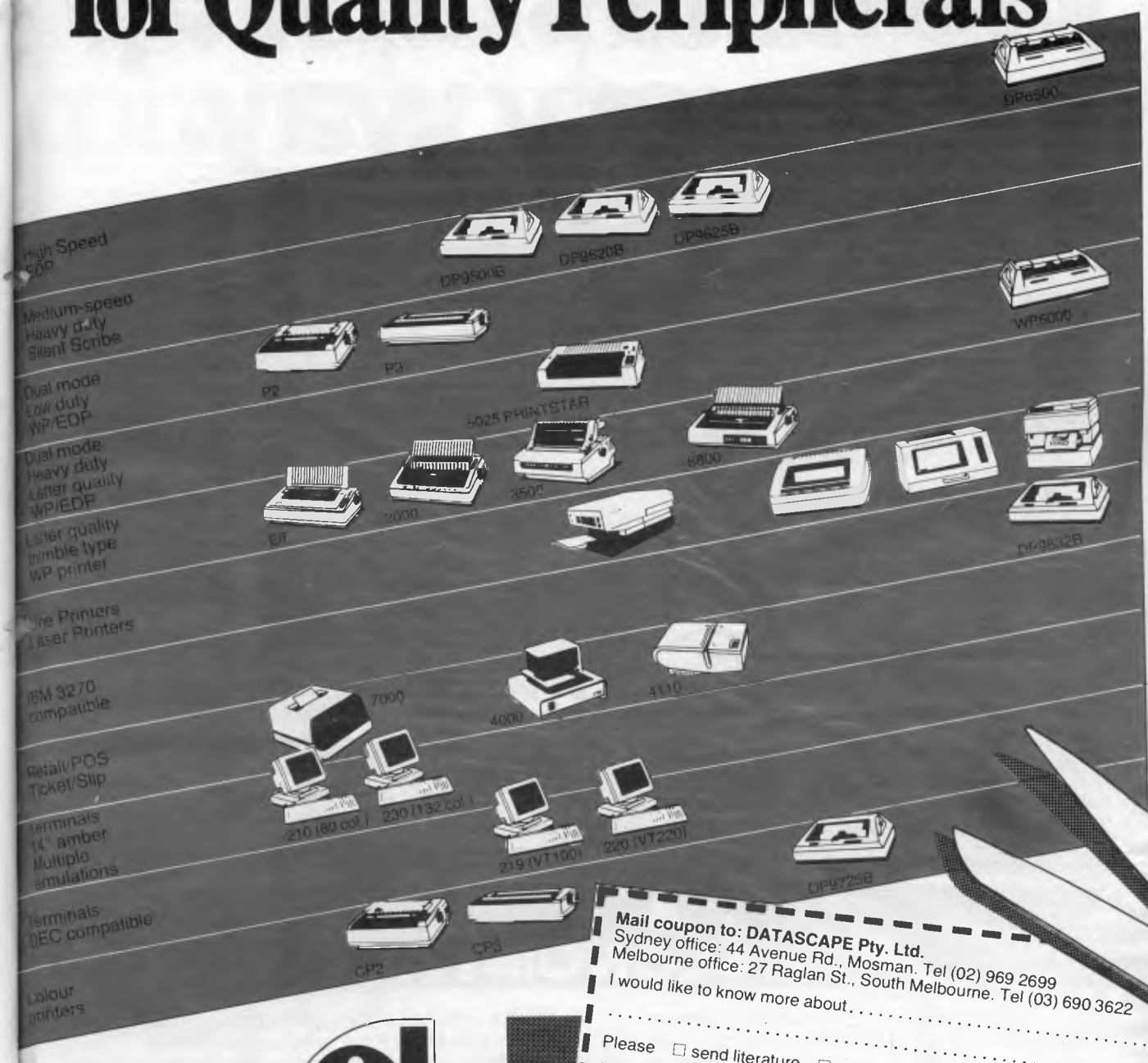


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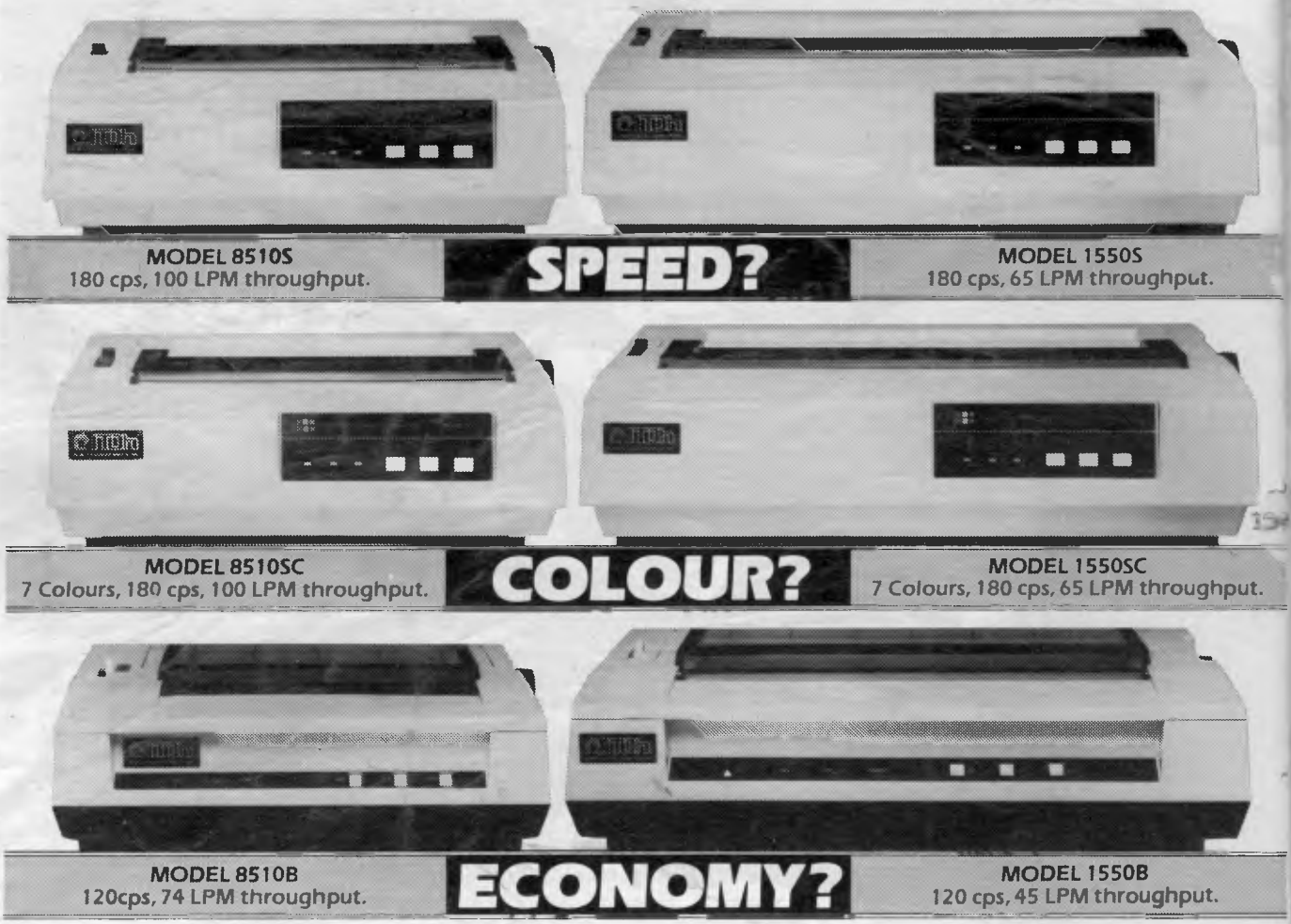

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graphics, and complex programs that required no training. The Amiga does so many things so much faster, with so much more detail and with the added advantage of colour, that I expect it to generate similar innovation.

I expect to see much more sophisticated programs, too, because of the multi-tasking ability and because most business users will have 20Mbytes of disk and 2.5Mbytes of RAM, within a year. Integration becomes less important when you have multi-tasking, and individual word processing, spreadsheet, comms and other ideas. Packages can be more virtuoso in their design. A talking word processing package, or database, is an obvious start . . .

Although there are few instant similarities between the Macintosh and the Amiga, both do use the 68000 and have high-level languages. I expect to see best-selling Macintosh programs coming onto the Amiga within weeks of its availability. Even programmers who have held aloof because of the non-disclosure requirements imposed by Commodore admit that it would normally take a matter of weeks, not months, to transfer new Macintosh programs to the new machine. I believe them.

## Documentation

I hate to duck out of the important question of documentation, but so little was ready when I did the Benchtest that I don't feel I can honestly express an opinion. What I did see was lucid and helpful, but I think there's scope for books on the machine.

## Prices

Commodore had not decided on Australian prices at the time of this review.

## Conclusion

Although the Basic Benchmarks don't prove it, this machine runs upwards of 10 times the speed of any of its rivals. It adds hardware animation, video input, and stereo sound synthesis, including speech, to the icon-and-mouse family of designs which the market has come to expect, and offers it all at a price less than half of that of the competition.

To close as I began, the Amiga is the first low-cost, multi-tasking computer, introducing a new price level to business computing.

## Technical specifications

| | |
|---|---|
| Processor: | Motorola 68000 at 8MHz clock |
| ROM: | 192k, possibly 256k |
| RAM: | 256k minimum, expandable to 8Mbytes |
| Mass storage: | Internal 800k floppy, 3½in. External options include another 800k floppy using system power, and two more with exterior power. Hard disks fit on expansion slot |
| Keyboard: | Full-travel qwerty with cursor keys |
| Size: | 11cm high x 44cm wide x 32cm deep |
| I/O: | Serial, parallel, video out and in, stereo sound, mouse |
| DOS: | Tripos, called AmigaDos |
| Bundled software: | Basic, DOS, Exec, no applications peripherals. Colour printers supported, video disk interface available |

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Fig 1

# Fatten up your Mac

**Soldering iron and pliers at the ready, David Burns presents a step-by-step guide to expanding the Macintosh — four times the memory for a third of the price.**

When Apple produced the first Macintosh computers, the new 256k RAM chips were not widely available. So, rather than be late into the marketplace, the company fitted 64k memories as a temporary measure. Although promoted as 128k computers, they are, in fact, only 64k word machines and much of this memory is taken up by the Mac's own software. Users of programs such as MacWrite and MacPaint soon became aware of the limitations of this memory — a mere seven A4 pages when word processing.

The new, larger memories were introduced and the 'Fat-Mac' was born: four times the memory and a boon to those sick of waiting for the Mac to dump to its clattery old disk drive so that they could add a bit more text or do another doodle. The problem, though, is the cost of the upgrade — $1,425. The cost of the memories themselves, however, has recently fallen rapidly, and the 16 256k RAMs needed to 'fatten up' your Mac can now be obtained for around $25 each —a total of less than $400. With the other few items required, the whole job can be done for well under $450, or a third of Apple's price.

Needless to say, Apple is not keen to be done out of sales of its new Fat-Mac boards. DIY upgrades will certainly invalidate any warranty, but if the machine is a year or more old then this should be of little consequence. Doing it yourself may involve a small risk to the computer, but the task is not difficult (if a little fiddly) for anyone who is reasonably competent with a soldering iron. The $900-plus saved will buy a lot of extra software or hardware — or a service contract for that matter!

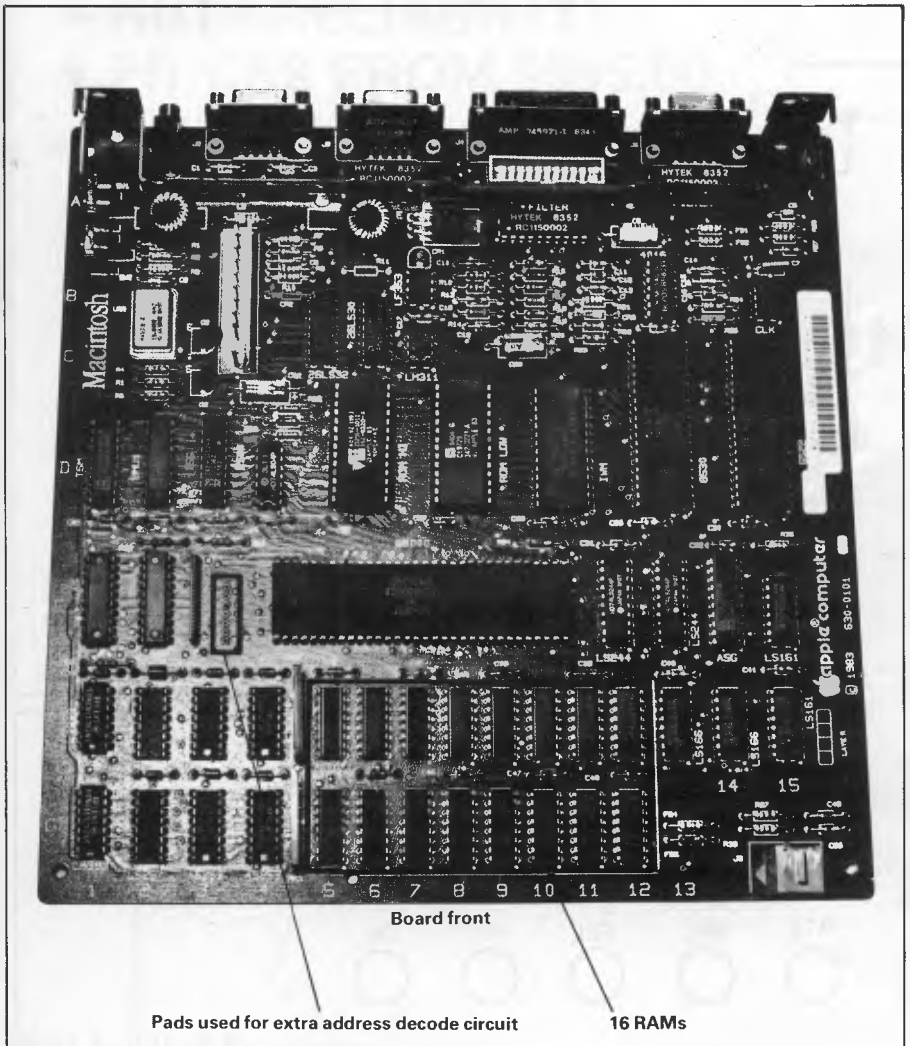


*Fig 1 The Macintosh board*

## Requirements

The main additional components are the 16 256k dynamic RAM chips. A suitable device is the Hitachi HM50256P-15, although equivalents are available from several sources. Dick Smith Electronics stocks these at about $25 each. It's worth shopping around as prices differ. Rod Irving Electronics, (03) 481 1436, advertised them for as little as $12.50.

You will also need another IC — I've specified the type used by Apple, the 74F253 — to act as the address multiplexer required by the larger RAMs. It's important that this device is fast — Fairchild's FAST or the Texas Instruments Advanced Shottky series — don't use ordinary TTL or low-power Shottky. They may work but cannot be guaranteed to do so. Other similar multiplexer chips could be substituted, but it seems reasonable to use the device already used by Apple to multiplex the other address lines.

The only other components required are a 47-ohm, ⅛watt resistor, a small piece of circuit board (Veroboard will do), solder and some solid wire. Necessary tools include a good, small soldering iron of reasonable capacity (25 watts minimum), a small screwdriver, and pliers. You'll also need an efficient desoldering tool — the chips aren't socketed. A small solder-sucker which costs around $8 is ideal, although there are several types available.

Finally, you need a 3/32in Allen key with a long (six inches or so) handle to open the Macintosh. If you can't get a long-handled one, it's easy enough to make one by cutting the bent end off a short one and soldering the resultant key into the end of a nut spinner or similar. Really, a Torx screwdriver is the right tool for the job, but an Allen key will do if you are careful.

## Memories

Dynamic RAMs generally have multiplexed address lines to save on pin connections and hence package size. With the original 64k RAMs 16 address lines are needed, but the 16-pin package only allows for eight address connections: A0-A7. Consequently, the address is loaded in two 'chunks'.

Firstly, half of the microprocessor's 16 low-order address lines are switched to the memories' A0-A7 pins, and a signal called $\overline{RAS}$ (row address strobe) is activated. Next, the other half of the low-order address lines are switched in, and a signal called $\overline{CAS}$ (column address strobe) is activated. This is achieved in the Macintosh using 74F253 multiplexer chips. With 256k RAMs you obviously need two more address lines but, because of the multiplexing system,

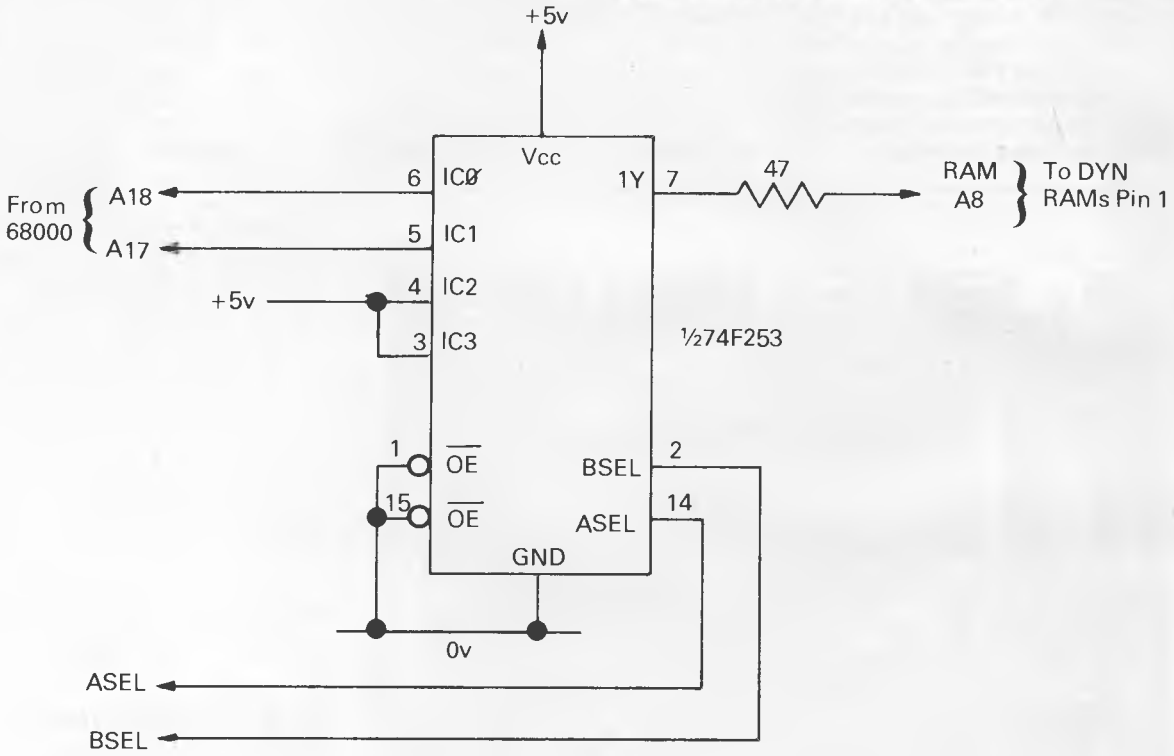


*Fig 2a A diagram of the pad layout*

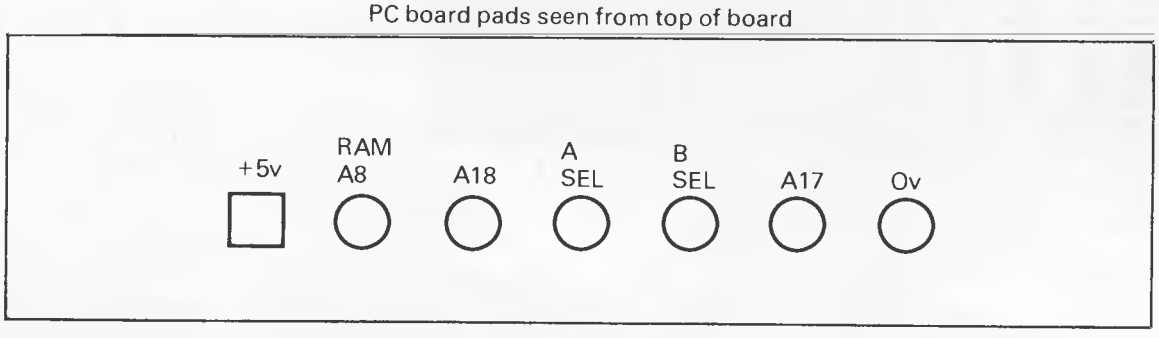


*Fig 2b The circuit required for multiplexing*

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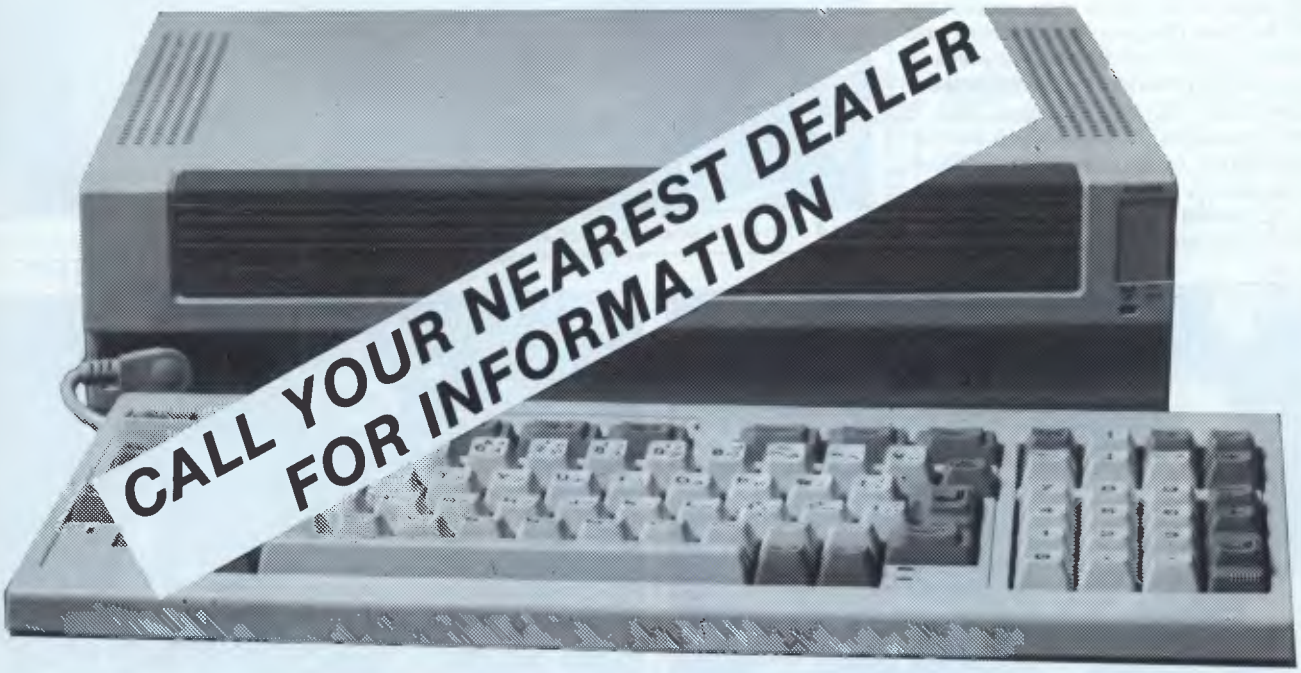


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*Figs 3a-3c The position of the five Allen screws which hold on the back of the Macintosh*

only one more pin is required; this is pin 1 which is unused on the 64k device.

On the Mac board, all the pin 1s of the memory chips are connected and taken to a row of pads on the printed circuit next to the microprocessor chip shown in Fig 1. I've called this signal 'RAM A8' in Fig 2a. This pad is next to the one marked '+5 volts', and on the 'thin' Mac these two pads are connected; they will have to be disconnected. The other pads in this set of seven are: 0 volts (ground); A17 and A18 from the computer address bus (these are the two extra address lines — for some reason Motorola starts counting its addresses at A1 and not A0); and 'A select' and 'B select' (my signal names) which are the two multiplex control signals that allow you to switch between A17 and A18, and, incidentally, the register which controls the memory refresh. A diagram of

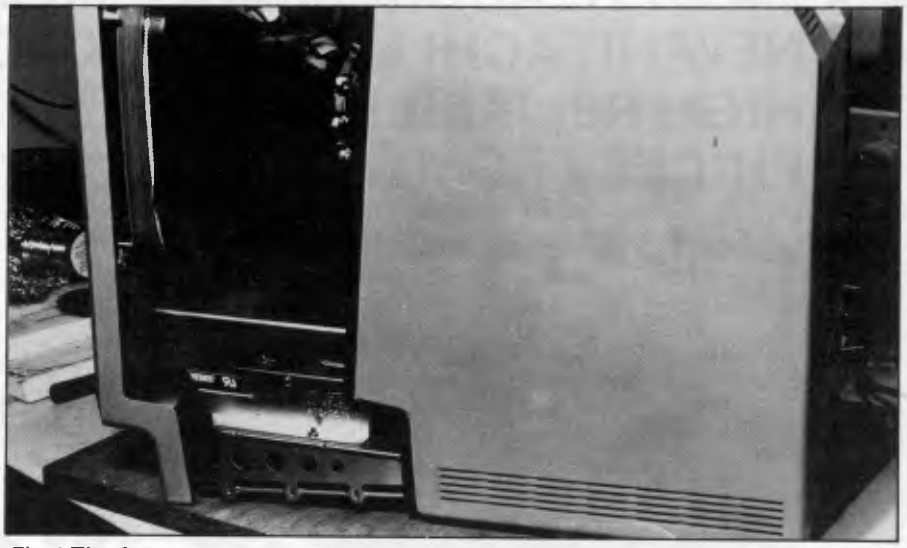

*Fig 4 The front and back separated*

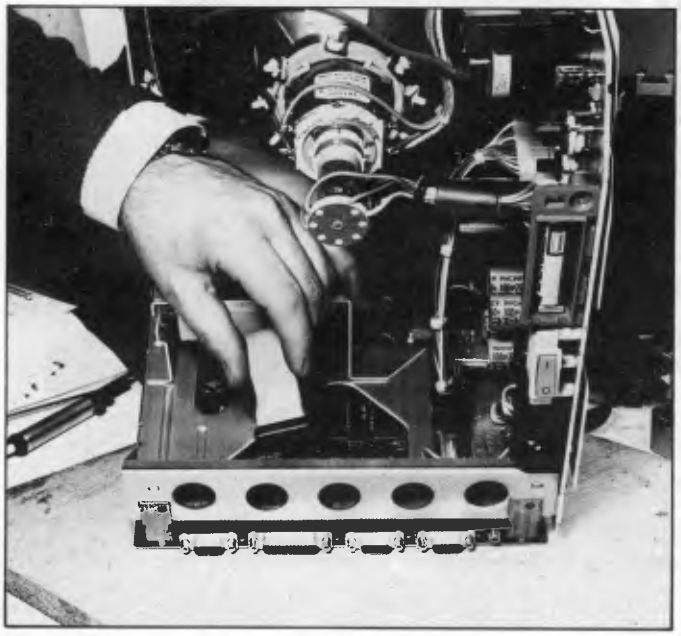

*Fig 5a The removal of the disk drive cable*

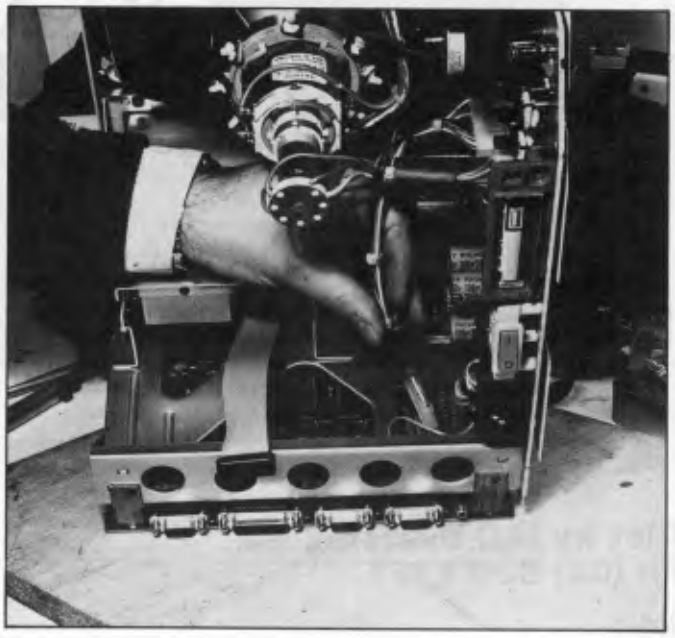

*Fig 5b The power and video connector*

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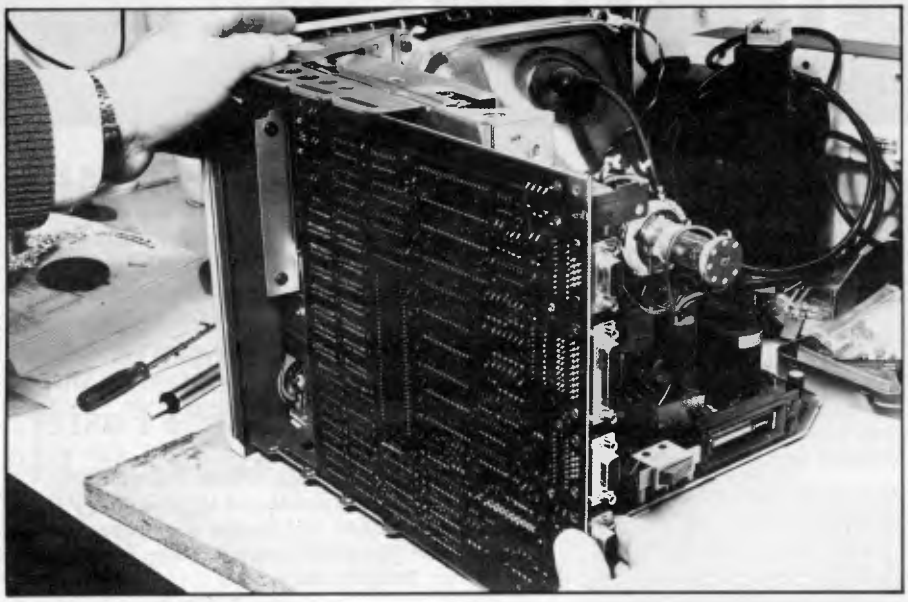

*Fig 6 The board slides from under the machine*

*Fig 7 Sucking the solder from the same side of the board as the iron*

*Fig 8 Heating one side of the board and sucking from the other*

*Fig 9 Straightening the IC pins*

the pad layout is shown in Fig 2a, and the circuit required to do the multiplexing is in Fig 2b. Note that the output of the 74F253 is connected to the RAM A8 signal via a 47-ohm resistor. This circuit can be made up on a small piece of Veroboard or home-made printed circuit (as mine is) for direct mounting on the Mac board. (I suspect that Apple has a small hybrid or similar circuit that slots in at this point — our upgrade will have to be a more modest affair.) The pad spacing is 0.1 ins and the +5-volt end is identified by a square printed circuit 'land', while all the others are round. It's important that pins 3 and 4 of the 74F253 are connected to +5 volts as shown or the circuit will not work properly. When you've made up this small board, you're ready to do the rest of the upgrade.

## Making a Fat-Mac

The best way to approach this job, as is often the case, is step-by-step.

1) Unplug everything — especially the mains! Find yourself an uncluttered area and get all the tools and parts to hand. Read the previous instructions thoroughly to make sure you haven't forgotten anything.

2) Remove the reset push-button from the lower rear left-hand side of the case (looking from the front) by gently prising it out. It should come out quite easily — whatever you do, don't force it. Use as broad-bladed a screwdriver as possible so as not to damage the plastic case. Take off the battery cover from the back of the case and remove the battery which powers the real-time clock.

3) You can now unscrew the five Allen screws which hold on the back, all of which are at the rear. Two are at the bottom corners, one is under the battery cover, and two are under the lip which forms the carrying handle (that's the reason for the long-handled Allen key). Figs 3a-3c show these positions.

4) Now comes the bit which at first seems impossible, but is really quite simple. The rear of the case slides off to give access to the interior. *Do not* try to prise the two apart by sticking a screwdriver into the gap just behind the front of the screen — you'll only ruin the case. Simply work out the front by pressing the screen surround forward while pushing into the battery compartment at the rear. It may also help to push gently on the mains plug inserted into the rear mains inlet, bearing in mind the following warning. Above all, don't be too forceful — the case *will* come apart. *Warning:* don't poke your fingers into the back of the mains inlet unless the Mac has been powered-down for some time. Apple has been rather naughty with the design, in that some time after the computer has been unplugged there is sufficient charge remaining on internal power supply capacitors to give you an unpleasant shock from the mains connector. It's wise to either switch off the Mac for some time before doing the upgrade or to discharge these capacitors *(if you know what you're doing)* through an appropriate resistance.

5) Eventually the back cover should slip off quite easily. Fig 4 shows the two parts separated.

6) Pull out the two connections to the main board. Fig 5a shows the removal of the disk drive cable and Fig 5b shows the power and video connector. There is also a metallised screen which normally sits over the rear serial I/O and printer connectors; this may have stayed in the back of the rear casing. Put this to one side.

7) The board should now easily slide from under the Mac (Fig 6).

8) You can now proceed to unsolder all the RAM chips shown in Fig 1. There are 16 altogether and numbers such as MCM6665 or 4164 will be inscribed on

# DISCWARE

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| Epson LX-80 | 599.00 | **420.00** |
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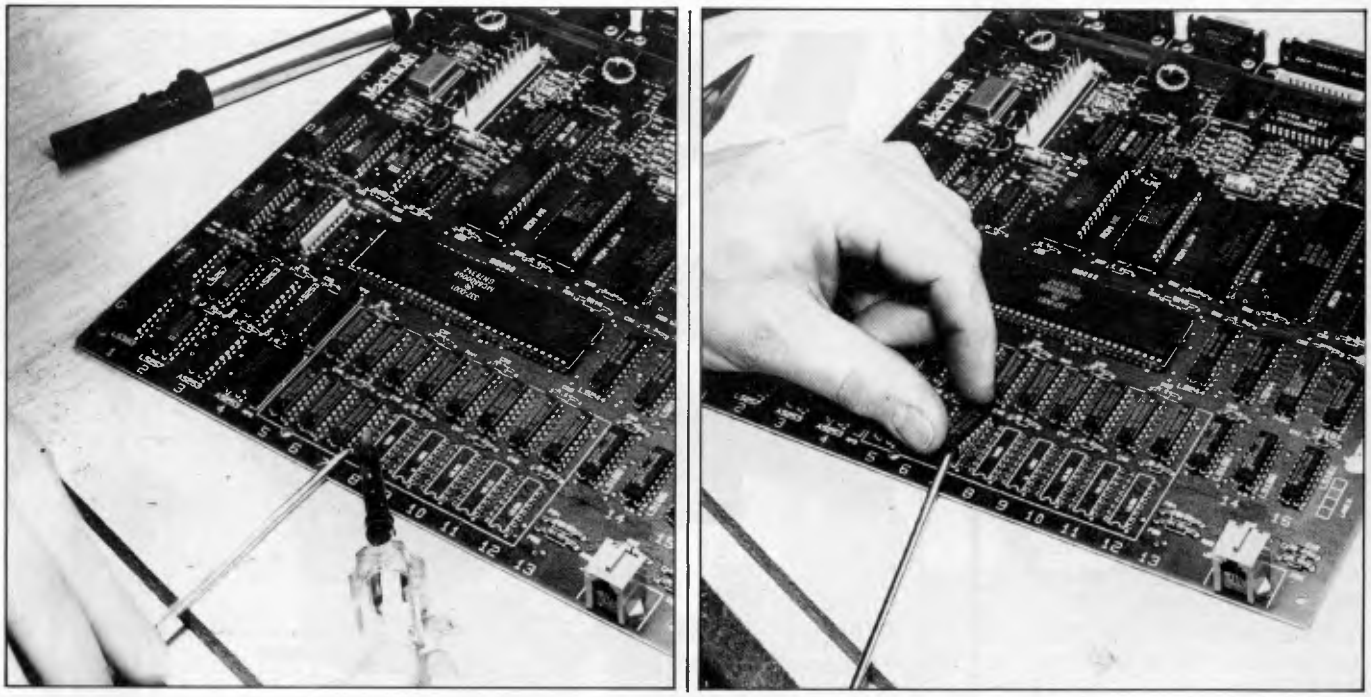

*Figs 10a & 10b Care should be taken when lifting the pads*

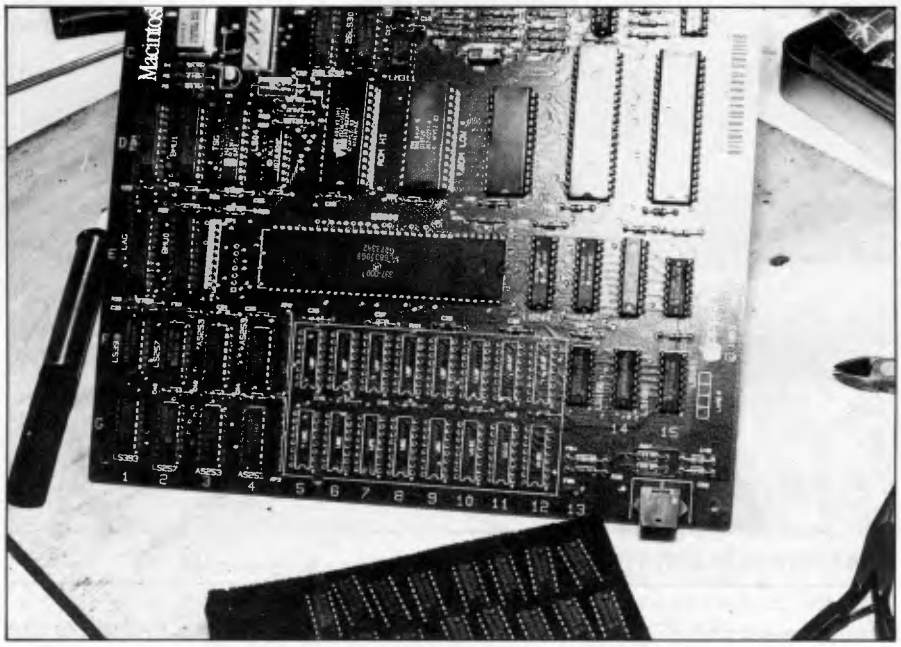

*Fig 11 The cleaned board ready for new RAM chips*

them. Make sure you don't take out anything else — you'll have enough of a job getting out the 16 correct ones. You can use several techniques to desolder these devices. If you're using a desolder gun you can try sucking the solder from the same side as the iron (Fig 7), or, holding the board vertically, you can heat one side and suck from the other (Fig 8). If you're not interested in the continued well-being of the 64k RAMs you're removing, then you can simply cut the legs off them and remove each pin separately. You should also clear the seven holes where your extra address decode circuit will go.

The Mac printed circuit board comprises four layers, with the two internal ones carrying +5 volts and ground. Consequently, there will be a significantly greater heat-sinking effect when you're trying to desolder the power pins of the memories (pins 8 and 16), so don't be surprised if this is the case and it's harder to melt the solder satisfactorily. Whatever happens, don't overheat the pads too much, and allow 'difficult' lands to occasionally cool down otherwise they will lift from the board.

9) Fig 9 shows the straightening of the IC pins under the board to ensure that they are not still soldered to the sides of the plated through-holes.

10) *Gently* work each old memory chip from the board. *Don't prise against the tracking which runs under the chips or you'll damage them:* lever against the edge of the board itself. Some holes may still require a little heat to loosen the remains of the solder, *but don't overdo it.* Don't forget, be careful when lifting the pads (Figs 10a and 10b).

11) This dismantling and desoldering should take no more than an hour if you're familiar with desoldering plated through-hole boards, but will take perhaps twice that if you're not. Either way, take your time. You're saving a lot of money, but you won't if you rush the job and damage the board.

12) At this stage, it's best to clean the board with a flux remover. Not only does it look nicer, but it will show up any damage you might have done which would have otherwise been covered up. Don't use any old solvent — you might take off the solder resist, the screen-printed component markings and dissolve a few connectors in the process. Fig 11 shows the cleaned board ready for the new RAM chips.

13) You can now insert and solder your extra address decode circuit into the row of seven holes on the left of the

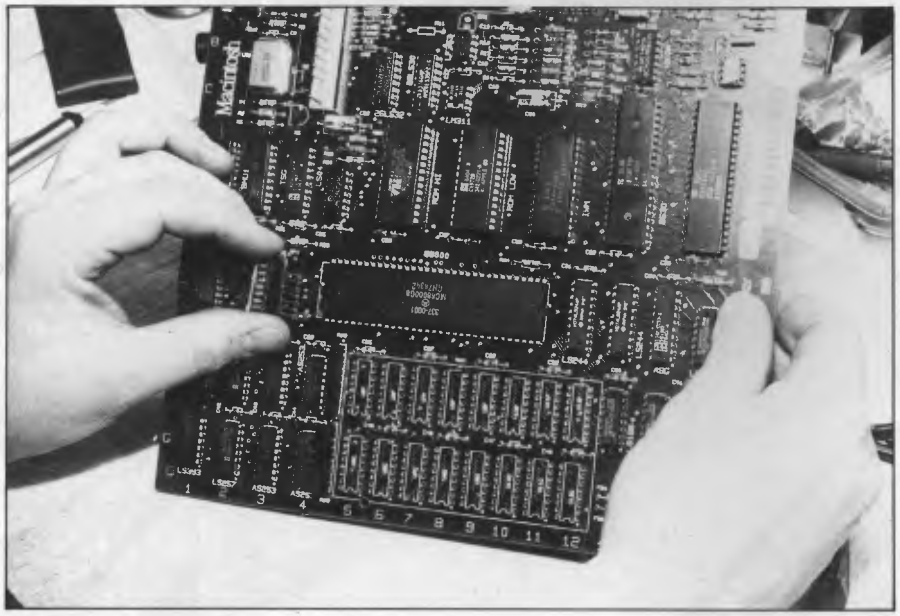

*Fig 12a Inserting the extra address decode circuit*

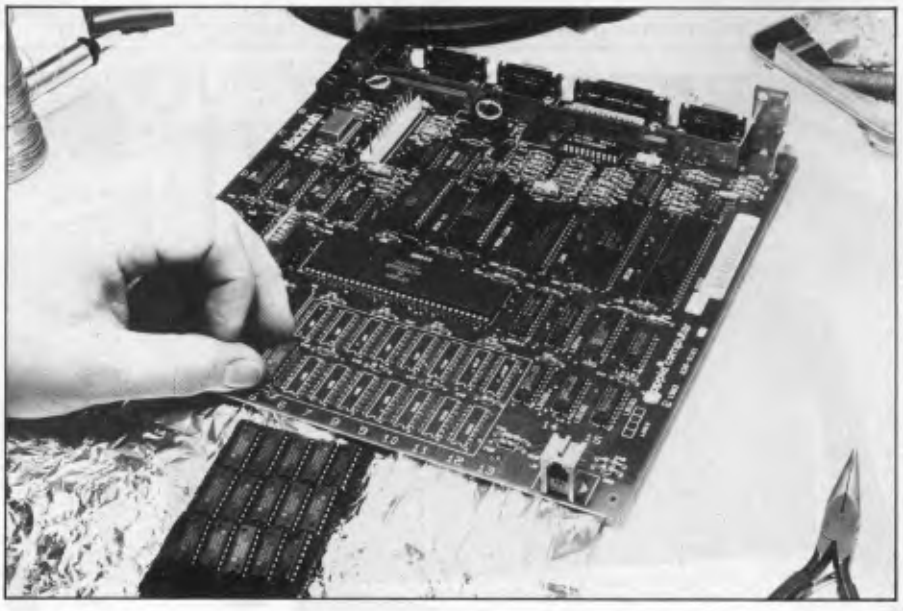

*Fig 12b Working with a sheet of aluminium foil as a base is ideal*

microprocessor chip (Fig 12a). Use wire links or pins to make the connection, and check the orientation of this circuit. Cut the track on the underside of the board between the +5 volts (square land) and the RAM A8 line next to it — *this is important.* A scalpel or sharp Stanley blade is suitable. Now insert the new RAM chips (don't put the old ones back in!) bearing in mind the usual precautions for dealing with MOS integrated circuits.

Working with the whole board, the packaging of the new chips and yourself resting on a sheet of aluminium foil is ideal (Fig 12b). Before picking up the iron, *make sure all the RAMs are the correct way around* — a mistake here can prove very expensive. Now solder in the whole lot, watching out for solder bridges between tracks in particular. Again, clean the board with a suitable flux remover and check for any obvious bridges or missing solder joints. Most importantly, make sure that no IC legs are folded under the chips instead of being inserted in the holes. Fig 13 shows a completed board.

14) When you're satisfied that all is well, you can reassemble the Mac by reversing the disassembly procedure. Take note of Fig 14, and ensure that the

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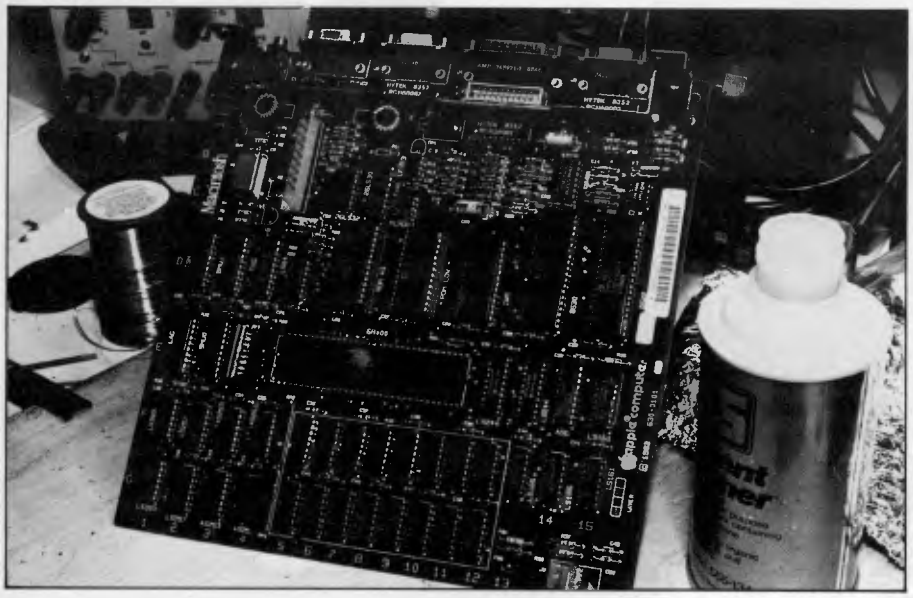

*Fig 13 A completed board*

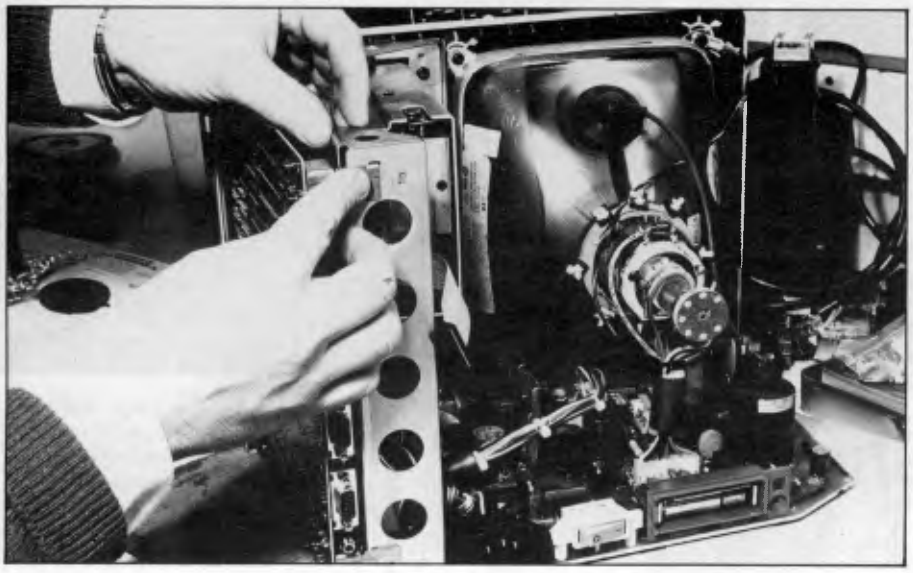

*Fig 14 Reassembling the Macintosh*

small tags on the back of the printed circuit board fit into the slots on the main frame. Now push back the disk drive and power connectors, making sure they are properly seated. Tilt the whole computer forward and drop the metallised foil screen over the rear connectors. Check whether the power supply and video board which sit vertically to the right (viewed from the rear) are seated in the slots down the front of the casing. You should now be able to slide on the back of the case. Make sure no wires are snagging and, above all, don't force anything. The five Allen screws can now be replaced along with the battery, its cover and the reset switch which simply pushes back into position.

15) Plug everything back in — mouse, keyboard, and so on — and switch on. If there's no smoke, breathe your first sigh of relief. Fat-Mac should now be asking for a disk. Put one in and shortly after, your new, enlarged Mac should be smiling its usual smile and pinging its usual ping. Another sigh of relief. Now check if *all* memory is working; use a program that you know uses up a lot of memory. For example, if you have MacWrite, load some text and copy it continually to see how soon the computer fills up. Originally, this should have occurred after only seven or so A4 pages; now it should allow you to go much further. If it does, go out and celebrate with some of the money you've saved. If it doesn't, it means that the microprocessor is not 'seeing' all the extra RAM. Firstly, check your additional circuit; and did you cut the track between +5 volts and RAM A8 properly? If there's no response whatsoever from your Mac, you will have to check things a little more closely. Look especially at the soldering to the RAMs and their orientation.

## The finished product

Don't be put off by some of the more dramatic warnings in this article. With patience the whole job should not take more than a couple of hours, and with care should not unduly threaten the health of your Macintosh. Apple and its dealers, however, will more than likely say that the job is too risky — but then they would, wouldn't they? After doing three upgrades without problems I'm convinced that it isn't too risky, although I have to add that *APC* cannot accept responsibility for any damage caused by following this advice.

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| **Tube:** | Black Matrix |
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| **V. Scan Frequency:** | 60Hz |
| **Signal Type:** | RGB I: TTL Level Positive<br>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)<br>266(H) x 367(W) x 318(D)mm |
| **Shipping Weight:** | 15.9kg |

Model HR31 200

Models HR 39 & HR 134

**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<br>Sync. H - TTL Level Positive<br>Sync. V - TTL Level Negative |
| **Video Response:** | 20MHz |
| **Display Size (H x V):** | 203mm x 135mm |
| **Display Time (H x V):** | 44Ms x 18.99msec |
| **Resolution:** | Centre 1,000 lines<br>Corner 800 lines |
| **Display Formats:** | 9 x 14 matrix, 2000 characters in 80 x 25 format |
| **Input Terminals:** | 9 pin "D" type connector |
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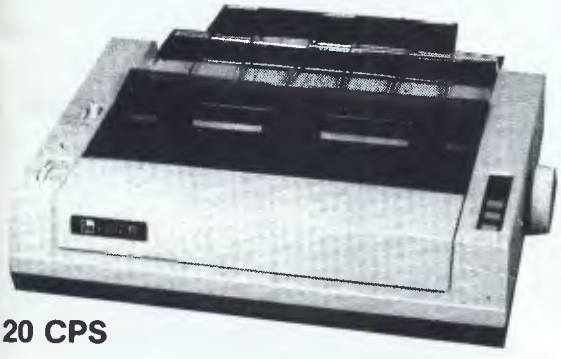

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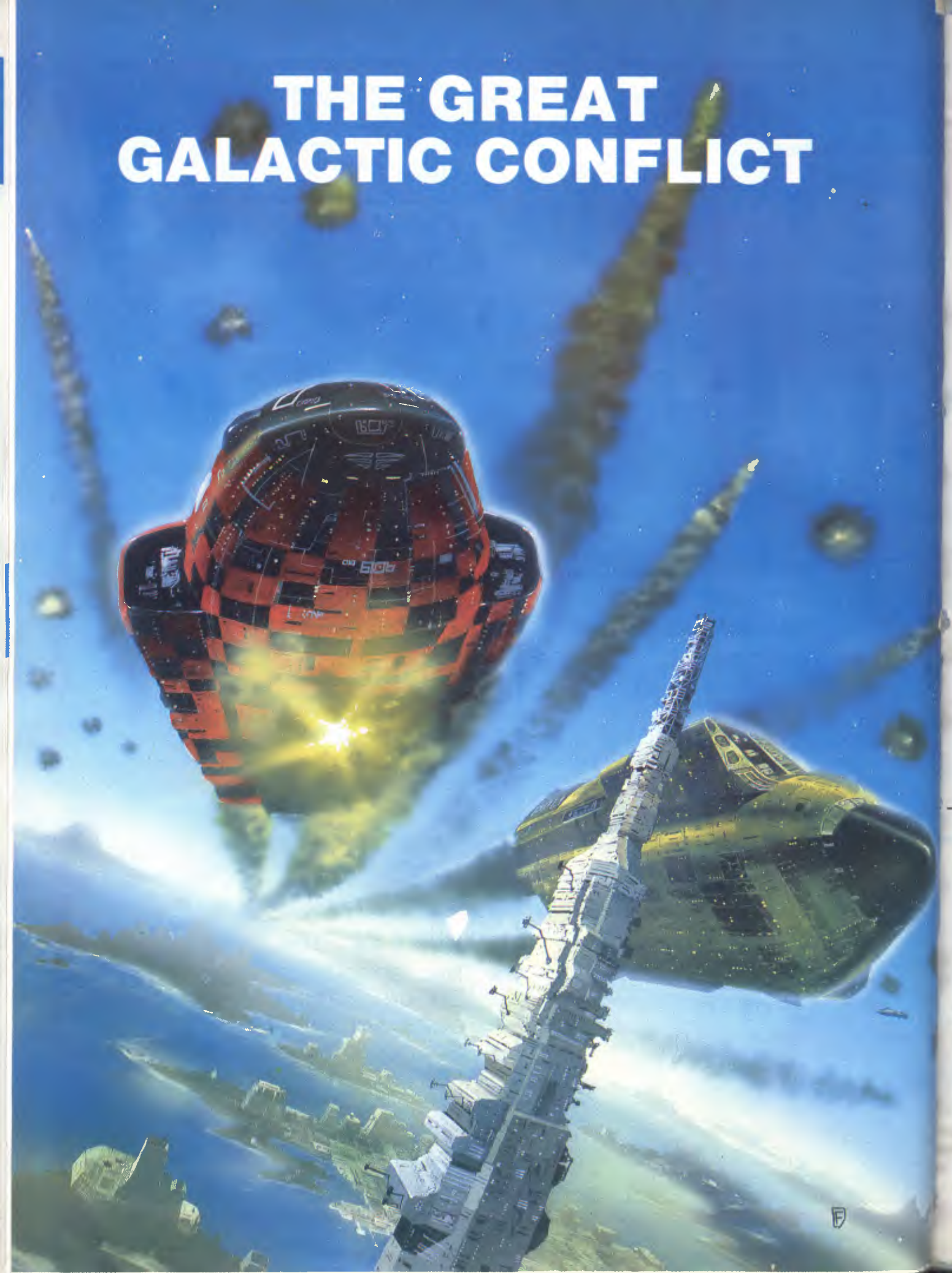

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```
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Line.............  :5  :
Text.............  :*  GENERAL LEDGER MAIN MENU  *      :

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Response number    :1  :
Line.............  :7  :
Column...........  :25:
Text.............  :1. Print financial reports        :
```

*An example of screen display on dMENU program*

## Conclusion

There is little more to be said about this package, as much of its usefulness is in the doing. Not being a professional dBASE programmer myself, I decided to show the package to some colleagues to hear their views. One was absolutely ecstatic, while the other said he would never use it. Not entirely sure who to believe I can only say that I found it a great help. Had it been around sooner it may or rather would have saved me many headaches with rescuing files to begin with, not to mention creating hasty menus.

dTOOLKIT is an essential extension of dBASE, and as it is well documented on the disk itself, does not require any great amount of reading to use. My version was running on PC-DOS, and is also available on MS-DOS, CP/M-86 and CP/M-80 formats.

*dTOOLKIT costs $99 and is available from The Computer Trader, 3 Bowen Crescent, Melbourne, Victoria 3004. Telephone (03) 266 1995.*

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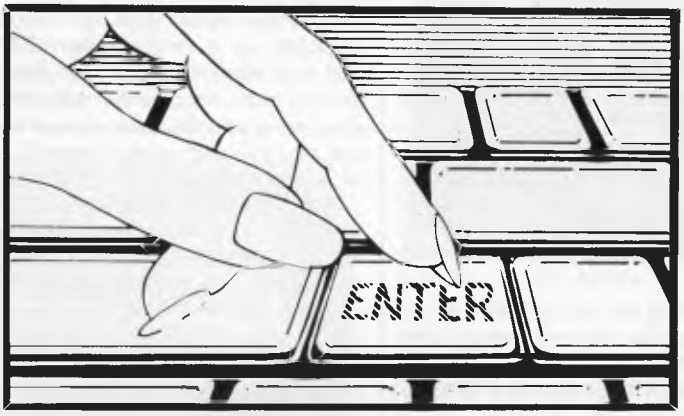


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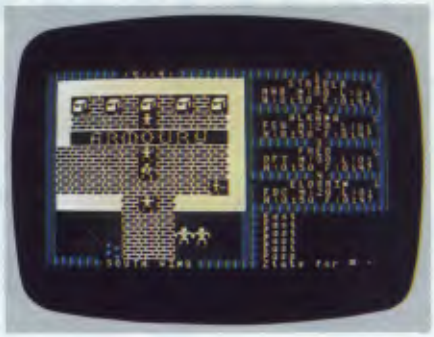
**Twice is not enough — the third episode in the Ultima story kicks off this month's selection of the best games around for the Commodore 64, Atari and Spectrum. Stephen Applebaum is your intrepid fall-guy.**



## For a little peace . . .

### GAME: Ultima III: Exodus
### MACHINE: Commodore 64, Atari

Traveller, beware — something stirs in the land of Sosaria. The hard-earned peace, fought for many moons ago, has been shattered by a devouring evil. Once more the sound of Orc drums, banished from Sosaria with the fall of Mondain and Manax, has pierced the calm air, striking terror into the hearts of the happy and prosperous subjects of Lord British.

Little is known about the new protagonist, the only clues are the babblings of a fright-stricken old man, an incomplete cloth map and the word 'Exodus', scrawled in blood on the deck of a wrecked ship. As *you* are the chosen one, it is up to you to make sense of these cryptic clues and banish the evil from Sosaria forever.

The quest starts with the player defining a number of characters who will fight for Lord British. Up to 20 individuals can be selected from the five races that inhabit Sosaria: Human, Elf, Dwarf, Bobbit and Fuzzy.

When all the characters have been chosen, they can be divided up into groups of four. These 'parties' are far more reliable than a single, loner character as all the members are able to rely on each other, making them collectively stronger in battle.

The land of Sosaria is vast and contains many towns (usually the first stop-off point) where armour, weapons, food and other provisions can be bought, and snippets of information gained from some of the inhabitants. As well as the mostly friendly towns, a party is likely to stumble across one of the many dungeons dotted over the land.

For the most part a dungeon is depicted as a now-familiar 3D maze. Although they are dangerous places, and hold death for unwary travellers, the dungeons are often a source of help and players will have to visit them if they are to complete Ultima III.

The greatest problem facing the explorer are the other nasties that inhabit the land. Most of these will engage you in combat, so you have to make sure that all your characters are armed with either weapons or magic.

A battle is depicted by a special combat screen, showing both the player's party and their assailants. Skirmishes often involve hand-to-hand combat as well as spells being thrown back and forth.

If you see that one of your characters is going to die, it is best to restore the game and go back to your last saved position. Although this sounds drastic, it is a good idea because when a character is killed, the program wipes it from the playing disk completely, making you one man short. The only way to return the group to full strength is to start the game from scratch.

Unfortunately, I can't describe the whole of Ultima III as it's such a complex adventure. I hope, however, that this small taster has been enough to whet your appetite for more.

## The witching hour

### GAME: Cauldron
### MACHINE: Commodore 64
### SUPPLIER: Melbourne House
### PRICE: $19.95

'Hubble, bubble, toil and trouble . . . no, this isn't Shakespeare Corner, but rather a way of introducing Cauldron, an

impressive new game from Melbourne House.

Cauldron begins outside a pleasant little cottage situated in an idyllic forest. Everything would be perfect if it were not for the bats, ominously flapping about above the trees, and the appearance of a witch at the cottage's front door. With the aid of a joystick the witch can be made to take flight on her broomstick and, darting through the night sky, embark on a quest to become the Halloween witch-queen.

The only way our friendly hag can become queen is by gathering up six ingredients which, when mixed together in her cauldron, will defeat the reigning Pumpkin king. Unfortunately, all the bits and pieces needed to complete the spell are scattered throughout several underground caverns, all the entrances to which are locked. Luckily, the keys to open the doors have been dropped and are lying around, ready to be plucked by the nearest passing witch.

Unless you are a dab hand with a joystick, you will find Cauldron very difficult to master.

Below ground there are just as many hazards. To get to an ingredient our heroine must bounce from rock ledge to rock ledge, avoiding various flying objects which threaten to put an end to her dreams of holding a ghoulish court.

Cauldron is one of the few games which is graphically on a par with some of the better software produced in the States. The witch looks impressive, zooming across a moonlit sky, while the house, complete with thatched roof and smoke wafting from its chimney, is a real joy to look at.

## Time out

**GAME: World Series Baseball**
**MACHINE: Commodore 64, Spectrum**
**SUPPLIER: ISD**
**PRICE: $29.95 cassette**

If you are tired of playing American Football and Mr Wimpey leaves a bad taste in your mouth, take a look at World Series Baseball, a 'new' Imagine game based on a butch version of rounders.

WSB is for one or two players and should excite even the most weary games player. The playing area is displayed as a view overlooking a massive sports stadium dominated by a large video screen. A game starts with each team running onto the field and taking up their positions, either batting or fielding.

The player taking the part of the pitcher (bowler) can pitch a ball in one of eight ways, depending on the direction of the joystick. For instance, pushing the stick forward and pressing the fire button releases a 'high ball', while the opposite produces a low ball.

Once a player on the opposing team has decided to make a run, the fielder can try to get him out by throwing the ball to one of his team-mates who then touches the appropriate base with the ball. Of course, a player can also be caught out.

Batting is rather more difficult than fielding. When a ball is bowled to your man, the giant video screen shows an enlarged side-on view of the ball flying towards the batter. Even with this feature I still found myself either swinging the bat too early or too late, and generally missing the ball.

A nice feature is the 'crowd pleaser' sequence where a line of cheer leaders, pom-poms and all, runs onto the pitch sporting the colours of the home team. After a swift jig they run off to be followed by the two teams.

World Series Baseball is a game which should keep most people happy. I was disappointed with the unimaginative sound effects, but on the whole they were compensated for by the unusual display.

## Musical construction

**GAME: Rock 'n' Bolt**
**MACHINE: Commodore 64**
**SUPPLIER: Imagineering**
**PRICE: $29.95**

Rock 'n' Bolt is a complex puzzle based around a building site. As Louie, a construction man, you have to face the challenge of erecting a 100-storey building. The only way to complete the job in quick time and so collect a nice fat cheque at the end, is to rush around with your blueprints, bolting the monolith together, girder by girder.

A practice mode has been included to allow you to take as long as you like. Harder levels have set time limits in which to complete a floor; any longer and Louie goes through a strange process of disintegration.

While fixing the girders together Louie can pick up a wage bonus by landing on gold bolts, or even gain an extra life by touching a green bolt.

Rock 'n' Bolt is a deceptively simple game on the surface. In play the story is very different, and it doesn't take long before you're sweating with the frustration of not being able to return to the lift to reach the next floor. If frustration leads you to give up Rock 'n' Bolt, just sit back and listen to the great music. It'll soon fire your enthusiasm.

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# Adventures in text compression

**RAM limit is constantly a restriction on applications that store substantial text in memory — but there are solutions. Here, Peter Finch explores the attraction of text compression.**

Why does the world use eight bits to store each character? History, in particular IBM's choice of an 8-bit byte more than 20 years ago, has led to an industry standard. (Some mainframe and mini manufacturers, for example Control Data and DEC, still use 6-bit characters, but these only provide 64 possibilities and thus exclude lowercase letters.) In the micro world the ASCII (American Standard Code for Information Interchange) character set with its 95 printed characters is the standard, but eight bits provides 256 potential variants, 161 of which ASCII does not use.

Hence the attraction of text compression. The trouble with most methods though, is that they are usually sophisticated algorithms requiring, for instance, large memories, disk-based dictionaries, or considerable processing power. For adventure games, or applications that store substantial text in memory (for example, word processors), users of home micros such as the Commodore 64 need something simpler. Firstly, they need more text for their RAM, so providing good compression with a small overhead for the storage of the program and any associated workspace and data. And secondly, they need fast unpacking of the compressed text. Fast packing is also advantageous, but text tends to be looked at more often than it is updated. This is certainly true for adventures.

## Program objectives

After some thought and experimentation with character-counting programs, I came up with the following requirements for the text compressing programs in this article.

1 Full ASCII 95-character set.

2 Newline, ASCII code 13. (Some machines use a code for carriage return followed by a newline code.) Without newline, the text would have to have an implicit line length and short lines would have to be extended on the right up to this length, thus wasting those bytes we are trying to save. ASCII characters and newlines (and no others) are assumed to be the only contents of the file.

3 End-of-text (EOT) marker. Although not essential, such a marker is extremely useful in any text manipulation. It is much easier to have a pointer to text to be printed rather than having both pointer and length.

4 Permit some redundant codes so that readers can add their own codes: for example, maths characters or colour control characters.

5 Programs should be written in Basic, which is compact and allows readers to modify the program to their own needs and writing style.

6 Minimum code and table overheads, especially for the unpacking program.

7 A goal for text compression of 2/3: that is, for 20k RAM, you can store 30k characters of text.

I excluded dictionary-based systems because of their need for lots of memory either in RAM or on disks. Next I investigated Huffman codes (see the article 'An introduction to Data Compression' by Harold Corbin, *Byte*, April 1981), a compression technique using a variable number of bits per character. But the programming overhead is significant since you have to program with bitstreams, which means that the decoding program has to examine the input file bit by bit to decide whether or not it has looked at enough to decode a character.

Then an article by J Pike (*Journal of the BCS*, vol 24 p324) prompted me to look at 4:8-bit representation of characters. The 4:8 approach allows you to program using ½bytes, which is easy and quick. A statistical analysis of other articles showed that the goal of ⅔ compression was obtainable.

## The approach

My basic approach was to use four bits to represent blank (or space) and the nine most frequently-used characters (in my case, 'aeiorstln', which, with blank, make up 70 per cent of my text). All the other characters, plus newline and EOT, stay at eight bits.

Fig 1 shows how to interpret a 4:8-bit compressed code stream. For codes 0 to 9, the character is as given. Codes 10 to 15 give one of six subtables, each giving a range of 16 ASCII characters. The following four bits state which value in the subtable to use, and newline and EOT are mapped onto codes 32 and 127.

I came up with two programs, Pack and Unpack, in two different versions to match different applications. The file-oriented versions, printed here, are suitable for large amounts of text. The other versions, intended for text in RAM such as in most adventure games, are simpler — just remove the references to the files.

Typically, for the Pack program, input will still be from a file but the compressed text will be stored in RAM. For the Unpack program, input will come from an array in memory. Output will be to the screen with a PRINT.

The Pack program, shown in Fig 2, takes a standard text file from disk in

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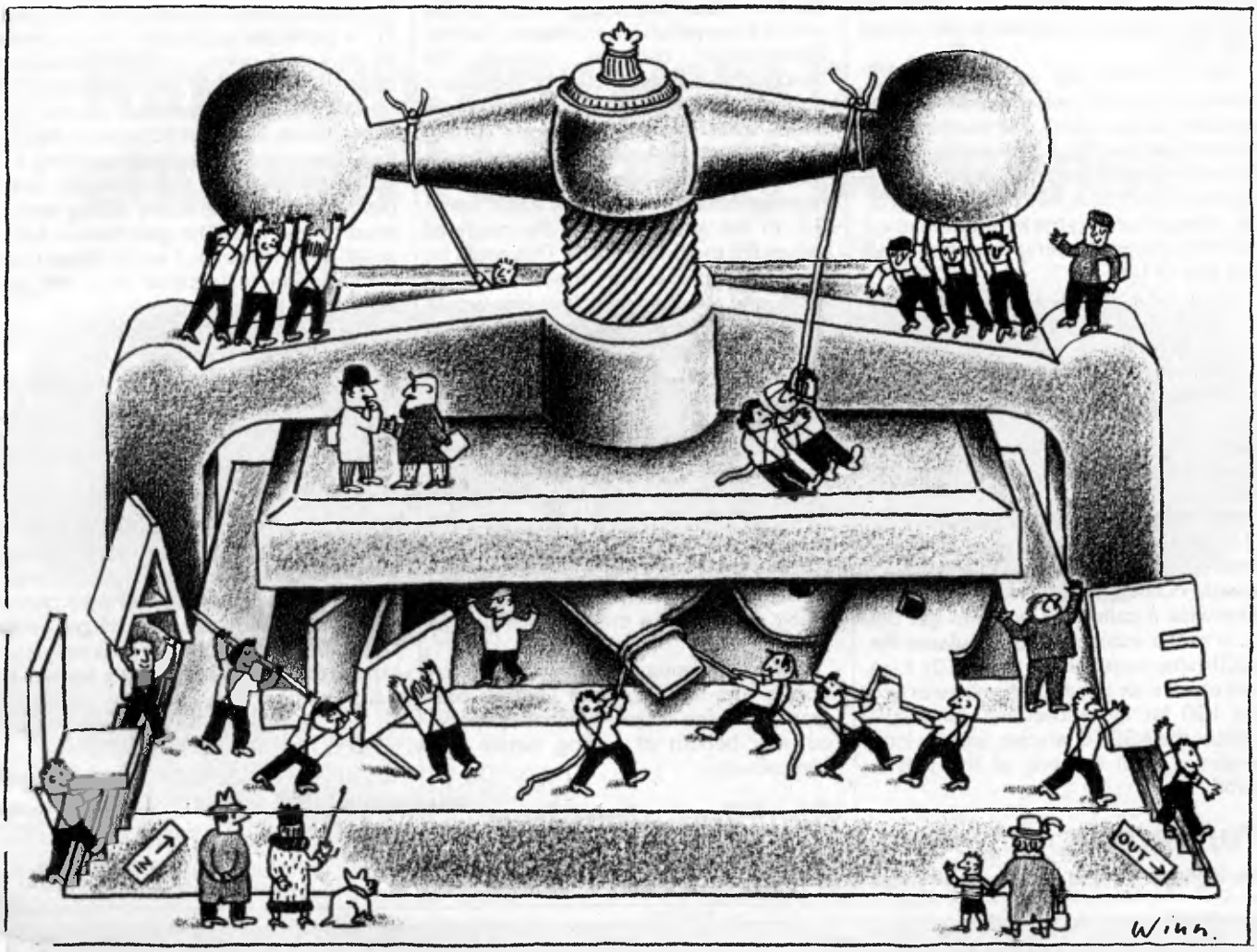


ASCII format and compresses it to another disk file.

It uses the following variables: AV%(126-97), a vector containing an integer value for ASCII characters from 97-126. This allows a rapid check of these characters (mainly the lowercase letters) to see which have a four-bit code: A non-zero value gives this code; C%, the byte from the input file; A%, the code from AV% if the character C% is in the range 97-126; IC% and OC%, counters of input and output bytes; OB%, a byte-sized buffer to prepare a byte for output; OBE, a Boolean flag, true if output byte buffer OB% is empty; T$, name of file; CR%, contains the subtable index, and CL%, contains the subtable number.

Looking at Fig 2 in more detail, lines 260-290 initialise the scalar variables, 310-380 set the values in vector AV%, and 390-450 open the input and output files after requesting their names.

The two procedures PROCOUT4 and PROCOUT8 output a 4-bit character or 8-bit character respectively. The first will only write a byte to the output file if the output buffer is already half-full, PROCOUT8 always outputs a byte, but if the buffer were half-full on entry, it will be on exit.

Each time around the main loop (lines 480-590), the program reads in a byte and checks to see if it is one of the nine letters or a blank that can be compressed to four bits. If so, PROCOUT4 is called. Otherwise, if the character is legal (a newline ASCUU 13 or in range 32-126), PROCOUT8 is called. This loop terminates when the end-of-text in the input file is reached, when the special end-of-text code of 127 is written to the output file.

The Unpack program is shown in Fig 3. Since it is intended to be short, it is written in a compact style with short names and only REMs at the start of the

| 4 bit code | Immediate character | ASCII char in range |
|---|---|---|
| 0 | Blank | |
| 1 | a | |
| 2 | e | |
| 3 | i | |
| 4 | o | |
| 5 | r | |
| 6 | s | |
| 7 | t | |
| 8 | l | |
| 9 | n | |
| 10 | | 32- 47 |
| 11 | | 48- 63 |
| 12 | | 64- 79 |
| 13 | | 80- 95 |
| 14 | | 96-111 |
| 15 | | 112-127 |

*Fig 1 Interpreting a 4:8-bit compression code stream*

listing, so that these can easily be deleted. Without the REMs, it uses about 270 bytes.

The variables are as follows: A%, Boolean flag saying whether four bits are available for decoding, or if another byte must be read in; E%, Boolean flag — true if at end of input text; I%, integer holding the current four bits being decoded; C%, integer holding the byte just read in; and R%, integer holding the right-hand four bits of C%.

Lines 100 to 130 initialise Boolean variables, and open the input and output files.

The function FNB returns the next four bits to be decoded. Each second time that it is called it reads in a character, under the control of the variable A% which is flip-flopping between true and false (line 250).

Each time around, the main loop (140-210) makes a call to FNB (line 159) and if this value is less than or equal to nine, it directly outputs the relevant character. Otherwise it calls FNB again to get the value in the subtable and calculates the ASCII value to be output (line 170). Line 180 checks for the end-of-text code and line 190 for the end-of-line. Line 200 outputs the ASCII character, and the loop continues until the end of the text is found.

## Repeated characters

The algorithm in Fig 1 reduces all these blanks to four bits, except those on the end of a line which are truncated. Further compression can be achieved by introducing a special code to represent multiple consecutive blanks. Some spare codes exist. Those 8-bit codes corresponding to the 4-bit letters are not used: for example, the letter 'a' has the 4-bit representation 1, hence its ASCII value 97, in the subtable with the range of values 96 to 111, is spare. This could be used to represent a 'repeated blank' code, and the following four bits would be a count of how many blanks had been compressed; thus 12 bits (four for subtable + four for position in subtable + four for blank count) could replace 16 blanks, or even more depending on the compression rule used. The Pack program would now have to count the blanks and if there were more than three, then this repeated blank character would be used. Similarly, any repeated character can be copied but an extra byte would be needed to state which character was being repeated, so the effective gain is lower.

The disadvantage of this sophistication is that the Pack and Unpack programs become longer, which may cancel out the benefit of having better text compression.

## Simlified alphabets

One way to get an improvement in text compression without complicated coding is to cut down the character set used. For a particular application, for example an adventure game, it may be sufficient to use a 76-character set, made up of 26 upper-and 26 lower-case letters, 10 digits, blank, EOT, and 12 special characters. Then only four subtables, giving 4 x 16 = 64 characters are needed, with blank and 11 characters being shortened to four bits. The gain here is fairly small. With my texts, I would expect my compression to improve from 66 per cent to 63.5 per cent.

The Sphinx adventure from Acornsoft begins with the following text:

'You are on the top of a mountain. In the distance a small building can be seen. All around you is dense forest. A road leads north. There are exits to the north, south, east and west.'

The Pack program reduces this text from 183 to 117 bytes. Admittedly this is a simple text without many special characters or capital letters, but it is typical adventure game text and does give a compression of better than 64 per cent. The RAM version of the Unpack program expands and prints this to the screen in 1.6 seconds.

END

```
10 REM Program              Pack
20 REM Author               P.M.Finch
30 REM Version 1.5          July 1984
40 REM PROGRAM SUBJECT TO COPYRIGHT
50 REM
60 REM Object of program : Text Compression
70 REM
80 REM Coding rules
90 REM 1st 4 Bits:
100 REM 0..9: Space and 9 Common Characters (aeiorstln)
110 REM 2nd 4 Bits:
120 REM 10..15: 6 sub tables (6*16=96 character codes)
130 REM
140 REM order   0   1   2   3   4   5
150 REM code   10  11  12  13  14  15
160 REM hex     A   B   C   D   E   F
170 REM from   32  48  64  80  96 112
180 REM  ..     .   .   .   .   .   .
190 REM to     47  63  79  95 111 127
200 REM
210 REM SubTable is Given by (Char-32) DIV 16
220 REM Code is this + 10
230 REM N.B. 32 is used for newline and 127 for end of text
```

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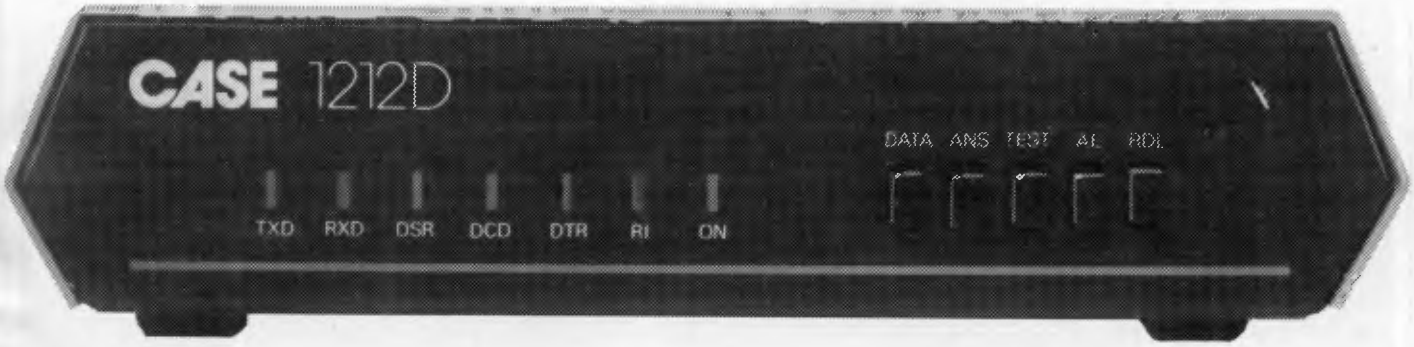


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```
240 REM
250 REM Initialisation
260 IC%=0                    ' Input Counter
270 OC%=0                    ' Output Counter
280 OB%=0                    ' Output byte buffer
290 OBE%=1                   ' One (true) if output buffer is empty
300 DIM AV%(126-97)
310 FOR I%=97 TO 122
320   READ C$
330   IF C$<>"" THEN AV%(I%-97)=VAL(C$)
340   NEXT I%
350 REM This DATA statement permits flexible redefinition'
360 REM of the set of 4 bit characters
370 REM  a bcde fghi jkl mn o pqr s t uvwxyz
380 DATA 1,,,,2,,,,3,,,8,,9,4,,,5,6,7,,,,,,,0
390 REM  Open files
400 INPUT "Name of input text (Default.is A.TXT)",T$
410 IF T$="" THEN T$="a.txt"
420 OPEN T$ FOR INPUT AS 1
430 INPUT "Name of output text (Default is P.TXT)",T$
440 IF T$="" THEN T$="p.txt"
450 OPEN T$ FOR OUTPUT AS 2
460 '
470 REM main loop
480 '
490 C$=INPUT$(1,1)
500 IF EOF(1) THEN GOTO 590
505 C%=ASC(C$)
510 IC%=IC%+1
520 IF C%<33 THEN 570
530 IF C%<97 THEN GOSUB 790 : GOTO 590
540 A%=AV%(C%-97)
550 IF A%=0 THEN GOSUB 790 ELSE GOSUB 690
560 GOTO 590
570 IF C%=32 THEN A%=0: GOSUB 690: GOTO 590
580 IF C%=13 THEN C%=32:GOSUB 790 ELSE PRINT "Ignore input Char ";C%
590 IF NOT EOF(1) THEN GOTO 480
600 REM   End of Text - Finish off
610 C%=127
620 GOSUB 790
630 CLOSE
640 PRINT "Input and Output Counters";IC%;OC%
650 PRINT "Compression is ";OC% / IC%*100; "%"
660 END
670 '
680 REM This procedure called to output a 4 bit character
690 REM Known as PROCOUT4
700 IF OBE% THEN OB%=A%*16 : OBE%=0 : RETURN
710 REM full byte ready to be sent
720 OB%=OB% + A%
730 PRINT#2,CHR$(OB%);
740 OBE%=1
750 OC%=OC%+1
760 RETURN
```

I N T E R - O F F I C E M E M O

Attention J.F. Fitzgerald,
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Here is an extract of the report as discuss

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*see reference 2 page 352.*

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| T 3. | | | | 0 | 21 | 19 | 31 | | | | 20 | 22 |
| H 4 | | | | 5 | 22 | 16 | 25 | | 37 | | 25 | 21 |
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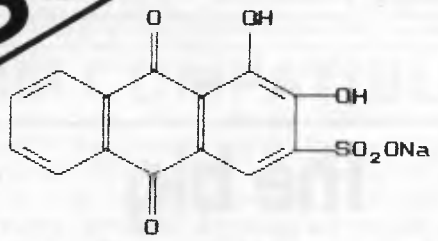


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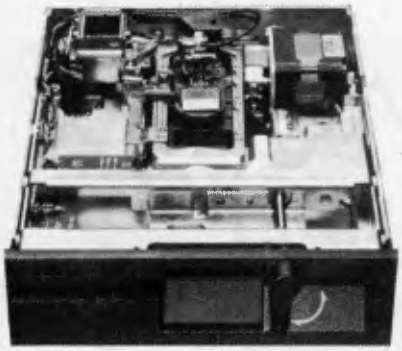

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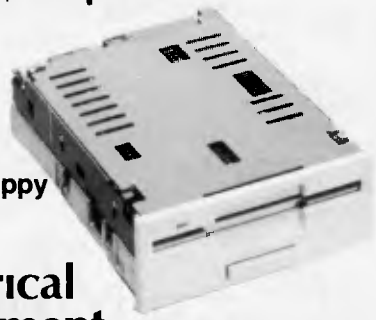

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```
770 '
780 REM This procedure is called to output a 8 bit character
790 REM Known as PROCOUT8
800 OC%=OC%+1
810 REM Set C% left and c% right
820 CL%= (C% ¥ 16) + 8
830 CR%= C% AND 15
840 IF OBE THEN PRINT#2,CHR$(CL%*16+CR%); : RETURN
850 REM output buffer is half full
860 OB%=OB% + CL%
870 PRINT#2,CHR$(OB%);
880 OB%=CR%*16
890 REM flush buffer if eot
900 IF C%=127 THEN PRINT#2,CHR$(OB%);
910 RETURN
```

```
10 REM Program              UnPack
20 REM Author               P.M.Finch
30 REM Version 1.5          July 1984
40 REM PROGRAM SUBJECT TO COPYRIGHT
50 REM
60 REM Object of program : Expansion of Compressed text
70 REM
100 A%=1
110 OPEN "p.txt" FOR INPUT AS 1
120 OPEN "e.txt" FOR OUTPUT AS 2
130 T%=0
140 ' Top of Loop
150   GOSUB 240 : I%=B%
160   IF I%<=9 THEN PRINT#2,ASC(MID$(" aeiorstln",I%+1,1));: GOTO 210
170   GOSUB 240 : O%=(I%-8)*16+B%
180   IF O%>126 THEN E%=1 : GOTO 210
190   IF O%=32 THEN O%=13
200   PRINT#2,CHR$(O%);
210   IF E%<>1 THEN GOTO 140
220 CLOSE
230 END
240 ' Function named FNB
250 IF A%=1 THEN A%=0 ELSE A%=1
260 IF A% THEN B%=R% ELSE C%=ASC(INPUT$(1,1)): R%=C% AND 15:B%=C% ¥ 16
270 RETURN
```

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| C/80 | 63 | 140 | 3584 |
| Aztec | 78 | 144 | 9168 |

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|---|---|
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| MS-DOS 2.xx | $300.00 |
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| Manual only | $ 25.00 |
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| Compiler | Execution Time | Compilation Time | Program Size |
|---|---|---|---|
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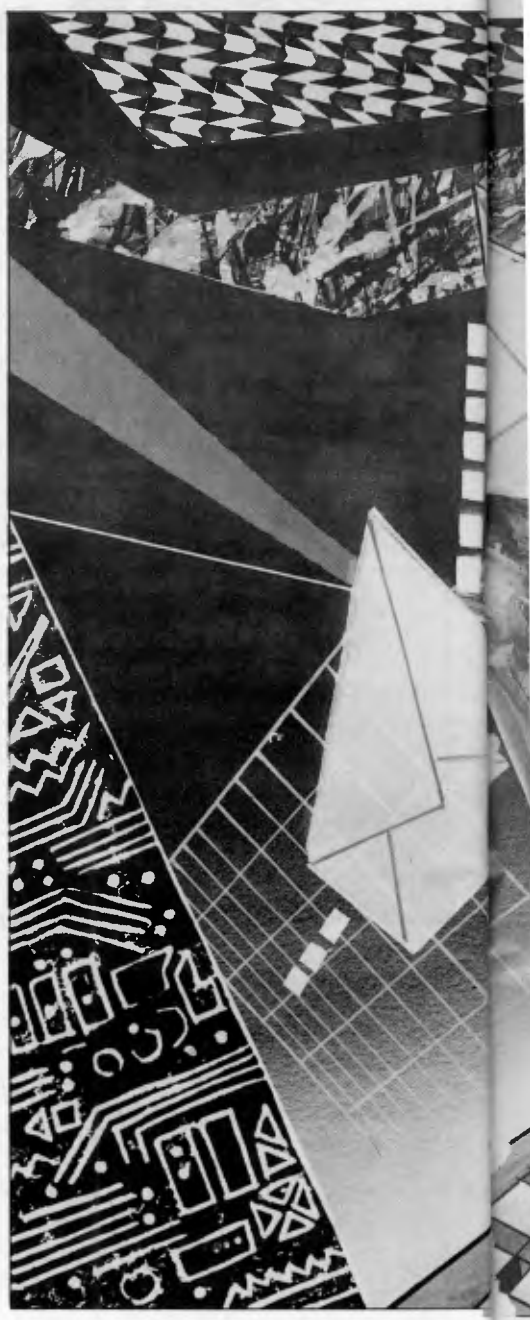
# Return to sender

**A mystique prevails over the exact workings of an electronic mailbox. Peter Vekinis presents his own mail database program which thoroughly illustrates the procedures involved.**



The proliferation of personal computers in homes and offices over the last few years is the direct consequence of the never-ending search for increased productivity and improved communication by people around the world.

Although many facilities exist today that help the user type a letter, calculate a cheque or obtain a list of groceries, few possibilities exist to enhance communications needs. Mail has been the basic means of communication of millions for more than a century. The tie-in of mail and the personal computer would seem a natural evolution, but alas that is not the case.

Electronic mail companies do exist today; their service is a highly needed one and, in most cases, efficient. However, for most users electronic mail is something that resembles a mailbox. User A sends a letter to user B who, upon looking at his 'electronic' mailbox, reads the contents of the letter. Users do not know what actually takes place and how the letter goes from one place to another in the mailbox. All they have to do is dial a number, connect the personal computer to a remote computer system and send the letter after signing on. It seems that some kind of mystique prevails over the operation.

The program in Fig 3 illustrates in a pedagogigal way how an electronic mail program works. Although the program is mainly intended for illustrative purposes it can be used for on-site mail, and is designed in a way that permits easy expansion.

```
Operation Menu

1 = Send Message
2 = Get Message
3 = List Users
4 = Exit
5 = System Setup
6 = Display Data Base

Enter Action?
```

*Fig 1 The operation menu*

## In use

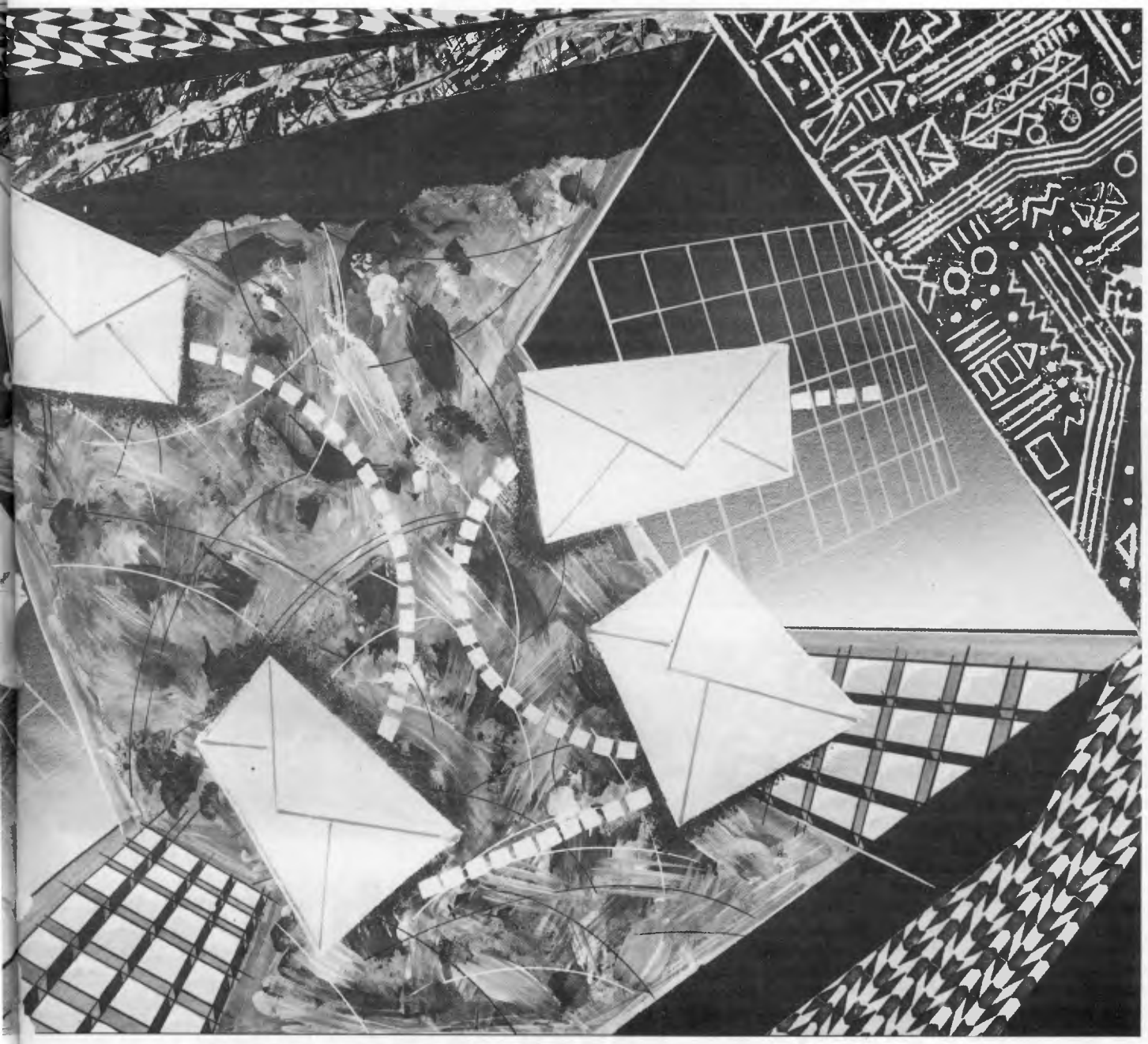
Type the program into an appropriate computer (an IBM PC is ideal). When the program starts it asks for the date, and a menu appears from which the user is asked to select a function. The menu accepts various entries, each corresponding to a unique action as shown in Fig 1. Since this is the first time the program is run, press the '5' key, followed by the Enter (RETURN) key. This takes you to the system set-up code which will set up the required files used by the program.

Enter the password 'peter' as in Fig 3, or the password you have chosen, and the program will ask you for the number of sectors which indicates the maximum number of lines (each up to 80 characters long) the mail database can contain at any time. Type 100 and press RETURN. Then type in the name that you would like to call the mail database, and the system file will be initialised as shown by an appropriate message on the screen.

The program will then initialise the actual mail data file in a specific way called the 'sector availability sequence' (SAS), as well as keeping you informed of the sector being initialised.

The user list or directory is set up next, which requires you to enter the mail system users' names. You can enter a name up to 30 characters long, although only the first four are significant. When the names are entered, enter the name 'END' which signifies the end of the user list; a maximum of 20 names may be entered. The program has now finished the initialisation of the required files and you are taken back to the main menu.

To send a message, press the '1' key followed by RETURN and the program will ask you for the name of the message which may have up to 30 characters of



text. The screen will be cleared and the program will wait for your message entry. The message is normally composed of lines which are terminated by the RETURN key, as on a typewriter. When the message is finished, the sequence "[@@@]" must be typed, which tells the program that the message entry is finished.

The user name must then be entered, which is a name that corresponds to one of the names entered in the user directory. At this point the program will return to the main menu and wait for another command.

To see the message on the user list, press the '3' key followed by RETURN and the user list will be shown. You will notice that the 'Cnt=' field of the line displaying the user's name selected shows the number '1', which means that one message is actually tagged to that user. Also, the 'Total cnt=' entry also has '1' as this is the first message.

To read the message, press '2' after returning to the main menu: this takes you to the program part that reads messages for each user. Assuming that you are the target user, enter the user name used as the target name in the send operation, and the system will try to find the message. If you have entered the correct name, the system will ask you whether you want the message printed on a printer, at which point reply 'n' followed by RETURN. The last line on the screen (that is, the 25th line) will show the message name, while the message will be shown on screen. If the message exceeds 18 lines, the RETURN key must be pressed to continue the display. When the process is finished, the system will ask you whether you would like to accept the message or not. If you enter 'Y' the system will update the files, so for all practical purposes the message has been deleted (in reality it has not, as will be shown). Subsequent display of the user list will have a zero in the current count field although the total count field will contain a '1'.

If you enter anything but 'Y', the program returns to the main menu and the message remains in the system for further examination. Additional messages to the same user will be run consecutively, while messages for other users will be allocated accordingly.

Although one main file is used for the actual message information, the system

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**System file 'SYSTEM.SYS'**

| Database name | Date created | Date last used | First free sector number | Last free sector number | Sectors used | Total sectors |
|---|---|---|---|---|---|---|
| (8 bytes) | (8 bytes) | (8 bytes) | (3 bytes) | (3 bytes) | (6 bytes) | (4 bytes) |

**User directory entry 'USER LIST'**

| User name | Date created | Count of current messages | Count of total messages | First sector pointer | Last sector pointer | Usage flag |
|---|---|---|---|---|---|---|
| (30 bytes) | (8 bytes) | (3 bytes) | (5 bytes) | (3 bytes) | (3 bytes) | (2 bytes) |

**Mail database 'MAIL.DAT' typical sector (record)**

| Previous sector pointer | Message name | Text data — line | Actual record pointer | Next sector pointer |
|---|---|---|---|---|
| (3 bytes) | (30 bytes) | (80 bytes) | (3 bytes) | (3 bytes) |

*Fig 2 The SYSTEM.SYS, USERLIST and MAIL.DAT files*

*Fig 3 Program which illustrates how an electronic mail program works*

```
10 REM  ************************************************************
20 REM  *                                                          *
30 REM  *              IBM PC Electronic mail executive            *
40 REM  *                                                          *
50 REM  *              Copyright Peter P. Vekinis 1984             *
60 REM  ************************************************************
70 REM  *                                                          *
80 REM  *                  Micro Business Products                 *
90 REM  *                43 ave. De L'Observatoire                 *
100 REM *                  1180 Brussels, Belgium                  *
110 REM *                    Tel : 027 375 3709                    *
120 REM *                                                          *
130 REM ************************************************************
140 KEY OFF
150 REM The following opens the three files
160 GOSUB 2400
170 CLS
180 LOCATE 10,20
190 PRINT" IBM PC Electronic mail Package"
200 DA2$=DATE$:LOCATE 14,30:PRINT DA2$   'get the date and show it
210 LOCATE 25,70:PRINT TIME$
220 GOSUB 2380
230 CLS
240 GET #1,1     'get the system file from the disk
250 LOCATE 10,30          'show the startup menu
260 COLOR 8,1
270 PRINT"      Operation Menu"
280 LOCATE 13,25
290 PRINT"1 = Send Message"
300 LOCATE 14,25
310 PRINT"2 = Get Message"
320 LOCATE 15,25
330 PRINT"3 = List Users"
340 LOCATE 16,25
350 PRINT"4 = System Setup"
360 LOCATE 17,25:PRINT"5 = Exit"
370 LOCATE 25,70:PRINT TIME$
380 LOCATE 22,25:INPUT"Enter Action";A
390 COLOR 7,1:ON A GOTO 410,950,1520,1670,1530      'show the menu with
400 IF A < 1 OR A>4 THEN 230                        'highlight mode and
410 REM the send message code function
420 CLS                                             'check the input
430 IK=1                                            'if it is ok, then
440 CN3=CVI(PERCENT$)                               'check to see thet
450 IF CN3=(CVI(TOTSEC$)) THEN CLS:LOCATE 15,30:PRINT"Data Base Full":GOSUB 2380
:GOTO 230
460 LOCATE 10,10                                    'there is space in the
470 INPUT"Enter message name please";PNAM$          'data base to store
480 FREST=CVI(FRESTR$)                              'new messages and ask
490 GET #3,FREST                                    'for the message name.
500 TEMP=FREST                                      'get the first free
510 CLS:LOCATE 25,1:PRINT"Enter the text with CR at each line end. Enter [000] t
o end"
520 LINE INPUT TEX$                                 'record, and store it
530 LSET PNAME$=PNAM$                               'at the sector. Also
540 FREX=CVI(RECNO$)                                'store the message
550 IF TEX$="[000]" THEN 640                        'name. If the string
560 GET #3,FREST                                    'indicates end of input
570 LSET PNAME$=PNAM$                               'then exit, else ensure
580 CN3=CN3+1                                       'that there is space on
590 IF CN3=(CVI(TOTSEC$)) THEN CLS:LOCATE 15,20:PRINT" Data Base Full - Force st
ore":GOSUB 2380:GOTO 640
600 LSET TEXT$=TEX$                                 'the data base.
610 PUT#3,FREST                                     'store the text and read

620 FREST=CVI(NEXTP$)                               'the next free sector
630 GOTO 520                                        'which is pointed to by
640 CLS                                             'a field in the current
650 HHJ$=MKI$(FREX)                                 'record and loop.
660 LSET FRESTR$=NEXTP$              'use the next pointer as the new first
670 GET #3,CVI(HHJ$)                 'available sector while ensure that
680 LSET NEXTP$=MKI$(0)              'the next sector field of the current
690 LSET DATEL$=DA2$                 'sector is set to zero. Update the date
700 PUT #3,CVI(HHJ$)                 'and store the data.
710 LOCATE 15,30
720 INPUT" Send to ?";USE$           'ask for the user name and look for
```

always keeps track of the relation of the messages to the respective target users using pointers.

## Database design

The correct allocation of the messages and user directory pointers relies upon the contents of the three files used by the program. These files, whose structures are shown in Fig 2, are called the 'SYSTEM.SYS', the 'USERLIST' and the 'MAIL.DAT'.

The SYSTEM.SYS file is used to store the name of the mail database, the date of creation and the date of last use, the count of total sectors available for messages, the count of sectors used, and two pointers which give the number of the first and last available sector. In order to understand what the pointers do, it is better to know what the MAIL.DAT is made of.

When the program is used to initialise the database and the user is asked to enter the number of sectors required for storage of messages, it creates what I call the 'sector availability sequence' (SAS) which is a way of tying sectors together so that they point to each other. The MAIL.DAT part of Fig 2 shows what a sector looks like as used for message storage. The first three bytes contain a pointer that points to the previous sector number if any or zero, if this is the first sector of the SAS or of a message.

The next 30 bytes are used to store the name of the message. Following that is

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| Font Registraction | Up to 40 characters |
| Character Structure | 9 x 9 |
| Character Size | Ordinary characters 1.99(W) x 2.24(H) mm<br>Superscript/<br>subscript characters 1.9(W) x 1.36(H) mm |
| Characters per line | Ordinary (pica/elite) 80/96<br>Double width elongated (pica/elite) 40/48<br>Compressed (pica/elite) 132/158<br>Compressed and elongated (pica/elite) 66/79<br>Superscript, subscript (pica/elite) 80/96 |
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| Copies | 3 max. |
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| **Dot configuration:** | 3/254 inch (0.3 mm) dot diameter<br>Draft (PICA) NLQ<br>Dot alignment (Hor. x Ver.) 9 x 9 12 x 18<br>Dot pitch (Hor.) 1/120" (0.21 mm) 1/160" (0.16 mm)<br>(Ver.) 1/72" (0.35 mm) 1/144" (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)<br>Elite (Draft, NLQ) 96 cpl (12 cpi)<br>Compressed 137 pcl (17 cpi)<br>Pica elongated 40 cpl (5 cpi)<br>Elite elongated 48 cpl (6 cpi)<br>Compressed elongated 68 cpl (8.5 cpi) |
| Printing speed: | Draft-Pica 180 cps<br>Draft-Elite 180 cps<br>Near Letter Quality 33 cps |
| Printing direction: | Text printing: Bi-directional<br>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)<br>Friction feed (with single sheet) |
| Paper used: | Fanfold paper Width: 4-10 inches (102-254 mm)<br>Thickness (paper weight in kg): 34-55 kg<br>Single sheet Width: 4-9 inches (102-229 mm)<br>Height: 5-14.3 inches (127-363 mm)<br>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 |
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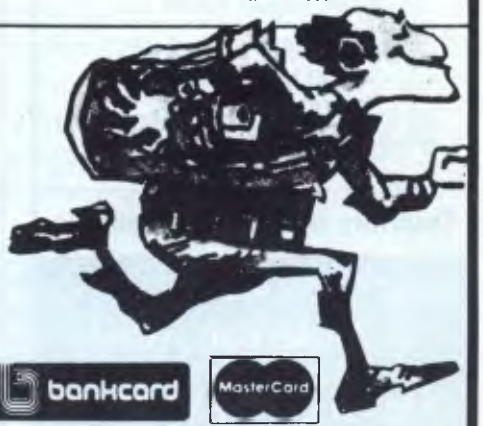

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```
730 RE=1                                        'it in the user list.
740 GET #2,RE
750 IF LEFT$(USE$,4)=LEFT$(USER$,4) THEN 780    'if the first 4 letters match
760 IF EOF(2) THEN 1550                         'then continue else show message

770 RE=RE+1:GOTO 740
780 FUNCTION=CVI(MID$(
790 IF PONT1<>0 THEN GET#3,CVI(POINTE$1:LSET NEXTP$=MKI$(TEMP1:PUT #3,CVI(POINTE
$):GOTO 810
800 LSET POIN$=MKI$(TEMP1                       'on the list then get the sector that
810 LSET POINTE$=HHJ$                           'is the last sector and update the next
820 CN=CVI(TOTCNT$)                             'sector number field. The messages are
830 CN=CN+1                                     'now linked. Update the list pointers
840 LSET TOTCNT$=MKI$(CN)                       'and the total sector counter.
850 CN1=CVI(CNT$)
860 CN1=CN1+1
870 LSET CNT$=MKI$(CN11                         'also update the counter of messages
880 PUT #2,RE                                   'for the user and store it in the
890 REM                                         'directory entry.
900 LSET PERCENT$=MKI$(CN3)
910 PUT #1,1
920 GOTO 230
930 REM
940 REM  The following code performs the get message function.
950 GET #1,1
960 CLS
970 LOCATE 10,10
980 CN4=CVI(PERCENT$)                                   'Get the number of sectors used
990 INPUT" Enter user name please";USE$                 'and the user name
1000 CLS:RE=1
1010 GET #2,RE
1020 IF LEFT$(USE$,4)=LEFT$(USER$,4) THEN 1050          'If the first 4 letters match
1030 IF EOF(2) THEN 1580                                'then continue, else show error

1040 RE=RE+1:GOTO 1010
1050 PO=CVI(POIN$):IF PO=0 THEN CLS:LOCATE 15,30:PRINT"No messages":GOSUB 2380:G
OTO 230
1060 GET #3,PO                                          'get the sector pointed to by
1070 PO2=PO                                             'the user directory entry and
1080 CLS                                                'ask the user whether printed
1090 LIN=3                                              'output is needed for lprint.
1100 CLS:LOCATE 15,20:INPUT"Use the printer ?(Y or N)";ADR$:CLS:IF ADR$="Y" THEN
 VC=1 ELSE VC=0
1110 GET #3,PO                                          'Get the first sector and
1120 LOCATE 25,10:PRINT"Message name = ";PNAME$         'show the message name on screen

1130 IF EOF(3 THEN LOCATE 15,30:PRINT"no more - end of disk":GOSUB 2380:GOTO 23
0
1140 NEX=CVI(NEXTP$)                                    'Get the next sector by fol-
1150 IF VC=1 THEN LPRINT TEXT$                          'lowing the list pointers until
1160 LOCATE LIN,1:PRINT TEXT$                           'it is zero which means the end
1170 CN4=CN4-1                                          'of the message.
1180 IF NEX=0 THEN PRINT:PRINT:PRINT"-------------------------------------------
-------------------------------":PRINT"All done":GOTO 1230

1190 PO=CVI(NEXTP$)
1200 LIN=LIN+1                                          'If the message is more than
1210 IF LIN=18 THEN PRINT:PRINT:PRINT:INPUT"Continue ?";CNU$:CLS:LIN=3:GOTO 1110

1220 GOTO 1110                                          '18 lines, then wait for key
1230 PRINT:PRINT:PRINT:PRINT                            'input to continue. When the
1240 INPUT" Accept the message (Y or N)";YE$            'message is finished, ask to
1250 IF YE$<>"Y" THEN CLS:LOCATE 15,25:PRINT"Message retained":GOSUB 2380:GOTO 2
30
1260 GET#2,RE                                           'accept it or not. If yes, then
1270 LSET POIN$=MKI$(0)                                 'update the user directory
1280 LSET POINTE$=MKI$(0)                               'pointers to zero and decrease
1290 CN3=CVI(CNT$)                                      'the current message counter.
1300 CN3=CN3-1
1310 LSET CNT$=MKI$(CN3)
1320 PUT #2,RE
1330 FR=CVI(FREND$)                                     'Update the sector pointers so
1340 LSET FREND$=MKI$(PO)                               'that the sectors freed end up
1350 GET #3,FR                                          'at the end of the availability
1360 LSET NEXTP$=MKI$(PO2)                              'list.
1370 PJ$=RECNO$
1380 PUT#3,FR
1390 GET #3,PO
1400 LSET NEXTP$=MKI$(0)                                'Zero the last sector's next
1410 PUT#3,PO                                           'sector pointer and update
1420 GET #3,PO2                                         'the sector counters of the
1430 LSET PREV$=PJ$                                     'system file as well as the
1440 PUT#3,PO2                                          'number of the first
1450 GET #3,CVI(FRESTR$)                                'sector available as pointed
1460 LSET PREV$=MKI$(0)                                 'to by the system file.
1470 PUT#3,CVI(FRESTR$)
1480 LSET PERCENT$=MKI$(CN41
1490 PUT#1,1
1500 CLS:LOCATE 15,30:PRINT"All Done":GOSUB 2380
1510 GOTO 2330
1520 GOTO 1610
1530 CLS:CLOSE
1540 END
1550 IF RE>20 THEN LOCATE 15,30:PRINT"No such user":BOSUB 2380:GOTO 710
1560 IF RE<20 THEN GOTO 640                     'If the user name is not there, show
1570 IF USE$="END" THEN 230 ELSE LOCATE 15,30:PRINT"No such user name":GOSUB 238
0:GOTO 710                                      'show error message
1580 IF RE>20 THEN LOCATE 15,30:PRINT"No such user":GUSUB 2380:GOTO 230
1590 IF RE<20 THEN GOTO 1040
1600 LOCATE 15,30:PRINT"No such user name : End of file":GOSUB 2380:GOTO 230
1610 K=1
1620 CLS:LOCATE 2,30:PRINT"User Directory"
1630 GET#2,K                                            'Show the user directory as long as the
1640 IF FL$="FF" THEN PRINT:PRINT:INPUT" Ok ?";A$:GOTO 230      'flag is not FF
1650 PRINT"User name ";USER$;" Cnt=";CVI(CNT$);" Total cnt=";CVI(TOTCNT$)
1660 K=K+1:GOTO 1630
1670 CLS                                        'Come here to setup the system which starts by entering a
1680 LOCATE 15,30                               'password
1690 INPUT" Enter Password please";ADF$
1700 IF ADF$="peter" THEN 1710 ELSE 230
1710 REM systems initialisation
1720 CLOSE
1730 CLS:LOCATE 15,20:PRINT"System initialisation - all previous data deleted"
1740 LOCATE 20,20:INPUT"Number of records ?";KJ         'Enter the number of
1750 OPEN "r",#1,"system.sys"                           'sectors to be used
1760 FIELD#1,8 AS SYSTE$,8 AS DATE1$,8 AS DATEL$,3 AS FRESTR$,3 AS FREND$,6 AS P
ERCENT$,4 AS TOTSEC$
1770 REM
1780 LOCATE 21,20
1790 INPUT"Please enter system name (less than 8 chars";NA$
1800 LSET SYSTE$=NA$
1810 LOCATE 22,20
1820 LSET DATE1$=DA2$                           'Enter the current date and set the
1830 LSET TOTSEC$=MKI$(KJ)                      'total sectors to the count entered
1840 LSET FRESTR$=MKI$(1)                       'and the free sector pointer to the
1850 LSET PERCENT$=MKI$(0)                      'first sector of the availability
1860 LSET FREND$=MKI$(KJ)                       'list. Set the sector used counter
1870 LSET DATEL$=DA$                            'to zero and the last date to the
1880 PUT #1,I                                   'current date and update the file.
1890 CLS
1900 LOCATE 15,30
1910 PRINT"System initialized"
1920 CLOSE#1
1930 OPEN"r",#1,"mail.dat"                      'Initialize the mail data base by
1940 FIELD#1,3 AS PREV$,30 AS PNAME$,80 AS TEXT$,3 AS RECNO$,3 AS NEXTP$
1950 REC=1
1960 CLS                                        'setting the message name to the string
1970 CNT=0                                      'not-used and the message area to
1980 LSET PNAME$="Not-used"                     'dots. The ensure that each sector
1990 LSET TEXT$="...............................Not used yet..................
..............."
2000 LSET PREV$=MKI$(CNT)                       'has its sector number on it, a pointer
2010 LSET RECNO$=MKI$(REC)                      'to the previous sector and a pointer
2020 LSET NEXTP$=MKI$(REC+1)                    'to the next sector. Of course the
```

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```
2030 PUT#1,REC                          'first sector has a previous pointer
2040 REC=REC+1                          'of zero and the last sector has a
2050 CNT=CNT+1                          'next sector pointer of zero.
2060 IF REC=KJ THEN 2090
2070 LOCATE 15,15:PRINT"Initialising data areas - stand-by  \\ Record no=";REC
2080 GOTO 2000
2090 LSET PREV$=MKI$(CNT):LSET RECNO$=MKI$(REC)
2100 LSET NEXTP$=MKI$(0):PUT#1,REC:CLS
2110 LOCATE 15,30:PRINT"Data area initialization finished"
2120 PRINT
2130 CLOSE #1
2140 REM user list                      'After initializing the data area, the
2150 OPEN "r",#1,"userlist"             'user list is done. The name is entered
2160 FIELD#1,30 AS USER$,8 AS DATEIN$,3 AS CNT$,3 AS POIN$,5 AS TOTCNT$,3 AS POI
NTE$,2 AS FLI$
2170 CLS                                'and the pointers are updated as
2180 PRINT                              'required. All the pointers are set
2190 DF=1                               'to zero and the flag is set to 0 which
2200 C=1                                'denotes the entry is valid. If the
2210 LOCATE 10,30:PRINT"User list initialization"       'name is the string
2220 LOCATE 20,10:INPUT"Enter user name or 'END' to exit";NA$
2230 LSET USER$=NA$                     'END then the user listing is done.
2240 LSET FLI$="00"
2250 LSET DATEIN$=DA2$                  'A maximum of 20 users are allowed.
2260 LSET TOTCNT$=MKI$(0)               'ALL THE POINTERS are reset and the
2270 LSET POIN$=MKI$(0)                 'process continues until the string
2280 LSET POINTE$=MKI$(0)               'END is typed in which in fact
2290 LSET CNT$=MKI$(0)                  'becomes the last entry with the flag
2300 IF NA$="END" THEN LSET FLI$="FF":PUT#1,C:GOTO 2350 'set to FF.
2310 IF C>19 THEN LOCATE 24,30:PRINT"Too many users":GOSUB 2380:CLOSE #1:RETURN
2320 PUT#1,C
2330 C=C+1
2340 CLS:GOTO 2210
2350 CLOSE #1
2360 CLS:LOCATE 15,30:PRINT"User directory done":GOSUB 2380
2370 CHE=1:GOTO 150
2380 FOR DLY=1 TO 1500:NEXT DLY                 'The delay routine waits a few
2390 RETURN                                     'seconds before continuing
2400 OPEN "r",#1,"system.sys"                   'The file definitions
2410 FIELD #1,20 AS SYSIE$,8 AS DATEI$, 8 AS DATEL$, 3 AS FRESIK$,3 AS FREND$,6 A
S PERCENT$,4 AS TOTSEC$
2420 OPEN "r",#2,"userlist"
2430 FIELD #2,30 AS USER$, 8 AS DATEIN$, 3 AS CNT$,3 AS POIN$,5 AS TOTCNT$, 3 AS
  POINTE$, 2 AS FLI$
2440 OPEN "r",#3,"mail.dat"
2450 FIELD #3,3 AS PREV$, 30 AS PNAME$, 80 AS TEXT$, 3 AS RECNO$,3 AS NEXTP$
2460 RETURN
```

the actual text, one line at a time. This is followed by a three-byte field containing the number of the actual sector, and another three-byte field that contains the next sector number if any or zero, if this is the last sectior of the SAS or the last sector of the message.

Upon initialisation the pointers are sequential, starting from 1 up to the number specified. As no sectors are used (that is, no messages sent), the first free sector pointer of file SYSTEM.SYS as shown at the top of Fig 2 contains 1, while the last free sector field contains 100, this being the last sector number. Also, the total sectors used field is zero, while the total sectors available field is 100.

At this point, the system points to the part of the MAIL.DAT file that can be used for storing messages. As no messages have been entered, all the data file sectors are available for text storage.

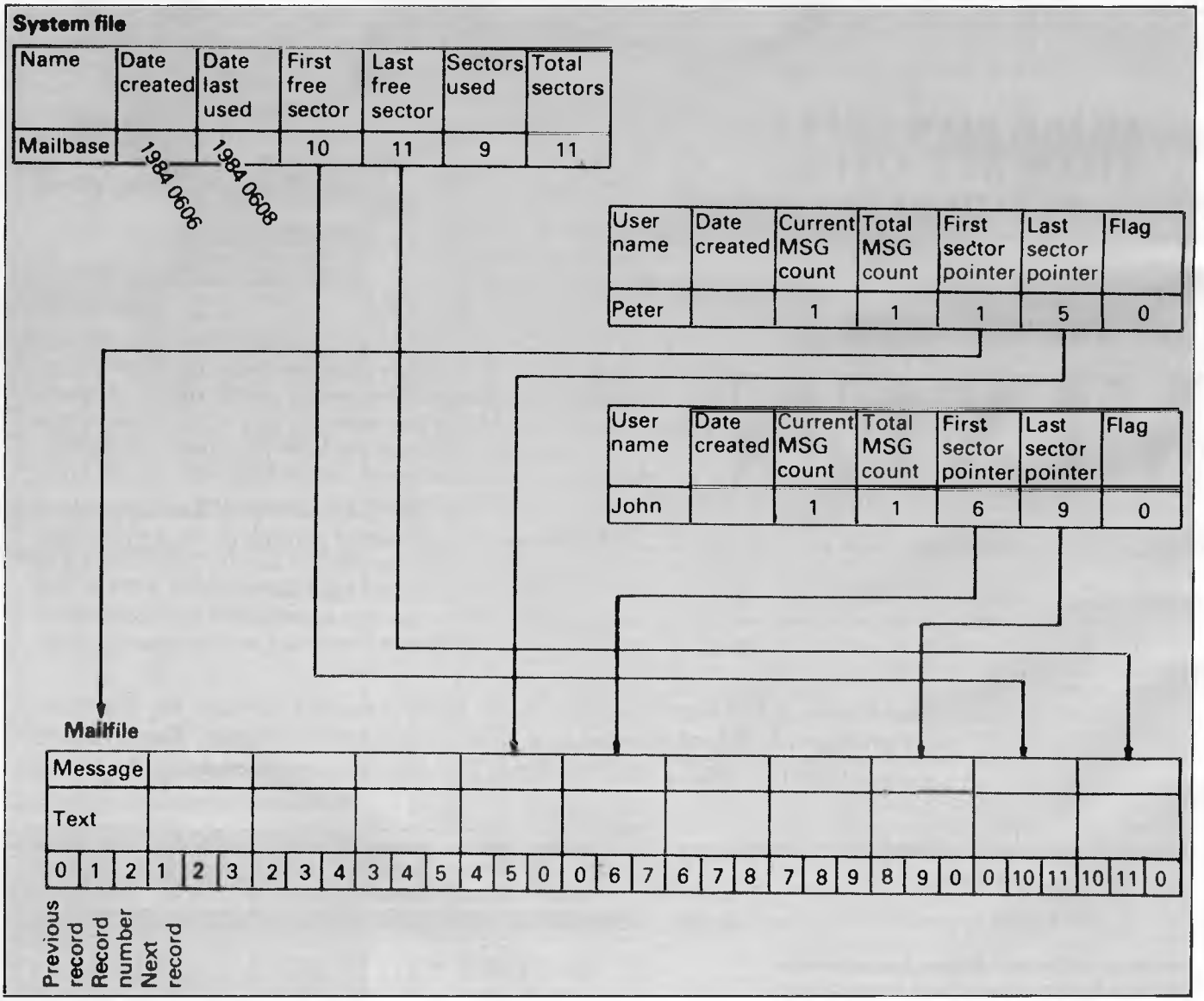


*Fig 4 The mail database with two users*

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The user directories are initialised by entering the user's name and setting a usage flag to 00 instead of FF. You will notice that the user directories contain additional pointers as well as counters; these are all set to zero during initialisation.

Let's assume that we have a database with a maximum of 11 sectors (as defined upon initialisation), and that one message containing five lines has been sent to a user called 'peter' and another message, four lines long, has been sent to user 'john'. The situation is shown in Fig 4.

The bottom part shows a schematic view of the MAIL.DAT file with sectors and their pointers with the necessary numbers. The first sector's 'previous sector pointer' has a zero in it, meaning that this is the first sector in the message or list. Sector five has a 'next sector pointer' filled with zero, meaning the end of the message. As this message was sent to user 'peter', the first sector pointer field in the directory of 'peter' contains the number 1, denoting sector 1 and the first sector of the message. The last sector of this message is five and is shown as such in the directory. The same is used for the second message, except that it is four lines or sectors long and that it belongs to user 'john'.

The main file SYSTEM.SYS has the first free sector pointing to sector 10 while the last available sector points to sector 11: that is, there are two free sectors in the database.

How are all these pointers used? When the user wants to read a message allocated in directory 'peter', the system will read the first sector pointed to by the directory entry, that is '1', and shows it onscreen. The 'next sector pointer' is used to get the next sector until it contains a zero which denotes the end of the message. If the reader of the message decides to accept it, the pointers are updated as shown in Fig 5.

The directory entry for the user 'peter' is set to unused by setting the flag to 'FF'. The current counter is reset while the pointers are set to zero since no messages are in the database for the user now. The available sector count in the SYSTEM.SYS file is increased by the number of sectors contained in the message just read (that is, increased by five) while the first free sector pointer still points to sector 10 as before. However, as the program puts the sectors of the last read message to the 'end' of the SAS, the last free sector pointer now points to sector 5. Notice that in order to keep the SAS continuous, the pointers have been updated accordingly

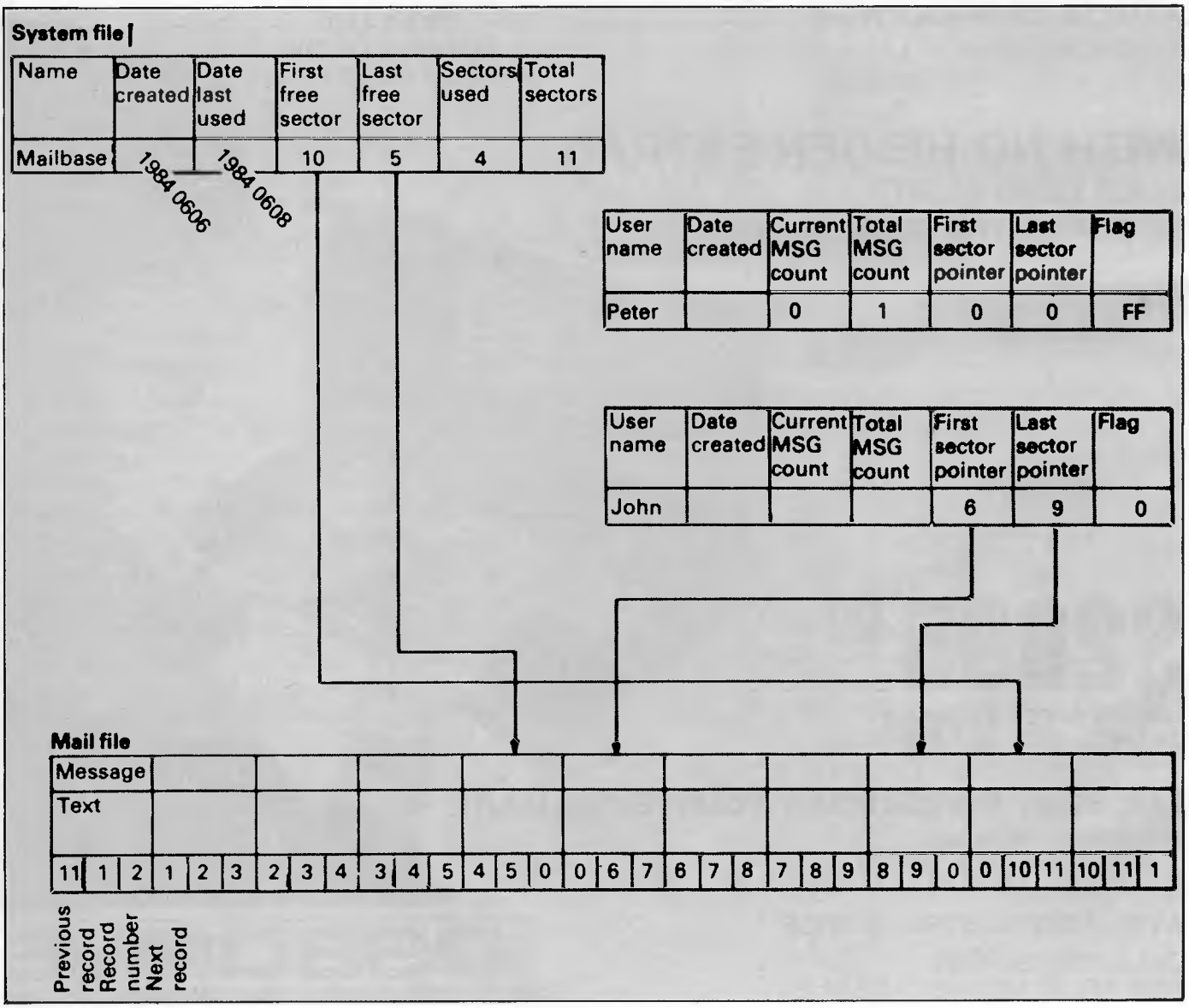


*Fig 5 The mail database after one user has read and accepted a message*

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with the 'next sector pointer' of sector 11 showing 1 and the 'previous sector pointer' of sector one displaying 11. The message for user 'john' is not touched during this updating operation.

If 'john' decides to read the message as well, the pointers are further updated as shown in Fig 6. All the sectors are available, although the sequence for using the sectors in new messages changes.

Although the extensive use of pointers makes the program difficult to track, its versatility and secure database arrangement compensates for the difference. The data in the database may not only be messages, but any other form of data that must be allocated to a specific user or keys. Also, the use of SAS in the database is an efficient means of allocating sectors for data, as well as ensuring that deleted or accepted data, in the case of the mail program, is still on disk.

*'Although many facilities exist today to help the user type a letter . . . or obtain a list of groceries, few possibilities exist to enhance communications needs.'*

## Conclusion

The program does not contain any software to drive a machine's communications ports, as it is mainly intended to illustrate the techniques involved when dealing with electronic mail database design. Such software may be placed instead of the code used to get the text from the console as well as the code used to display the text. Additionally, better password protection and accounting code may be implemented for user versatility.

Many of the techniques shown in this program, especially in the case of the pointer handling, may be used in other forms of database types. Writing programs with pointers is not easy due to the large number of variables processed, however, the use of pointers in such applications permits extreme flexibility as well as additional protection in case of faults. This protection alone is worth the trouble — there is no worse error in a database than unexplained data loss.

*Program notes: the listing in Fig 3 is for the IBM PC Basic but can easily be modified to run on other machines. The program uses random files which are available with most versions of Microsoft Basic. Please note that the LOCATE command is used on the IBM PC to place the cursor at the required row and column.*

END

**System file**

| Name | Date created | Date last used | First free sector | Last free sector | Sectors used | |
|---|---|---|---|---|---|---|
| Mailbase | 1984 0606 | 1984 0608 | 10 | 9 | 0 | 11 |

| User name | Date created | Current MSG count | Total MSG count | First sector pointer | Last sector pointer | Flag |
|---|---|---|---|---|---|---|
| Peter | | 0 | 1 | 0 | 0 | FF |

| User name | Date created | Current MSG count | Total MSG count | First sector pointer | Last sector pointer | Flag |
|---|---|---|---|---|---|---|
| John | | 0 | 1 | 0 | 0 | FF |

**Mail file**

| Message | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Text | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 1 | 2 | 1 | 2 | 3 | 2 | 3 | 4 | 3 | 4 | 5 | 4 | 5 | 6 | 5 | 6 | 7 | 6 | 7 | 8 | 7 | 8 | 9 | 8 | 9 | 0 | 0 | 10 | 11 | 10 | 11 | 1 |
| Previous record | Record number | Next record | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

*Fig 6 The mail database after both messages have been retrieved*

# TJ'S WORKSHOP

**Our monthly pot-pourri of hardware and software tips for popular micros. If you have a favourite tip to pass on, send it to 'TJ's Workshop', 2nd floor, 215 Clarence Street, Sydney 2000. Please keep your contributions as concise as possible. We will pay $10–$25 for any tips we publish. APC can accept no responsibility for damage caused by using these tips, and readers should be advised that any hardware modifications may render the maker's guarantee invalid.**

## UCSD PASCAL PROCEDURES

Pascal assumes that writing onto a VDU will follow the same pattern as writing to a line printer. While an equivalent of such commands in Basic as the MTX's CSR (X,Y) or the PRINT AT (X,Y) of some other micro is rarely essential, it is occasionally useful and cannot be implemented using Pascal's field-width parameter.

UCSD Pascal provides a GOTOXY (X,Y=INTEGER) procedure. This procedure will GOTOXY (X,Y) for any micro which uses the standard ASCII teleprinter control codes for VDU formatting. (CHR (26) (ASCII 'SUB') homes the cursor to the start of the current page, and CHR (25) (ASCII 'EM') advances the print cursor one position without printing a space.

*BH*

```
PROCEDURE GOTOXY(X,Y:INTEGER);

   (Places print position/cursor at)
   (Cartesian coordinates supplied.)
   (Note that error-trapping should)
   (be outside this PROCEDURE,so    )
   (that alternate text windows,    )
   (screen modes,etc.may be handled)
   (Assumes that micro uses ASCII   )
   (contol characters as VDU format)
   (commands.                       )

VAR A:INTEGER;
BEGIN
  IF (X>=0) AND (Y>=0) THEN
    BEGIN
     WRITE(CHR(26));
     FOR A:=1 TO Y DO WRITELN;
       FOR A:=1 TO X DO WRITE(CHR(25))
    END
END;
```

## COMMODORE DISK DIRECTORY

Here is a tape and listing of a disk directory subroutine for a Commodore 64, which allows the user to read a disk directory without destroying a program in memory.

To add it to programs, type it in and save it as a separate program as usual.

Now load the program it is to be added to (ensure this contains line numbers below 60000). Type in direct mode:

```
POKE 43, PEEK(45)-2
POKE 44, PEEK (46)
NEW
LOAD "NAME OF DISC ROUTINE",8
POKE 43,1
POKE 44,8
```

Remember to press RETURN after each statement. The routine and your program will now be merged.

*IL*

```
60000 OPEN1,8,0:CLOSE1:IFST=-128THEN60240
60010 OPEN1,8,0,"$0"
60020 GET#1,A$,B$
60030 GET#1,A$,B$
60040 GET#1,A$,B$
60050 M=0
60055 R$="■■"
60060 IFA$<>""THENM=ASC(A$)
60070 IFB$<>""THENM=M+ASC(B$)*256
60080 PRINT"■"MID$(STR$(M),2);TAB(5);"■";
60090 GET#1,B$:IFST<>0THEN60160
60100 IFB$<>CHR$(34)THEN60090
60105 GET#1,B$:IFB$<>CHR$(34)THENPRINTR$+B$;:GOTO60105
60110 GET#1,B$:IFR$=CHR$(32)THEN60110
60120 PRINTTAB(27);:M$=""
60130 M$=M$+B$:GET#1,B$:IFB$<>""THEN60130
60140 PRINT"■":LEFT$(M$,3)
60150 IFST=0THEN60030
60160 PRINT"BLOCKS FREE":CLOSE1
60170 END
60200 PRINT"■DEVICE NOT PRESENT"
```

## UNROLLING LOOPS IN BASIC

What is the fastest way, in Basic, of summing the N elements of a one-dimensional array X? I suspect most programmers would opt for the simple, tight loop embodied in line 510 of the accompanying program. There is, however, a faster method, based on the idea of 'unrolling' a loop. This technique consists of replicating the contents of the loop one or more times and making the appropriate adjustments to the loop counter. The aim is to decrease the overall execution time of the loop by reducing the overheads of incrementing the loop variable, testing for the end of the loop, and branching back to the start of the loop.

Line 630 of the program contains a loop unrolled to a depth of three. Other moduli are possible, and some experimentation is required to find the most suitable value of M for a particular application and a given computer. If a higher value of M is to be used, extra terms should be added in line 630 so that each time through the loop, M consecutive terms of the array X are summed.

Line 620 is a clean-up loop which deals with any elements remaining after the N elements of X have been divided into groups of three.

The table in Fig 1 gives some timings obtained on the Commodore PET using the listed program. The unrolled loop provides a useful speed increase for N greater than about 10, although it is marginally slower than the standard method for smaller N due to its start-up overhead. I would expect similar speed increases to be obtained for the other popular micros.

This technique is well worth considering if you need to squeeze the last ounce of performance out of your Basic interpreter!

*Nick Higham*

| N | Time for standard method (Jiffies) | Speed-up ratio |
|---|---|---|
| 10 | 5 | 1.2 |
| 15 | 7 | 1.0 |
| 25 | 12 | .917 |
| 100 | 45 | .844 |
| 500 | 221 | .855 |
| 1000 | 439 | .838 |

*Fig 1*

```
10 REM UNROLLING LOOPS
15 REM IN: PET BASIC
20 REM EXAMPLE: SUMMING X(1),...,X(N)
30 REM BY: NICK HIGHAM
40
100 REM VARIABLES ARE 'FASTER' THAN CONSTANTS:
105 M=3:P=1:Q=2
110 INPUT N
120 DIM X(N):FORI=1TON:X(I)=I:NEXT
130
200 T=TI:GOSUB500:T1=TI-T:PRINTT1,S
210 T=TI:GOSUB600:T2=TI-T:PRINTT2,S
220 PRINT"SPEED-UP RATIO:"T2/T1:END
230
500 REM STANDARD METHOD
505 S=0
510 FORI=1TON:S=S+X(I):NEXT
520 RETURN
 530
 600 REM UNROLLED LOOP : MODULUS M=3
 605 S=0
 610 R=N-INT(N/M)*M
 620 IF R>0 THENFORI=1TOR:S=S+X(I):NEXT
 630 IF R<N THENFORI=R+1TONSTEPM:S=S+X(I)+X(I+P)+X(I+Q):NEXT
 640 RETURN
READY.
```

# BBC BREAKS

The effects of the BREAK key and CTRL BREAK can be easily harnessed using the *FX247 command; this redirects the Break vector to a user's own routine. Certain protocols must be observed, and the operating system has to be allowed to reset variables.

The OS checks the break vector twice, and it is best to intercept the vector the second time. During the first check, the OS enters with carry clear and the second with carry set. To tell the OS the address of the user's routine, *X248 and *FX249 are used (low byte, high byte respectively). The demonstration program shows the theory in practice.

```
10 MODE 7:REM Intercept
 break
20 FOR PASS=0 TO 3 STEP 3
30 P%=&C00
40 [OPT PASS
50 BCS START   /Check if
 second access of the vector
60  RTS
70 .START
80 CLI      /Re-enable
 interrupts
90 LDX #&00      /Print string
100 .LOOP      /Onscreen
110 LDA string,X
120 JSR &FFE3
130 INX
140 CMP #&0D
150 BNE LOOP
160 JSR &FFE3
170 RTS
180 .string
190 ]
200 $P%="The Soup
 Dragon's dropped a
 Clanger"
210 P%=P%+LEN($P%)+1
220 NEXT PASS
230 *FX247,76
240 *FX248,00
250 *FX249,12
260 PRINT CHR$(129)
 "PRESS BREAK!!"
```

BBC disks may be protected by setting the directory option to the 'teletext conceal' character. Type in PRINT CHR$(&98);"*" [return], then type in *DIR. Use the cursor keys to copy the invisible character before the '*'. When it is copied correctly, the copy cursor disappears. Now press RETURN. Any files saved while this directory is set will not be visible when the directory is set back to normal. To see the filenames, this procedure must be repeated — a boot file could do it automatically.

To give simple protection in a basic program by hiding any important lines using CHR$)42) ('*'), make a REM statement at the end of the lines to be hidden. This REM statement should be made up of the number of asterisk characters required to hide what goes before it (don't forget to include the REM itself).

Now fit into your program these lines:

```
1 TEST=FALSE:FOR
 X=PAGE TO TOP STEP 1
2 IF ?X=&F4 THEN
 TEST=TRUE
3 IF ?X=&0D THE
 TEST=FALSE
4 IF ?X=42 AND TEST=TRUE
 THEN ?X=&7F
5 NEXT X
6 END
```

Run the routine with GOTO 1 and then DEL. 1.6. When the program is listed, the REMs will have been filled with CHR$(&7F) (the delete character) which will cause the characters before the REM to be deleted from the screen when the program is listed (that is, the parts of lines that you don't want visible).

It is possible to redefine the copy cursor by storing the new ASCII code at address &366.

*S Jamieson*

# ORIC SOFTWARE TIP

Oric owners probably thought they would never see another tip in *APC*. Well, this is just to prove they were wrong.

This simple and short machine code routine is designed to stop the cursor flashing. Why you would want to do this is arguable, but I find it a little distracting and occasionally annoying!

It works by re-vectoring the fast interrupt vector located at #229 to the start of the machine code (in this case #400, but the code is relocatable to any area in memory where it is safe from being overwritten by Basic).

The code continually stores zero at location #0274. A ROM-based routine uses the timer at #0274/#0275 to decide how long has elapsed between the cursor having been flashed on and off. When zero is reached, the cursor is flashed on. Therefore, as this routine continually zeros the timer, the cursor is permanently on.

Flashing can be restored to normal by entering POKE#229, #EC03 as a direct command.

*J Wright*

**Assembler listing**

```
#400    PHA :TXA:       (Preserve registers)
        PHA: TYA: PHA
#405    LDA £#00        (Load accumulator with zero)
#407    STA#0274        (Store Acc @#0274)
#409    PLA: TAY: PLA:  (Re-instate registers)
        TAX: PLA
#40E    JMP#EC03        (Jump to interrupt handler)
```

# THE MICROTEX 666

FOR MORE MICROTEX 666 INFORMATION SEE PAGE 120


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**Basic listing**

```
10      FOR I=0 TO 17
20      READ D$ :D=VAL("&"+D)
30      POKE#400+I,D
40      NEXT I
50      DOKE#229,#400
60      DATA 48,8A,48,98,48,A9,00,8D,74,02
70      DATA 68,A8,68,AA,68,4C,03,EC
```

# IBM PC # REDEFINITION

Something like "GWBASIC LPT_INIS" included in an autoexec can make spreadsheet automatic pounding considerably more useful.

*W Roberts*

```
10      'Epson FX 80/100 printer £s and #s redefine. For IBM PC or Compatables
20 ON ERROR GOTO 280
30 CLS
40 LOCATE 10,24:PRINT"Printer inisalisation program."
50 LOCATE 12,8
60 PRINT"This redefines the £ sign and ths # to be the same as the screen."
70 READ N                       ' If no WHILE/WHEND then change 80 & 110 to:
80 WHILE N<>-1                  ' IF N=-1 THEN GOTO 120
90 LPRINT CHR$(N);
100 READ N
110 WEND                        GOTO 80
120 ON ERROR GOTO 0
130 LOCATE 20,23
140 PRINT"Printer inisalization done with."
150 SYSTEM '                    This could be system, return, stop, or .
160 '                           Move rom chars. into ram
170 DATA 27,58,0,0,0
180 '                           Use ram chars.
190 DATA 27,37,1,0
200 '                           Define 35 as #
210 DATA 27,38,0,35,35,140,40,40,254,254,40,40,254,254,40,40,0
220 '                           Define 156 as £
230 DATA 27,38,0,156,156,139,18,18,126,146,18,128,2,128,66,0,0
240 '                           Let chars. 128-159 & 255 be printed
250 DATA 27,54
260 '                           End of data flag
270 DATA -1
280 IF (ERR=24)OR(ERR=25)OR(ERR=27) THEN LOCATE 20,24:PRINT"THE PRINTER IS PLAYI
NG DEAD.":BEEP
290 LOCATE 22,26:PRINT"HIT A KEY TO TRY AGAIN."
300 RESTORE '                           -Start again!
310 DEF SEG :POKE 106,0                 -Empty's the keyboard buffer
320 IF INKEY$ <>"" THEN RESUME 10 ELSE GOTO 320
```

# AMSTRAD LVAR

This short utility for the AWA Amstrad will print out all the variables and their current values used in a Basic program. Put a break point where the bug occurs and type GOTO 65500. The program should be MERGEd in from tape or disk rather than loaded in.

This routine uses a few variables of its own which should be avoided in your Basic program. These are LV,LVS, LVL and LVS$.

*J Jack*

```
65500 '-----------------------------------------------
65501 '- LVAR. - J.W.Jack - 1985.
65502 DEF FN lv(x)=PEEK(x)+256*PEEK(x+1) :lv=0 :lvs=FN lv(44679)-17
65503 FOR lvl=FN lv(44677) TO lvs-16
65504 IF PEEK(lvl)>0 THEN GOSUB 65508
65505 NEXT
65506  lvs=lvs-16  :   POKE  44679,lvs-INT(lvs/256)*256  :   POKE
44680,INT(lvs/256)
65507 END
65508 '- Label.
65509 lvl$=""
65510 IF PEEK(lvl)>128 THEN lvl$=lvl$+CHR$(PEEK(lvl)-128) :  GOTO
65511 ELSE lvl$=lvl$+CHR$(PEEK(lvl)): lvl=lvl+1 : GOTO 65510
65511 PRINT lvl$;
65512 '- Type & Value.
65513 lvl=lvl+1
65514  IF PEEK(lvl)=1 THEN PRINT"% = ";FN lv(lvl+1)  :  lvl=lvl+3:
RETURN
65515  IF  PEEK(lvl)=2  THEN PRINT"$  =  ";CHR$(34);  :FOR
lvg=FN lv(lvl+2)  TO  FN lv(lvl+2)+PEEK(lvl+1)-1  :  PRINT
CHR$(PEEK(lvg));:NEXT  :PRINT  CHR$(34)  :  lvl=lvl+PEEK(lvl+1):
RETURN
65516  IF  PEEK(lvl)=4  THEN  FOR  lvg=1  TO  5:POKE
lvs+lvg,PEEK(lvl+lvg) :NEXT :PRINT " = ";lv :lvl=lvl+6 :RETURN
65517 lvl=lvl+2 : PRINT" is a FuNction." : RETURN
65518 '-----------------------------------------------
```

# ATARI CLOCK

This listing is for all Ataris, and is a real-time clock which is accurate to about 10 seconds a day.

When run it provides a 12-hour digital clock in the top right-hand corner of the screen.

The program is interrupt-driven, leaving normal operations unaffected, and updates the time by looking at the Atari's 50Hz clock.

It is affected by scrolling or clearing the screen, but will reappear in the same place after one second.

*M Maestranzi*

```
9000 GRAPHICS 0:? "REAL TIME CLOCK":? :? "BY MAURO MAESTRANZI":? :? "TIME IS IN
HH:MM:SS FORMAT"
9010 TRAP 9030
9020 FOR A=1 TO 300:READ M:POKE A+1535,M:NEXT A
9030 ? :? "ENTER TIME: ";USR(1536)
9060 DATA 162,0,32,199,6,24,42,42,42,42,141,255,6,32,199,6,24,109,255,6,157,248,
6,232,224,3,240,11,169,58,141,251,2,32
9070 DATA 200,6,76,2,6,173,49,2,133,205,173,48,2,24,105,63,133,204,144,2,230,205
,169,0,141,14,212,169,79,141,36,2,169,6
9080 DATA 141,37,2,169,64,141,14,212,76,0,160,162,0,202,208,253,240,14,162,0,173
,243,6,105,1,141,243,6
9090 DATA 201,00,144,96,142,243,6,173,242,6,105,0,141,242,6,201,96,144,35,142,24
2,6,173,241,6,105,0,141,241,6,201,96
9100 DATA 144,28,142,241,6,173,240,6,105,0,141,240,6,201,10,144,5,169,1,141,240,
6,173,221,6,208,41,24,162,2,160,0,189
9110 DATA 240,6,72,41,15,9,16,145,204,104,136,106,106,106,106,41,15,9,16,145,204
,136,169,26,145,204,136,202,16,225,200
9120 DATA 169,0,145,204,76,98,228,142,254,6,32,226,246,174,254,6,142,254,6,32,17
0,246,41,15,234,174,254,6,96,0,0,0,0,0
9130 DATA 0
```

# VZ-200 instant colour

This short machine code routine will turn the screen the colour you have put in the data — instantly!!

To call the machine code routine type X=USR (0) where needed in your program.

To get different colours you change the underlined number in the data.

The numbers for the different colours are:

0=GREEN 170=BLUE
85=YELLOW 255=RED

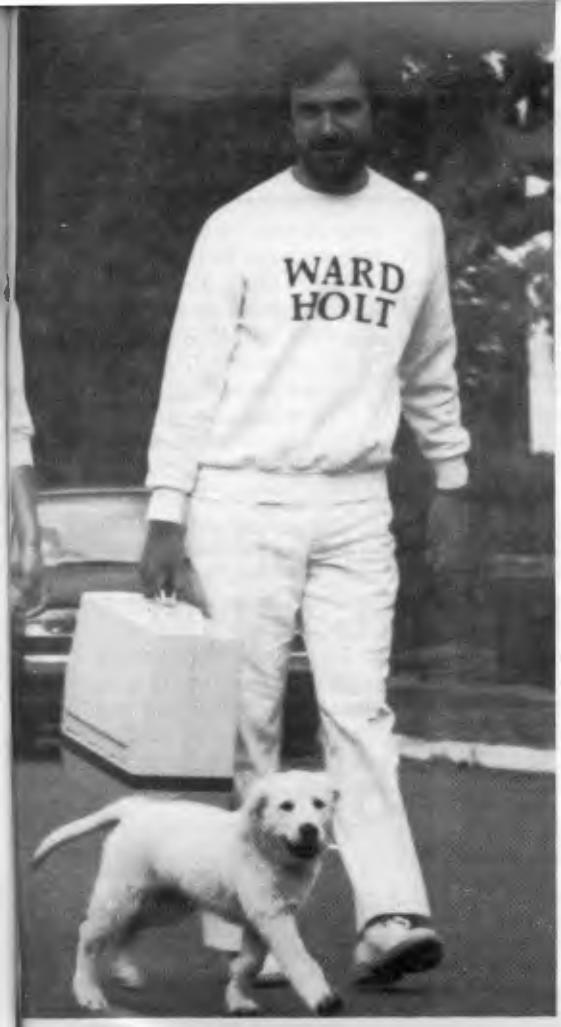
*A Willows*

```
00010 FORI=-28687 TO -28674
00020 READA:POKEI,A
00030 NEXT
00040 DATA33,0,112,17,1,112,1
      ,255,7,54,85,237,176,201
00050 POKE30862,241:POKE30863,143
```

# Reversed REM

Labelling subroutines with REM statements that describe the functions of the subroutines is obviously helpful to the programmer who has trouble remembering what parts do what when designing a long program.

One way to make the subroutines stand out in the LISTing is to use inverse REM statements. But the VZ computer will not straight-

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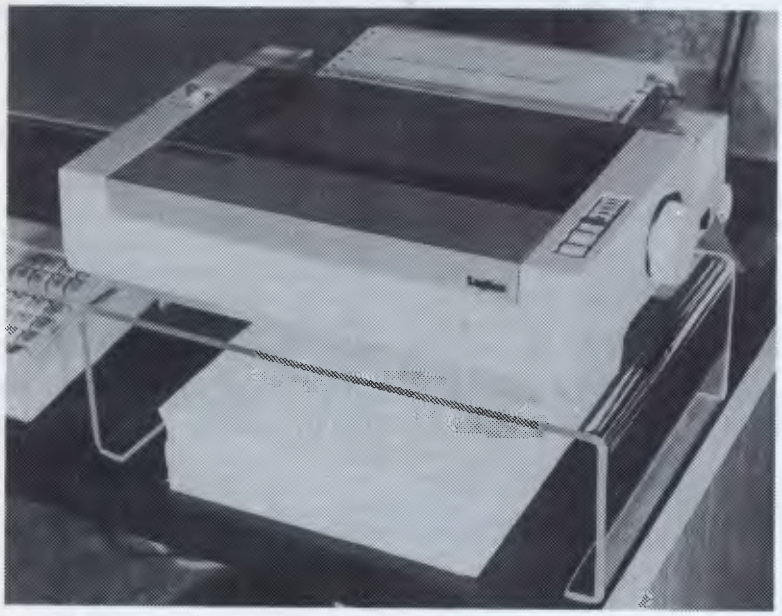

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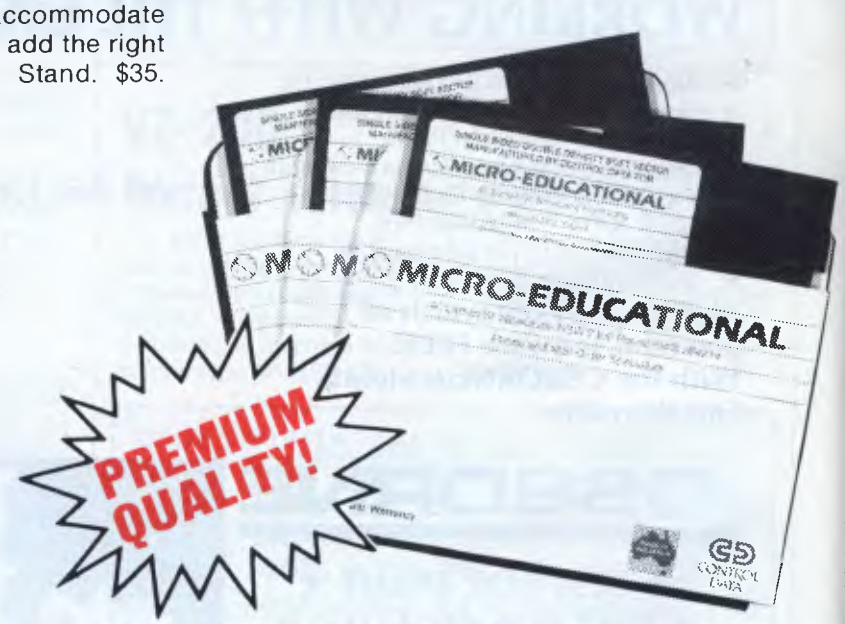


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forwardly accept REM statements in inverse print — such REM lines are not entered into the LISTing when return key is pressed and the SYNTAX ERROR? MESSAGE displays.

This can be simply overcome by preceding an inverse REM statement with quotes.

120 REM"AN EXAMPLE

end quotes are not needed; the underlined characters are in inverse form — do not inverse the word REM!

Having suitably named our subroutines, wouldn't it be great if we could call those subroutines by name instead of GOSUB a line number?

The VZ does not implement procedural calls, but we can simulate this desirable feature by placing the name we have given the subroutine immediately after the GOSUB number:

30 GOSUB120"AN EXAMPLE"

and because the name is in inverse form here also, it stands out clearly in the LISTing that this is a call on that particular subroutine. In the case of a GOSUB you must use end quotes also if any further statements follow the GOSUB on the same program line.

GOTO can be treated in the same way — simply give a REM name to the block of code you GOTO.

*R Quinn*

```
10 REM"LOOP
20 A$=INKEY$:A$=INKEY$
30 IFA$="L"THENGOSUB60"INSERT
40IF A$=":"THENGOSUB80"INVERSE"
   :SOUND 20,1
50 GOTO20"LOOP
60REM"INSERT
70 PRINT"INSERT":SOUND30,2:RETURN
80 REM"INVERSE
90 PRINT"INVERSE":RETURN
```

*Sample listing*

*"... and this disk tells you how to work the training disk, and this disk tells you how to work the disk that tells you how to ..."*

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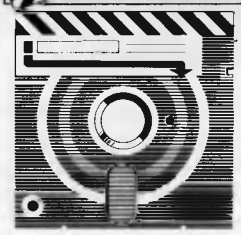


# Power-base

**Power-base is a hefty data management package which includes facilities for handling complex problems. Aimed at the novice user, is it helpful? Kathy Lang finds out.**

Most people who consider using a data management or database management package already have a manual system based on one or more conventional card indexes. You may have large numbers of clients' names and addresses which you wish to store, keep up-to-date and print, or you may be processing personnel or stock records — there are a thousand and one ways in which manual card indexes are used, and which are candidates for computerisation. Where you have a single card index to automate, the process should be relatively simple, and there are several good, inexpensive packages on the market, such as Friday! which will work well for you.

Such packages will not, however, meet your needs if you have several sets of related information. For example, you may need to keep files recording the names and addresses of all your suppliers, and also information about each product you sell. Every supplier supplies more than one product, and each product is available from more than one supplier. In a manual system you would probably have one card index of products, where each contained just the name of the supplier of each product, together with a second card index giving details of each supplier (address, delivery charges, credit information, and so on).

In a flat-file system such as Friday!, in which different sets of records may not be connected together, there is no easy way to handle this situation. You could have two separate files, and close one before you look up the other, which would lead to a lot of paper jottings — just what you were trying to avoid. Or you could store all the information in one file, keeping the full information about the supplier with every product; a solution which would be very wasteful of space and liable to error since much information would be duplicated.

Many packages now allow you to relate two or more files together in ways which would make this application much easier to implement. Examples range from Pearl at the less expensive end of the market, to dBase III and Sensible Solution at the upper end. On the whole, the more expensive packages have more facilities but are harder to use. No one package has all the features you really need to handle this type of problem, while at the same time being really easy to use for someone with little experience of computers.

*'Power-base appears to be aimed squarely at the novice user, using menus to give instructions, and with a full set of tutorials . . . '*

So it was with considerable interest that I turned to Power-base, an American package which has been available over here for a short while, and which has just been issued as version 2.1 with the addition of several features vital to its success as a system for handling complex data management problems. In addition, Power-base appears to be aimed squarely at the novice user, using menus to give instructions, and with a full set of tutorials including example applications; the documentation is among the best I've seen.

Power-base uses a technique called power-zoom to link sets of records together. This allows up to 10 levels of linkage to be active at any one time — there is no overall limit to the number of sets of records which can be linked. Zooming is permitted both onscreen and when printing reports.

In addition to the range of features you would expect from a package at this level — screen and batch amendment of information, formatted reports, links to a variety of other types of file used for spreadsheet analysis and word processing, multiple keys kept up-to-date — there are some neat and unusual features. For example, you can set up the system with two printers, and to specify which — draft or final quality — should be used for reports. Where you need your printer available most of the time, and must have a letter-quality printer for some of your work, the ability also to use a cheap and reliable matrix printer for the donkey work is very helpful. Not all packages make it possible to do this without, at the very least, switching plugs on the back of your computer.

At present, Power-base is available only for the IBM PC and AT (and needs a minimum of 256k memory), but there are plans to extend its availability. Since it does not use fancy graphics features, this shouldn't be too difficult.

## Constraints

The major constraints and functions of Power-base are shown in Fig 1. Probably the most important concerns indexing, which is used to provide fast access to individual records, and to determine the order in which records are to be displayed. Three ways are provided to allow the system to look up in one file values

which are to be used in another, namely the Look-up, Function and Table validation options. For example, when setting up invoices in a stock control/invoicing application, you might wish to find the price of a product by looking this up in a file of product information. The Function feature provides the ability to have a field whose value depends, not on the value of a field in another file, but on the average, sum, maximum, minimum or number of occurrences of that field across all records in the referenced file.

Table validation allows you to specify that only certain values are legitimate for a particular field, by referencing another file against which to check the value entered at the keyboard. In each of these cases, the field referenced for checking must be indexed, in addition to any fields which must be indexed for fast retrieval or to determine display order. A maximum of six fields in any file may be indexed; in complex applications, therefore, you might need to split information across files in order to give yourself sufficient index fields.

Other data types permitted include data, which take the American forms of MM/DD/YY or MM/DD/YYYY. In addition to the ability to look up in one file the values of fields to be used in another, you can also calculate fields from other fields in the same record.

## File creation and indexing

The first step in setting up a Power-base data file is to specify the name, size and type of each field in the record; at the same time, you construct, by paint-a-screen techniques, the layout to be used when each record is displayed. You can add help messages for display during data entry. Since record definition and screen layout are firmly linked, you cannot have several different 'masks' for a file which contains a mixture of confidential and public information. Nor can you avoid the problem by keeping the two types of information in separate files and zooming between them, since Power-base provides no constraints against unauthorised access except at application level. The display of one record may not span more than one screen. The zoom features do, however, provide an alternative solution to the problems of screen handling of large files; you would split the information between the two files, with one display screen for each, and a zoom between the two.

When setting up a field definition, you may specify that the field must have a value entered, or that the value must be unique (in which case the field will automatically also be indexed, further restricting the number of indexes available). You may also specify a default value for a field, which may be a constant, or a repeat of the same field in the pre-

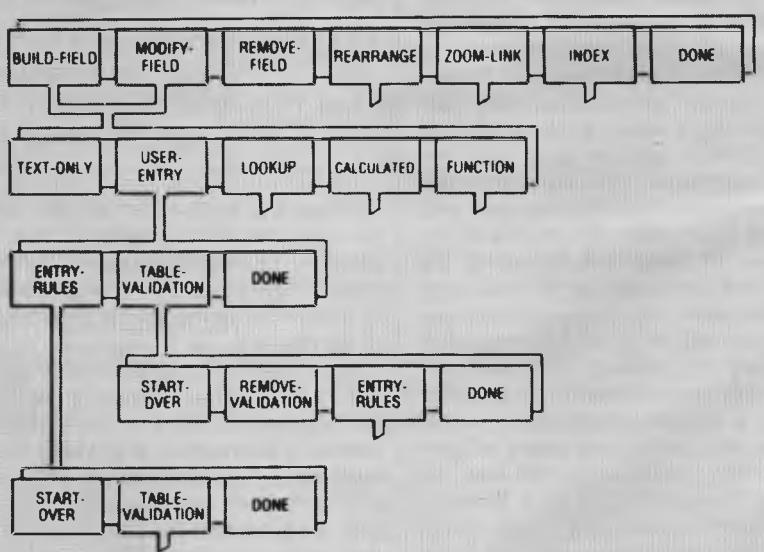
| | |
|---|---|
| Maximum file size | 65,534 |
| Max record size (ch) | 1600 |
| Max no fields | 64 |
| Max field size | 80 |
| Max digits | 15 |
| Max prime key length | 80 |
| Special disk format? | N |
| File size fixed? | N |
| Link to ASCII files? | YV |
| Data types | N,C,D,L,$,R,F |
| Fixed rec structure? | Y |
| Fixed record length stored? | Y |
| Amend rec structure? | CO |
| Link data files? | Y |
| No data files open | UL(10 deep) |
| No sort fields | 5 |
| No keys | 6 |
| Max key length (chars, fields) | 80,80 |
| Subsidiary indexes kept up-to-date? | UTD |
| Data validation | G |
| Screen formatting | P |
| Unique keys | No |
| Report formatting | D |
| Store calculated data | IN,BA |
| Totals & statistics | S |
| Store selecn criteria | N |
| Combining criteria | A,O |
| >1 criterion/field? | Y |
| Wild code selection? | SW |
| Browsing methods | AK |
| Interaction methods | M,C |
| Reference Manual + | **** |
| Tutorial Guide + | **** |
| Reference Card + | ***** |
| OnLine Help + | *** |
| Hot-line? | D |

*Fig 1 Features and constraints*

**Purpose**

To define edit checks that data entered into a field must meet before Power-base will accept it, to enter a Help Message that will be displayed when ADDing-DATA or EDITing a field, and to define default values for a field.

**Command Tree**




**Procedures**

1. Select ENTRY-RULES.
2. The ENTRY-RULES screen appears. Default values are assigned to some of the parameters. Move the cursor to the parameter you want to use, and answer the question or enter a value, or a Help Message, if desired.
3. Select DONE to save the ENTRY-RULES specified and exit, or select TABLE-VALIDATION to save the ENTRY-RULES and define a TABLE-VALIDATION.

*Fig 2 A typical page from the* Reference Guide

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vious record, or the system date.

Fields whose values are obtained by being looked up in another file, via the Look-up and Function options, may either be stored in the target file or derived afresh each time. If they are not stored, they may not be used to provide the zoom link between two files, nor may they be indexed or used in criteria for selecting records when processing subsets. Calculated fields, which derive from fields in the same record, are never stored, but neither is their use restricted in these ways.

If you change your mind about the structure of a set of records, or wish to index on additional fields, you can make such changes after data has been entered, but to do this Power-base must copy the data file to the new format.

## Data input and updating

Records may be entered or amended using full-screen editing facilities. When editing records which are linked to others through a zoom link, you can use zoom to move to the linked records and edit them, then zoom on or back, with nesting up to 10 levels deep. When editing a set of records with the same characteristics, Power-base allows you to save the current record and retrieve the next with a single keystroke. Retrieving records for updating can either be by means of individual indexed fields, or by stepping through a set of records. Stepping uses the order either of the first key field, or of the first key field in the current set of selection rules, thus you can effectively retrieve records by any field when editing in contrast with those packages which permit retrieval for this purpose only through the use of key fields.

In addition to screen updating, Power-base allows you to update a set of records in a batch. You can use this feature to recalculate the stored values of fields obtained via the Look-up or Function options (these fields normally reflect the current value of the Look-up source only if they are not stored, to prevent such undesirable events as increasing prices on the file copy of an invoice which has already been issued). You can also amend a batch of records in the same way, perhaps to increase the price of a range of goods by 10 per cent.

The program also supports 30 languages for date, currency and decimal format.

## Screen display

Records are displayed for amendment using the format set up when the file is created; this format may also be used when viewing individual records. Sets of records may be displayed using the Power-base List option, which shows a specified set of fields from each record. Where the records will fit, using the length given for each field in the record definition, Power-base will display one record per line; otherwise, the records are shown with one field on each line. Or you may set up a formatted report, and have it displayed on the screen.

## Printed reports

The basic formatted report features provided by Power-base allow you to have either one or two lines for each record, with the exact column widths determined by you if you wish. Where a character field will not fit on one line, Power-base will automatically wrap it round onto the next unless you countermand this. Where zoom links have been established, your report may include fields from more than one file. A report may include headings for the field columns, and a header and footer for each page. You can sort on up to five fields and have sub-totals printed when they change, as well as grand totals at the end. You can also specify, as an alternative, that each field in each record should be printed on a new line, or you can use the user-defined mailing label generator. Any report may be printed and displayed onscreen, or stored in a disk file. Report definitions may be saved for subsequent re-use and amendment.

## Selection & sorting

When retrieving Power-base records for editing or inclusion in a list or report, you can set up a group of tests which must be passed in order for a record to be retrieved. These tests may be set up either by entering them in a *pro forma* record on the screen, or by entering a command line containing the necessary tests and combinations spelled out. Where you wish to include comparison of fields (rather than just testing fields against constant values), the latter method must be used.

The usual range of arithmetic operators are provided (less than, greater than, and so on), plus concatenation; for character fields, you can select using wild codes for both individual characters and for groups of characters. Tests may be combined with AND and OR, so you can specify that all must be passed, or any combinations. Selection criteria cannot be saved except when set up for a report, when they are saved with the report definition. You may, however, either use the current set of criteria or revert to the set most recently used.

Power-base orders records in one of two ways. In reports, you can specify that the records be sorted on up to five fields, one within another. When Power-base stores records, they are indexed on the keys you specified when the file was created, and individual records may be retrieved for screen display in order on any one of these (keys may be a concatenation of several fields).

## Calculation

Calculations are provided on entry and on update; you can also specify that results of calculations should be printed in reports. All calculations may use the usual arithmetic operators, with brackets to alter the order of evaluation if necessary.

## Multiple files

I described earlier the Power-base features for extracting information from one file for use or storage in another, using the Look-up and Function options. The main method of relating files in Power-base uses the zoom features, which allow you to move among files by zooming along pre-established links. For example, if you had set up a system of files to deal with the supplier-product application referred to at the beginning, you would establish in the product record a field containing a supplier identifier, which would allow you to zoom from a product record to the record of one of its suppliers. Once there, you can step through all the records of suppliers of that product, then zoom back to the product record. Fields used for zoom links need not be indexed, but this does speed them up.

When working online you can zoom around your database at will, wherever the links allow you to go, constrained only by the limit of 10 consecutive zooms without unzooming.

In reports, however, there is a restriction: you can specify reporting on fields in the initial file, then zoom to another linked to it, and then on to another if such links exist. But you cannot unzoom to the initial record, and zoom again down another zoom path. Zooming also provides the only way of reporting on several files in the same report, so links must be established if only for this purpose.

## Tailoring

Power-base provides a limited degree of tailoring for individual applications beyond the basic database facilities. You can set up menus to give access to individual files by creating a one-record

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| Milestone | 425.00 | 329.00 |
| Lotus 1-2-3 | 835.00 | 589.00 |
| Multimate 3.3 incl. Brit. Dict. | 695.00 | 439.00 |
| Open Access | 995.00 | 636.00 |
| Word Perfect | 625.00 | 425.00 |
| Wordstar | 415.00 | 349.00 |
| Wordstar 2000 | 645.00 | 420.00 |
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| Dollars + Sense | 99.00 | 79.00 |
| Clout | 300.00 | 229.00 |
| RBase | 630.00 | 519.00 |
| Infostar | 595.00 | 355.00 |
| Quickcode III | 405.00 | 329.00 |
| PFS File Graph Report | 195.00 | 165.00 |
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| Smartkey | 79.95 | 59.95 |
| Tourbo Pascal | 125.00 | 109.00 |
| Tourbo T/Box/Graphics | 99.00 | 85.00 |
| PC Alien | 95.00 | 82.00 |
| Spellbinder/Scientific | 795.00 | 592.00 |
| For Software Not Listed | | CALL |

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|---|---|---|
| Paradise 64k/384k 5 pack card | 615.00 | 425.00 |
| Paradise Serial printer port | 184.00 | 159.00 |
| Paradise clock/256k | 578.00 | 478.00 |
| Paradise Modular graphics card | 797.00 | 627.00 |
| Paradise Mouse | 250.00 | 220.00 |
| Hercules Graphics Card | 445.00 | 375.00 |
| Qubie 10mb hard D.D | 2250.00 | 1500.00 |
| Qubie 20mb hard D.D | 2750.00 | 2250.00 |
| Ast Megapak 256k | 919.00 | 742.00 |
| Qubie Monitors Gr + Amb | 395.00 | 289.00 |
| Hercules, Graphics Edge, Persist | CALL | CALL |
| Hardware Not Listed | | CALL |

### Apple

| | | |
|---|---|---|
| Printshop | 74.95 | 64.95 |
| Bank St. Speller | 105.00 | 89.00 |
| Bank St. Writer | 104.95 | 89.00 |
| Megaworks | 179.00 | 155.00 |
| Wordstar | 395.00 | 320.00 |
| Infostar | 595.00 | 395.00 |
| Milestone | 295.00 | 240.00 |
| Friday | 400.00 | 298.00 |
| PFS File/Write/Report/Graph | 195.00 | 165.00 |
| PFS School Record | 195.00 | 155.00 |
| Dollars + Sense | 164.00 | 138.00 |
| Zardax II Pro | 300.00 | 245.00 |
| DBase II cp/m | 599.00 | 475.00 |
| Sensible Speller | 213.00 | 185.00 |
| Zork I/II | @54.95 | 49.95 |
| Turbo Pascal + Toolbox | 219.00 | 199.00 |
| Sam Speech Synthesiser | 210.00 | 65.00 |
| Wizardry | 79.95 | 67.95 |
| Ultima II | 79.95 | 67.95 |
| Sorcerer | 74.95 | 64.95 |
| Sargon III | 75.95 | 64.95 |
| Auto Ice Printer Interface Card | 130.00 | 85.00 |
| RS232 Serial Card | 99.00 | 79.00 |
| Microsoft Z80 Card | 769.00 | 569.00 |
| Supercalc Card | 249.00 | 198.00 |
| Microgenera Hard Disc Drives | CALL | CALL |
| Extended 80 Col Card + 64kb | 199.00 | 99.00 |
| Microsoft Z80 Softcard II | 769.00 | 569.00 |
| Zardax II Pro DOS | 300.00 | 240.00 |
| Zardax I DOS 3.3 | 200.00 | 169.00 |
| For rest of available hardware and software | | CALL |

### Discs

| | | |
|---|---|---|
| Nashua Professional SSDD | 49.95 | 37.00 |
| Nashua Professional DSDD | 79.95 | 44.50 |
| Nashua 8" DSDD | 92.00 | 59.60 |
| Memorex SSDD | 49.95 | 37.00 |
| Memorex DSDD | 80.00 | 44.99 |
| 3½" Microfloppies SSDD | 95.00 | 65.00 |
| Xidex | 49.95 | CALL |

### Modems

| | | |
|---|---|---|
| Sendata 300AA | 410.00 | 299.00 |
| Sendata 700AC | 319.00 | 165.00 |
| Apple Auto Ice modem | 399.00 | CALL |
| Avtec Modems | CALL | CALL |
| Tulpi Modems | CALL | CALL |
| Datacraft Custom made Modems | CALL | CALL |
| PC In/Modem | 848.00 | 679.00 |
| Viatel Modems | CALL | CALL |
| For the best price on any modem in Australia | | CALL |

### CP/M Software

| | | |
|---|---|---|
| Turbo Toolbox + Pascal | 260.00 | 199.00 |
| Nevada Languages | 65.00 | 53.00 |
| Access Manager | 595.00 | 442.00 |
| Supercalc | 320.00 | 255.00 |
| Infostar | 595.00 | 410.00 |
| Display Manager | 750.00 | 588.00 |
| CP/M + (3) unconfigured | 488.00 | 436.00 |
| Concurrent cp/m | 465.00 | 399.00 |
| Modem 86 | 199.00 | 160.00 |

### MACINTOSH SOFTWARE

| | | |
|---|---|---|
| Filevision | 275.00 | 170.00 |
| Dollars and Sense | 175.00 | 148.00 |
| Keystroke | 859.00 | 699.00 |
| DB Master | 360.00 | 280.00 |
| Think Tank | 210.00 | 159.00 |
| MacVision | 435.00 | 385.00 |
| Word (Microsoft) | 325.00 | 285.00 |
| Multiplan | 325.00 | 285.00 |
| File | 325.00 | 285.00 |
| Excell | 750.00 | 595.00 |
| Entrepeneur | 145.00 | 85.00 |
| Logo | 235.00 | 199.00 |
| Jazz | 899.00 | 695.00 |
| Megamerge | 199.00 | 175.00 |
| Megaform | 315.00 | 255.00 |
| Megafiler | 245.00 | 215.00 |
| For latest Mack Software | | CALL |

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| | | |
|---|---|---|
| Epson LX80 | 492.00 | CALL |
| RX80 F-T+ | 594.00 | CALL |
| RX100 | 840.00 | CALL |
| FX100 + | 1108.00 | CALL |
| LQ1500 | 2040.00 | 1790.00 |
| Star Radix 10 200cps | 999.00 | 799.00 |
| Star Delta 10 160cps | 575.00 | 520.00 |
| Star Delta 15 160cps | 850.00 | 675.00 |
| Silver Reed 500 | 787.00 | 559.00 |
| Silver Reed 550 | 1281.00 | 894.00 |
| Silver Reed EB50 | 430.00 | 340.00 |
| Silver Reed 770 | 1893.00 | 1349.00 |
| NEC P3/P2 | 1450.00 | CALL |
| 64kb Buffers | 399.00 | 280.00 |

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| President 16PC and Walkabout | CALL |
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| NEC Apc III | CALL |
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file, each of whose fields zooms to a real file. There is also a simple testing feature which allows you to use the concatenation operator to determine whether, say, to print a debit or a credit message against a balance.

A number of Applications Templates is available and will be released by Paxus in early August.

As it provides only a true/false test, this facility gives a very limited choice of action. There are no command language features, of the kind available in dBase or Sensible Solution, to allow you to store sets of actions and initiate them with a single keystroke through a menu option, and to choose different paths through these options according to flexible tests of the kind found in programming languages such as Basic.

## Security & housekeeping

Password protection is available at application level. Power-base allows you to copy data files or file descriptions, and to delete data files within the current directory. You can change directories within power-base, and the package automatically creates a separate subdirectory for each application under the directory in which the package is stored. (Normally this is called PB, but you can specify otherwise.)

All Power-base files in a single application must be in the same directory. There are provisions for accessing files from separate directories when importing or exporting files.

## Links with outside

Power-base allows an unusually wide range of formats for files which are to be imported into the package or written out from it. The permitted formats include the usual comma-delimited format for mailmerge, the DIF™ format used by many spreadsheets, the SYLK format used by Multiplan, the dBase II file format, and others. Such flexibility should enable you to pass information in and out of Power-base more easily than with most packages — even now there are many data management packages which cannot easily be linked with spreadsheets.

## User image

For people who like using menus, Power-base is easy to use and provides its options in a sensible way. For example, at all times the options which could potentially be available are shown on the bottom of the screen, with those actually available brighter than those not at present applicable (for instance, because no zoom links apply to this file).

The currently chosen option is highlighted; options may be chosen either by moving this highlighting (with function keys or with the cursor), or by entering the first letter or two of the option name.

Function keys are used consistently: for example, F1 always means 'done', while the ESCape key can be used to abandon the current task. Another helpful provision for the error-prone is the START OVER option, provided during editing to allow you to abandon the changes made to the current record and refresh it with the filed version.

Some of the options are not very helpfully named: for example, EDIT-SCAN is the option for scanning data records and amending them, while EDIT-SELECTION allows you to enter or edit criteria (not choose which records to edit, as I at first thought). Such mistakes are actually not easy to make, since Power-base provides very good signposting of the menu options.

## Benchmarks

| | | |
|---|---|---|
| BM1 | Time to add one new record | Inst |
| BM2 | Time to select record by primary key | Inst |
| BM3 | Time to select record by secondary key | Inst |
| BM4 | Time to access 20 records from 1000 sequentially on three-character field (same field as in BM2 key) | 2secs/rec |
| BM5 | Time to access record using wild code | Inst |
| BM6 | Time to index 1000 records on three-character field | 30m12secs |
| BM7 | Time to sort 1000 records on five-character field | 4m45secs |
| BM8 | Time to calculate on one field per record and store result in record | 5m17secs |
| BM9 | Time to total three fields over 1000 records | 7m43secs |
| Bm10 | Time to add one new field to each of 1000 records | 30m37secs |

Time to import a file of 1000 records: 13m28secs

Notes: NT=Not tested NP=Not possible +=including scrolling

Benchmarks recorded on an IBM PC/XT(H)

## Documentation

The Power-base documentation is among the best I've seen. There is a good 'road map' to guide you through the location of the various menu options. The *Reference Summary* is a pocket card which includes not only a list of every menu option, but also various other items.

There are two manuals: the *Tutorial Guide* takes you through all the main Power-base features, using a set of example applications which come with the package, and also through setting up an application using several related sets of records. The *Reference Manual* includes an overview for people who already know a bit about data management, and a set of notes on 'advanced topics' (using particular aspects of Power-base which are more suited to experienced users), as well as a reference guide to each command. These are set out in a helpful and consistent manner. Fig 2 shows a typical page from the *Reference Guide.*

## Conclusion

The developers of Power-base have made a valiant attempt to provide complex features for data management in a way that novice users can understand. On the whole they may have succeeded. although I fear that the sheer size (unavoidable for a package with such features) of both the package and the manual may put some off.

There are, of course, a few criticisms. The reporting features are still not as powerful as one would like, in particular the lack of a letter-writing feature, while the almost total absence of control features would prevent one from recommending Power-base as a system developer's tool.

Nevertheless, if you are relatively new to computing and a flat-file package is insufficiently powerful, you should find Power-base well worth a close look. Even for more experienced users, there is plenty of power there.

## Summary

| | |
|---|---|
| Supplier | Paxus Commercial Systems (incorporating Interactive Applications and Framework Information Systems) |
| Telephone | (02) 920 1377 |
| System | IBM PC and compatibles |
| Version reviewed | 2.1 |
| Type | F.N |
| Features | Top View compatible. Database management system allowing links among many files, up to 10 links active at once. Max six keys per file, kept up-to-date. Batch updating, reasonable reporting, excellent links to other file types: for example, spreadsheet (DIF and 1-2-3). |
| Drawbacks | Re-indexing tedious. Reporting not very powerful — no letter writer, limits on file linkage. No control structures. |
| Ease of use | Good: menu-driven, all options always shown. No extra online help, but usually self-evident. Manuals excellent. |

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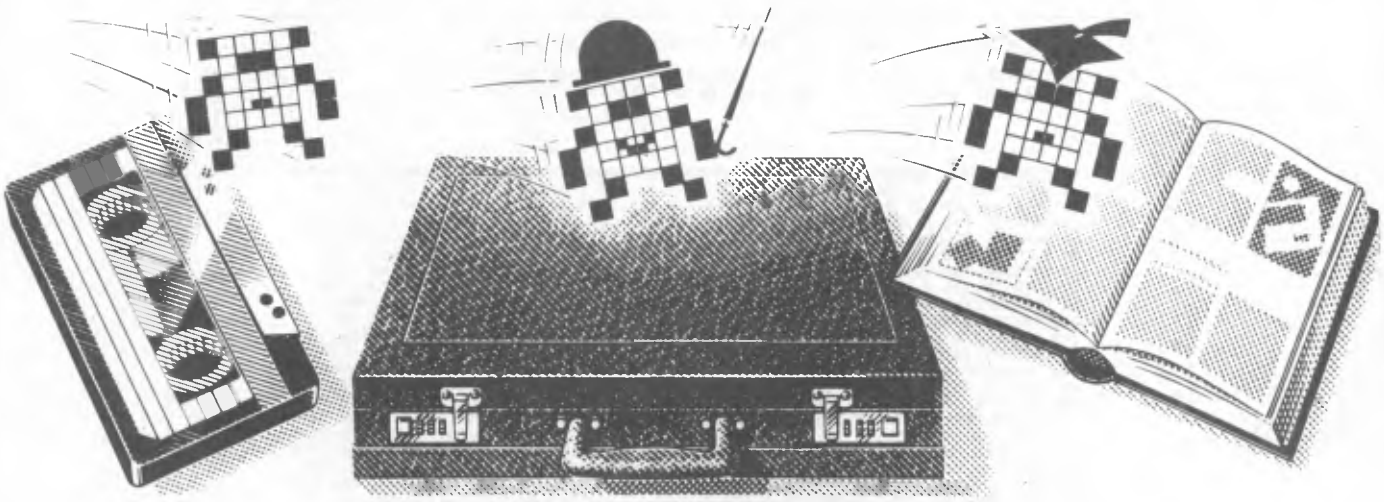

**Nick Walker selects the best of readers' programs — for details on submitting your own, see the end of this section.**

In *APC* June I published a Commodore 64 utility to make disk access commands friendly. This month's utility, Turbo-DOS, makes the disk drive operate six to seven times faster. Recently the turbo-load programs for cassettes have led to Commodore 64 cassettes loading quicker than disks, but Turbo-DOS redresses the balance and will even work with some commercial software. As an example of the power of this program I loaded a small Basic program using the normal method which took 26 seconds — using Turbo-DOS, it took under four seconds.

The utility theme is continued this month with Spectrum Speech, a program that will take any sound presented to the ear socket (that is, from a microphone or cassette) and digitise it. The sound can then be edited in memory if required and played back through the Spectrum's speaker. Don't expect too much when playing voice back: the best effects come from other sounds. Other utilities this month include a professional-quality communications program for the Epson HX-20 and a program compressor written in Microsoft Basic.

For the BBC, there is a game called Revenge of the Flying Bunnies — despite its title it is a very good game. And there's a couple of very useful utilities from Kevin Riordan for Commodore 64 owners as well as one for the Apple II from Paul Rule.

*Games*

*Scientific/mathematic*

*Business*

*Toolkit/utilities*

*Educational/Computer Aided Learning*

# Commodore 64 Turbo-DOS

**by Kietil Nass**

**MICROTEX 666**

Still keying in programs? Forget it! This program is available for telesoftware downloading on Microtex 666 (page *66614#.)

It's pretty sickening being the proud owner of a 1541 disk drive and discovering that the new fast loader cassettes can load a program faster than the disk drive. This program redresses the balance, allowing the 1541 to operate up to seven times faster.

The listing creates a machine code file containing Turbo-DOS. Type in the listing as shown and save it, then type RUN; any errors in the data statements will be detected by the checksums within the program. After correcting all errors, the program will generate the machine code program called TURBO-LOAD 64 on disk. Whenever you want to use Turbo-DOS just insert the disk, type LOAD "TURBOLOAD 64", 8 and then RUN. All further disk access will be at the new high speed. That's all you need to know to use the program, but for those who are interested the following explains how the program works.

The program fools the disk into thinking it's an RS232 device instead of a 3600 baud serial device. As with most RS232 devices the baud rate is then user-selectable, and in Turbo-DOS is selected to operate at 15200 baud (it can be taken to 19600 baud, but at this rate load errors start to creep in). The fast load system will work on any program that uses the normal LOAD vectors, and unlike most toolkit programs this one uses no user memory. After initialisation the program puts itself under the kernal at $C000 to $D000. This leaves the normal 38911 Basic bytes free and a 4k block at $C000-$D000, giving plenty of room for any extras.

## TURBOLOAD 64 — THE FAST LOADING O.S

REQUIREMENTS: A COMMODORE 64 COMPUTER WITH A 1541 DISK DRIVE CONNECTED
PLEASE NOTE THAT ALL THAT 'REM'S CAN BE OMITTED WHEN TYPING IT IN.

```
10 REM[illegible]
20 DATA11,8,192,7,158,51,50,51,56,0,0,0,32,47,243,169,226,162,248,133,167,-219
30 DATA134,168,169,0,162,3,133,169,134,170,169,0,32,12,237,169,111,32,185,-149
40 DATA237,169,77,32,221,237,169,45,32,221,237,169,87,32,221,237,160,0,165,-188
50 DATA169,32,221,237,165,170,32,221,237,169,30,32,221,237,177,167,32,221,-210
60 DATA237,200,192,38,144,246,32,254,237,24,165,167,105,38,133,167,144,3,-206
70 DATA230,168,24,165,169,166,170,105,38,133,169,144,2,230,170,224,5,144,-144
80 DATA173,201,0,144,169,169,0,32,12,237,169,111,32,185,237,169,77,32,221,-74
90 DATA237,169,45,32,221,237,169,69,32,221,237,169,139,32,221,237,169,4,-88
100 DATA32,221,237,169,11,141,17,208,32,251,237,234,234,76,46,248,169,11,-6
110 DATA141,0,221,44,0,221,16,251,169,3,141,0,221,162,5,202,234,208,252,162,-93
120 DATA4,173,0,221,42,42,102,176,106,102,176,234,202,208,242,165,176,73,-140
130 DATA255,96,32,82,239,201,255,240,248,160,0,169,11,141,0,221,44,0,221,-55
140 DATA16,251,169,3,141,0,221,162,7,202,208,253,173,0,221,42,42,102,176,-85
150 DATA106,102,176,234,234,173,0,221,42,42,102,176,106,102,176,234,234,173,-73
160 DATA0,221,42,42,102,176,106,102,176,234,234,173,0,221,42,42,102,176,106,-249
170 DATA102,176,165,176,73,255,153,166,251,200,208,180,96,120,169,1,133,167,-231
180 DATA160,255,32,124,239,192,255,240,64,162,2,165,167,240,2,162,4,173,166,-244
190 DATA251,208,7,238,167,251,173,167,251,44,169,0,133,168,189,166,251,145,-162
200 DATA174,230,174,208,2,230,175,232,228,168,208,240,162,0,134,167,173,166,-255
210 DATA251,208,198,169,53,133,1,169,27,141,17,208,169,64,133,144,24,96,169,-70
220 DATA53,133,1,169,27,141,17,208,234,169,29,56,96,160,0,185,66,240,153,-89
230 DATA48,1,200,192,31,208,245,32,210,239,76,48,1,234,8,72,169,0,168,89,-223
240 DATA0,160,200,208,250,201,128,240,4,169,55,133,1,166,174,164,175,104,-228
250 DATA40,88,96,221,16,173,240,34,173,161,2,74,176,250,173,1,221,41,253,-129
260 DATA141,1,221,173,1,221,41,4,240,249,169,144,24,76,59,239,173,161,2,41,-76
270 DATA18,240,243,24,96,173,151,2,172,156,2,204,155,2,240,11,41,247,141,-14
280 DATA151,2,177,247,238,156,2,96,9,8,141,151,2,169,0,96,72,173,161,2,240,-245
290 DATA17,173,161,2,41,3,208,249,169,16,141,13,221,169,0,141,161,2,104,96,-39
300 DATA165,0,41,6,201,2,240,3,76,158,253,234,169,5,133,9,162,90,134,75,162,-14
310 DATA0,169,82,133,36,32,86,245,80,254,184,173,1,28,197,36,240,9,198,75,-210
320 DATA208,239,169,10,76,105,249,80,254,184,173,1,28,149,37,232,224,7,208,-73
330 DATA243,32,151,244,165,22,69,23,69,24,69,25,69,26,240,7,198,9,208,192,-37
340 DATA76,30,244,165,24,197,6,240,3,76,11,244,133,34,169,6,133,49,76,60,-184
350 DATA4,165,18,166,19,133,22,134,23,165,6,133,24,165,7,133,25,169,0,69,-44
360 DATA22,69,23,69,24,69,25,133,26,32,52,249,162,90,32,86,245,160,0,80,254,-110
370 DATA184,173,1,28,217,36,0,240,6,202,208,237,76,81,245,200,192,0,208,234,-216
380 DATA32,86,245,80,254,184,173,1,28,145,48,200,208,245,160,186,80,254,184,-233
390 DATA173,1,28,153,0,1,208,208,244,32,224,248,165,56,197,71,240,3,76,246,-6
400 DATA244,32,233,245,197,58,240,3,76,2,245,160,0,169,85,32,82,4,185,0,6,-250
410 DATA133,119,44,0,24,16,251,169,16,141,0,24,44,0,24,48,251,162,0,138,102,-170
420 DATA119,42,42,102,119,42,42,141,0,24,138,102,119,42,42,102,119,42,42,-141
430 DATA141,0,24,138,102,119,42,42,102,119,42,42,141,0,24,138,102,119,42,-199
440 DATA42,102,119,42,42,141,0,24,162,2,202,208,253,169,15,141,0,24,200,208,-48
450 DATA173,234,234,234,234,234,234,234,234,173,0,28,9,8,141,0,28,173,0,6,208,-25
460 DATA3,76,158,253,197,24,208,249,133,6,173,1,6,133,7,76,101,3,133,119,-11
470 DATA44,0,24,16,251,169,16,141,0,24,44,0,24,48,251,162,4,169,0,102,119,-72
480 DATA42,42,102,119,42,42,141,0,24,202,208,240,234,234,234,234,234,234,-48
490 DATA169,15,141,0,24,96,96,133,0,88,165,0,48,252,120,96,120,234,234,234,-217
500 DATA234,234,234,165,24,141,0,6,133,6,165,25,141,1,6,133,7,169,4,133,120,-33
510 DATA169,226,32,130,4,201,2,144,51,160,0,132,120,164,120,185,219,254,240,-249
520 DATA18,88,32,118,214,120,169,226,32,130,4,201,2,144,26,230,120,208,231,-5
530 DATA169,192,32,130,4,169,226,32,130,4,201,2,144,8,169,255,32,82,4,76,-13
540 DATA34,235,173,0,6,240,248,197,24,240,196,173,0,6,133,6,173,1,6,133,7,-183
550 DATA76,160,4,234,234,234,234,160,0,185,25,244,153,48,1,200,192,31,208,-63
560 DATA245,76,48,1,169,0,168,89,0,160,200,208,250,201,128,240,7,169,55,133,-243
570 DATA1,76,1,245,76,48,244,160,0,177,187,201,36,240,242,169,1,133,167,169,-13
580 DATA0,133,144,165,167,32,12,237,169,111,32,185,237,165,144,16,11,230,-142
590 DATA167,165,167,201,16,208,230,76,187,238,165,167,201,8,240,239,160,0,-19
600 DATA185,122,244,240,6,32,210,255,200,208,245,32,225,255,208,251,238,234,-62
610 DATA234,234,234,76,187,238,234,13,89,79,85,32,72,65,86,69,32,77,79,82,-249
620 DATA69,32,84,72,65,78,32,49,32,68,69,86,73,67,69,32,79,78,45,76,73,78,-126
625 DATA69,13,0,-82
630 DATA0,0,0,120,169,55,133,1,160,0,132,3,169,160,133,4,177,3,145,3,230,-5
640 DATA3,208,248,230,4,208,244,169,229,141,214,253,169,76,141,114,254,141,-230
650 DATA249,244,169,188,141,115,254,169,254,141,116,254,169,9,141,250,244,-35
660 DATA169,244,141,251,244,169,18,133,3,169,10,133,4,169,226,133,5,169,248,-78
670 DATA133,6,177,3,145,5,200,208,249,230,4,230,6,165,6,201,250,208,239,169,-18
680 DATA16,162,8,133,3,134,4,169,187,162,238,133,5,134,6,177,3,145,5,200,-232
690 DATA208,249,230,4,230,6,165,6,201,240,208,239,185,67,13,153,95,228,200,-111
700 DATA192,80,208,245,160,0,185,12,12,153,9,244,200,192,148,208,245,169,-102
710 DATA53,133,1,76,248,252,234,234,0,32,66,89,84,69,83,32,70,82,69,69,13,-197
720 DATA0,0,0,0,0,0,0,147,67,66,77,32,83,85,80,69,82,32,68,79,83,13,79,46,-164
730 DATA83,32,49,46,48,13,40,67,41,32,49,57,56,52,32,72,69,76,77,83,77,65,-192
740 DATA78,32,83,79,70,84,87,65,82,69,32,67,79,82,80,46,13,0,129,72,32,0,-81
750 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,49,54,53,44,49,55,54,44,48,55,51,44,50,-138
760 DATA53,53,44,48,57,32,32,32,32,32,42,80,82,71,32,32,0,223,13,1,0,32,32,-31
770 DATA32,34,70,65,83,84,46,83,80,69,67,73,65,76,34,32,32,32,32,32,80,82,-3
780 DATA71,32,32,0,255,13,6,0,32,32,32,34,72,69,76,77,83,77,65,78,32,84,85,-57
790 DATA82,66,79,68,73,34,32,80,82,71,32,32,0,29,14,241,0,66,76,79,67,75,-98
800 DATA83,32,70,82,69,69,46,32,32,32,32,32,32,32,32,32,32,32,32,32,0,0,0,-99
810 DATA44,55,-99,-999
820 GOSUB960
830 GOSUB1270
840 GOSUB1160
850 REM[illegible]
860 RESTORE:OPEN1,8,3,"@:TURBOLOAD 64,P,W":PRINT#1,CHR$(1);CHR$(8);
870 PRINT"NOW GENERATING THE TURBOLOAD FILE"
880 READA:IFA<0GOTO900
890 PRINT#1,CHR$(A);:GOTO880
900 IFA<>-999GOTO880
910 PRINT#1:CLOSE1:SAVE"@:TURBO.GEN",8
920 GOSUB1420
930 REM[illegible]
940 LOAD"TURBOLOAD 64",8
950 REM[illegible]
960 PRINT"□        ***TURBOLOAD GENERATOR***"
970 ALLCHECK=0:FORLINE=0TO79
980 CHECK=0
```

```
990 READITEM:IFITEM<0GOTO1030
1000 CHECK=CHECK+ITEM:CODE=CODE+1
1010 ALLCHECK=ALLCHECK+SUM+CHECK
1020 GOTO990
1030 SUM=ABS(ITEM):IFSUM=999THENRETURN
1040 IFSUM<>(CHECK AND255)GOTO1090
1050 PRINT"[illegible]READING DATA FROM LINE";PEEK(63)+256*PEEK(64)
1060 NEXT LINE
1070 IF ALLCHECK<>197778GOTO1140
1080 RETURN
1090 PRINT"??DATA ERROR IN LINE   ";PEEK(63)+256*PEEK(64)
1100 PRINT"GENERATED CHECKSUM     ";CHAND255
1110 PRINT"SHOULD HAVE BEEN       ";SUM
1120 ER$="L"+STR$(PEEK(63)+256*PEEK(64))+CHR$(13)+"RUN":FORI=1TOLEN(ER$)
1130 POKE630+I,ASC(MID$(ER$,I,1)):NEXT:POKE198,LEN(ER$):END
1140 PRINT"UNRECOVERABLE ERROR. CHECK YOUR DATA-    STATEMENTS CAREFULLY" END
1150 REM[illegible]
1160 OPEN8,8,0,"$0:*E$%%"
1170 FORI=1TO8:GET#8,X$:NEXT
1180 GET#8,X$:IFX$<>""GOTO1180
1190 GET#8,X$:GET#8,X$
1200 GET#8,X$:GET#8,Y$
1210 X=LEN(X$):IFXTHENX=ASC(X$)
1220 Y=LEN(Y$):IFYTHENY=ASC(Y$)
1230 L=X+Y#256:IFL>50THENPRINT"YOU HAVE"L" BLOCKS FREE ON THE DISK":RETURN
1240 PRINT"NOT SUFFICIENT SPACE ON YOUR DISK"
1250 INPUT"INSERT ANOTHER DISK AND HIT 'RETURN'",X$:GOTO830
1260 REM[illegible]
1270 OPEN15,8,15,"I"
1280 INPUT#15,EN:IFEN=0THENCLOSE15:RETURN
1290 IFEN<>21THENPRINT"YOU HAVE A FAULTY DISK INSERTED":GOTO1250
1300 PRINT"YOUR DISK IS NOT FORMATTED"
1310 PRINT"DO YOU WANT ME TO FORMAT IT (Y/N)":POKE198,0
1320 GETA$:IFA$="N"ORA$="Y"GOTO1340
1330 GOTO1320
1340 IFA$="N"GOTO1250
1350 INPUT"ENTER NEW DISK NAME";NAME$:IFLEN(NAME$)>16GOTO1350
1360 INPUT"ENTER NEW ID-CODE";ID$:IFLEN(ID$)>2GOTO1360
1370 PRINT#15,"NEW0:"+NAME$+","+ID$:CLOSE15
1380 FORI=1TO10:OPEN15,8,15,"I"
1390 INPUT#15,EN:IFEN<>0THENPRINT"YOU HAVE A FAULTY DISK":GOTO1250
1400 CLOSE15:NEXT:RETURN
1410 REM[illegible]
1420 PRINT"DO YOU WANT TO PROTECT THE TURBOLOAD     FILE  (Y/N) ?":POKE198,0
1430 GETA$:IFA$="N"ORA$="Y"GOTO1450
1440 GOTO1430
1450 IFA$="N"THENRETURN
1460 FORAD=828TO1006:READDA:POKEAD,DA:NEXT
1470 F$="TURBOLOAD 64"
1480 POKE675,1:FORI=1TOLEN(F$):POKE683+I,ASC(MID$(F$,I,1)):NEXT
1490 POKE700,0:OPEN15,8,15 OPEN2,8,2,"#":T=18:S=1
1500 PRINT#15,"U1";2;0;T;S:SYS828 A=PEEK(252):IFA<>0GOTO1530
1510 T=PEEK(691) S=PEEK(692) IFTGOTO1500
1520 PRINT"THE FILE IS NOT ON THE DISK":PRINT"UNRECOVERABLE ERROR. TRY AGAIN" E
ND
1530 IF(AAND64)THENPRINT"THE FILE IS ALREADY LOCKED.":STOP
1540 P=PEEK(255):PRINT#15,"U1";2;0;T;S:PRINT#15,"B-P";2;P:PRINT#2,CHR$(A OR64),
1550 PRINT#15,"B-P 2 0":PRINT#15,"U2";2;0;T;S
1560 PRINT"THE FILE IS NOW PROPERLY LOCKED" RETURN
1570 REM[illegible]
1580 REM[illegible]
1590 REM[illegible]
1600 DATA169,0,141,168,2,133,253,162,2,32,198,255,32
1610 DATA228,255,141,169,2,32,228,255,141,170,2,230,253
1620 DATA230,253,32,228,255,133,252,165,253,133,255,32,228
1630 DATA255,32,228,255,230,253,230,253,160,0,32,228,255
1640 DATA230,253,133,169,2,200,24,192,16,144,242,160,243
1650 DATA32,228,255,230,253,165,144,240,3,141,168,2,200
1660 DATA208,241,165,252,208,7,173,168,2,208,22,240,191
1670 DATA165,140,240,3,32,199,3,173,167,2,240,3,32
1680 DATA175,3,173,168,2,240,171,32,204,255,96,160,0
1690 DATA185,172,2,240,6,217,189,2,208,7,200,208,243
1700 DATA238,168,2,96,169,0,133,252
1710 DATA96,160,0,185,189,2,240,6,32,210,255,200,208
1720 DATA245,165,252,41,64,240,10,169,144,32,210,255,169,60,32,210,255,169
1730 DATA13,32,210,255,169,144,32,210,255,96

READY.
```

# Spectrum Speech

## by Philip Kirkpatrick

This program will take any outside sound (including speech) and record it into the Spectrum's memory. Once in memory, the sound can be speeded up and rearranged as required by the user.

To use this program, type in the first listing and save to cassette with the command SAVE "speech" LINE 3. Then type CLEAR 32767:NEW and type in the second listing with the command SAVE "sc" CODE 65279,100.

To run the program type CLEAR 32767:NEW:LOAD " " ; the program will automatically load the machine code. After loading you will be presented with a menu of eight different options:

1) Sample sound — this will allow you to record any sound entered via the ear port into the Spectrum memory.
2) Change parameters — allows you to lengthen, shorten or change the speed of the recording in memory.
3) Play sound.
4) Save sound — saves the sound in memory to tape.
5) Load sound — loads previously stored sound.
6) Name sound — adds a single letter label to sound.
7) Program sequence — allows you to create a sequence from previously defined labels.
8) Run sequence — executes the sequence created.

```
LIST
    1 REM *** PUBLIC SPEECH (C)1985 *
    2 REM *** BY P.KIRKPATRICK ******
    3 PRINT AT 10,9;BRIGHT 1;FLASH 1;"Code is Loading"
    5 LOAD ""CODE
    6 DIM F$(50):DIM E(50):DIM B(50):LET C=0
    7 LET S$=""
    8 LET S=32768:LET F=65024:LET P=8
    9 CLS
   10 PRINT AT 0,10;"Public Speech"
   20 PRINT AT 0,10;OVER 1;"------------":REM 12 UNDERLINE CHARS
   30 PRINT AT 2,0;"OPTIONS-"
   40 PRINT AT 4,0;"1....Sample Sound"
   50 PRINT AT 6,0;"2....Change Parameter"
   60 PRINT AT 8,0;"3....Play Sound"
   70 PRINT AT 10,0;"4....Save Sound"
   80 PRINT AT 12,0;"5....Load Sound"
   85 PRINT AT 14,0;"6....Name Sound"
   87 PRINT AT 16,0;"7....Program Sequence"
   88 PRINT AT 18,0;"8....Run Sequence"
   90 LET A$=INKEY$
  100 IF A$="1" THEN CLS:GOSUB 1000:CLS:GOTO 10
  110 IF A$="2" THEN CLS:GOSUB 1500:CLS:GOTO 10
  120 IF A$="3" THEN CLS:GOSUB 2000:CLS:GOTO 10
  130 IF A$="4" THEN CLS:GOSUB 2500:CLS:GOTO 10
  140 IF A$="5" THEN CLS:GOSUB 3000:CLS:GOTO 10
  150 IF A$="6" THEN CLS:GOSUB 3500:CLS:GOTO 10
  160 IF A$="7" THEN CLS:GOSUB 3600:CLS:GOTO 10
  170 IF A$="8" THEN CLS:GOSUB 3650:CLS:GOTO 10
  180 GOTO 90
 1000 INPUT"Press ENTER to Sample ";LINE A$
 1010 RANDOMIZE USR 65280
 1020 RETURN
 1500 PRINT AT 0,8;"Alterations Menu"
 1510 PRINT AT 0,8;OVER 1;"----------------":REM 16 UNDERLINE CHARS
 1520 PRINT AT 2,0;"OPTIONS-"
 1530 PRINT AT 4,0;"1....Change Start Address"
 1540 PRINT AT 6,0;"2....Change Last Address"
 1550 PRINT AT 8,0;"3....Change Speed"
 1560 LET A$=INKEY$
 1570 IF A$="1" THEN CLS:GOSUB 1620:CLS:GOTO 1500
 1580 IF A$="2" THEN CLS:GOSUB 1680:CLS:GOTO 1500
 1590 IF A$="3" THEN CLS:GOSUB 1740:CLS:GOTO 1500
 1600 IF A$=CHR$ 13 THEN RETURN
 1610 GOTO 1560
 1620 PRINT AT 0,0;"Current Start Address ";S
 1630 INPUT"ENTER New Start Address ";S
 1640 IF S<F OR S<32768 THEN GOTO 1630
 1650 LET H=INT (S/256):LET L=S-(H*256)
 1660 POKE 65310,L:POKE 65311,H
 1670 RETURN
 1680 PRINT AT 0,0;"Current Last Address ";F
 1690 INPUT"ENTER New Last Address ";F
 1700 LET N=INT(F/256)
 1710 IF N>254 OR N<128 THEN GOTO 1690
 1720 POKE 65305,N
 1730 RETURN
 1740 PRINT AT 0,0;"Current Speed ";P
 1750 INPUT"ENTER New Speed ";P
 1760 IF P<1 OR P>15 THEN GOTO 1750
 1770 POKE 65313,P
 1780 RETURN
 2000 INPUT"Press ENTER for Sound ";LINE A$
 2010 RANDOMIZE USR 65308
 2020 IF INKEY$=CHR$ 13 THEN RETURN
 2030 GOTO 2010
 2500 INPUT"ENTER Name of File ";LINE N$
 2502 IF N$="" THEN GOTO 2500
 2510 SAVE N$ CODE 32767,32512
 2520 RETURN
 3000 INPUT"ENTER Name of File ";LINE N$
 3002 IF N$="" THEN GOTO 3000
 3010 LOAD N$ CODE
 3020 RETURN
 3500 LET C=C+1:IF C>50 THEN PRINT AT 10,1;"Dictionary Full":PAUSE 0:RETURN
 3505 PRINT AT 10,8;"Press Letter Name"
 3510 PAUSE 0:LET A$=INKEY$
 3515 IF A$="/" THEN GOTO 3505
 3520 PRINT AT 21,6;A$;" = Name of This Sound"
 3530 LET F$(C)=A$:LET E(C)=F:LET B(C)=S
 3540 RANDOMIZE USR 65308
 3550 RETURN
 3600 PRINT AT 0,0;"Program-";S$
 3601 INPUT"Re-Program? ";LINE E$
 3602 IF E$="" OR E$="n" THEN RETURN
 3603 INPUT"ENTER Pause Length Reqd. ";M
 3605 IF M<1 OR M>20 THEN GOTO 3600
 3610 PRINT AT 10,0;"Program Sequence Now"
 3615 LET S$=""
 3620 INPUT LINE S$
 3625 IF S$="" THEN GOTO 3620
 3630 RETURN
 3650 IF S$="" THEN RETURN
 3655 FOR L=1 TO LEN S$
 3660 IF S$(L)="/" THEN PAUSE M:NEXT L
 3670 FOR K=1 TO LEN F$
 3680 IF F$(K)=S$(L) THEN GOTO 3710
 3690 NEXT K
 3700 GOTO 3750
 3710 POKE 65311,INT (B(K)/256)
```

```
3715 LET W=PEEK 65311
3720 POKE 65310,B(K)-(W*256)
3730 POKE 65335,INT (E(K)/256)
3740 RANDOMIZE USR 65308
3750 NEXT L
3760 LET F=PEEK 65335*256
3770 LET G=W*256+PEEK 65310
3780 RETURN

10 FOR a=65280 TO 65339
20 READ v:POKE a,v
30 NEXT a
40 DATA 243,33,0,128,6,8,219,254,203,119,32,2,203,254,203,62,16,244,203,
14,35,124,254,254,32,234,251,201,243,33,0,128,6,8,203,70,40,4,62,0,211,
254,62,255,211,254,203,6,16,240,203,6,35,124,254,254,32,230,251,201
```

# Epson HX-20 HX-Modem

## by Wico Ypma

HX-Modem is a communications program for the Epson HX-20, allowing you to use the HX-20 as a smart terminal. For transfer of files it employs the Ward Christensen (or XModem) protocol. This protocol is very popular among CP/M systems, so you can not only transfer files from HX-20 to HX-20 but also to CP/M machines (including the Epson PX-8 and QX-10).

When you run the program the terminal machine code section will load into memory as a file called HX-Modem, and some Basic will be left called SetModem. Select HX-Modem from the menu to enter terminal mode or SetModem to configure communication conditions.

*HX-Modem*

In this mode the PF-keys have the following functions:

PF-1 — local Echo ON/OFF
PF-2 — automatic LF after CR during transmission ON/OFF
PF-3 — filter during transmission ON/OFF
PF-4 — send the file in the RAM file area
PF-5 — return to MENU
PF-6 — disable left-right scrolling ON/OFF
PF-7 — automatic LF after CR during receive ON/OFF
PF-8 — filter during receive ON/OFF
PF-9 — receive a file in the RAM file area
PF-0 — return to MENU

The filter function filters out non-ASCII symbols and control codes, and converts the delete (ASCII B) into the more general (ASCII 127) code.

*SetModem*

The SetModem section of the program has three options:

1) Allows you to change the RS232 handshaking conditions and the amount of memory reserved for the screen file and file buffer.
2) Handles saving and loading of text to tape in text or ASCII-Basic format.
3) Loads a text or ASCII-Basic file from tape and stores it in the file buffer ready for transmission.

```
T
X
100 'HX-Modem V3.1  1985 BY J.W.Ypma"
110 CLS:PRINT"  HANG ON A SECOND"
120 MEMSET &HEA8+81*24
130 FOR I=&HA40 TO &HEA6:READ A:POKE I,A:NEXT
140 TITLE "SetModem"
150 EXEC&HA40:A$="DELETE 1-999"+CHR$(13)+"EXEC&HDFFD"+CHR$(13)
160 A=VARPTR(A$):POKE&H916,&HFE:POKE&H917,PEEK(A+1):POKE&H918,PEEK(A+2)
170 END
180 DATA 206,1,60,60,238,2,140,255,255,39,5,24,56,24,32,243,56,204,186,65,237,0
190 DATA 204,10,92,237,2,57,186,65,255,255,10,116,72,88,45,77,111,100,101,109
200 DATA 32,32,86,51,46,49,32,87,89,0,206,14,77,198,7,166,0,167,7,8,90,38,248
210 DATA 206,14,84,189,255,94,206,14,86,189,255,94,134,255,183,14,55,183,14,57
220 DATA 183,14,59,183,14,58,79,183,14,56,204,253,40,189,255,136,134,1,189,255
230 DATA 133,254,255,220,204,1,4,189,255,130,189,255,157,37,93,39,94,189,255
240 DATA 154,129,254,38,19,192,241,37,83,193,10,36,79,88,206,11,114,58,238,0
250 DATA 173,0,32,68,246,14,57,39,34,129,13,39,30,129,32,44,26,129,8,39,7,54
260 DATA 189,255,79,50,32,44,246,14,55,39,3,189,255,79,134,127,189,255,118,32
270 DATA 29,189,255,118,246,14,55,39,5,54,189,255,79,50,129,13,38,12,246,14,56
280 DATA 39,7,134,10,32,230,126,14,43,254,255,216,236,0,39,148,189,255,121,246
290 DATA 14,59,39,34,129,127,46,136,45,4,134,8,32,24,129,127,39,57,44,52,129,32
300 DATA 44,14,129,7,39,31,45,42,129,13,46,38,129,11,39,29,54,189,255,79,50,246
310 DATA 14,58,38,3,126,10,179,129,13,38,17,134,10,32,235,204,10,2,189,255,100
320 DATA 32,5,134,10,189,255,79,126,10,179,134,8,32,215,11,141,11,152,11,163,13
330 DATA 87,14,43,11,174,11,195,11,206,11,217,14,43,76,198,1,189,255,100,57,182
340 DATA 14,55,67,183,14,55,132,15,32,238,182,14,56,67,183,14,56,132,15,32,227
350 DATA 182,14,57,67,183,14,57,132,15,32,216,182,2,128,133,1,39,7,122,2,128
360 DATA 134,0,32,202,124,2,128,134,15,32,195,182,14,58,67,183,14,58,132,15,32
370 DATA 184,182,14,59,67,183,14,59,132,15,32,173,198,0,189,255,73,198,19,206
380 DATA 14,91,189,255,73,198,10,206,14,111,189,255,73,198,10,206,14,122,189
390 DATA 255,73,79,183,14,73,183,14,71,183,14,70,189,13,67,189,13,47,252,1,44
400 DATA 253,14,64,179,4,254,253,14,62,134,21,189,255,118,204,160,0,253,14,68
410 DATA 189,13,12,182,14,75,39,3,126,12,181,182,14,74,129,1,38,122,189,12,254
420 DATA 182,14,74,183,14,71,189,12,254,182,14,74,187,14,71,76,38,113,182,14,71
430 DATA 176,14,70,38,3,126,12,231,74,38,99,79,183,14,72,198,128,247,14,76,254
440 DATA 14,62,255,14,60,189,12,254,182,14,74,254,14,60,167,0,8,188,14,64,44,67
450 DATA 255,14,60,187,14,72,183,14,72,122,14,76,38,225,141,124,182,14,74,177
460 DATA 14,72,38,43,182,14,70,76,183,14,70,189,13,47,79,183,14,73,189,13,67
470 DATA 254,14,60,255,14,62,134,6,189,255,118,126,12,23,129,4,38,8,134,6,189
480 DATA 255,118,126,12,197,182,14,73,76,183,14,73,54,189,13,67,50,129,10,45,12
490 DATA 198,0,189,255,73,204,10,2,189,255,100,57,141,3,126,12,18,189,12,241
500 DATA 204,5,0,253,14,68,141,29,182,14,75,39,240,57,141,237,134,6,189,255,118
```

```
510 DATA 126,12,23,254,255,216,236,0,39,5,189,255,121,32,244,57,204,16,0,253,14
520 DATA 63,189,255,157,36,3,126,255,37,127,14,75,254,255,216,236,0,30,18,198
530 DATA 25,90,46,253,254,14,63,9,255,14,68,38,235,115,14,75,57,189,255,121,183
540 DATA 14,74,57,182,14,70,22,79,206,14,135,189,255,40,214,6,206,14,133,189
550 DATA 255,73,57,182,14,73,22,79,206,14,142,189,255,40,198,6,206,14,140,189
560 DATA 255,73,57,198,0,189,255,73,198,19,206,14,147,189,255,73,198,18,206,14
570 DATA 111,189,255,73,198,10,206,14,122,189,255,73,127,14,73,189,13,67,252,1
580 DATA 44,179,4,254,253,14,62,206,14,66,227,0,253,14,64,134,1,183,14,70,189
590 DATA 13,47,254,14,62,134,1,189,255,118,182,14,70,189,255,118,67,189,255,118
600 DATA 198,128,247,14,76,79,183,14,72,166,0,189,255,118,187,14,72,183,14,72,8
610 DATA 122,14,76,38,239,182,14,72,189,255,118,60,204,160,0,253,14,68,189,13
620 DATA 12,182,14,74,129,6,39,22,56,189,12,214,124,14,73,182,14,73,54,189,13
630 DATA 67,50,129,10,45,170,126,12,197,56,255,14,62,124,14,70,188,14,64,44,14
640 DATA 182,14,70,189,13,47,127,14,73,189,13,67,32,141,134,4,189,255,118,189
650 DATA 12,254,182,14,74,129,6,38,3,126,12,197,124,14,73,189,13,67,189,12,214
660 DATA 182,14,73,129,10,45,222,126,12,197,189,255,127,79,189,255,133,56,126
670 DATA 255,37,57,255,0,255,0,255,78,128,67,0,66,240,2,240,14,214,7,29,70,0,6
680 DATA 0,0,132,34,135,79,23,14,167,132,34,135,0,23,14,167,0,0,32,32,72,88,45
690 DATA 77,111,100,101,109,32,82,101,99,101,105,118,101,0,1,32,32,83,69,67,84
700 DATA 79,82,58,0,2,32,32,69,82,82,79,82,83,58,9,1,48,48,48,48,48,9,2,48,48
710 DATA 48,48,48,0,0,32,32,72,88,45,77,111,100,101,109,32,83,101,110,100,32,32
720 DATA 32
1000 'SetModem FOR HX-Modem V-3.1:29/04/85:BY J.W.YPMA
1010 WIDTH 21,20,I:POKE&H27C,0:ON ERRDR GOTO 1540
1020 CLS:PRINT"*  Set-Modem V3.1  *'
1030 PRINT"I SET CONDITIONS":PRINT"2 SAVE/LOAD FILE":PRINT"3 MENU";
1040 A=VAL(INPUT$(1)):ON A GOTO 1060,2000,1050:GOTO 1040
1050 EXEC&HDFFD
1060 CLS:F=PEEK(&H4FE)*256+PEEK(&H4FF)
1070 PRINT"AVAILABLE MEMORY FOR":PRINTUSING"FILES : ##### Bytes";F
1080 PRINT:PRINT"1:O.K.     2:CHANGE";
1090 K$=INPUT$(1):IF K$="I" THEN 1110
1100 CLS:PRINT"REQUIRED MEMORY FOR":INPUT"FILES :",F:CLEAR 200,F:GOTO1060
1110 CLS:PRINT"AVAILABLE MEMORY FOR"
1120 M=PEEK(&H136)*256+PEEK(&H137)-&HEA5
1130 COL=PEEK(&HE50)+1:LIN=PEEK(&HE51)+1
1140 PRINTUSING"SCREEN:  ### COLUMNS";COL:PRINTUSING"          ### LINES";LIN
1150 PRINT"1:O.K.     2:CHANGE";
1160 K$=INPUT$(1):IF K$="1" THEN 1210 ELSE IF K$<>"2" THEN PRINTK$:GOTO 1160
1170 CLS:PRINT"INPUT NUMBER OF":INPUT"COLUMNS    : ",COL:INPUT"LINES      : ",LIN
1180 POKE &HE50,(COL-1):POKE&HE51,(LIN-1)
1190 M=&HEA6+LIN*(COL+1):MEMSET M
1200 GOTO 1110
1210 CLS:PRINT"*  Set-Modem V31  *"
1220 A=PEEK(&HAA0):B=PEEK(&HAA1)
1230 PRINT"WORDLENGTH:    ";B AND &H0F;"BIT"
1240 PRINTUSING"BIT RATE  : #### BPS";2^((B AND &HF0)/16-1)*150
1250 PRINT"STOP BITS :    ";A AND &H03;"BIT"
1260 CD=A AND 4:PRINT"CD          : ";:IF CD THEN PRINT"NO CHECK" ELSE PRINT"   CHECK"
1270 RTS=A AND 8:PRINT"RTS        :       ";:IF RTS THEN PRINT" ON" ELSE PRINT"OFF"
1280 CTS=A AND 32:PRINT"CTS       : ";:IF CTS THEN PRINT"NO CHECK" ELSE PRINT"   CHECK"
1290 DSR=A AND 16:PRINT"DSR       : ";:IF DSR THEN PRINT"ND CHECK" ELSE PRINT"   CHECK"
1300 PAR=(A AND &HC0)/64:PRINT"PARITY     : ";
1310 IF PAR=0 THEN PRINT"    EVEN" ELSE IF PAR=1 THEN PRINT"     ODD" ELSE PPINT"NO CHECK"
1320 PRINT:PRINT"1:O.K.     2:CHANGE";
1330 K$=INPUT$(1):IF K$="1" THEN 1000
1340 IF K$<>"2" THEN PRINTK$;:GOTO 1330
1350 CLS:PRINT"WORDLENGTH":PRINT"1:  7 BIT":PRINT"2:  8 BIT"
1360 W$=INPUT$(1):IF W$="1" THEN WL=7 ELSE IF W$="2" THEN WL=8 ELSE 1350
1370 CLS:PRINT"BIT RATE":PRINT"1:   300    4: 2400":PRINT"2:   600    5: 4800":PRINT"3:  1200";
1380 BR=VAL(INPUT$(1)):IF BR<1 OR BR>5 THEN 1370 ELSE BR=BR+1
1390 POKE &HAA1,(BR*16+WL)
1400 CLS:PRINT"STOP BITS":PRINT"1:  1 BIT":PRINT"2:  2 BIT"
1410 S$=INPUT$(1):IF S$="1" THEN SB=1 ELSE IF S$="2" THEN SB=2 ELSE 1400
1420 CLS:PRINT"CARRIER DETECT":PRINT"1:  CHECK":PRINT"2:  NO CHECK"
1430 T$=INPUT$(1):IF T$="1" THEN CD=0 ELSE IF T$="2" THEN CD=1 ELSE 1420
1440 CLS:PRINT"REQUEST TO SEND":PRINT"1:  ON":PRINT"2:  OFF"
1450 R$=INPUT$(1):IF R$="1" THEN RTS=1 ELSE IF R$="2" THEN RST=0 ELSE 1440
1460 CLS:PRINT"CLEAR TO SEND":PRINT"1:  CHECK":PRINT"2:  NO CHECK"
1470 C$=INPUT$(1):IF C$="1" THEN CTS=0 ELSE IF C$="2" THEN CTS=1 ELSE 1480
1480 CLS:PRINT"DATA SET READY":PRINT"1:  CHECK":PRINT"2:  NO CHECK"
1490 D$=INPUT$(1):IF D$="1" THEN DSR=0 ELSE IF D$="2" THEN DSR=1 ELSE 1460
1500 CLS:PRINT"PARITY CHECK":PRINT"1:  EVEN":PRINT"2:  ODD":PRINT"3:  NONE";
1510 P$=INPUT$(1):IF P$="1" THEN P=0 ELSE IF P$="2" THEN P=1 ELSE P=2
1520 POKE&HAA0,(SB+4*CD+8*RTS+16*DSR+32*CTS+64*P)
1530 GOTO1210
1540 CLS:IF ERR=7 OR ERR=9 THEN PRINT"  MEMORY OVERFLOW" ELSE PRINT"  UNDEFINED ERROR"
1550 PRINT:PRINT"      ENTER CR";:A$=INPUT$(1):RUN
2000 CLS:PRINT"*  Set-Modem V3.1  *":PRINT"1 SAVE SCREEN":PRINT"2 SAVE FILE":PPINT"3 LOAD FILE";
2010 A=VAL(INPUT$(1)):ON A GOTO 2020,2100,2190:GOTO2010
2020 CLS:PRINT"**  SAVE SCREEN  **'
2030 GOSUB2270:OPEN"O",#1,"CAS0:"+A$+".ASC"
2040 COL=PEEK(&HE50):LIN=PEEK(&HE51):D=&HEA7
2050 FOR I=0 TO LIN:A$=""
2060  FOR J=0 TO COL
2070  A$=A$+CHR$(PEEK(D+J+I*(COL+1)))
2080  NEXT J:PRINT#1,A$
2090 NEXT I:CLOSE#1:GOTO1000
2100 CLS:PRINT" **  SAVE FILE  **":GOSUB 2270
2110 OPEN"O",#1,"CAS0:"+A$+".ASC":M=PEEK(&H12C)*256+PEEK(&H12D)
2120 M=M-PEEK(&H4FE)*256-PEEK(&H4FF):L=PEEK(&HE3C)*256+PEEK(&H23D)-M
2130 POKE&HE42,(L\256):POKE&HE43,(L MOD256)
2140 L=PEEK(&HE42)*256+PEEK(&HE43):DEFFIL I,0:I=0:B$=CHR$(13)+CHR$(10):A$=""
2150 GET% I,I$:A$=A$+I$:I=I+1:IF I>L THEN 2180
2160 IF RIGHT$(A$,1)<>CHR$(13) THEN 2150 ELSE PRINT#1,LEFT$(A$,LEN(A$)-1):A$=""
2170 GET% I+1,I$:IF I$=CHR$(10) THEN I=I+1:GOTO2150 ELSE GOTO 2150
2180 PRINT#1,A$:CLOSE#1:GOTO1000
2190 CLS:PRINT"**  LOAD FILE  **":GOSUB 2270
2200 OPEN"I",#1,"CAS0:"+A$+".*":DEFFIL 1,0:L=0:CLS:PRINT"  LOADING "A$
2210 IF EOF(1) THEN 2250
2220 INPUT#1,B$:FOR I=1 TO LEN(B$)
2230 PUT% L,MID$(B$,I,1):L=L+1:NEXT
2240 PUT% L,CHR$(13):PUT% L+1,CHR$(10):L=L+2:GOTO 2210
2250 POKE &HE42,(L\256):POKE&HE43,(L MOD256):FOR I=L TO L+127:PUT% I,CHR$(0):NEXT
2260 CLOSE#1:GOTO1000
2270 INPUT"FILE NAME:",A$:A$=LEFT$(A$,8)
2280 PRINT"TAPE-COUNT:"TAPCNT"
2290 PRINT"IN POSITION?  (Y/N)";
2300 B$=INPUT$(1):IF B$<>"Y" AND B$<>"y" THEN 2280
2310 RETURN
```

# Microsoft Basic Compressor

## by Bjorn Taale Sandberg

One of the sad consequences of Basic being an interpreted language is the amount of memory the source code consumes. This often makes it necessary to go through the program, removing comments and compressing statements from a well-tested bit to make room for more. This compressor program takes a Basic program stored on disk as an ASCII file, removes all comments, and appends lines to the end of preceding lines wherever possible. The resulting program is considerably shorter and usually faster.

Lines referred to in any GOTO, GOSUB, RESUME, RESTORE, THEN or DELETE statements are not touched. Whenever a line consisting entirely of a comment cannot be removed because it is the destination for a jump, the comment is removed and replaced by 'JTR (jump to remark).

```
10 DIM GT(5000) :TGT%=0:PASS=1:GOSUB 140
20 PRINT"Input file opened !"
30 GOSUB 680
40 PRINT"Line numbers logged !":PRINT
50 GOSUB 750
60 PRINT"Line numbers sorted !":PRINT
70 OPEN"I",#1,RF$
80 OPEN"O",#2,OF$
90 PASS=2
100 PRINT"Ready for pass 2 -> Compression & comment deletion.":PRINT
110 GOSUB 680
120 PRINT:PRINT"Process complete:";RF$;" => ";OF$:PRINT:PRINT
130 END
140 'JTR
150 ON ERROR GOTO 250
160 PRINT:PRINT
170 INPUT"Input BASIC ASCII file ";RF$
180 IF RF$="" THEN END
190 FILES RF$:ON ERROR GOTO 0
200 OPEN"I",#1,RF$
210 INPUT"Dutput BASIC ASCII file ';OF$
220 IF OF$="" THEN END
230 OPEN"O",#2,OF$
240 RETURN
250 RESUME 260
260 ON ERROR GOTO 0
270 PRINT"No such file exist !!!!!!!"
280 GOTO 150
290 'JTR
300 LW$=""
310 TSV$=I$
320 IF INSTR(I$,CHR$(34))>0 THEN GOSUB 890:GT(TGT%)=VAL(RW$):TGT%=TGT%+1:I$=TSV$
:GOTO 340
330 IF INSTR(I$,"IF ")>0  THEN GOSUB 890:GT(TGT%)=VAL(RW$):TGT%=TGT%+1:I$=TSV$
340 GOSUB 890
350 IF VAL(RW$)>0 THEN 380
360 IF RW$="," THEN 390
370 LW$=RW$:GOTO 390
380 IF LW$="THEN" OR LW$="RESTORE" OR LW$="GOTO" OR LW$="GOSUB" OR LW$="RESUME"
OR LW$="DELETE" THEN GT(TGT%)=VAL(RW$):TGT%=TGT%+1
390 IF I$="" THEN RETURN
400 GOTO 340
410 'JTR
420 S$=I$ :GOSUB 890 :LNR=VAL(RW$):I$=S$:SS1$=RW$:GOSUB 790
430 IF FEIL% THEN 490
440 GOSUB 570:IF  (VAL(I$)>0) AND (ABS(LOG(VAL(I$)+1)*.434294482#-LEN(I$))<4) THE
N I$=I$+"'JTR"
450 IF OP$<>"" THEN PRINT#2,OP$
460 PRINT#2,I$
470 OP$="":I$=""
480 RETURN
490 GOSUB 890:ES$=RW$
500 GOSUB 570
510 IF I$="" THEN RETURN
520 IF OP$="" THEN OP$=ES$+I$:RETURN
530 IF LEN(OP$)+LEN(I$)>250 THEN 550
540 OP$=OP$+":'+I$:RETURN
550 PRINT#2,OP$
560 OP$=ES$+I$:RETURN
570 R$=""
580 C$=RIGHT$(I$,1)
590 R$=C$+R$:I$=LEFT$(I$,LEN(I$)-1)
600 IF C$=CHR$(34) THEN I$=I$+R$:RETURN
610 IF C$="'" THEN 660
620 IF I$="" THEN I$=R$:RETURN
630 IF C$<>"M" THEN 580
640 IF (RIGHT$(I$,3)=" RE") OR (RIGHT$(I$,3)=":RE") THEN I$=LEFT$(I$,LEN(I$)-3):
RETURN
650 GOTO 580
660 IF I$=SPACE$(LEN(I$)) THEN I$=":RETURN
670 RETURN
680 'JTR
690 WHILE NOT(EOF(1)):LINE INPUT#1,I$:PRINT I$
700    IF PASS=1 THEN GOSUB 290 ELSE GOSUB 410
710 WEND
720 PRINT"End of input file reached !"
730 IF PASS=2 AND OP$<>"" THEN PRINT#2,OP$
740 CLOSE#1:CLOSE#2:RETURN
750 FOR O1%=0 TO TGT%-1
760   FOR O2%=O1%+1 TO TGT%
770       IF GT(O2%)<GT(O1%) THEN SWAP GT(O1%),GT(O2%)
780   NEXT:NEXT:RETURN
790 FEIL%=(0=1)
800 TP%=TGT%:BU%=0:CU%=(TP%+BU%)\2
810 IF LNR=GT(CU%) THEN RETURN
820 IF GT(CU%)<LNR THEN 860
830 TP%=CU%:CU%=(TP%+BU%)\2
840 IF TP%-BU%=1 THEN 880
```

```
850 GOTO 810
860 BU%=CU%:CU%=(TP%+BU%)Ø2
870 GOTO 840
880 IF LNR=GT(CU%) OR LNR=GT(BU%) OR LNR=GT(TP%) THEN RETURN ELSE FEIL%=(Ø=Ø):RE
TURN
890 'JTR
900 W$=""
910 IF I$="" THEN RW$="":RETURN
920 C$=LEFT$(I$,1)
930 I$=MID$(I$,2)
940 IF C$=CHR$(34) THEN 980
950 IF INSTR("':,;##+-/()=><^Ø",C$)<>Ø THEN 980
960 IF C$=" " THEN RW$=W$:RETURN
970 W$=W$+C$:GOTO 920
980 IF W$<>"" THEN I$=C$+I$:RW$=W$:RETURN
990 RW$=C$:RETURN
```

# BBC Spooler

## by Mark Clegg

MICROTEX 666

Still keying in programs? Forget it! This program is available for telesoftware downloading on Microtex 666 (page *66614#.)

This program sets up drivers in a sideways RAM to allocate a larger printer buffer than that catered for by the BBC's operating system. Once installed, the program will remain until the RAM is erased or the computer is turned off.

The driver is fully compatible with MOS calls in that the buffer may be purged-examined and used in the normal way, and a buffer-full event will also be generated (if the event is enabled) when appropriate.

Up to 15.25k may be used as a buffer, the exact amount available being dependent on the size of the RAM installed. The program is configured for the size of RAM chip by setting the variable 'RAMTOP' on line 90 to the appropriate value — &BB for a 2k chip, &90 for 4k (that is, the high byte of the next address after the RAM).

The installation section of the program assumes that the RAM will be located in ROM socket 'F', and that any write operations to the sideways ROM area will automatically select this ROM. The code actually placed in the ROM is, however, independent of the ROM socket used, so modification for use in different sockets should be no great problem.

To produce a working driver for your BBC Micro, run the following program which assembles the required code together with a ROM installation routine. The code produced is saved to disk as the binary file PSPOOL. The printer spooler can then be set up by issuing the command '*PSPOOL' (best utilised from within a !BOOT file).

```
 10 REM ****************************************
 20 REM *****          RAMSPOOL            *****
 30 REM ****************************************
 40 REM ***** A program allocating paged RAM *****
 50 REM ***** space  to the  printer  buffer *****
 60 REM ***** A maximum of 15.5K can be used *****
 70 REM ****************************************
 80
 90 ramtop=&88 : REM Amount of ram available +&8000 (High byte)
100 OSBYTE=&FFF4 : OSNEWL=&FFE7 : OSWRCH=&FFEE
110 FOR pass%=4 TO 7 STEP 3
120   P%=&1900 : O%=&3200
130   [ OPT pass%
140   .instal LDA &28Ø \ Check spooler not already installed
150   CMP £&81 : BNE start : RTS : .start
160   SEI
170   LDA £(data DIV 256) : STA &F9 \ Install spooler in paged RAM
180   LDA £(data MOD 256) : STA &F8 : LDY £0 : LDA £&80
190   STA &FB : STY &FA
200   .inst13 LDA (&F8),Y : STA (&FA),Y : INC &F8 : BNE inst11 : INC &F9
210   .inst11 INC &FA : BNE inst12 : INC &FB
220   .inst12 LDA &FB : CMP £&83 : BNE inst13
230   LDA &F4 : PHA : LDA £&F : STA &F4 : STA &FE30 : JSR boot
240   PLA : STA &F4 : STA &FE30 : LDA £&81 : STA &28Ø : CLI : RTS
250   .data
260   ] : P%=&8000 : VDU12 : [ OPT pass%
270   \ ***********************************
280   \ *****          RAMSPOOL          *****
290   \ ***********************************
300   \ ***** A  program  to  allocate *****
310   \ ***** paged  RAM  to  form  an *****
320   \ ***** extended  printer buffer *****
330   \ ***** up to a maximum of 15.5K *****
340   \ ***********************************
350   JMP 0 : JMP sentry
360   EQUB &81 \ ROM Type.
370   EQUB cright \ Copyright offset pointer.
380   EQUB &01 \ Version number.
390   EQUS "Ram Spool"
400   .cright EQUB &00 \ Copyright message.
410   EQUS "(C) M.C. 1984."
420   EQUB &00
430   .hlpmsg \ Printed by '*HELP'
440   EQUS "Printer Spooler V1.0 (1.5k)"
450   EQUB &D:EQUB &A
460   .sentry CMP £&09 \ Test type of service requested.
470   BEQ help \ Help expansion
480   CMP £3 \ or
490   BEQ boot \ Auto boot
500   RTS
510   .help   PHA \ Check for specific help.
520   TYA : PHA
530   .help1  LDA (&F2),Y \ Is rest of command line empty ?
```

```
540   CMP £&20:BNE help2:INY:JMP help1
550   .help2  CMP £&0D:BEQ dohelp
560   .help4  PLA:TAY:PLA:RTS
570   .dohelp JSR OSNEWL \ Type out ROM's name.
580   LDY £&00
590   .help3  LDA hlpmsg,Y
600   JSR OSWRCH

610   INY
620   CMP £&0A
630   BNE help3
640   JMP help4
650   .boot   PHA \ Auto boot.
660   TYA:PHA:TXA:PHA
670   LDY £0
680   .boot1  LDA hlpmsg,Y: JSR OSWRCH: INY: CMP £&A: BNE boot1
690   JSR OSNEWL
700

710   .ramspl LDA &22A \ Save old values of vectors
720   STA insold : LDA &22B : STA insold+1 : LDA &22C : STA remold
730   LDA &22D : STA remold+1 : LDA &22E : STA prgold : LDA &22F
740   STA prgold+1
750
760   LDA £&A8 \ Obtain address of extended
770   LDX £0 \ vector space
780   LDY £&FF : JSR OSBYTE : STX &F2 : STY &F3
790

800   LDY £&3F \ Set up the three extended vectors
810   LDA £(insbuf MOD 256) : STA (&F2),Y \ INSV,REMV and CNPV
820   INY : LDA £(insbuf DIV 256) : STA (&F2),Y : INY
830   LDA &F4 : STA (&F2),Y : INY : LDA £(rembuf MOD 256) : STA (&F2),Y
840   INY : LDA £(rembuf DIV 256) : STA (&F2),Y : INY : LDA &F4 : STA (&F2),Y
850   INY : LDA £(cnprge MOD 256) : STA (&F2),Y : INY :LDA £(cnprge DIV 256)
860   STA (&F2),Y : INY : LDA &F4 : STA (&F2),Y
870

880   SEI \ Set up the vectors to point
890   LDA £&FF \ to the extended vector workspace
900   STA &22B : STA &22D : STA &22F : LDA £&3F : STA &22A : LDA £&42
910   STA &22C : LDA £&45 : STA &22E : CLI : LDX £3 : LDA £&40 : PHA : PLP
920   JSR cnprge : PLA : TAX : PLA : TAY : PLA : RTS
930
940   .cnprge SEI \ Purge buffer / determine free space
950   PHP : CPX £3 : BEQ purge : PLP : CLI : JMP (prgold)
960   .purge  BVS purge1 \ Purge or buffer count ?
970   BCS romlft \ Buffer space remaining ?
980   SEI : LDX buflen \ Number of characters in buffer
990   LDY buflen+1 : PLP : CLI : RTS


1000
1010  .romlft SEC \ Return anmount of space left
1020  LDA bufmax \ in buffer
1030  SBC buflen : TAX : LDA bufmax+1 : SBC buflen+1
1040  TAY : PLP : CLI : RTS
1050
1060  .purge1 LDA £&83 \ Purger buffer contents
1070  STA bufend+1 : STA buftop+1 : LDA £(ramtop-&83) : STA bufmax+1
1080  LDA £0 : STA bufend : STA buftop : STA bufmax : STA buflen : STA buflen+


1
1090  PLP : CLI : RTS
1100
1110  .insbuf PHP \ Insert character into buffer
1120  SEI : CPX £3 : BEQ insbf1 : PLP : JMP (insold)
1130  .insbf1 TAX \ Printer buffer selected
1140  LDA buflen : CMP bufmax : BNE insbf2 : LDA buflen+1 : CMP bufmax+1
1150  BNE insbf2 : TXA : LDX £3 : PLP : SEC : RTS
1160  .insbf2 LDA bufend \ Buffer not full so insert char
1170  STA &FA : LDA bufend+1 : STA &FB : LDY £0 : TXA : STA (&FA),Y
1180  INC buflen : BNE insbf3 : INC buflen+1
1190  .insbf3 INC bufend : BNE insbf4 : INC bufend+1 : LDA bufend+1
1200  CMP framtop : BNE insbf4 : LDA £&83 : STA bufend+1


1210  .insbf4 TXA : LDX £3 : PLP : CLC : RTS
1220
1230  .rembuf PHP \ Remove character from buffer
1240  SEI : CPX £3 : BEQ rembf1 : PLP : JMP (remold)
1250  .rembf1 LDA buflen : ORA buflen+1 : BNE rembf2 : PLP : SEC : RTS
1260  .rembf2 LDA buftop : STA &FA : LDA buftop+1 : STA &FB : LDY £0
1270  LDA (&FA),Y : BVC rembf3
1280  PLP \ Examine only
1290  CLC : RTS
1300  .rembf3 PHA : SEC : LDA buflen : SBC £1 : STA buflen : BCS rembf4
1310  DEC buflen+1
1320  .rembf4 INC buftop : BNE rembf5 : INC buftop+1 : LDA buftop+1
1330  CMP framtop : BNE rembf5 : LDA £&83 : STA buftop+1
1340  .rembf5 LDA buflen : ORA buflen+1 : BNE rembf6 : LDA £0 : TAY : LDX £3
1350  JSR &E494 \ Generate event
1360  .rembf6 PLA : LDX £3 : PLP : CLC : RTS


1370
1380  .insold EQUW 0
1390  .remold EQUW 0
1400  .prgold EQUW 0
1410  .buftop EQUW 0
1420  .bufend EQUW 0
1430  .buflen EQUW 0
1440  .bufmax EQUW 0
1450  ]
1460  NEXT
1470 *SAVE"PSPOOL" 3200 +300 1900 1900
```

# FKEY

## by K Riordan

MICROTEX 666

Still keying in programs? Forget it! This program is available for telesoftware downloading on Microtex 666 (page *66614#.)

This is an excellent function key/routine machine language program for the Commodore 64. It is constructed as a series of Basic DATA statements so no knowledge of machine language or an editor/assembler is required. Full instructions are in the listing.

```
100 REM ************************************************************************
101 REM *                                                                      *
102 REM *                                                                      *
103 REM *                              FKEY                                    *
104 REM *              A FUNCTION KEY ASSIGNMENT PROGRAMMER'S                  *
105 REM *                      AID FOR COMMODORE 64                            *
106 REM *                    (KEVIN RIORDAN     1985)                         *
107 REM *                                                                      *
108 REM *                                                                      *
109 REM ************************************************************************
110 :
111 :
112 :
113 REM  THIS USER-FRIENDLY MACHINE-CODE UTILITY ASSIGNS FUNCTIONS TO
114 REM       KEYS F1-F8 AS FOLLOWS:
115 :
116 REM  F1 = AUTO: PROMPTS USER FOR REQUIRED STARTING LINE NUMBER AND STEP
117 REM       BETWEEN LINE NUMBERS.  DEFAULT VALUES OF 100 AND 10 MAY
118 REM       BE CHOSEN BY <RETURN> RESPONSE TO EACH PROMPT.  IF CURRENT
119 REM       AUTO LINE ALREADY EXISTS IN RESIDENT BASIC PROGRAM, FLAG
120 REM       OF '?' IS SHOWN ON SCREEN.
121 REM       AUTO MAY BE DISENGAGED BY <RETURN>ING A NULL PROGRAM LINE.
122 REM       NO OTHER FKEY FUNCTION IS AVAILABLE WHILE AUTO IS IN OPERATION.
123 :
124 REM  F2 = RENUM: PROVIDES A FULL BASIC PROGRAM RENUMBERING
125 REM       FACILITY, PERFORMING NECESSARY ALTERATIONS TO GOTO, GOSUB
126 REM       AND IF...THEN REFERENCES TO RENUMBERED LINES.  PROMPTS AND
127 REM       DEFAULTS ARE IDENTICAL TO AUTO, WITH THE ADDITIONAL
128 REM       PROVISION THAT EITHER GLOBAL OR SECTIONAL RENUMBERING MAY
129 REM       BE SPECIFIED.
130 REM       GLOBAL RENUMBERING IS ACHIEVED BY SELECTING DEFAULT VALUES
131 REM       (0 AND 63999) FOR THE 'START AT' AND 'END AT' PROMPTS;
132 REM       ANY OTHER VALUES GIVEN TO THESE PROMPTS WILL RENUMBER ONLY
133 REM       THE SPECIFIED PROGRAM BLOCK, LEAVING ALL PROGRAM LINES IN
134 REM       LEGAL ASCENDING SEQUENCE.
135 REM       THE FEATURE IS 'SMART' ENOUGH NOT TO PERMIT INTERLEAVING
136 REM       OF PROGRAM LINES, ILLEGAL LINE NUMBERING OR AN INCOMPLETE
137 REM       RENUMBERING.  ANY ACTION BY THE USER WHICH WOULD CAUSE ANY
138 REM       OF THESE DISASTERS FORCES AN EXIT TO BASIC'S ERROR HANDLER,
139 REM       LEAVING THE USER'S BASIC PROGRAM INTACT.
140 :
141 REM  F3 = DISASSEMBLE: DISPLAYS A SCREEN OF DISASSEMBLED MACHINE
142 REM       CODE FROM THE ADDRESS GIVEN BY THE USER.  START ADDRESS MAY
143 REM       BE GIVEN IN EITHER DECIMAL OR HEXADECIMAL PREFIXED BY '$'.
144 REM       SPACE BAR IS USED TO PAGE AHEAD; ANY OTHER KEY QUITS THE
145 REM       FUNCTION.
146 :
147 REM  F4 = DUMP: DISPLAYS A SCREEN OF MEMORY IN HEX FORMAT WITH ASCII
148 REM       EQUIVALENTS.  OPERATION IS SIMILAR TO F3.
149 :
150 REM  F5 = DEC-HEX: NUMERIC BASE CONVERSION OF ANY VALUE 0-65535 AND
151 REM       $0000-$FFFF.
152 :
153 REM  F6 = DELETE: REMOVES A SPECIFIED BLOCK OF LINES FROM A RESIDENT
154 REM       BASIC PROGRAM.
155 :
156 REM  F7 = DIR: ENABLES DISK DIRECTORY INSPECTION WITHOUT DISTURBING
157 REM       RESIDENT BASIC PROGRAM.
158 :
159 REM  F8 = STATUS: DISCOVER WHY THAT LITTLE RED LIGHT IS FLASHING -
160 REM       IN IMMEDIATE MODE!
161 :
162 :
163 :
164 REM  THE BASIC LOADER LISTED BELOW SWITCHES FKEY ON.  THE USER MAY
165 REM       SUBSEQUENTLY TOGGLE THE UTILITY ON OR OFF BY 'SYS49152'.
166 :
167 :
168 :
169 PRINT"[CLR][12DOWN][9RIGHT]LOADING MACHINE CODE..."
170 PRINTTAB(11)"(TAKES 90 SECONDS)":FORX=49152TO52146:READH$:D=0:FORY=1TO2
171 A=ASC(MID$(H$,Y,1))-48:D=D*16+A+7*(A>9)
172 NEXT:POKEX,D:NEXT:PRINT"[CLR]":SYS49152:NEW
173 :
174 :
175 :
```

```
176 DATAAD,02,03,49,92,8D,02,03,AD,03,03,49,64,8D,03,03
177 DATA60,A5,C6,85,CC,8D,92,02,F0,F7,78,A5,CF,F0,0C,A5
178 DATACE,AE,87,02,A0,00,84,CF,20,13,EA,20,B4,E5,C9,85
179 DATA90,04,C9,8D,90,08,8D,77,02,E6,C6,4C,83,A4,EA,EA
180 DATAC9,85,F0,1A,C9,86,F0,1C,C9,87,F0,1E,C9,88,F0,20
181 DATAC9,89,F0,0D,C9,8A,F0,0F,C9,8B,F0,11,D0,15,4C,57
182 DATAC2,4C,51,C6,4C,C7,C3,4C,FA,C4,4C,63,C5,4C,43,CB
183 DATA4C,BA,C5,4C,1B,C6,0D,0D,45,4E,54,45,52,20,45,41
184 DATA43,48,20,50,41,52,41,4D,45,54,45,52,20,49,4E,20
185 DATA54,55,52,4E,0D,28,3C,52,45,54,55,52,4E,3E,20,46
186 DATA4F,52,20,44,45,46,41,55,4C,54,20,56,41,4C,55,45
187 DATA0D,53,48,4F,57,4E,20,49,4E,20,42,52,41,43,4B,45
188 DATA54,53,29,2E,0D,0D,46,49,52,53,54,20,4C,49,4E,45
189 DATA20,23,20,28,31,30,30,29,3F,20,00,0D,49,4E,43,52
190 DATA45,4D,45,4E,54,20,28,31,30,29,3F,20,00,0D,53,54
191 DATA41,52,54,20,41,54,20,4C,49,4E,45,20,23,20,28,30
192 DATA29,3F,20,20,20,00,0D,45,4E,44,20,41,54,20,4C,49
193 DATA4E,45,20,23,20,28,36,33,39,39,39,29,3F,20,00,0D
194 DATA53,54,41,52,54,20,41,44,44,52,45,53,53,3F,20,00
195 DATA0D,0D,3C,53,50,41,43,45,3E,20,54,4F,20,43,4F,4E
196 DATA54,49,4E,55,45,0D,00,0D,0D,49,4E,54,45,52,4C,45
197 DATA41,56,49,4E,47,20,4F,43,43,55,52,53,0D,00,0D,23
198 DATA3F,20,00,04,20,54,30,0D,80,04,90,03,22,54,33,0D
199 DATA80,04,90,04,20,54,33,0D,80,04,90,04,20,54,3B,0D
200 DATA80,04,90,00,22,44,33,0D,C8,44,00,11,22,44,33,0D
201 DATAC8,44,A9,01,22,44,33,0D,80,04,90,01,22,44,33,0D
202 DATA80,04,90,26,31,87,9A,00,21,81,82,00,00,59,4D,91
203 DATA92,86,4A,85,9D,2C,29,2C,23,28,24,59,00,58,24,24
204 DATA00,1C,8A,1C,23,5D,8B,1B,A1,9D,8A,1D,23,9D,8B,1D
205 DATAA1,00,29,19,AE,69,A8,19,23,24,53,1B,23,24,53,19
206 DATAA1,00,1A,5B,5B,A5,69,24,24,AE,AE,A8,AD,29,00,7C
207 DATA00,15,9C,6D,9C,A5,69,29,53,84,13,34,11,A5,69,23
208 DATAA0,D8,62,5A,48,26,62,94,88,54,44,C8,54,68,44,E8
209 DATA94,00,B4,08,84,74,B4,28,6E,74,F4,CC,4A,72,F2,A4
210 DATA8A,00,AA,A2,A2,74,74,74,72,44,68,B2,32,B2,00,22
211 DATA00,1A,1A,26,26,72,72,88,C8,C4,CA,26,48,44,44,A2
212 DATAC8,64,00,0A,00,00,00,FF,F9,0A,64,E8,10,FF,00,00
213 DATA03,27,FF,89,8A,8D,A7,A9,00,85,02,20,B6,C2,A9,68
214 DATA8D,02,03,A9,C2,8D,03,03,AE,3C,03,AD,3D,03,C9,FA
215 DATAB0,3C,86,14,85,15,20,CD,BD,20,13,A6,B0,03,A9,20
216 DATA2C,A9,3F,20,D2,FF,20,2F,CB,20,60,A5,86,7A,84,7B
217 DATA20,73,00,AA,F0,07,A2,FF,86,3A,4C,9F,A4,20,A3,C2
218 DATA4C,74,A4,A9,11,8D,02,03,A9,C0,8D,03,03,60,A2,0E
219 DATA20,A3,C2,4C,37,A4,A2,07,BD,41,C2,9D,3C,03,CA,10
220 DATAF7,A5,02,4A,B0,36,A9,76,A0,C0,20,2D,C3,F0,0F,20
221 DATA48,C3,B0,DA,E0,FA,B0,D6,8D,3C,03,8E,3D,03,A9,DB
222 DATAA0,C0,20,2D,C3,F0,11,20,48,C3,B0,C2,05,15,F0,BE
223 DATAA5,14,8D,3E,03,8E,3F,03,24,02,10,30,A9,ED,A0,C0
224 DATA20,2D,C3,F0,0F,20,48,C3,B0,C8,E0,FA,B0,C4,8D,40
225 DATA03,8E,41,03,A9,06,A0,C1,20,2D,C3,F0,0F,20,48,C3
226 DATAB0,B0,E0,FA,B0,AC,8D,42,03,8E,43,03,60,85,22,84
227 DATA23,A0,00,B1,22,F0,06,20,D2,FF,C8,D0,F6,A9,00,85
228 DATA99,20,60,A5,AD,00,02,60,A0,00,84,14,84,15,88,84
229 DATA7A,A0,01,84,7B,20,73,00,C9,24,F0,33,D0,05,20,73
230 DATA00,F0,52,38,E9,30,30,53,C9,0A,B0,4F,20,8A,C3,65
```

```
231 DATA14,AA,A9,00,65,15,A8,20,8A,C3,20,8A,C3,8A,65,14
232 DATA85,14,98,65,15,85,15,90,D5,60,06,14,26,15,60,20
233 DATA73,00,F0,21,38,E9,30,30,22,C9,0A,90,08,E9,07,30
234 DATA1A,C9,10,B0,16,A2,04,06,14,26,15,CA,D0,F9,05,14
235 DATA85,14,4C,8F,C3,18,A5,14,A6,15,24,38,60,A9,1F,A0
236 DATAC1,20,2D,C3,4C,48,C3,20,BD,C3,90,03,4C,AE,C2,A9
237 DATA16,48,20,F9,C3,20,C6,C4,85,14,84,15,68,38,E9,01
238 DATAD0,EF,20,EA,C3,F0,E8,4C,74,A4,A9,30,A0,C1,20,1E
239 DATAAB,20,E4,FF,F0,FB,C9,20,60,20,71,C4,48,B1,14,20
240 DATAD5,C4,A2,01,20,BF,C4,C4,FC,C8,90,F1,A2,03,C0,04
241 DATA90,F2,68,A8,B9,C1,C1,85,FD,B9,01,C2,85,FE,A9,00
242 DATAA0,05,06,FE,26,FD,2A,88,D0,F8,69,3F,20,D2,FF,CA
243 DATAD0,EC,20,BD,C4,A4,FC,A2,06,E0,03,F0,1C,06,FB,90
244 DATA0E,BD,B4,C1,20,D2,FF,BD,BA,C1,F0,03,20,D2,FF,CA
245 DATAD0,E7,60,88,30,E7,20,D5,C4,A5,FB,C9,E8,B1,14,90
246 DATAF2,20,C9,C4,AA,E8,D0,01,C8,98,20,D5,C4,8A,4C,D5
247 DATAC4,20,EB,C4,20,BD,C4,A1,14,A8,4A,90,09,6A,B0,15
248 DATAC9,A2,F0,11,29,87,4A,AA,BD,63,C1,90,04,4A,4A,4A
249 DATA4A,29,0F,D0,04,A0,80,A9,00,AA,BD,A7,C1,85,FB,29
250 DATA03,85,FC,98,29,8F,AA,98,A0,03,E0,8A,F0,0B,4A,90
251 DATA08,4A,4A,09,20,88,D0,FA,C8,88,D0,F2,60,A2,03,20
252 DATA3F,AB,CA,D0,FA,60,38,A5,FC,A4,15,AA,10,01,88,65
253 DATA14,90,01,C8,60,48,4A,4A,4A,4A,20,E0,C4,68,29,0F
254 DATA09,30,C9,3A,90,02,69,06,4C,D2,FF,A6,14,A4,15,20
255 DATAD7,AA,20,69,C4,A0,00,4C,3F,AB,20,BD,C3,90,03,4C
256 DATAAE,C2,A9,16,48,20,EB,C4,84,FE,A5,14,29,07,C5,FE
257 DATAF0,11,A9,20,A6,FE,9D,00,02,20,BD,C4,E6,FE,D0,EA
258 DATA20,3F,AB,B1,14,48,C9,20,90,04,C9,60,90,02,A9,71
259 DATAA6,FE,9D,00,02,E6,FE,68,20,D5,C4,E6,14,D0,02,E6
260 DATA15,A5,FE,C9,08,90,D9,A2,02,20,BF,C4,BD,00,02,20
261 DATAD2,FF,E8,E0,08,90,F5,68,E9,01,D0,A8,20,EA,C3,F0
262 DATAA1,D0,53,A9,5E,A0,C1,20,1E,AB,20,60,A5,38,20,F0
263 DATAFF,CA,18,20,F0,FF,A0,03,B1,D1,C8,C9,20,D0,F9,84
264 DATA02,38,20,F0,FF,A4,02,18,20,F0,FF,A9,3D,20,D2,FF
265 DATA20,3F,AB,A9,24,CD,00,02,08,F0,03,20,D2,FF,20,48
266 DATAC3,90,04,28,4C,AE,C2,A6,14,A5,15,28,F0,05,20,6A
267 DATAC4,90,03,20,CD,BD,4C,74,A4,24,A9,01,A2,B9,A0,C5
268 DATA20,BD,FF,A9,08,85,BA,A9,60,85,B9,20,D5,F3,A5,BA
269 DATA20,B4,FF,A5,B9,20,96,FF,A9,00,85,90,A0,03,84,B7
270 DATA20,A5,FF,85,14,20,A5,FF,85,15,A4,90,D0,27,A4,B7
271 DATA88,D0,EB,20,D7,AA,A6,14,A5,15,20,CD,BD,20,3F,AB
272 DATA20,A5,FF,A6,90,D0,0E,A0,02,AA,F0,D2,C9,22,F0,F0
273 DATA20,D2,FF,90,EB,20,42,F6,4C,74,A4,20,D7,AA,A9,0F
274 DATAA2,08,A8,20,BA,FF,A9,00,20,BD,FF,20,C0,FF,A2,0F
275 DATA20,C6,FF,20,CF,FF,C9,2C,D0,F9,20,CF,FF,C9,2C,F0
276 DATA05,20,D2,FF,90,F4,A9,0F,20,C3,FF,20,E7,FF,4C,74
277 DATAA4,A9,80,85,02,20,B6,C2,AD,42,03,CD,40,03,AD,43
278 DATA03,ED,41,03,B0,03,4C,AE,C2,20,CC,CA,AD,40,03,AE
279 DATA41,03,85,14,86,15,20,13,A6,A0,01,B1,5F,F0,55,C8
280 DATAAD,42,03,D1,5F,C8,AD,43,03,F1,5F,90,47,A5,32,85
281 DATA30,A5,31,85,2F,69,03,85,31,90,02,E6,32,A5,37,C5
282 DATA31,A5,38,E5,32,B0,05,A2,10,4C,B0,C2,B1,5F,AA,88
283 DATAB1,5F,A0,00,91,2F,8A,C8,91,2F,C8,AD,3C,03,91,2F
284 DATAC8,AD,3D,03,91,2F,C9,FA,B0,9C,20,2F,CB,B0,97,20
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285 DATAE5,CA,90,A5,A5,2D,C5,31,A5,2E,E5,32,90,03,4C,74
286 DATAA4,A0,03,B1,2D,99,3A,03,B1,2F,99,3C,03,88,C0,02
287 DATAB0,F1,AD,3C,03,CD,40,03,AD,3D,03,ED,41,03,B0,34
288 DATA20,F2,CA,A0,01,B1,5F,D0,03,4C,5E,C7,20,FB,CA,20
289 DATA24,CB,90,4A,A5,14,CD,40,03,A5,15,ED,41,03,B0,14
290 DATA20,19,CB,B0,05,20,E5,CA,90,D9,A9,47,A0,C1,20,1E
291 DATAAB,4C,74,A4,AD,42,03,AE,43,03,85,14,E6,14,D0,01
292 DATAE8,86,15,20,13,A6,A0,01,B1,5F,F0,12,20,FB,CA,20
293 DATA24,CB,90,0A,20,19,CB,B0,D1,20,E5,CA,90,E8,20,F2
294 DATACA,A0,01,B1,5F,F0,5C,A0,03,A2,03,C8,E8,E0,59,B0
295 DATA42,B1,5F,F0,43,10,F4,86,02,20,C7,C9,A6,02,90,EB
296 DATAC8,20,D4,C9,90,E6,84,FE,20,2B,CA,B0,03,20,06,CB
297 DATAA0,04,E8,E0,59,B0,1C,A5,14,D9,49,C2,A5,15,F9,4E
298 DATAC2,90,03,88,10,EC,A4,FE,B1,5F,C9,2C,D0,BE,E8,E0
299 DATA59,90,CD,A2,17,4C,B0,C2,E0,59,B0,F7,A2,5F,20,5C
300 DATACA,90,9E,A5,37,C5,31,A5,38,E5,32,C9,02,B0,05,A2
301 DATA10,4C,B0,C2,A2,01,B5,2B,95,5F,B5,31,95,5A,B5,37
302 DATA95,58,CA,10,F1,20,68,CA,38,A5,31,E5,2D,85,49,A5
303 DATA32,E5,2E,85,4A,38,A5,37,E5,49,85,2D,A5,38,E5,4A
304 DATA85,2E,A2,01,B5,58,95,5F,B5,37,95,31,B5,2B,95,41
305 DATACA,10,F1,A2,00,A0,00,B1,5F,20,A9,C8,C8,B1,5F,D0
306 DATA03,4C,B2,C8,20,A9,C8,20,FB,CA,20,2B,CA,B0,03,20
307 DATA06,CB,A5,14,20,A9,C8,A5,15,20,A9,C8,A0,03,C8,B1
308 DATA5F,20,A9,C8,48,68,F0,59,10,F4,20,C7,C9,A2,00,90
309 DATAED,C8,20,D4,C9,90,E8,84,FE,20,2B,CA,B0,03,20,06
310 DATACB,20,6E,CA,A2,00,A0,00,84,4A,C8,84,49,C8,B9,62
311 DATA00,46,49,B0,06,E6,49,4A,4A,4A,4A,29,0F,C5,4A,F0
312 DATA07,C6,4A,09,30,20,A9,C8,A5,49,D0,E2,88,10,DF,A5
313 DATA4A,F0,EE,A4,FE,B1,5F,C9,2C,D0,A4,20,A9,C8,4C,51
314 DATAC8,A2,5F,20,5C,CA,4C,13,C8,81,41,E6,41,D0,02,E6
315 DATA42,60,20,A9,C8,20,F2,CA,20,12,CB,A0,01,B1,5F,D0
316 DATA03,4C,BD,C9,C8,B1,5F,C5,14,85,14,C8,B1,5F,E5,15
317 DATA90,10,B1,5F,85,15,C8,B1,5F,D0,FB,A2,5F,20,5C,CA
318 DATA90,D9,A5,41,A6,42,85,5A,86,5B,A5,37,A6,38,85,58
319 DATA86,59,20,68,CA,A9,00,A0,00,91,5F,C8,91,5F,A2,5F
320 DATA20,5C,CA,A2,01,B5,58,95,3F,B5,5F,95,5A,B5,2B,95
321 DATA5F,95,41,CA,10,EF,A5,3F,A6,40,85,58,86,59,20,68
322 DATACA,A5,3F,A6,40,85,5A,86,5B,A5,58,A6,59,85,5F,86
323 DATA60,A0,01,B1,5F,F0,63,B1,3F,F0,6F,A0,03,B1,5F,D1
324 DATA3F,90,18,D0,2C,88,B1,5F,D1,3F,90,0F,D0,23,C8,C8
325 DATAB1,5F,D0,FB,A2,5F,20,5C,CA,90,16,A0,FF,C8,B1,5F
326 DATA91,41,C0,03,90,F7,C8,B1,5F,91,41,D0,F9,A2,5F,D0
327 DATA14,A0,FF,C8,B1,3F,91,41,C0,03,90,F7,C8,B1,3F,91
328 DATA41,D0,F9,A2,3F,20,5C,CA,A2,41,20,5C,CA,A5,5F,C5
329 DATA41,A5,60,E5,42,D0,9A,4C,16,C9,A5,3F,A6,40,85,5F
330 DATA86,60,A5,37,A6,38,85,5A,86,5B,A5,41,A6,42,85,3F
331 DATA86,40,20,95,CA,A5,3F,A6,40,85,41,86,42,20,CC,CA
332 DATA85,2F,86,30,4C,74,A4,A2,03,DD,53,C2,F0,04,CA,10
333 DATAF8,18,60,C8,B1,5F,C9,20,F0,F9,C9,30,90,1C,C9,3A
334 DATAB0,18,20,12,CB,20,FC,C9,90,03,4C,AE,C2,C8,B1,5F
335 DATAC9,30,90,04,C9,3A,90,ED,38,60,18,60,85,FC,A5,15
336 DATAC9,19,B0,26,06,14,2A,85,15,85,49,A5,14,0A,26,49
337 DATA0A,26,49,65,14,85,14,A5,49,65,15,85,15,A5,FC,29
338 DATA0F,65,14,85,14,90,03,E6,15,18,60,A5,2D,85,2F,A5
339 DATA2E,85,30,A5,2F,C5,31,A5,30,E5,32,90,01,60,A0,00
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340 DATAB1,2F,C5,14,D0,09,C8,B1,2F,C5,15,D0,02,18,60,18
341 DATAA5,2F,69,04,85,2F,90,D8,E6,30,B0,D7,38,98,75,00
342 DATA95,00,90,03,F6,01,18,60,20,BF,A3,E6,59,60,A5,14
343 DATA85,49,A5,15,85,4A,A2,00,86,62,86,63,86,64,A0,0F
344 DATA06,49,26,4A,F8,A2,FD,B5,65,75,65,95,65,E8,30,F7
345 DATAD8,88,10,EC,60,38,A5,5F,E5,5A,A8,A5,60,E5,5B,AA
346 DATACA,98,F0,20,E8,84,22,38,A5,5F,E5,22,85,5F,B0,02
347 DATAC6,60,38,A5,3F,E5,22,85,3F,B0,02,C6,40,B1,5F,91
348 DATA3F,C8,D0,F9,E6,60,E6,40,E8,D0,F2,60,20,33,A5,88
349 DATA91,22,18,A9,02,A6,23,65,22,90,01,E8,85,2D,86,2E
350 DATA85,31,86,32,60,A0,01,B1,5F,AA,88,B1,5F,85,5F,86
351 DATA60,60,A5,2B,85,5F,A5,2C,85,60,60,C8,B1,5F,85,14
352 DATAC8,B1,5F,85,15,60,A0,02,B1,2F,85,14,C8,B1,2F,85
353 DATA15,60,A2,00,86,14,86,15,60,A5,14,CD,3C,03,A5,15
354 DATAED,3D,03,60,AD,3E,03,C5,14,AD,3F,03,E5,15,60,18
355 DATAAD,3C,03,6D,3E,03,8D,3C,03,AD,3D,03,6D,3F,03,8D
356 DATA3D,03,60,A9,01,85,02,20,B6,C2,AD,42,03,CD,40,03
357 DATAAD,43,03,ED,41,03,B0,03,4C,AE,C2,AD,40,03,AE,41
358 DATA03,85,14,86,15,20,13,A6,A5,5F,85,58,A5,60,85,59
359 DATAAE,42,03,AC,43,03,E8,D0,01,C8,86,14,84,15,20,13
360 DATAA6,A0,00,B1,5F,91,58,E6,5F,D0,02,E6,60,E6,58,D0
361 DATA02,E6,59,A5,2D,C5,5F,A5,2E,E5,60,B0,E6,A6,58,A4
362 DATA59,D0,01,88,CA,86,2D,84,2E,20,59,A6,20,33,A5,4C
363 DATA74,A4,00
READY.
```

# Disk File Inspector

### by K Riordan

As is typical of Kevin's programs, this disk utility is a very useful piece of work. As with FKEY above this machine language program is composed of Basic DATA statements and full instructions are included in the listing.

```
100 REM ************************************************************************
101 REM *                                                                      *
102 REM *                                                                      *
103 REM *                        DISK FILE INSPECTOR                           *
104 REM *                      (KEVIN RIORDAN    1985)                       *
105 REM *                                                                      *
106 REM *                                                                      *
107 REM ************************************************************************
108 :
109 :
110 :
111 REM  THIS PROGRAM DISASSEMBLES OR DUMPS A FILE FROM DISK TO SCREEN
112 REM       AND IS CALLED BY 'SYS49152'.
113 REM       THE USER IS PROMPTED FOR REQUIRED FORMAT ('P' GIVES FILE
114 REM       DISASSEMBLY AND 'D' GIVES HEX DUMP WITH ASCII EQUIVALENTS)
115 REM       AND FILENAME.
116 REM       THE UTILITY IS EXTREMELY USEFUL FOR SCANNING UNKNOWN FILES
117 REM       AND COMMERCIAL PROGRAMS.
118 :
119 :
120 :
121 PRINT"[CLR][12DOWN][9RIGHT]LOADING MACHINE CODE..."
122 PRINTTAB(11)"TAKES 40 SECONDS"
123 FORX=49152TO49943:READH$:D=0:FORY=1TO2
124 A=ASC(MID$(H$,Y,1))-48:D=D*16+A+7*(A>9)
125 NEXT:POKEX,D:NEXT:PRINT"[CLR]":SYS49152:NEW
126 :
127 :
128 :
129 DATA4C,E1,C0,04,20,54,30,0D,80,04,90,03,22,54,33,0D
130 DATA80,04,90,04,20,54,33,0D,80,04,90,04,20,54,3B,0D
131 DATA80,04,90,00,22,44,33,0D,C8,44,00,11,22,44,33,0D
```

```
132 DATAC8,44,A9,01,22,44,33,0D,80,04,90,01,22,44,33,0D
133 DATA80,04,90,26,31,87,9A,00,21,81,82,00,00,59,4D,91
134 DATA92,86,4A,85,9D,2C,29,2C,23,28,24,59,00,58,24,24
135 DATA00,1C,8A,1C,23,5D,8B,1B,A1,9D,8A,1D,23,9D,8B,1D
136 DATAA1,00,29,19,AE,69,A8,19,23,24,53,1B,23,24,53,19
137 DATAA1,00,1A,5B,5B,A5,69,24,24,AE,AE,A8,AD,29,00,7C
138 DATA00,15,9C,6D,9C,A5,69,29,53,84,13,34,11,A5,69,23
139 DATAA0,D8,62,5A,48,26,62,94,88,54,44,C8,54,68,44,E8
140 DATA94,00,B4,08,84,74,B4,28,6E,74,F4,CC,4A,72,F2,A4

141 DATA8A,00,AA,A2,A2,74,74,74,72,44,68,B2,32,B2,00,22
142 DATA00,1A,1A,26,26,72,72,88,C8,C4,CA,26,48,44,44,A2
143 DATAC8,A9,EE,A0,C2,20,1E,AB,20,CF,FF,C9,50,F0,04,C9
144 DATA44,D0,F5,48,A9,0C,A0,C3,20,1E,AB,A2,00,20,12,E1
145 DATAC9,0D,F0,08,9D,00,02,E8,E0,10,90,F1,8A,A2,00,A0
146 DATA02,20,BD,FF,A9,01,A2,08,A0,00,20,BA,FF,20,C0,FF
147 DATAA2,01,20,C6,FF,20,CF,FF,85,14,20,CF,FF,85,15,68
148 DATAC9,44,F0,1B,4C,C5,C1,A6,14,A4,15,20,D7,AA,20,B8
149 DATAC2,A0,00,4C,3F,AB,A9,07,25,14,D0,1E,20,A3,C1,20
150 DATADA,C1,20,37,C1,84,0B,A9,07,25,14,C5,0B,F0,0E,A9

151 DATA2E,99,00,02,20,C0,C2,C8,D0,EB,20,3F,AB,20,CF,FF
152 DATA48,C9,20,90,04,C9,60,90,02,A9,2E,99,00,02,C8,68
153 DATA20,D8,C2,A5,90,29,40,D0,09,E6,14,D0,B9,E6,15,4C
154 DATA46,C1,C0,08,B0,0B,A9,20,99,00,02,20,C0,C2,C8,D0
155 DATAF1,A9,FF,08,A2,02,20,C2,C2,BD,00,02,20,D2,FF,E8
156 DATAE0,08,90,F5,28,D0,01,60,A9,01,20,C3,FF,20,E7,FF
157 DATA68,68,4C,86,E3,20,DA,C1,20,EF,C1,20,C9,C2,85,14
158 DATA84,15,A5,90,29,40,F0,ED,D0,DE,20,E1,FF,D0,05,68
159 DATA68,4C,B8,C1,A5,CB,C9,40,D0,F0,A9,00,85,C6,60,20
160 DATA37,C1,20,CF,FF,85,3F,A8,4A,90,09,6A,B0,15,C9,A2

161 DATAF0,11,29,87,4A,AA,BD,03,C0,90,04,4A,4A,4A,4A,29
162 DATA0F,D0,04,A0,80,A9,00,AA,BD,47,C0,85,FB,29,03,85
163 DATAFC,98,29,8F,AA,98,A0,03,E0,8A,F0,0B,4A,90,08,4A
164 DATA4A,09,20,88,D0,FA,C8,88,D0,F2,48,C4,FC,B0,09,20
165 DATACF,FF,C8,99,3F,00,D0,F3,A0,00,B9,3F,00,20,D8,C2
166 DATAA2,01,20,C2,C2,C4,FC,C8,90,F0,A2,03,C0,04,90,F2
167 DATA68,A8,B9,61,C0,85,FD,B9,A1,C0,85,FE,A9,00,A0,05
168 DATA06,FE,26,FD,2A,88,D0,F8,69,3F,20,D2,FF,CA,D0,EC
169 DATA20,C0,C2,A4,FC,A2,06,E0,03,F0,1C,06,FB,90,0E,BD
170 DATA54,C0,20,D2,FF,BD,5A,C0,F0,03,20,D2,FF,CA,D0,E7

171 DATA60,88,30,E7,20,D8,C2,A5,FB,C9,E8,B9,3F,00,90,F1
172 DATA20,CC,C2,AA,E8,D0,01,C8,98,20,D8,C2,8A,4C,D8,C2
173 DATAA2,03,20,3F,AB,CA,D0,FA,60,38,A5,FC,A4,15,AA,10
174 DATA01,88,65,14,90,01,C8,60,48,4A,4A,4A,4A,20,E3,C2
175 DATA68,29,0F,09,30,C9,3A,90,02,69,06,4C,D2,FF,0D,5B
176 DATA50,5D,52,4F,47,52,41,4D,20,4F,52,20,5B,44,5D,41
177 DATA54,41,20,46,4F,52,4D,41,54,3F,20,00,0D,46,49,4C
178 DATA45,4E,41,4D,45,3F,20,00
READY.
```

# Vandaldos

## by Paul Rule

This cutely named utility is a disk editing program for the Apple II which runs under DOS 3.3 or any compatible DOS such as FDOS or Diversidos. The program has twelve smaller programs incorporated in it. If you are not sure what the program does when you are using it then it is a good idea to experiment on a disk that contains programs that you don't want to keep. After using an option in the main menu, you may have to re-load the program, as certain routines can overwrite parts of the memory containing the program. *Do not run the program before saving it or before you have finished typing it in. Parts of the program could be corrupted.*

The TRACK DUMP will display the contents of disk tracks to the screen. It does not show byte values, but the ASCII character equivalent. The Basic routine interfaces with a machine language routine to print the contents of the buffer on the screen. The machine language routine was used for speed. You cannot alter the contents of a disk with this option.

The SECTOR EDITOR allows you to read, edit and write sectors back to the disk. This option requires an 80 column card as it prints the bytes and ASCII characters of a whole sector on one screen. To enter a decimal byte, type 'D'. To exit from this mode press return when asked for next values. To enter text, type 'T' and you can use the right arrow to copy over text or you can type in changes. To exit from this mode press return. To save a sector back to disk, type 'S'.

The VTOC BIT MAP EDITOR allows you to edit the map that tells DOS which sectors are free and which are used. Normally you wouldn't want to alter this map, but there are still reasons for altering it. For example: if you had formatted track 35 and you wanted to use it under DOS you would have to alter the bit map to free that track. This option is definitely not for people who don't know what they're doing. If you wreck the VTOC (which stands for Volume Table of Contents) it could make the disk unusable until it is initialised again. If you free sectors that are occupied by other programs, then the next time you save something on that disk, it could overwrite previously saved programs.

ADD 11 SECTORS TO DISK will do just that. If you are using standard 3.3, FDOS or 48k Diversidos then you can free track 2, sectors 5 to 15. These sectors are reserved by DOS but not used. Do not use this option on a disk that you have used the 'EXTEND CATALOG' option on. If you would like to check the changes made then use the 'VTOC BIT MAP EDITOR' to have a look at the map.

EXTEND CATALOG will allow you to have approximately 180 file names, instead of 105. This is only of use if you are dealing with lots of small files. Do not use this option if you have used the 'ADD 11 SECTORS' option. The extension to the catalog is put on track 2, sectors 15 to 5.

FDOS MESSAGE CHANGER allows you to change the message that FDOS displays when you boot the disk. Don't use it on disks that don't contain FDOS.

DISK VOLUME MESSAGE CHANGER allows you to change the 'DISK VOLUME' message displayed when you 'CATALOG' a disk. You can change it to say things like 'FRED'S DISK' or just about anything you want.

DOS COMMAND CHANGER will allow you to change the DOS commands in memory. You can do things like change 'CATALOG' to 'AVALOOK' or 'RUN' to '—' (like ProDOS) or 'DELETE' to 'KILL', 'INIT' to 'DESTROYDISK', the only limit is the length of the words and your imagination. You can save these changes to disk. They are saved as a binary file, so the new commands are not permanent. After booting the disk the new commands will not work. If you saved them, then you can just 'BLOAD' the file and they will work again.

PRODOS MESSAGE CHANGER allows you to change the message ProDOS displays on booting.

PRODOS STARTUP PROGRAM NAME CHANGER allows you to change the name of the 'STARTUP' program name used by ProDOS. Unlike 3.3, the 'booting system' under ProDOS must be called 'STARTUP'. This program allows you to have any name you like.

CPM MESSAGE CHANGER is like the ProDOS message changer, except that it's for CP/M. It allows you to change the message that CP/M disks display on booting. (The message that says what version you are using). An 80 column card is required for this option, and don't forget, you have to use return and CTRL-J for a new line under CP/M.

TYPEWRITER allows you to use your printer like a typewriter. Most printers usually only print the contents of their buffer after a carriage return or a backspace. What this program does is to get a keypress from the user, then print that character, a backspace, then a space. The printer should print each character as you type it.

```
1  REM  ****************************************
2  REM  *                                      *
3  REM  * VANDALDDS  BY PAUL RULE  27-APR-85   *
4  REM  *                                      *
5  REM  * FOR APPLE ][ ,][ +, //e, //c         *
6  REM  *                                      *
7  REM  * USE DOS 3.3, FDOS, DIVERSI DOS       *
8  REM  *                                      *
9  REM  * ANY DOS THAT IS SIMILAR TO 3.3       *
10  REM *                                      *
11  REM * NOT PRODOS                           *
12  REM *                                      *
13  REM * PROGRAM SIZE = 19K  SO YOU NEED AT    *
14  REM *                                      *
15  REM * LEAST 48 K OF RAM                    *
16  REM *                                      *
17  REM ****************************************


20  DATA 169,3,160,32,32,217,3,176,1,96,169,128,141,64,3,24,96,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,1,96,1,0,0,0,49,3,0,116,0,0,1,9,17,96,1,0,1,239,216
1000  PR# 0: IN# 0: CALL 1002
1010 N = 12
1020  DIM O$(N)
1030  HOME : INVERSE
1040  HTAB 13: PRINT "VANDALDOS.3": NORMAL
1050  PRINT
1060  HTAB 2: PRINT "COPYRIGHT RULE-ISTIC SOFTWARE 1985"
```

```
1070  PRINT
1080  HTAB 2: PRINT "THE BEST USER-UNFRIENDLY SOFTWARE"
1090  PRINT : PRINT : HTAB 20: PRINT "[USE <- -> & RETURN]"
1100  PRINT
1110 O$(1) = "TRACK DUMP"
1120 O$(2) = "SECTOR EDITOR"
1130 O$(3) = "VTOC BIT MAP EDITOR"
1140 O$(4) = "ADD 11 SECTORS TO DISK"
1150 O$(5) = "EXTEND CATALOG"
1160 O$(6) = "FDOS MESSAGE CHANGER"
1170 O$(7) = "DISK VOLUME MESSAGE CHANGER"
1180 O$(8) = "DOS COMMAND CHANGER"
1190 O$(9) = "PRODOS MESSAGE CHANGER"
1200 O$(10) = "PRODOS STARTUP PROGRAM NAME CHANGER"
1210 O$(11) = "CPM MESSAGE CHANGER"
1220 O$(12) = "TYPEWRITER"
1230  FOR O = 1 TO N
1240  VTAB O + 8
1250  PRINT O$(O)
1260  NEXT O
1270 O = 1:OO = 1
1280  VTAB OO + 8: PRINT O$(OO)
1290  VTAB O + 8: INVERSE : PRINT O$(O): NORMAL
1300  POKE  - 16368,0: WAIT  - 16384,128:O$ =  CHR$ ( PEEK ( - 16384) - 128)
1310  IF O$ =  CHR$ (21) THEN OO = O:O = O + 1: IF O > N THEN O = 1
1320  IF O$ =  CHR$ (8) THEN OO = O:O = O - 1: IF O < 1 THEN O = N
1330  IF O$ =  CHR$ (13) THEN  GET O$: PRINT : ON O GOTO 2000,3000,4000,5000
,6000,7000,8000,9000,10000,11000,12000,13000
1340  GOTO 1280
1999  REM
---- TRACK DUMP ----

2000  CLEAR : HOME
2010  INPUT "START TRACK ?";ST
2020  INPUT "END TRACK ?";ET
2030 SL = 6:DR = 1
2040 BUFFER = 24576
2050 G$ =  CHR$ (7)
2060  FOR A = 768 TO 820: READ B: POKE A,B: NEXT A
2080  DATA 162,0,189,0,96,168,192,4,208,2,169,174,192,132,208,2,169,174,32,237
,253,224,255,232,208,232,96
2090  FOR A = 0 TO 26: READ B: POKE 16384 + A,B: NEXT
2100  POKE 801,SLOT * 16
2110  POKE 802,DRIVE
2120  POKE 803,0
2130  POKE 809,BUFFER / 256
2140  POKE 808,BUFF -  PEEK (809) * 256
2150  POKE 815,SLOT * 16
2160  POKE 816,DRIVE
2170  REM PEEK HERE
2180  REM

PRINT IT


2190  POKE  - 16368,0
2200  VTAB 20
2210  FOR TR = ST TO ET
2220  FOR SE = 0 TO 15
2230  POKE 804,TR
2240  POKE 805,SE
2250  CALL 768
2260  PRINT : PRINT : PRINT : PRINT : PRINT "TRACK "TR" SECTOR "SE: PRINT
: PRINT : PRINT : PRINT
2270  CALL 16384
2280  IF  PEEK ( - 16384) > 128 THEN  POKE  - 16368,0: WAIT  - 16384,128:
POKE  - 16368,0
2290  NEXT SE,TR
2998  END
2999  REM
---- SECTOR EDITOR ----

3000  CLEAR
3001  HOME : PRINT "USE 80 COLUMN CARD": FOR R = 1 TO 2000: NEXT
3002  PR# 3: CALL 1002
3005 SLOT = 6
3010 DRIVE = 1
3015  REM       THIS WILL LOOK SILLY WITHOUT AN 80 COLUMN CARD

3020  HOME : PRINT  CHR$ (12)
3025  PRINT  TAB( 16)"--------------------------------------"
3030  FOR SP = 1 TO 28 STEP 2
3035  PRINT  TAB( 28)"APPLE ][ SECTOR EDITOR"
3040  PRINT  TAB( 28)"FOR 3.3 & FDOS"
3045  FOR SP = 1 TO 28 STEP 2
3050  PRINT  TAB( 28)"(c) RULE-ISTIC SOFTWARE"
3055  PRINT  TAB( 16)"--------------------------------------"
3060  HTAB 28: INPUT "DRIVE (1/2) ?";DR$: IF DR$ = "2" THEN DRIVE = 2
3065  HTAB 28: INPUT "PRINTER (Y/N) ?";PR$
3070  PRINT : HTAB 28: INPUT "DECIMAL OR HEX (D/H) ?";T$: IF T$ = "H" THEN
H = 1
3075 H$ = "0123456789ABCDEF"
3080 Y = 2
3085 BUFFER = 30000
3090 G$ =  CHR$ (7)
3095  FOR A = 768 TO 820: READ B: POKE A,B: NEXT A
3105  POKE 801,SLOT * 16
3110  POKE 802,DRIVE
3115  POKE 803,0
3120  POKE 809,BUFFER / 256
3125  POKE 808,BUFF -  PEEK (809) * 256
3130  POKE 815,SLOT * 16
3135  POKE 816,DRIVE
3140  REM PEEK HERE
3145  VTAB 20: HTAB 30: PRINT "TRACK NUMBER (0-34) ";: INPUT AN$: IF AN$
= "" THEN  END
3150 TRACK =  INT ( VAL (AN$))
3155  VTAB 20: HTAB 30: PRINT "SECTOR (0-15)       ";: INPUT AN$: IF AN$
= "" THEN  PRINT G$: GOTO 3145
3160 SECT =  INT ( VAL (AN$))
3165  IF CS = 0 THEN  HOME : PRINT  CHR$ (12)
```

```
3170 CS = 1
3175  POKE 804,TRACK
3180  POKE 805,SECTOR
3185  POKE 812,1
3190  POKE 832,0: CALL 768: ON  PEEK (832) > 127 GOTO 3445:Q = 1
3195 P = 0
3200  REM

PRINT IT


3205  VTAB 1
3210  IF PR$ = "Y" OR PR$ = "y" THEN  PR# 1
3215  PRINT "0123456789ABCDEF   0   1   2   3   4   5   6   7   8   9   A   B
   C   D   E   F"
3220  IF PR$ <  > "Y" THEN  VTAB  PEEK (37)
3225  PRINT "---------------- ----------------------------------------------
---------------"
3230  IF PR$ <  > "Y" THEN  VTAB  PEEK (37)
3235 ZZ = 0
3240  HTAB 1
3245  FOR S = 1 TO 16
3250  FOR A = (S - 1) * 16 TO (S * 16) - 1
3255 B =  PEEK (BUFFER + A)
3260  IF B < 32 THEN B = 46
3265  IF B > 127 AND B < 160 THEN B = 46
3270  IF B = 127 OR B = 255 THEN  IF PR$ = "Y" THEN B = B - 1
3275  PRINT  CHR$ (B);
3280  IF  PEEK ( - 16384) > 127 THEN 3360
3285  IF  PEEK ( - 16384) > 127 THEN 3360
3290  NEXT A
3295 FL = 0
3300  PRINT  MID$ (H$,S,1);
3305  FOR A = (S - 1) * 16 TO (S * 16) - 1
3310 B =  PEEK (BUFFER + A)
3315  IF H THEN  GOSUB 3735: GOTO 3325
3320 PO$ =  STR$ (B)
3325  IF  LEN (PO$) < 3 THEN PO$ = " " + PO$: GOTO 3325
3330  PRINT PO$;: IF FL < 15 THEN  PRINT " ";
3335 FL = FL + 1: IF FL >  = 15 THEN FL = 0
3340  IF  PEEK ( - 16384) > 127 THEN 3360
3345  NEXT
3350  PRINT : HTAB 1: IF PR$ <  > "Y" THEN  VTAB  PEEK (37)
3355  NEXT S
3360  PRINT
3365  VTAB 20
3370  HTAB 1
3375  PRINT "TRACK=";TR;" SECTOR=";SECT;" ?": VTAB  PEEK (37)
3380  IF PR$ = "Y" OR PR$ = "y" THEN  PR# 3: CALL 1002
3385  GET A$
3390  PRINT
3395  IF A$ = "T" THEN  VTAB Y: PRINT : GOTO 3505
3400  IF A$ = "D" THEN 3600
3405  IF A$ = "S" THEN  GOSUB 3660
3410  IF A$ =  CHR$ (13) THEN 3140
3415  IF AN$ =  CHR$ (8) THEN SE = SE - 1: ON SE >  = 0 GOTO 3175:SE = 15:
TR = TR - 1: ON TR >  = 0 GOTO 3175:TR = 34: GOTO 3175
3420  IF AN$ =  CHR$ (13) THEN 3140
3425  IF AN$ =  CHR$ (21) THEN SE = SE + 1: ON SE < 16 GOTO 3175:SE = 0:TR
= TR + 1: ON TR < 35 GOTO 3175:TR = 0: GOTO 3175
3430  IF AN$ <  >  CHR$ (27) THEN  PRINT G$;: GOTO 3365
3435  GOTO 3145
3440  END
3445  REM ERROR HANDLING
3450  POKE 832,0: HOME : PRINT  CHR$ (12)
3455  IF  PEEK (813) = 64 THEN  PRINT "DRIVE ERROR";G$: GOTO 3470
3460  IF  PEEK (813) = 128 THEN  PRINT "READ ERROR";G$: GOTO 3470
3465  PRINT "DISK-ERROR ERROR";G$
3470  GET TA$: GOTO 3145
3475  PRINT
3480  PRINT "THE END"
3485  END
3490  REM

EDITING

3495  REM
3500  REM
3505  VTAB Y
3510  PRINT
3515  GET A$
3520  IF A$ =  CHR$ (13) THEN 3360
3525  IF A$ =  CHR$ (8) THEN  IF X > 0 THEN X = X - 1: PRINT : VTAB Y + 1:
FOR C = ((Y - 2) * 16) + X TO X:: GOSUB 3715: NEXT :P = P - 1
3530  IF A$ =  CHR$ (21) THEN  VTAB Y + 1: FOR C = ((Y - 2) * 16) + X TO X:
GOSUB 3715: NEXT :X = X + 1:P = P + 1
3535  IF X > 15 THEN X = 0: IF Y < 17 THEN Y = Y + 1: PRINT : VTAB Y
3540  IF X < 0 THEN X = 15: IF Y > 2 THEN Y = Y - 1
3545  IF A$ =  CHR$ (8) OR A$ =  CHR$ (21) THEN 3515
3550  GET A$
3555  IF A$ =  CHR$ (27) OR A$ =  CHR$ (13) THEN X = 0:Y = 2:P = 0: GOTO 3495
3560  IF A$ =  CHR$ (8) OR A$ =  CHR$ (21) THEN 3515
3565  IF P > 255 THEN 3495
3570 X = X + 1: IF X > 16 THEN X = 1: IF Y < 17 THEN Y = Y + 1: PRINT
3575  PRINT A$;
3580  POKE BUFFER + P, ASC (A$)
3585 P = P + 1
3590  GOTO 3550
3595  REM


DECIMAL ENTRY


3600  VTAB 20: HTAB 20
3605  INPUT "ENTER COLUMN (0-15), ROW (0-15) ??";R$,C$
3610  IF R$ = "" AND C$ = "" THEN 3205
3615 R =  VAL (R$):C =  VAL (C$)
3620  IF R < 0 OR R > 15 OR C < 0 OR C > 15 THEN 3605
3625  VTAB 20: HTAB 30
3630  INPUT "ENTER DECIMAL NUMBER (0-255) ?";V
3635  IF V < 0 OR V > 255 THEN 3625
3640 P = (C * 16) + R
```

```
3645  POKE BUFFER + P,V
3650  GOTO 3600
3655  REM
WRITE TRACK/SECTOR
3660  VTAB 20
3665  INPUT "WRITE TO TRACK ?";TR
3670  VTAB 20
3675  INPUT "         SECTOR ?";SE
3680  POKE 804,TR
3685  POKE 805,SE
3690  POKE 812,2
3695  CALL 768
3700  POKE 812,1
3705  RETURN
3710  REM
PRINT
3715 B =  PEEK (BU + C)
3720  IF B < 32 OR B > 127 AND B < 160 THEN B = 46
3725  PRINT  CHR$ (B);
3730  RETURN
3735  REM

HEX PRINT
3740 H% = B / 16
3745 L% = B - H% * 16
3750  IF H% > 9 THEN H% = H% + 7
3755  IF L% > 9 THEN L% = L% + 7
3760 PO$ =  CHR$ (H% + 176) +  CHR$ (L% + 176)
3765  RETURN
3998  END
3999  REM


---- VTOC BIT MAP EDITOR ---
4000  CLEAR
4002  POKE 216,0: ONERR  GOTO 4665
4005 TR = 17
4010  HOME : HTAB 11: INVERSE
4015  PRINT "VTOC BIT MAP EDITOR": PRINT : PRINT
4020  NORMAL
4025  PRINT "COPYRIGHT (C) RULE-ISTIC SOFTWARE 1985"
4030  PRINT : PRINT "USE"
4035  INVERSE
4040  HTAB 8: PRINT "I
"
4045  HTAB 5: PRINT "J";: NORMAL : PRINT "  +  ";: INVERSE : PRINT "K
"
4050  HTAB 8: PRINT "M": NORMAL
4055  PRINT "          TO MOVE CURSOR"
4060  PRINT : PRINT "S = SAVE BIT MAP"
4065  PRINT
4070  PRINT "CTRL-R = RE-READ BIT MAP"
4075  PRINT
4080  PRINT "P = RE-PRINT MAP (TO CHECK IF CORRUPT)"
4085  PRINT
4090  PRINT "T = TOGGLE WHOLE TRACK"
4095  PRINT
4100  PRINT "RETURN = TOGGLE SECTOR"
4105  REM 0-25
4110  DATA 00000000,00000001,00000010,00000011,00000100,00000101,00000110,
00000111,00001000,00001001,00001010,00001011,00001100,00001101,00001110,
00001111,00010000,00010001,00010010,00010011,00010100,00010101,00010110,
00010111,00011000,00011001
4115  REM 26-50
4120  DATA 00011010,00011011,00011100,00011101,00011110,00011111,00100000,
00100001,00100010,00100011,00100100,00100101,00100110,00100111,00101000,
00101001,00101010,00101011,00101100,00101101,00101110,00101111,00110000,
00110001,00110010
4125  REM 51-75
4130  DATA 00110011,00110100,00110101,00110110,00110111,00111000,00111001,
00111010,00111011,00111100,00111101,00111110,00111111,01000000,01000001,
01000010,01000011,01000100,01000101,01000110,01000111,01001000,01001001,
01001010,01001011
4135  REM 76-100
4140  DATA 01001100,01001101,01001110,01001111,01010000,01010001,01010010,
01010011,01010100,01010101,01010110,01010111,01011000,01011001,01011010,
01011011,01011100,01011101,01011110,01011111,01100000,01100001,01100010,
01100011,01100100
4145  REM 101-125
4150  DATA 01100101,01100110,01100111,01101000,01101001,01101010,01101011,
01101100,01101101,01101110,01101111,01110000,01110001,01110010,01110011,
01110100,01110101,01110110,01110111,01111000,01111001,01111010,01111011,
01111100,01111101
4155  REM 126-150
4160  DATA 01111110,01111111,10000000,10000001,10000010,10000011,10000100,
10000101,10000110,10000111,10001000,10001001,10001010,10001011,10001100,
10001101,10001110,10001111,10010000,10010001,10010010,10010011,10010100,
10010101,10010110
4165  REM 151-175
4170  DATA 10010111,10011000,10011001,10011010,10011011,10011100,10011101,
10011110,10011111,10100000,10100001,10100010,10100011,10100100,10100101,
10100110,10100111,10101000,10101001,10101010,10101011,10101100,10101101,
10101110,10101111
4175  REM 176-200
4180  DATA 10110000,10110001,10110010,10110011,10110100,10110101,10110110,
10110111,10111000,10111001,10111010,10111011,10111100,10111101,10111110,
10111111,11000000,11000001,11000010,11000011,11000100,11000101,11000110,
11000111,11001000
4185  REM 201-225
4190  DATA 11001001,11001010,11001011,11001100,11001101,11001110,11001111,
11010000,11010001,11010010,11010011,11010100,11010101,11010110,11010111,
11011000,11011001,11011010,11011011,11011100,11011101,11011110,11011111,
11100000,11100001
4195  REM 226TO252
4200  DATA 11100010,11100011,11100100,11100101,11100110,11100111,11101000,
11101001,11101010,11101011,11101100,11101101,11101110,11101111,11110000,
11110001,11110010,11110011,11110100,11110101,11110110,11110111,11111000,
11111001,11111010
4205  REM 253-255
4210  DATA 11111011,11111100,11111101,11111110,11111111
4215  REM
```

```
4220  DIM B$(256)
4225  DIM X(36,17)
4227  FOR A = 768 TO 820: READ B: POKE A,B: NEXT A
4228  FOR A = 0 TO 26: READ B: NEXT
4230  FOR A = 0 TO 255: READ B$(A): NEXT
4235 BUFFER = [redacted] 30000
4240 HT = 3
4255  VTAB 23
4260  FLASH
4265  INPUT "ENTER TRACK OF VTOC (RETURN FOR 17) ?";A$
4270  IF A$ <  > "" THEN TR =  VAL (A$)
4275  NORMAL
4280  POKE 809,BU / 256
4285  POKE 808,BU -  PEEK (809) * 256
4290  POKE 804,TR: REM  TRACK
4295  POKE 805,0: REM SECTOR
4300  POKE 812,1
4305  CALL 768: IF  PEEK (832) > 127 THEN  PRINT "ERROR": POKE 832,0: END
4310  HOME
4315  VTAB 2
4320 FR = 0:HT = 3
4325  PRINT "  0123456789ABCDEF0123456789ABCDEF0123"
4330  PRINT "  0         1         2         3   E"
4335  PRINT "  012345678901234567890123456789012345"
4340  FOR A = 0 TO 15
4345  HTAB 1: VTAB A + 5: PRINT A
4350  NEXT
4355  REM
BIG LOOP TO READ BUFFER & DEFINE TRACKS

4360  FOR A = 56 TO 55 + (36 * 4) STEP 4
4365 B =  PEEK (BUFFER + A)
4370 T$ = "":T$ = B$(B)
4375 B =  PEEK (BUFFER + A + 1)
4380 T$ = T$ + B$(B)
4385  REM
PRINT MAP

4390  FOR C = 16 TO 1 STEP  - 1
4395  VTAB (21 - C): HTAB HT
4400 P$ =  MID$ (T$,C,1)
4405  IF P$ = "0" THEN  INVERSE : PRINT " ": NORMAL
4410  IF P$ = "1" THEN  PRINT " ":FR = FR + 1
4415 X(HT - 3,16 - C) =  VAL (P$)
4420  NEXT C
4425  REM
4430 HT = HT + 1
4435  NEXT A
4440  VTAB 23: PRINT FR" FREE SECTORS                    "
4445 CH = 3:CV = 5:A = 56
4450  VTAB CV: HTAB CH
4455  GET A$
4460  IF A$ = "J" AND CH > 3 THEN CH = CH - 1:A = A - 4
4465  IF A$ = "K" AND CH < 38 THEN CH = CH + 1:A = A + 4
4470  IF A$ = "I" AND CV > 5 THEN CV = CV - 1
4475  IF A$ = "M" AND CV < 20 THEN CV = CV + 1
4480  IF A$ =  CHR$ (27) THEN  VTAB 23: END
4485  IF A$ =  CHR$ (13) THEN AL = AL + 1: GOTO 4580
4490  IF A$ = "S" THEN  POKE 812,2: CALL 768
4495  IF A$ =  CHR$ (18) THEN  POKE 812,1: VTAB 2: HTAB 1: CALL 768: GOTO 4320
4500  IF A$ = "T" THEN  GOSUB 4680
4505  IF A$ = "P" THEN  VTAB 23: HTAB 20: FLASH : PRINT "REPRINTING": NORMAL
: GOTO 4315
4510  GOTO 4450
4515 B =  PEEK (BUFFER + A)
4520 T$ = "":T$ = B$(B)
4525 B =  PEEK (BUFFER + A + 1)
4530 T$ = T$ + B$(B)
4535 T$ =  LEFT$ (T$,CV - 3) + "1" +  RIGHT$ (T$,16 - CV)
4540  FOR D = 0 TO 255
4545  IF  RIGHT$ (T$,8) = B$(D) THEN  POKE BU + A,D
4550  NEXT D
4555  FOR D = 0 TO 255
4560  IF  LEFT$ (T$,8) = B$(D) THEN  POKE BU + 1,D
4565  NEXT D
4570 HT = 3
4575  GOTO 4360
4580 X(CH - 3,CV - 5) =  NOT X(CH - 3,CV - 5)
4585  HTAB CH: VTAB CV
4590  IF X(CH - 3,CV - 5) = 0 THEN  INVERSE : PRINT " ": NORMAL
4595  IF X(CH - 3,CV - 5) = 1 THEN  PRINT " "
4600 T$ = "":T1$ = ""
4605  FOR R = 15 TO 8 STEP  - 1:T$ = T$ +  STR$ (X(CH - 3,R)): NEXT
4610  FOR R = 7 TO 0 STEP  - 1:T1$ = T1$ +  STR$ (X(CH - 3,R)): NEXT
4615 A = (CH - 3) * 4
4620  FOR L1 = 0 TO 255: IF T$ = B$(L1) THEN V = L1
4625  NEXT
4630  FOR L2 = 0 TO 255: IF T1$ = B$(L2) THEN W = L2
4635  NEXT
4640 A = ((CH - 3) * 4) + 56
4645  POKE BUFFER + A + 1,W
4650  POKE BUFFER + A,V
4655 HT = 3
4660  GOTO 4450
4665  IF  PEEK (222) = 0 THEN  VTAB 23: PRINT "SAVE (Y/N)";: GET A$: IF A$
= "Y" THEN  POKE 812,2: CALL 768: RUN
4670  IF  PEEK (222) = 77 THEN MEM =  FRE (0): RESUME
4675  VTAB 23: PRINT "ERROR " PEEK (222): GOTO 4450
4680  REM
TRACK

4685  IF  PEEK (BU + A + 1) = 0 AND  PEEK (BU + A) = 0 THEN 4710
4690  POKE BU + A + 1,0
4695  POKE BU + A,0
4700  FOR RP = 0 TO 15: HTAB CH: VTAB RP + 5: INVERSE : PRINT " ": NEXT
: NORMAL
4705  RETURN
4710  POKE BU + A + 1,255
4715  POKE BU + A,255
4720  FOR RP = 0 TO 15: HTAB CH: VTAB RP + 5: PRINT " ": NEXT
4725  RETURN
4998  END
4999  REM
---- ADD 11 SECTORS TO DISK ----
```

```
5000  CLEAR
5005 BUFFER = 29000
5010  FOR A = 768 TO 820: READ B: POKE A,B: NEXT A
5030  HOME : PRINT  CHR$ (12)
5040  INVERSE : PRINT "DISK SPACE ADDER BY PAUL RULE.(FOR 3.3)": NORMAL
5050  PRINT : PRINT : PRINT "THIS PROGRAM WILL GIVE YOU AN EXTRA 11  SECTORS
ON YOUR DISK."
5060  PRINT "THIS PROGRAM FREES THE SECTORS FROM     TRACK 2,SECTOR 5 TO TRACK
2,SECTOR 15    (THE ONES RESERVED BY DOS BUT NOT USED."
5070  VTAB 22
5080  FLASH
5090  INPUT "INSERT DISK TO BE EXTENDED & PRESS RET";A$
5100  POKE 809,BU / 256
5110  NORMAL
5120  POKE 808,BU -  PEEK (809) * 256
5130  POKE 804,17: REM TRACK
5140  POKE 805,0: REM SECTOR
5150  POKE 812,1
5160  CALL 768: IF  PEEK (B32) > 127 THEN  PRINT "ERROR": POKE 832,0: END
5170  POKE BUFFER + 64,255
5180  POKE BUFFER + 65,224
5190  POKE 812,2
5200  CALL 768
5998  END
5999  REM
---- CATALOG EXTENDER ----
6000  CLEAR
6005 BUFFER = 29000
6010 REED = 1
6020 WRITE = 2
6030  FOR A = 768 TO 820: READ B: POKE A,B: NEXT A
6050  POKE 809,BU / 256
6060  POKE 808,BU -  PEEK (809) * 256
6070  HOME : PRINT  CHR$ (12)
6080  INVERSE : PRINT "CATALOG EXTENDER BY PAUL RULE.(FOR 3.3)": NORMAL
6090  PRINT : PRINT : PRINT "THIS PROGRAM EXTENDS CATALOG LENGTH FROM105 FILES
TO 182. (FOR LOTS OF LITTLE   FILES)"
6100  PRINT "THE EXTENSION IS ADDED ONTO TRACK 2 FROMSECTOR 15 TO SECTOR 5.
(THE PART DOS    RESERVES BUT DOESN'T USE)
6110  FLASH : VTAB 22: PRINT "INSERT DISK TO BE EXTENDED & PRESS SPACE";:
NORMAL : WAIT  - 16384,160
6120  REM
CHANGE TRACK 17,SECTOR 1
6130 TRACK = 17
6140 SECTOR = 1
6150 COMMUND = REED
6160  GOSUB 6410
6170  POKE BUFFER + 1,2
6180  POKE BUFFER + 2,15
6190 COMMUND = WRITE
6200  GOSUB 6410
6210  REM
 CHANGE TR 2,SECS (15-6)
 6220 TRACK = 2
 6230  FOR SECTOR = 15 TO 6 STEP  - 1
 6240 COMMUND = REED
 6250  GOSUB 6410
 6260  POKE BUFFER + 1,2
 6270  POKE BUFFER + 2,SECTOR - 1
 6280 COMMUND = WRITE
 6290  GOSUB 6410
 6300  NEXT SECTOR
 6310  REM
 NULL ENTRY TR 2,SE 5          (END OF CATALOG)
 6320 SECTOR = 5
 6330 COMMUND = REED
 6340  GOSUB 6410
 6350  POKE BUFFER + 1,0
 6360  POKE BUFFER + 2,0
 6370 COMMUND = WRITE
 6380  GOSUB 6410
 6390  END
 6400  REM
 RWTS SUBROUTINE
 6410  POKE 804,TRACK
 6420  POKE 805,SECTOR
 6430  POKE 812,COMMUND
 6440  CALL 768: IF  PEEK (832) > 127 THEN  PRINT  CHR$ (7)"ERROR": END
 6450  RETURN
 6998  END
 6999  REM
 ---- FDOS MESSAGE CHANGER ----
 7000  CLEAR
 7005 BUFFER = 29000
 7010  FOR A = 768 TO 820: READ B: POKE A,B: NEXT A
 7030  POKE 809,BU / 256
 7040  POKE 808,BU -  PEEK (809) * 256
 7050  POKE 804,0: REM TRACK
 7060  POKE 805,0: REM SECTOR
 7070  CALL 768
 7080  HOME : PRINT  CHR$ (12)
 7090  INVERSE : PRINT "FDOS MESSAGE CHANGER": NORMAL
 7100  PRINT : PRINT "CURRENT MESSAGE IS..."
 7110  PRINT
 7120  FOR A = 94 TO 94 + 42
 7130 B =  PEEK (BUFFER + A)
 7140  PRINT  CHR$ (B);
 7150  NEXT A
 7160  INPUT "FLASHING/NORMAL/INVERSE ?";C$
 7170  IF C$ = "F" THEN CT = 0
 7180  IF C$ = "N" THEN CT = 128
 7190  IF C$ = "I" THEN CT =  - 64
 7200  PRINT : PRINT "ENTER NEW MESSAGE (42 CHARACTERS)"
 7210  PRINT : PRINT "__________________________________________";
 7220  HTAB 1: VTAB  PEEK (37): POKE 1403,0
 7230  GET A$
 7240  IF A$ =  CHR$ (8) THEN  PRINT A$;:N = N - 1: GOTO 7230
 7250  IF A$ = " " AND CT =  - 64 THEN A$ =  CHR$ (96)
 7260  IF  ASC (A$) < 32 THEN  INVERSE : PRINT  CHR$ ( ASC (A$) + 64);: NORMAL
```

```
: GOTO 7290
7270  IF  ASC (A$) < 64 AND CT =  - 64 THEN A$ =  CHR$ ( ASC (A$) + 64)
7280  PRINT A$;
7290  IF A$ =  CHR$ (13) THEN  POKE BU + 94 + N, ASC (A$) + 128: GOTO 7310
7300  POKE BU + 94 + N, ASC (A$) + CT
7310 N = N + 1: IF N < 42 THEN 7230
7320  PRINT : PRINT
7330  FOR A = 94 TO 94 + 42
7340 B =  PEEK (BUFFER + A)
7350  PRINT  CHR$ (B);
7360  NEXT A
7370  PRINT : INPUT "OKAY (Y/N) ?";O$: IF O$ <  > "Y" THEN N = 0: GOTO 7200
7380  POKE 804,0: REM  TRACK
7390  POKE 805,0: REM  SECTOR
7400  POKE 812,2
7410  CALL 768
7420  END
7430  PRINT "ERROR"
7998  END
7999  REM
---- DISK VOLUME MESSAGE CHANGER ----
8000  CLEAR
8005 TR = 2:SE = 3
8010 N = 11
8020 LO = 109
8030 BUFFER = 29000
8040  FOR A = 768 TO 820: READ B: POKE A,B: NEXT A
8060  HOME : PRINT  CHR$ (12)
8070  INVERSE : PRINT "DISK VOLUME MESSAGE CHANGER": NORMAL
8080  PRINT : INPUT "3.3 OR FDOS (3/F) ?";D$
8090  IF D$ = "3" THEN SE = 2:LO = 175
8100  POKE 809,BU / 256
8110  POKE 808,BU -  PEEK (809) * 256
8120  POKE 804,TR: REM  TRACK
8130  POKE 805,SE: REM  SECTOR
8140  CALL 768
8150  INPUT "FLASHING/INVERSE/NORMAL ?";C$
8160  IF C$ = "F" THEN CT = 0
8170  IF C$ = "I" THEN CT =  - 64
8180  IF C$ = "N" OR C$ = "" THEN CT = 128
8190  PRINT : PRINT "CURRENT MESSAGE IS..."
8200  PRINT
8210  FOR A = LO + 11 TO LO STEP  - 1
8220 B =  PEEK (BUFFER + A)
8230  PRINT  CHR$ (B);
8240  NEXT A
8250  PRINT : PRINT "ENTER NEW MESSAGE (12 CHARACTERS)"
8260  PRINT : PRINT "____________"
8270  HTAB 1: VTAB  PEEK (37): POKE 1403,0
8280  GET A$
8290  IF A$ =  CHR$ (8) THEN  PRINT A$;:N = N + 1: GOTO 8280
8300  IF  ASC (A$) < 32 THEN  INVERSE : PRINT  CHR$ ( ASC (A$) + 64);: NORMAL
: GOTO 8340
8310  IF  ASC (A$) < 64 AND CT =  - 64 THEN A$ =  CHR$ ( ASC (A$) + 64)
8320  IF  ASC (A$) < 64 AND CT = 0 THEN A$ =  CHR$ ( ASC (A$) + 64)
8330  PRINT A$;
8340  IF A$ =  CHR$ (13) THEN  POKE BU + LO + N,141: GOTO 8360
8350  POKE BU + LO + N, ASC (A$) + CT
8360 N = N - 1: IF N >  - 1 THEN 8280
8370  PRINT : PRINT
8380  FOR A = LO + 11 TO LO STEP  - 1
8390 B =  PEEK (BUFFER + A)
8400  PRINT  CHR$ (B);
8410  NEXT A
8420  PRINT : INPUT "OKAY (Y/N) ?";O$: IF O$ <  > "Y" THEN N = 11: GOTO 8250
8430  POKE 804,TR: REM  TRACK
8440  POKE 805,SE: REM  SECTOR
8450  POKE 812,2
8460  CALL 768
8470  END
8480  PRINT "ERROR"
8998  END
8999  REM
----DOS COMMAND CHANGER ----
9000  CLEAR
9005  HOME
9010  INVERSE : PRINT "THE CURRENT DOS COMMANDS": NORMAL : PRINT
9030  DIM B$(30)
9032 B$(1) = "INIT":B$(2) = "LOAD":B$(3) = "SAVE":B$(4) = "RUN":B$(5) = "CHAIN"
:B$(6) = "DELETE":B$(7) = "LOCK":B$(8) = "UNLOCK":B$(9) = "CLOSE":B$(10) =
"READ":B$(11) = "EXEC":B$(12) = "WRITE":B$(13) = "POSITION":B$(14) = "OPEN"
:B$(15) = "APPEND"
9034 B$(16) = "RENAME":B$(17) = "CATALOG":B$(18) = "MON":B$(19) = "NOMON"
:B$(20) = "PR#":B$(21) = "IN#":B$(22) = "MAXFILES":B$(23) = "FP":B$(24) = "INT"
:B$(25) = "BSAVE":B$(26) = "BLOAD":B$(27) = "BRUN":B$(28) = "VERIFY"
9050 D = 1: DIM A$(30)
9060 A = 43140:E = 43271
9070  PRINT B$(1)"-";
9080  FOR B = A TO E
9090 C =  PEEK (B)
9100  PRINT  CHR$ (C);:A$(D) = A$(D) +  CHR$ (C)
9110  IF C > 128 THEN D = D + 1: PRINT ,B$(D)"-";
9120  IF D = 29 THEN 9140
9130  NEXT
9140 G = A
9150  PRINT
9160 @@@@@@@
9160  FOR D = 1 TO 28
9170  PRINT B$(D)" IS "A$(D)" ";: INPUT A$: IF A$ <  > "" THEN A$(D) = A$
9180  PRINT G - A +  LEN (A$(D))"/131 ";
9190  FOR F = G TO G +  LEN (A$(D)) - 1
9200 M = M + 1
9210  POKE F, ASC ( MID$ (A$(D),M,1))
9220  NEXT F
9230  IF  ASC ( MID$ (A$(D),M,1)) < 128 THEN  POKE F - 1, ASC ( MID$ (A$(D),M,1
)) + 128: GOTO 9250
9240  POKE F - 1, ASC ( MID$ (A$(D),M,1))
9250 M = 0:G = G +  LEN (A$(D))
9260  IF G > E + 1 THEN  PRINT "TABLE FULL": FOR R = 1 TO 3000: NEXT
: RUN
9270  NEXT D
9280  PRINT : PRINT "SAVE AS BINARY FILE ?";: GET A$: IF A$ = "Y" THEN  INPUT
```

```
"NAME ?";A$: PRINT  CHR$ (4)A$(25)A$",A"A",L442"
 9998  END
 9999  REM
 ---- PRODOS MESSAGE CHANGER ----
10000  CLEAR
10005  HOME : PRINT "INSERT PRODDS DISK";: GET A$
10010 BUFFER = 29000
10020  FOR A = 768 TD 820: READ B: POKE A,B: NEXT A
10040  POKE 809,EJ / 256
10050  POKE 808,BU -  PEEK (809) ÷ 256
10060  POKE 804,1: REM  TRACK
10070  POKE 805,11: REM  SECTOR
10080  CALL 768
10090  HDME : PRINT  CHR$ (12)
10100  INVERSE : PRINT "PRODOS MESSSAGE CHANGER"
10110  NORMAL
10120  PRINT
10130  VTAB 10: HTAB 15
10140  FOR A = 146 TO 146 + 7
10150 B =  PEEK (BUFFER + A)
10160  IF B < 64 THEN  INVERSE
10170  IF B >  = 64 AND B < 128 THEN  FLASH
10180  IF B >  = 128 THEN  NORMAL
10190  PRINT  CHR$ (B);
10200  NORMAL
10210  NEXT A
10220  VTAB 12: HTAB 7
10230  FOR A = 146 + 8 TO 146 + 7 + 23
10240 B =  PEEK (BUFFER + A)
10250  PRINT  CHR$ (B);
10260  NEXT A
10270  VTAB 14: HTAB 12
10280  FOR A = 146 + 8 + 23 TO 146 + 8 + 23 + 13
10290 B =  PEEK (BUFFER + A)
10300  PRINT  CHR$ (B);
10310  NEXT A
10320  VTAB 24: HTAB 1
10330  FOR A = 146 + 8 + 23 + 13 + 1 TO 146 + 8 + 23 + 14 + 38
10340 B =  PEEK (BUFFER + A)
10350  PRINT  CHR$ (B);
10360  NEXT A
10370  VTAB 3: HTAB 1
10380  INPUT "FLASHING/NORMAL/INVERSE ?";C$
10390  IF C$ = "" THEN CT = 128
10400  IF C$ = "F" THEN CT = 0
10410  IF C$ = "N" THEN CT = 128
10420  IF C$ = "I" THEN CT =  - 64
10430  PRINT "SAVE (Y/N) ?";: GET S$: IF S$ = "Y" THEN 10600
10440  VTAB 10: HTAB 15
10450  GET A$
10460  IF A$ =  CHR$ (8) THEN  PRINT A$;:N = N - 1: GOTO 10450
10470  IF A$ =  CHR$ (21) THEN  HTAB  PEEK (36) + 2: GOTO 10540
10480  IF A$ = " " AND CT =  - 64 THEN A$ =  CHR$ (96)
10490  IF  ASC (A$) < 32 THEN  INVERSE : PRINT  CHR$ ( ASC (A$) + 64);:
NORMAL : GOTO 10520
10500  IF  ASC (A$) < 64 AND CT =  - 64 THEN A$ =  CHR$ ( ASC (A$) + 64)
10510  PRINT A$;
10520  IF A$ =  CHR$ (13) THEN  POKE BU + 94 + N, ASC (A$) + 128: GOTO 10570
10530  POKE BU + 146 + N, ASC (A$) + CT
10540  IF N = 7 THEN  VTAB 12: HTAB 7
10550  IF N = 30 THEN  VTAB 14: HTAB 12
10560  IF N = 44 THEN  VTAB 24: HTAB 1
10570 N = N + 1: IF N < 84 THEN 10450
10580 N = 0
10590  GOTO 10090
10600  POKE 804,1
10610  POKE 805,11
10620  PDKE 812,2
10630  CALL 768
10640  END
10650  PRINT "ERROR"
10998  END
10999  REM
---- PRODOS STARTUP NAME CHANGER ----
11000  CLEAR
11005 BUFFER = 29000
11010  FOR A = 768 TO 820: READ B: POKE A,B: NEXT A
11030  POKE 809,BU / 256
11040  POKE 808,BU -  PEEK (809) * 256
11050  POKE 804,4
11060  POKE 805,2
11070  CALL 768
11080  HOME : PRINT  CHR$ (12)
11090  INVERSE : PRINT "PRODOS STARTUP PROGRAM NAME": NORMAL
11100  PRINT : PRINT "CURRENT NAME IS.."
11110  PRINT
11120  FOR A = 230 TO 237
11130 B =  PEEK (BUFFER + A)
11140  PRINT  CHR$ (B);
11150  NEXT A
11160  PRINT
11170 CT = 0
11180  PRINT : PRINT "ENTER NEW NAME"
11190  PRINT : PRINT "_______";
11200  HTAB 1: POKE 1403,0
11210  GET A$
11220  IF A$ =  CHR$ (8) THEN  PRINT A$;:N = N - 1: GOTO 11210
11230  IF A$ = " " AND CT =  - 64 THEN A$ =  CHR$ (96)
11240  IF  ASC (A$) < 32 THEN  INVERSE : PRINT  CHR$ ( ASC (A$) + 64);:
NORMAL : GOTO 11270
11250  IF  ASC (A$) < 64 AND CT =  - 64 THEN A$ =  CHR$ ( ASC (A$) + 64)
11260  PRINT A$;
11270  IF A$ =  CHR$ (13) THEN  POKE BU + 94 + N, ASC (A$) + 128: GOTO 11290
11280  POKE BU + 230 + N, ASC (A$) + CT
11290 N = N + 1: IF N < 7 THEN 11210
11300  PRINT : PRINT
11310  FOR A = 230 TO 237
11320 B =  PEEK (BUFFER + A)
11330  PRINT  CHR$ (B);
11340  NEXT A
11350  PRINT : INPUT "OKAY (Y/N) ?";O$: IF O$ <  > "Y" THEN N = 0: GOTO 11180
11360  POKE 804,4
11370  POKE 805,2
```

```
11380  POKE 812,2
11390  CALL 768
11400  END
11410  PRINT "ERROR"
11998  END
11999  REM


---- CPM MESSAGE CHANGER ----



12000  CLEAR
12005 S6 = 7:BB = 183:LE = 70
12010 BUFFER = 29000
12020  FOR A = 768 TO 820: READ B: POKE A,B: NEXT A
12040  POKE 809,BU / 256
12050  POKE 808,BU -  PEEK (809) * 256
12060  POKE 804,2: REM  TRACK
12070  POKE 805,S6: REM    SECTOR
12080  HOME : PRINT "USE 80 COLUMN CARD"
12090  PR# 3: CALL 1002: PRINT  CHR$ (12);
12100  PRINT "56K CPM OR 60K CPM (5/6) ?";: GET C$
12110  IF C$ = "5" THEN S6 = 9: POKE 805,S6:BB = 115:LE = 57
12120  CALL 768
12130  HOME : PRINT  CHR$ (12)
12140  INVERSE : PRINT "CPM MESSAGE CHANGER"
12150  NORMAL
12160  PRINT : PRINT "CURRENT MESSAGE IS..."
12170  PRINT
12180  FOR A = BB TO BB + LE
12190 B =  PEEK (BUFFER + A)
12200  IF B = 13 THEN  VTAB  PEEK (37): PRINT : GOTO 12220
12210  PRINT  CHR$ (B);
12220  NEXT A
12230 CT = 0
12240  PRINT : PRINT "ENTER NEW MESSAGE ("LE" CHARACTERS)"
12250  GET A$
12260  IF A$ =  CHR$ (8) THEN  PRINT A$;:N = N - 1: GOTO 12250
12270  IF  ASC (A$) < 64 AND CT =  - 64 THEN A$ =  CHR$ ( ASC (A$) + 64)
12280  PRINT A$;
12290  IF A$ =  CHR$ (13) THEN  VTAB  PEEK (37) - 1: PRINT
12300  POKE BU + BB + N, ASC (A$)
12310 N = N + 1: IF N < LE + 1 THEN 12250
12320  PRINT : PRINT
12330  FOR A = BB TO BB + LE
12340 B =  PEEK (BUFFER + A)
12350  IF B = 13 THEN  VTAB  PEEK (37) - 1: PRINT : GOTO 12360
12360  PRINT  CHR$ (B);
12370  NEXT A
12380  PRINT : INPUT "OKAY (Y/N) ?";O$: IF O$ <  > "Y" THEN N = 0: GOTO 12240
12390  POKE 804,2: REM   TRACK
12400  POKE 805,S6: REM    SECTOR
12410  POKE 812,2
12420  CALL 768
12430  END
12440  PRINT "ERROR"
12998  END
12999  REM


---- TYPEWRITER ----



13000  CLEAR
13005  HOME
13010  PRINT "PR#1": PRINT
13020 V = 1
13030  GET A$
13040  IF A$ =  CHR$ (13) THEN  PRINT :V =  PEEK (37) + 1:B$ = "": GOTO 13030
13050 B$ = B$ + A$
13060  PRINT A$ CHR$ (8)" ";
13070  PR# 0
13080  VTAB V: HTAB 1: PRINT B$;
13090  PR# 1
13100  GOTO 13030
```

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.

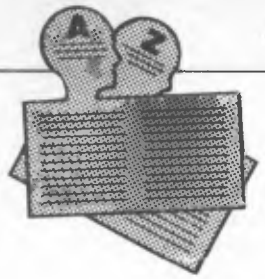
All programs should be fully debugged and your own original, unpublished work.

We prefer to receive programs with a maximum 80-column width printed in emphasised typeface.

Please keep a copy of everything,

Programs are paid for at the rate of $20 per page of published listing.

Send your contributions to APC programs, 77 Glenhuntly Road, Elwood, Victoria 3184.



# 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 December 1985 issue of APC.**

| NAME OF GROUP: | CATERING FOR: | MEETINGS: | CONTACT: |
|---|---|---|---|
| **NEW SOUTH WALES** | | | |
| A.P.F. User Group | A.P.F. | — | Norm Mc Mahon<br>288 Kissing Point Road,<br>Turramurra, 2074<br>(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<br>PO Box 505<br>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<br>Box C530 Clarence Street,<br>Sydney 2000 |
| Australian Unix User Group | Unix | — | Chris Campbell<br>PO Box 324,<br>Pymble 2073<br>(02) 449 4400 |
| Australasian ZX User Group | Sinclair Computers — ZX80, ZX81 and Spectrum | — | Send S.A.S.E. to:<br>PO Box 397,<br>Dapto 2530<br>(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<br>Secretary<br>10 Uralla Circuit<br>Kelso 2795 |
| Broken Hill MicroBee User Group | MicroBee | — | Peter Cotter<br>533 Radium Street,<br>Broken Hill 2880<br>(080) 88 1621 (AH) |
| B.U.G. | Commodore | — | Wayne Herring<br>Secretary<br>Bay Users Group<br>PO Box 308<br>Nelson Bay 2135 |
| Compucolor User Group | Compucolor | 1st Tuesday of each month at 8.00pm | Tony Lee<br>President<br>NSW CCII User Group<br>52 Cowan Road<br>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<br>PO Box 115,<br>Mayfield 2304 |
| Excalibur 64 User Group | Excalibur 64 | — | A Bendeli<br>99 Bradfield Road<br>Lindfield<br>(02) 46 1976 |

# USER GROUPS INDEX

| NAME OF GROUP: | CATERING FOR: | MEETINGS: | CONTACT: |
|---|---|---|---|
| Gosford Commodore Computer Users (GOSCOM) | Commodore VIC 20, C16, C64, Plus/4, C128 | Meetings are held every third Wednesday of the month at 7.30 pm at the Library of East Gosford Public School, East Gosford. | Rob Jackson<br>C/- GOSCOM<br>PO Box 86,<br>Umina 2257 |
| Great Western User Group | General | Meetings are held on the 1st Tuesday of every month at 8.00pm. | Great Western User Group<br>PO Box 210<br>Wentworthville 2145<br>(02) 631 2066 |
| Griffith Computer Association | General | — | Ron Gauci<br>Secretary<br>Griffith Computer Association<br>PO Box 425<br>Griffith 2680 |
| Hunter User Group | General | Meets at University of Newcastle, Room W308 Education Building on the 2nd Wednesday of each month at 7.30pm. | Secretary,<br>PO Box 39,<br>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,<br>Wollongong 2500 |
| Lismore C-64 User Group | Commodore 64 | Meets on the 2nd Wednesday of each month at Kadina High School Library, commencing at 7pm. | John Grimmond<br>Secretary<br>Richmond Hill Road<br>Wollongbar via Lismore<br>(066) 24 2320 |
| 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<br>23 Athel Tree Crescent<br>Bradbury 2560 |
| MicroBee User Group | MicroBee | — | Eric Eulenstein<br>202 Kooba Street,<br>Albury 2640<br>(060) 25 1601 |
| NEC User Group of NSW | NEC | Meets on the 2nd Tuesday of each month at the Crows Nest Club, Hayberry Street, Crows Nest at 7.30pm. | Hon. Secretary<br>NEC User Group<br>PO Box 568<br>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,<br>Hamilton 2303 or<br>Anthony Bliss (049) 67 2433<br>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<br>37 Mooramie Street,<br>Kensington 2033 |
| Southern Districts Commodore User Group | Commodore | Meets on the 1st and 3rd Wednesday of every month. | A Toms<br>President<br>3 Lucille Crescent<br>Casula 2170 |
| Spellbinder User Group | Spellbinder WP | — | Kath Hanson<br>PO Box 171<br>Matraville 2036<br>(02) 694 1523 |
| 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 Tregeagle<br>10 Binda Avenue,<br>Yowie Bay 2228<br>(02) 524 7490 (AH) |

# USER GROUPS INDEX

| NAME OF GROUP: | CATERING FOR: | MEETINGS: | CONTACT: |
|---|---|---|---|
| Sydney MicroBee User Group | MicroBee | Meets on the 3rd Saturday of each month at the McMahons Point Community Centre, Blues Point Road, North Sydney from 1pm to 5pm, and the 1st Tuesday of each month at the Auburn Girls High School, Braemar Street, Auburn from 7pm to 9pm. | President/Editor<br>Colin Tringham<br>S.M.U.G.<br>PO Box C233<br>Clarence Street<br>Sydney 2001 |
| System 80/TRS-80 and Color Computer User Group | System 80/TRS-80 and Color Computer | — | Jim Fisher<br>37 Fairburn Avenue<br>West Pennant Hills<br>Sydney 2120 |
| T.I.S.H.U.G. | Texas Instruments TI-99/4 and other 16 bit TMS 9900-based personal computers | — | John Robinson<br>PO Box 149,<br>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<br>Editor<br>TISHUG<br>PO Box 595<br>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<br>6 Hillcrest Avenue,<br>Faulconbridge<br>(047) 51 2258 (AH) |
| 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<br>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<br>125 Woolana Avenue<br>Budgewoi 2262 |
| 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<br>(047) 36 4825 |
| Wollongong Computer Club | General | — | P.O. Box 397<br>Dapto 2530<br>(042) 61 5451 |

## VICTORIA

| | | | |
|---|---|---|---|
| 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<br>AUSOM<br>PO Box 43<br>Forest Hills 3131 |
| BBC User Group | BBC | Meets on the 3rd Sunday of each month at the Second Brighton Scout Hall, 44 Whyte Street, Brighton. | Bruce Leister<br>(03) 391 6002 (AH)<br>or Gary Cooper<br>(03) 546 8544 (BH) |
| Compucolor User Group | Compucolor | Meets on the 2nd Wednesday of each month at the Surrey Hills Neighbourhood Centre, 157 Union Road, Surrey Hills, Victoria at 8.00pm. | CUVIC<br>PO Box 420<br>Camberwell 3124 |
| Forth Interest Group | Forth | Meets on the 1st Friday of each month at 8pm. Contact secretary for details | Lance Collins,<br>PO Box 103,<br>Camberwell 3124<br>(03) 29 2600 |
| Geelong Commodore Computer Club | Commodore | — | D Gerrard<br>Geelong Commodore Computer Club<br>C/- 15 Jacaranda Place<br>Belmont<br>Geelong 3216 |

# USER GROUPS INDEX

| NAME OF GROUP: | CATERING FOR: | MEETINGS: | CONTACT: |
|---|---|---|---|
| Lap Computer User Group | All lap computers | — | The Secretary<br>Lap Computer User Group<br>Box 2884DD GPO<br>Melbourne 3001 |
| Melbourne Atari Computer Enthusiasts Group | Atari | Usually held at the Rotunda at Monash University on the 2nd Sunday of each month at 12pm | M.A.C.E. Secretary,<br>PO Box 340,<br>Rosanna 3084 |
| Melb PC User Group | IBM and compatibles | — | Stephen Wagen<br>C/- Pannell Kerr Forster<br>14th Floor<br>500 Bourke Street<br>Melbourne 3000 |
| 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<br>PO Box 252<br>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<br>(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<br>Convenor, NM MUG<br>Box 2830 AA<br>GPO Melbourne 3001 |
| Osborne User Group | Osborne | — | Osborne User Group<br>PO Box 169<br>Camberwell 3124 |
| Otrona Attache User Group | Otrona Attache | — | David Broadbent<br>Chairman<br>(03) 528 2792 |
| Peninsula User Group | General | Meets at 16 Orwill Street, Frankston on the 2nd Tuesday of each month at 7.30pm. | M.G. Thompson<br>(03) 772 2674 |
| RCA VIP, ETI 660, Dream 6800 or Comx 35 Micros | RCA VIP, ETI 660, Dream 6800, Comx 35 | — | Frank Rees<br>27 King Street,<br>Boort 3537 |
| Seymour-Pucka Computer Club | General | — | Garry Sutton<br>25 Malaya Road<br>Puckapunyal 3662<br>(057) 93 1091 |
| Sorcerer Computer Users (Australia) | Sorcerer | Meets on the 1st Sunday of each month at Burwood Teachers College, 2pm. | Public Relations Officer<br>GPO Box 2402<br>Melbourne 3001 |
| Spectravideo User Group | Spectravideo | — | Mitch Raitt<br>68 Grassy Flat Road<br>Diamond Creek<br>Victoria 3098<br>(03) 438 2687 |
| Teach-80 Group | General | Meets at the Waverley Centre, Miller Street, Mt Waverley. | G Behrendorff<br>Secretary<br>(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<br>3 Quamby Avenue,<br>North Geelong 3215<br>(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<br>ESEUG<br>8 Chestnut Street<br>Surrey Hills 3127<br>(03) 288 1713 (AH) |
| TI-99/4 Users Group Melbourne | TI-99/4 | Meets monthly at Victoria College, Burwood | Wayne Worladge<br>123 Ashburn Grove,<br>Ashburton 3147<br>(03) 25 1832 |

# USER GROUPS INDEX

| NAME OF GROUP: | CATERING FOR: | MEETINGS: | CONTACT: |
|---|---|---|---|
| **A.C.T.** | | | |
| ACT Apple | Apple | Meets on the 2nd Thursday of each month | Eddie Tsui, Secretary<br>PO Box 1231,<br>Canberra City 2601 |
| ACT VIC 20 User Association | VIC 20 | Meets each month. Details available from Association | Chris Groenhout<br>25 Kerferd Street,<br>Watson 2602<br>(062) 41 2316 |
| 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<br>President<br>(062) 31 5621 (AH)<br>Frank Ellis<br>Secretary<br>(062) 65 4934 |
| ASUG | Sirius (Victor 9000) | — | Rob Judd<br>31 Altree Crescent,<br>Phillip 2605 |
| Atari User Group of Canberra | Atari | Meetings are held on the 1st Monday of each month at 8pm. 1st Floor, Building A, Canberra TAFE College, Reid. | ACTARI<br>PO Box E112<br>Old Canberra<br>ACT 2600 |
| 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 | M.J. Cottee<br>33 Crawford Crescent,<br>Flynn 2615<br>(062) 58 8822 |
| 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)<br>PO Box 599<br>Belconnen<br>ACT 2616 |
| Compucolor User Group | Compucolor | — | Ken Kerrison<br>5 Beltana Road<br>Pialligo ACT 2609<br>(063) 73 7743 |
| Excalibur 64 User Group | Excalibur 64 | — | Frank Nugent<br>28 Kingston Street<br>Evatt 2617<br>(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,<br>PO Box E237,<br>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<br>PO Box 173<br>Belconnen 2616<br>(062) 54 1614 |
| The Australian ZX Users Association | ZX80, ZX81 and ZX Spectrum Microcomputers | — | AZUA<br>19 Godfrey Street,<br>Campbell 2601 |
| **QUEENSLAND** | | | |
| Adventure Club | General | — | Ms Christine Ogden<br>37 Samford Road<br>Leichhardt, Ipswich<br>Queensland 4305 |
| 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<br>PO Box 721,<br>South Brisbane 4101 |
| Australian Computer Education Association | General | — | Guy Coppens,<br>ACEA<br>PO Box 4075<br>(07) 379 9365 |

# USER GROUPS INDEX

| NAME OF GROUP: | CATERING FOR: | MEETINGS: | CONTACT: |
|---|---|---|---|
| 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<br>Secretary<br>1 Paxton Street<br>Townsville 4810<br>(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<br>PO Box 274,<br>Springwood 4127<br>(07) 287 2705 |
| Compucolor User Group | Compucolor | Meets on the 2nd Saturday of each month at 1pm. | Ray Halliday<br>325 Enoggera Road<br>Newmarket 4051<br>(07) 356 4236 |
| Cranium Computers | General | — | Chris Lucey<br>34 Lawless Street,<br>Blackwater 4717 |
| Medfly User Group | Medfly | — | Medfly User Group<br>120 Highgate Street<br>Coopers Plain 4108 |
| Ohio Superboard User Group | Ohio Scientific Microcomputers | — | Ed Richardson<br>146 York Street,<br>Nundah 4012 |
| Osborne Users Group | Osborne | — | Glen McBride<br>(07) 371 4243 (AH)<br>(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<br>or Brian Williams<br>19 Patrick Street,<br>Norman Park |
| PC 1500/PC 2 Club | PC 1500 and PC 2 users | — | Mark Tischler<br>PO Box 3,<br>Wavell Heights,<br>Brisbane 4012 |
| S.C.C.U.G. | Commodore | Every Monday night at 7pm (ex school holidays), Labrador State School, Turpin Road, Labrador | Bill Fitzpatrick<br>5/19 Huth Street,<br>Labrador 4215<br>(075) 32 0061 |
| Sinclair Computer Club | Sinclair Spectrum | Meets every 3rd Sunday of each month, 2.00pm at Everton Park State High School, Brisbane. | Mrs V Lewis<br>Secretary<br>37 Samford Road<br>Leichhardt Ipswich<br>Queensland 4305 |
| Southport Commodore Computer User Group | Commodore | Meets weekly at the Labrador State Primary School, Turpin Road, Labrador. | Bill Fitzpatrick<br>President/Editor<br>(075) 32 0061, or<br>John Smith<br>Treasurer<br>(075) 58 2929 |
| T.I.B.U.G. | TI 99/4 users | Meets 1st Friday every month | R Saunders<br>PO Box 57,<br>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<br>(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<br>Secretary<br>25 Primrose Street<br>Woodridge<br>Queensland 4114<br>(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<br>Secretary<br>16 Laver Street<br>Macgregor 4109<br>(07) 343 5771 |

# USER GROUPS INDEX

| NAME OF GROUP: | CATERING FOR: | MEETINGS: | CONTACT: |
|---|---|---|---|
| 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<br>34 Lawless Street<br>Blackwater<br>Queensland 4717<br>(079) 82 6146 |

## SOUTH AUSTRALIA

| | | | |
|---|---|---|---|
| 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<br>PO Box 427<br>North Adelaide |
| Compucolor User Group | Compucolor | — | Brian O'Sullivan<br>PO Box 86<br>Torensville 5031<br>(08) 352 3296 |
| Excalibur 64 | Excalibur | — | Terry Mulvaney<br>31 Charmouth Street<br>Elizabeth West 5113<br>(08) 255 7123 |
| Kaypro User Group | Kaypro | — | Ralph Engler<br>Kaypro User Group<br>16/34 John Street<br>Payneham SA 5070 |
| MicroBee Users Group of South Australia | MicroBee | — | Brian Uren<br>GPO Box 767,<br>Adelaide 5001<br>(08) 260 5038 |
| 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<br>14 Scott Road,<br>Newton 5074 |
| 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<br>P.O. Box 68,<br>Walkerville 5081<br>(08) 261 9590 |
| 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<br>PO Box 210<br>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<br>(08) 79 3445 |
| TRS-80 User Group | TRS-80 | — | R.G. Stevenson<br>36 Stuart Street,<br>Adelaide 5000<br>(08) 51 5241 (BH)<br>(08) 337 6682 (AH) |
| Adelaide Atari Computer Club | Atari | Meets at Gilles Street Primary School on 1st Monday of each month (2nd if 1st is on a public holiday) | N Pearce<br>PO Box 333,<br>Norwood 5067 |
| Beebnet Inc | BBC & Econet users | — | PO Box 262<br>Kingswood 5062 |
| Hitachi User Group | Hitachi | — | Geoff Drury<br>27 Creslin Terrace,<br>Camden Park 5038<br>(08) 295 2778 (AH) |

# USER GROUPS INDEX

| NAME OF GROUP: | CATERING FOR: | MEETINGS: | CONTACT: |
|---|---|---|---|
| **TASMANIA** | | | |
| Devonport Computer Interest Group | General | Meets 4th Thursday of each month. Contact group for location details | John Stevenson<br>RSD 422,<br>Sheffield 7306<br>(004) 92 3237 |
| SVI-MSX Australasian User Group | Spectravideo/MSX | — | SVI-MSX Australasian User Group<br>PO Box 191<br>Launceston South<br>Tasmania 7249 |
| Tandy Hobart User Group | All Tandy Computers | — | Kristen Rees<br>Secretary<br>GPO Box 127IN<br>Hobart Tasmania<br>(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<br>PO Box 25<br>North Hobart<br>Tasmania 7000<br>(002) 34 2704 |
| 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<br>Secretary<br>TAVC<br>PO Box 188<br>North Hobart 7008 |
| Tasmanian TI 99/4A | Texas Instruments | Meets on the 3rd Sunday of each month commencing at 2pm at the University of Tasmania in Room 373. | L Lonergan<br>Secretary/Treasurer<br>7 Tarana Road<br>Blackman's Bay 7152<br>(002) 29 4009 |
| Tasmanian Computer Group | General | Meets 1st Tuesday of each month. Contact group for location details | Allan Appleby<br>17 Ninabah Street,<br>Howrah 7018<br>(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<br>1 Benboyd Court,<br>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<br>NT Computer Club<br>349 McMillans Road<br>Anula NT 5793<br>(089) 27 9208 |
| **WESTERN AUSTRALIA** | | | |
| Compucolor User Group | Compucolor | 1st Wednesday of each month at 8pm. | John Newman<br>WAIT Computer Centre<br>Kent Street<br>Sth Bentley 6102 |
| Excalibur 64 User Group | Excalibur 64 | — | Jim Barbas<br>(09) 342 3625 (AH)<br>(09) 325 4409 (BH) |
| The Australian QL User Association | Sinclair QL | — | Graeme Ashford<br>Secretary<br>12 St Michael Terrace<br>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<br>Oswest<br>PO Box 199<br>Mundaring 6554 |

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# USER GROUPS INDEX

| NAME OF GROUP: | CATERING FOR: | MEETINGS: | CONTACT: |
|---|---|---|---|
| Texas Instruments User Group (Perth) (T.I.U.P.) | Texas Instruments | Meets on the 3rd Saturday of each month. | Secretary<br>T.I.U.P.<br>PO Box 246<br>Mt Lawley<br>WA 6050 |

## 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: 46 7347 (H). Meetings: 2nd Tuesday, Western Suburbs Radio Club, Gt North Road, New Lynn.

Compucolor User Group: Ron Strain, 19 Warwick Street, Wilton, Wellington.

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: 79 0328 (W). Meetings: 3rd Wednesday, Centre Computers, Great South Road, Epsom.

NZ TRS-80 Microcomputer Club: Olaf 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, PO Box 4118, Christchurch. Telephone: (03) 37 0381 (A.H.).

Nelson Commodore Users Group: Peter Archer, PO Box 860, Nelson, NZ. Telephone: (054) 79 362.

NZ PC 1500 User group: Allan Thomas, PO Box 155, Napier, NZ.

Taranaki Microcomputer Society: Keith Smith, PO 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: 76 1670 (H). Meetings: 3rd Tuesday each month at the OSNZ Hall, 107 Hillsborough Road, Mt Roskill.

BBC Users Group: Dave Fielder. Telephone: 77 0630 Extn 518 (W). Meetings: 2nd Wednesday at the VHF Clubrooms, Hazel Avenue, Mt Roskill.

BUSINESS Users Group: Cathy Arrow. Telephone 49 1012 (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: 69 5355 (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: 45 2639 (H), 77 8910 (W). Meetings 3rd Thursday each month at the OSNZ Hall, 107 Hillsborough Road, Mt Roskill.

NZ COMMODORE Users Group (AK): John Walker. Telephone 833 9589, 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: 49 1012, P.O. Box 6210, Auckland, (See above for full details).

NZ OSBORNE Users Group (MZOG): Brian Jones. Telephone: 65 9738 (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: 57 6618 (H).

SINCLAIR Users Group: Doug Farmer. Telephone 56 7589 (H). Meetings: 4th Wednesday at the VHF Clubrooms, Hazel Avenue, Mt Roskill.

SORCERER Users Group (NZ): Selwyn Arrow. Telephone: 49 1012 (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: 56 8155 (H).

ToMorrow Users Group: Chris Cotton. Telephone: 78 9153. Meetings: 3rd Thursday, 20 Kingsley Street, Grey Lynn. BYO floppy disk.

WIZZARD Users Group: Richard McFadgen, 11 Hilling Street, Titirangi. Telephone: 817 8219 (H).

1802 Users Group: Brian Conquer. Telephone: 69 5669 (H).

2650 Users Group: Trevor Sheffield. Telephone: 67 6591 (H).

68xx(x) Users Group: John Kucernak. Telephone: 60 6935 (H).

*All the above use the Micro Club's postal address.*


# Amstrad 664

**Amstrad's latest offering, the CPC 664 has arrived. Andrew Farrell checks it out.**

I have a fascination with new computers. They are a little like an unexplored land waiting to be discovered. Most machines reveal their true character soon after you turn them on. Their exact capabilities become obvious, limitations start to surface, and you get some feel for what is at your fingertips.

In writing this review I found myself somewhat confused at first. Unlike many other beasts, the Amstrad was a very mysterious device. I found myself unsure as to what was beneath the sturdy dark grey case that seemed to be acting like a home computer with the occasional hint of CP/M version 2.2 poking its head here and there.

A little old with the new. This version of CP/M was running on a 3in disk drive. However, to all intents and purposes, I don't entirely agree that it is such a good thing. Most software for CP/M is on 5¼in disks, that will not, despite my best efforts, fit into that three inch drive.

So, it appears that many of the advantages of CP/M compatibility and range of titles, is lost in a simple format problem. An RS232 interface is available, and as a result many programs will eventually appear on the 3in format. However, this could be viewed as a drawback for the time being.

Despite all that, I'm assured a vast range of software is being produced for the CPC 664. There are also many programs already available which have been developed over the past year, when the 664's older cousin, the 464, was new or the micro scene. Most of these programs will work on the 664, despite a few minor differences in the amount of memory available and the hardware configuration.

## Hardware

With that cleared up, let's ignore CP/M for a moment and see just what the Amstrad really has to offer. The unit comes complete with a green or colour monitor which forms an integral part of the hardware setup. The main console consists of a keyboard, numeric keypad, cursor diamond and built in disk drive.

All the control keys are highlighted in a pleasant light blue, while the rest of the keys are light grey. The return key is exceptionally large, which makes things easy for hunt and peck typists like myself. The cursor diamond is very similar to that found on many of the newer computers such as the MSX range.

*Overall, the main unit is quite long, and tends to grab more desk room than is healthy for such a young computer.*

Overall, the main unit is quite long, and tends to grab more desk room than is healthy for such a young computer. I, for one, have little enough area on my desk as it is without space hungry computers wanting more. On the other hand, having the drive built in certainly saves time connecting cables, looks neater and probably means the entire system is marginally cheaper.

There are four cables in all to plug in, three between the main console and monitor and a power cord from the back of the monitor that supplies the computer as well. They are all very easy to connect, and look neat and tidy once set up.

At the rear of the 664 is an array of ports and sockets just below a long row of ventilation slots. Working from left to right, there's a socket to connect the Amstrad to your stereo, a joystick plug, cassette port, printer port and expansion bus. Further to the right are the two power plugs, video socket and last of all a disk drive port. All are clearly labelled on the unit itself, although occasionally receive different names in the manual, which could be a little confusing.

On the right hand side of the unit is the power switch and volume control. The monitor has its own separate power button and the controls to adjust brightness, contrast and vertical hold are mounted on the front where they are easily accessible.

Basic is contained in ROM on the computer, so unlike most CP/M machines, you don't need to have a disk in the drive to power up. Just switch it on and you're ready to go. A little over 42k of memory is available to program with due to ROM overlay techniques employed by many of the newer machines. This involves switching in and out ROMs as required, so that they don't take up any more valuable memory space than is possible. On some of the latest computers, this means that almost all the available RAM is free to use. However, some of the Amstrad's 64k is still unavailable. All together there is 32k of Basic ROM and operating systems. Up to 240 additional ROMs may also be switched in and out, all of which address the top 32k of memory.

*Amstrad informs us in the manual that its version of Basic is very fast. After several very simple tests it appears that this is indeed true.*

At the heart of all the action is a Z80A processor running at 4MHz. Although this chip is now a little long in the tooth, it still has a strong following and remains as a permanent reminder to us of the

days when TRS-80's were all the go and S100 reined supreme. A 6845 CRT controller looks after the screen display, which may be 20, 40 or 80 columns. In the area of graphics there are also three modes, all corresponding with the various column widths available. In normal mode you may have four colours on a screen resolution of 200 x 320 dots.

## Graphics

Hi-res mode allows two colours on a resolution of 200 x 640 dots and last of all, multi-colour mode gives 16 colours on a 200 x 160 matrix. On a green screen the various colours produce changes in intensity.

Colour capabilities on the Amstrad are very powerful. The screen addresses its own 16k of memory, which is a big space saver. In that area you can select from 27 different colours up to a maximum allowed for the mode you are in. The border area around the screen is independent of the screen modes, and may be any one of the 27 colours at any time.

The colours you select become known

as your palette. It is possible to change the selected colours in the palette very easily, creating some interesting screen effects. Once you get a pretty picture on the screen, you can scroll it around using the capabilities of the video chip.

from one screen position to another, CREAL converts a number into a REAL number — sounds novel. Another interesting one is EVERY. Perhaps you want something to happen every so many seconds such as a blip. Simply

*For the moment the 664 is a bit of a border line case in my books. At a time when we are awaiting the arrival of the powerful new Atari range, and the Commodore 128, the Amstrad may be a step sideways, rather than a leap forward.*

## Fuel injected Basic

Amstrad informs us in the manual that its version of Basic is very fast. After several very simple tests it appears that this is indeed true. However, it is also a very comprehensive version of this ever popular language. In fact, the 664 has an even bigger dialect than the 464. Additional commands for disk handling were the first improvement, others include Fill, for painting an area in graphics mode, and FRAME, which tests the position of the raster beam on the monitor enabling smoother graphic displays to be produced.

These features are, as expected, not compatible with the 464. At this stage Amstrad is not planning to provide this bigger, brighter Basic to 464 owners either, although I'm sure it wouldn't have been too much of a problem to do so.

Basic 1.2, the latest version of Amstrad's answer to Microsoft Basic, contains a few very strange and yet very useful commands. Some of these reminded me of the dreaded Sinclair Spectrum, although they seem so much more useful on a machine such as the 664 that has a real keyboard.

COPYCHR$ can be used to copy text

include the command EVERY 5,1 GOSUB 20 and every five fiftieths of a second, program control will divert to line 20. Other associated keywords are AFTER and REMAIN, both of which are interrupt based.

FILL is an exceptionally fast paint command, GRAPHICS PAPER is used to set the background colour and GRAPHICS PEN sets the colour. Other related commands include INK, MASK, TAG and TAGOFF. Of course you can also DRAW, select a MODE, and mix text and graphics without any bother.

IF . . . THEN . . . ELSE is supported, along with some powerful error trapping commands. These have been extended on the 664 to support the disk drive. Overall the built in language is more than sufficient, and if you do tire of Basic, other languages such as Pascal and Forth are available.

## Documentation

Amstrad has written some very informative manuals for the 664, with one section specifically designed for the absolute raw beginner. It takes computing from the ground and procedes to explain all a beginner will ever need to know in an easy to understand manner. All the sorts of questions you might ask are answered along with a few that may seem ridiculous to the more seasoned reader. Nevertheless, a well prepared reference section is also included, making life easy once you start getting into the swing of things.

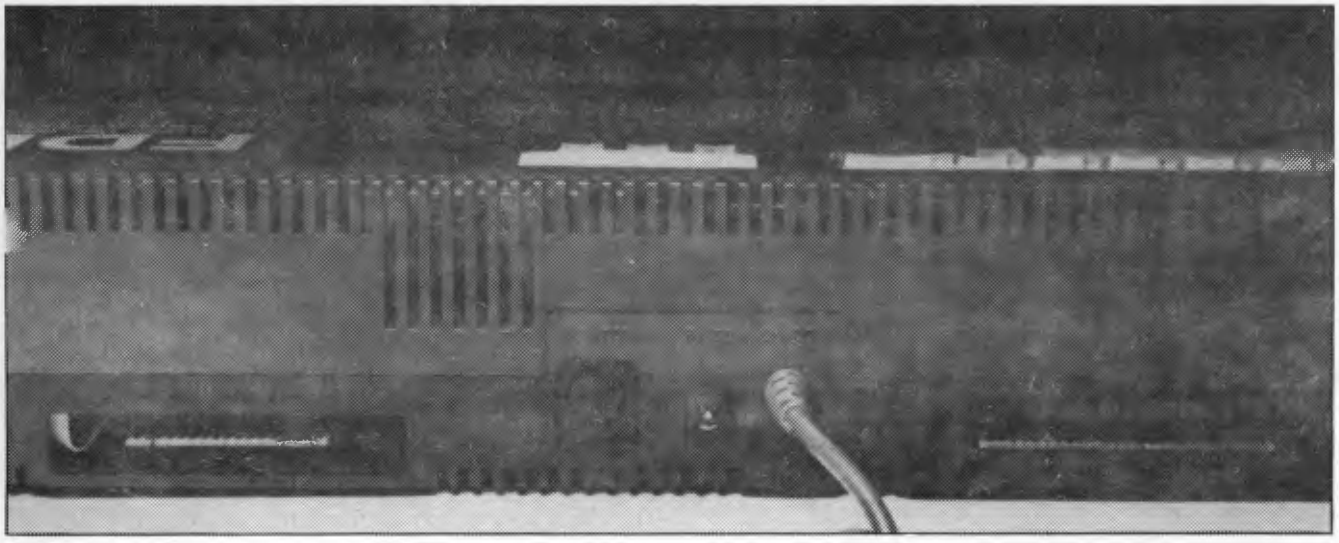
The final manuals for the 664 will be a single slab of documentation made by combining the original 464 manual and adding a few necessary extensions with regard to some of the new features. This should be truly adequate for all types of owners.

## AMSDOS or CP/M 2.2

Although the 664 does support a cassette unit, it is unlikely that one would be used, other than for loading games. The disk operating system is the almost immortal CP/M, which stands for Control Program for Microcomputers. The manual claims that this is the standard disk operating system for 8-bit computers. This is not entirely the case, although CP/M is truly very popular, or perhaps I should say was and is now looking like becoming popular again thanks to the very inexpensive price that it is now available for.

Version 2.2 is not the latest and greatest, in fact Version 3.0 is now the more accepted due to many enhancements that have been added. Nonetheless, Amstrad's implementation of CP/M is good by any standards, and the 3in drives are fast enough to cope with a disk based operating system.

Unfortunately CP/M runs a lot better when you have two disk drives. Amstrad's disk system is single sided, although the disks are double sided.



*The RGB monitor, disk interface, and printer and user ports are now joined by an external cassette port*

Approximately 160k is stored per side, which is less than you normally have under CP/M. I would have thought the obvious thing to do would be to make use of both sides of the disk at once, thereby giving a more acceptable 320k of disk space. Alternatively the second side could have been set up as drive B. But this was not to be, so at times you have to do much disk swapping, which is very irritating as computers are supposed to save time, not waste it.

Three formats are supported on the disk drive, all available under the normal CP/M format command. These are System, Data and IBM format. Data format is good, because you get a little extra space, which is fine if you only intend to use AMSDOS. System format is the old CP/M standard, while IBM format is IBM PC CP/M format — something that I didn't know existed.

AMSDOS is simply all the disk commands available from Basic. These include LOAD, RUN, CHAIN, MERGE and various file commands such as OPENIN and OPENOUT. From what I could see, AMSDOS is a midway step between Basic and CP/M, as the normal CP/M error messages are encountered when you goof. At times I had to re-insert the CP/M system disk and constantly found myself fumbling about the place looking for the right disk.

Incidentally, these were times when I would have hoped to be returned to the software I was using, rather than being tossed back to CP/M. This brings me to another question: why are so many companies insisting on relapsing into the dark ages by reverting to the use of CP/M? Tried and tested it may be, and inexpensive after being well and truly superseded, but friendly it is not.

## Technical specifications

| | |
|---|---|
| Processor: | Z80A running at 4MHz |
| ROM: | 32k |
| RAM: | 64k |
| Mass storage: | 3in disks, 160k per side |
| Keyboard: | 74 key, including keypad/function keys and four cursor keys |
| I/O: | Printer port, (Centronics compatible), I/O, expansion bus, disk drive port |
| Bundled software: | CP/M utilities disk, Dr LOGO |


*The bulging right-hand side now includes an integral 3in disk drive*

## Conclusions

Overall the Amstrad shows plenty of thought in its design, and is a fair attempt at being all things to all people. For the home hobbyist there is a powerful Basic, suppported by equally powerful capabilities in the bit mapped graphics area. The 20/40/80 column option is ideal, making the Amstrad well qualified for serious use.

The operating system is questionable, yet acceptable. For what CP/M is it will no doubt prove to be a flexible DOS for the home user as it has in the past. The 3in disk drives may not be the way of the future, however, they are very fast and seem reliable enough. Perhaps a little more beefing in the I/O area, such as a proper Centronics port and RS232 interface and the Amstrad would be a very competitive machine.

For the moment the 664 is a bit of a border line case in my books. At a time when we are awaiting the arrival of the powerful new Atari range, and the Commodore 128, the Amstrad may be a step sideways, rather than a leap forward. Undoubtedly, there is a gap for it in the meantime, as a sort of serious user/hobbyist machine. CP/M will be around for a good while yet, despite its age and lack of style. Providing that there is a good range of software continually made available for the Amstrad, you won't be left with a lemon. In fact, the 664 can pack quite a punch.

The CPC 664 will come with a choice of monitors and will retail from approximately $800 with the green screen, and from around $1,000 with the colour monitor. Supplies will be available to the retail trade in July.

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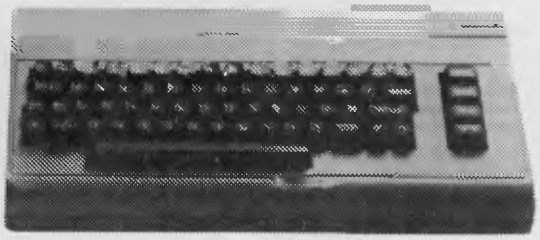

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# Finding the way

**Tackling algorithmic problems with your micro can be fun — Marcus Jeffrey explains various methods of defining problems by using a calculation program and mathematical functions.**

Imagine a number of plane figures, each made up of five equal-sized squares. These are the pentonimoes, 12 of which are shown in Fig 1, making up a 6 x 10 square. Now write a program to find all the possible ways of arranging the pentonimoes so that they form a 6 x 10 rectangle. Although writing the program may not be too difficult, the computation time is likely to be rather high with over 39916800 possibilities. This can be calculated by placing one of the 12 pieces, then one of the remaining 11, and so on, giving 11 x 10 x 9 x 8 x 7 x 6 x 5 x 4 x 3 x 2 x 1, written as 11! (factorial) possible solutions. This ignores the fact that each piece may be placed anywhere on the board and each may be rotated.

## Problem-solving

Another problem with similar complexity is the Travelling Salesman problem. Here, you are asked to plan the optimal route for a salesman who must visit a number of cities. For example, suppose you were given the map in Fig 2, with eight cities and the distances between them (Fig 3). Find the shortest possible route that passes once through all the cities and returns to the starting point. Obviously, because you have to eventually pass through all the cities, you can choose any starting point and still be sure of the shortest solution. If you now continue to measure all the possible routes and take the shortest, you're sure to get the best route. If you've done this fully, you'll have covered 7! (or 5040) different routes.

The program (Fig 4) will do all these calculations for you. Rather than having reams of output, it only outputs any information when it finds a route shorter than its previous shortest possible circuit. By covering all routes, this ensures that the final output is the shortest route.

Now imagine that there are 100 cities, instead of the eight in the example. This more likely situation gives 99 possible routes, which Fig 5 shows to be quite a few possibilities. Even the fastest computers would require days, or perhaps weeks, of computation for these larger problems. One way of avoiding this might be to always consider the nearest cities, but you'll soon discover that this does not guarantee the best solution. In fact, although other algorithms do exist for this problem, they are not much better than the method we have already used. It is thought that no efficient algorithms can ever be produced for this problem, but no-one has yet been able to prove this.

By working through the travelling salesman problem, we have been able to speculate that an optimal solution for 'a large number of cities' would take 'too long' to compute. This is, however, a little vague, and we really need a more general method for evaluating and comparing algorithms. To do this, we imagine that a particular algorithm is supplied with more and more inputs (cities in the above example) and measure the increases between the execution times. This rate of increase can then be used as a measure of the efficiency of the algorithm.

In the case of the travelling salesman problem, the route increases for 'n' cities can be shown by the function $f(n) = (n-1)!$. Thus, 24 routes would have to be considered for five cities, 120 routes for six cities, and so on. Other problems have functions with similar growth rates, such as $2^n$ and $n^n$, all of which can be said to have exponential growth rates. Other problems, where n doesn't appear as a factor of the exponent, are said to have polynominal growth rates. Typical examples of these are $5n$, $n^n$, $n^3$, and so on. If n is sufficiently large, any exponential-time algorithm will take longer to compute than an algorithm with polynomial time. In most cases, only polynomial-time algorithms are considered fast enough to implement for general applications. This system of classification has the added advantage of being independent of the machine the algorithm is run on.

Another problem, closely related to the travelling salesman problem, that can again only be solved using exponential-time algorithms, is the Hamiltonian Circuit. Consider the graph in Fig 6. The problem is to discover a path which travels through all the nodes once, finishing at the starting node. In this particular case it is very easy: the path 1,2,3,4,5,1 will do. Now try the slightly more complex case shown in Fig 7. If you finally give up, then I must tell you that no such circuit exists. This can easily be shown by naming the three top nodes of type A, and the five bottom nodes of type B. Then you'll realise that no node is directly connected to a node of the same type, so all routes must be of the form A to B, or B to A. We need to produce a circuit containing seven routes and finishing at a node of the same type as the start node, which is impossible. We can easily transform the Hamiltonian Circuit problem into the travelling salesman problem. Firstly, construct a 'complete graph' by connecting each point to every other point, then assign a cost to each line (the distance between the cities). The Hamiltonian Circuit with least cost is now the solution.

Let's consider a very similar problem: that of finding a route which traverses each line (as opposed to each point) of a graph exactly once, known as a Eulerian Path. A classic problem of this type is that of the Konigsberg Bridges (Fig 8). During the 18th century, the (then German) city of Konigsberg had a park built on the banks of a river. The banks were connected to two islands via the bridges shown in the diagram. The problem here is to decide whether or not a path exists which will cross all the bridges once and only once. The problem can be reduced to the graph given in Fig 9, since the size of the islands and the bridges does not really matter.

Again, the obvious method would be to list all the possible routes, starting from each of the four locations, and see if any of them met the requirement. This would be an exponential-time algorithm

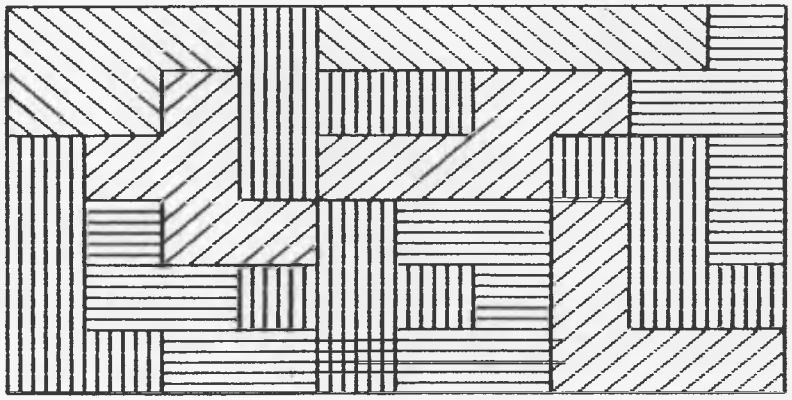

*Fig 1 12 pentonimoes*

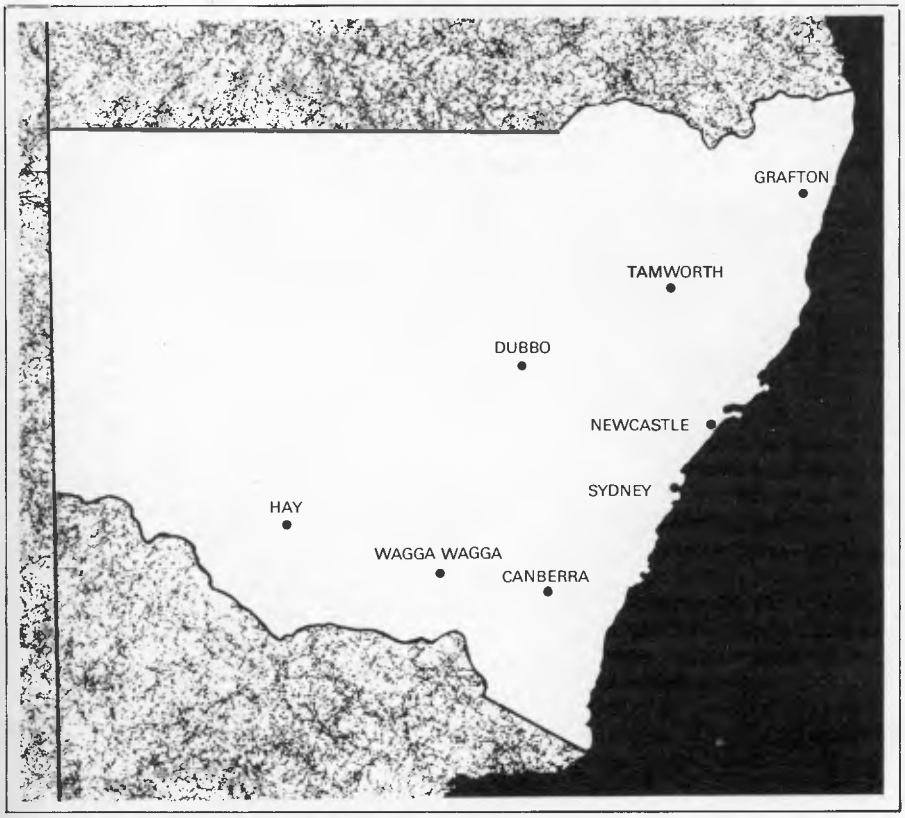


*Fig 2 A map showing the location of eight cities*

| Canberra | | | | | | | |
|---|---|---|---|---|---|---|---|
| 454 | Dubbo | | | | | | |
| 943 | 710 | Grafton | | | | | |
| 510 | 515 | 1225 | Hay | | | | |
| 459 | 440 | 484 | 899 | Newcastle | | | |
| 288 | 412 | 655 | 728 | 171 | Sydney | | |
| 622 | 341 | 309 | 856 | 280 | 451 | Tamworth | |
| 243 | 423 | 1182 | 267 | 698 | 527 | 978 | Wagga Wagga |

*Fig 3 Mileage chart*

but would be sure of finding a route, if one existed. Unlike the previous problems, however, this one does have a polynomial-time solution. Euler was able to show that all graphs with the following conditions have Eulerian Paths:

(a) The graph must not be disconnected. In other words, it must be possible to travel from any point on the graph to any other point by following the lines of the graph.

(b) Either all graph points must be at the junction of an even number of lines, or exactly two points must be connected by an odd number of lines.

It is clear that to have a Eulerian Path, it must be possible to reach all parts of the graph as specified in condition (a). If each point has an even number of lines, it is possible to use half of them to reach the point and the other half to leave it, thus forming a path. The exception to this is where two nodes have an odd number of lines, in which case they must be the start and end points. This explains why a graph containing a Eulerian Path must meet these requirements, but Euler was able to go further than this. He was able to prove that any graph meeting these requirements must have a Eulerian Path.

Consequently, there is no solution to the Konigsberg Bridge Problem. However, if you were to take any one of the bridges away, then the graph meets the requirements and you should be able to find a path. Try testing the graphs given in Fig 10, which are of the common 'draw without lifting your pen from the paper' type.

## *The Turing Machine*

In the 1930s a mathematician, AM Turing, studied these and many other algorithms. His intent was not to solve them, but to investigate which problems could be solved, and which could not. Using an imaginary computing device known as the Turing Machine, he was able to show that there are some problems for which no algorithmic solutions exist. Other problems, he was able to divide into two groups. We have already seen these: those for which polynomial-time algorithms exist; and those which can (at present) only be solved by inefficient exponential-time algorithms. However, as we have seen, it is sometimes very difficult to assign a problem to one of these groups.

The hypothetical machine which Turing devised is known as a Deterministic Turing Machine. In essence, this can be regarded as a single processor. The machine, though very simple, was able to perform any calculations currently carried out by computers. Any problems

```
5 DEFINT A-Z
10 DIM DISTANCE%(7,7), CITY$(7)
20 '
30 '     Read Array Values
40 '
50 FOR I=0 TO 7
60     FOR J=0 TO I
70         READ MILES
80         DISTANCE(I,J) = MILES
90         DISTANCE(J,I) = MILES
100        NEXT
105    NEXT
110 '
120 FOR I=0 TO 7
130     READ CITY$(I)
140     NEXT
150 '
160 DATA   0
170 DATA 454.   0
180 DATA 943. 710.   0
190 DATA 510. 515. 1225.   0
200 DATA 459. 440. 484. 899.   0
210 DATA 288. 412. 655. 728. 171.   0
220 DATA 622. 341. 309. 856. 280. 451.   0
230 DATA 243. 423. 1182.267. 698. 527. 978.   0
240 DATA  Canberra     .  Dubbo
250 DATA  Grafton      .  Hay
260 DATA  Newcastle    .  Sydney
270 DATA  Tamworth     .  Wagga Wagga
280 '
290 '    Main Program
300 '
310 DIM VISITED(7), FROM(7), MILEAGE(7), NUMBER(7), GOING.TO(7)
320 BEST.ROUTE=9999
325 RECURSION.LEVEL=0
330 FROM(0)=0 : MILEAGE(0)=0 : NUMBER(0)=1 : GOSUB 380
340 END
350 '
360 '
370 '     Subroutine to visit a location
380 '
390 '
400 VISITED(FROM(RECURSION.LEVEL)) = NUMBER(RECURSION.LEVEL)
410 GOING.TO(RECURSION.LEVEL) = 0
420   IF VISITED(GOING.TO(RECURSION.LEVEL)) <> 0 THEN GOTO 430
421      FROM(RECURSION.LEVEL+1)     = GOING.TO (RECURSION.LEVEL)
422      MILEAGE(RECURSION.LEVEL+1) = MILEAGE(RECURSION.LEVEL) +
                    DISTANCE(FROM(RECURSION.LEVEL), GOING.TO(RECURSION.LEVEL))
423      NUMBER(RECURSION.LEVEL+1)  = NUMBER(RECURSION.LEVEL) + 1
424      RECURSION.LEVEL = RECURSION.LEVEL + 1
425      GOSUB 380
430   GOING.TO(RECURSION.LEVEL) = GOING.TO(RECURSION.LEVEL) + 1
431   IF GOING.TO(RECURSION.LEVEL) <= 7 THEN GOTO 420
440 IF NUMBER(RECURSION.LEVEL) = 8 THEN GOSUB 500
450 VISITED(FROM(RECURSION.LEVEL)) = 0
460 RECURSION.LEVEL = RECURSION.LEVEL - 1
470 RETURN
480 '
490 '     print subroutine
500 '
505 PRINT.QTY = MILEAGE(RECURSION.LEVEL) + DISTANCE(FROM(RECURSION.LEVEL),0)
510 IF BEST.ROUTE <= PRINT.QTY THEN RETURN
515 BEST.ROUTE = PRINT.QTY
520 PRINT "============================="
530 PRINT "Mileage: "; BEST.ROUTE; "  Route is:"
540 FOR I=1 TO 8
550     FOR J=0 TO 7
560         IF VISITED(J)=I THEN PRINT "  --  ";CITY$(J)
570         NEXT
580     NEXT
590 PRINT
600 RETURN
```

*Fig 4 The calculation program*

```
933.  262.
154.  439.  441.  526.  816.  992.  388.  562.  667.  004.
907.  159.  682.  643.  816.  214.  685.  929.  638.  952.
175.  999.  932.  299.  156.  089.  414.  639.  761.  565.
182.  862.  536.  979.  208.  272.  237.  582.  511.  852.
109.  168.  640.  000.  000.  000.  000.  000.  000.  000
```

*Fig 5 99 is a big number ...*

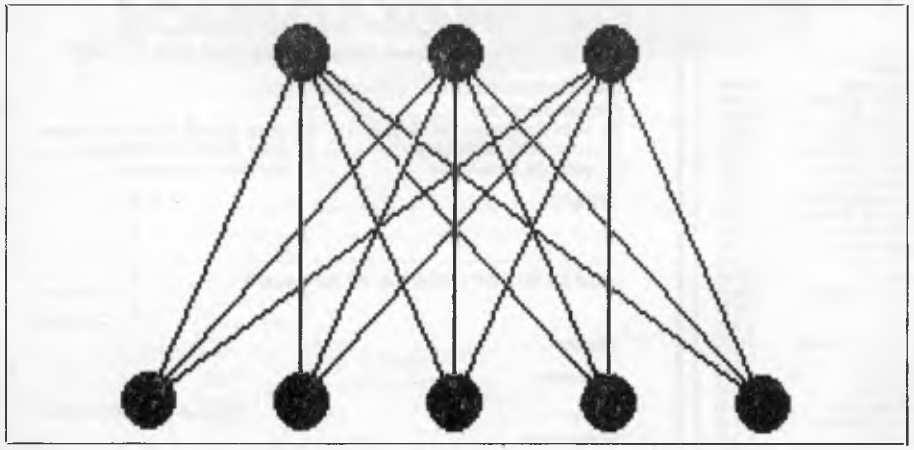

*Fig 7 Does this graph have a Hamiltonian Circuit?*

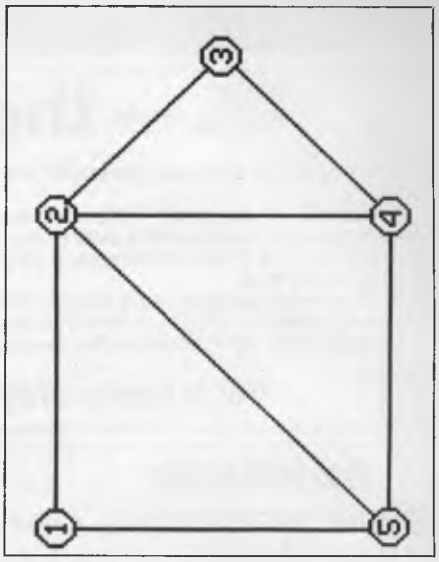


*Fig 6 A Hamiltonian Circuit graph*

which could be implemented using a polynomial-time algorithm on the Deterministic Turing Machine could also be computed in polynomial time on a computer. In our classification of algorithms, these are said to belong to the class P (for Polynomial).

Turing then devised a slightly different machine, known as a Nondeterministic Turing Machine. This machine is quite 'clever' in that if faced with a number of possible choices, it will always choose the correct one in order to solve the problem. In some ways, this could be considered to be a machine with an infinite number of parallel processors. Whenever the machine is faced with a choice, it merely gives each possibility to a different processor. In the end, one of the processors must find the correct solution, if one exists. For example, our travelling salesman, when he starts, is

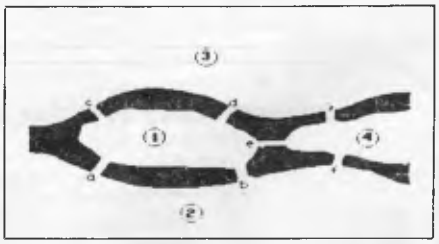


*Fig 8 The Konigsberg Bridges*

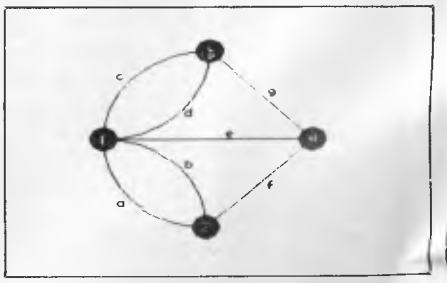

*Fig 9 Euler's Problem*

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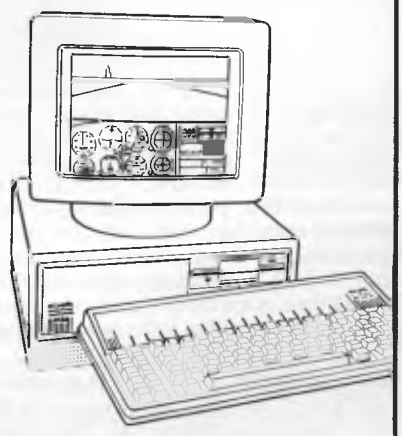

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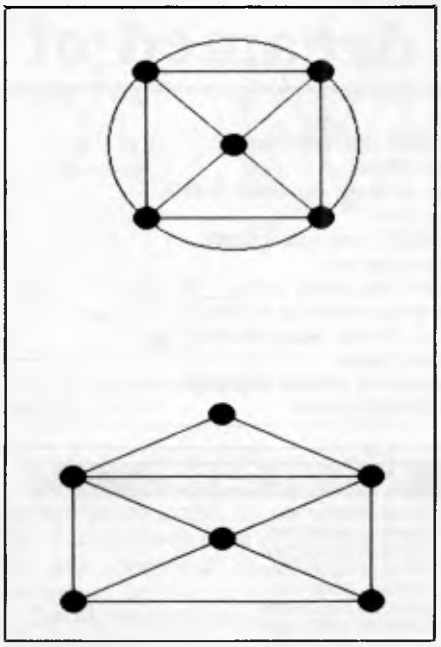

*Fig 10 Graphs to test Euler's Problem*

faced with seven possible choices (the remaining seven cities). Each possibility is given to a different processor, which is then faced with six possibilities. These are also shared out, and so on, until all the possibilities have been considered. One of these processors will clearly find the optimum route because all possible routes will be considered. The problem can be completed in polynomial time on a machine of this type; thus, these problems are classified as NP (Nondeterministic Polynomial).

Unfortunately, a machine of this type could never actually be built. Although the example with eight cities would only need 5040 parallel processors, a computer capable of handling 100 cities would require more processors than there are atoms in the universe!

Based upon this classification (shown by the Venn diagram in Fig 11), it is clear that all problems in the class P are also in the class NP. In other words, all problems which can be computed in polynomial time on a deterministic machine could also be calculated on a nondeterministic machine. However, it is not necessarily the case that NP problems are also in the class P. If this were the case, then the classes P and NP would, in fact, be the same. Unfortunately, mathematicians have so far been unable to prove this one way or the other, and it is now generally thought that the two classes are indeed different. At first sight, Euler's Problem may have appeared to be in the class NP, but it has since been proven to be in the class P because it does have a polynomial-time solution. It may be that other problems, presently in the NP class, will also be found to lie in P.

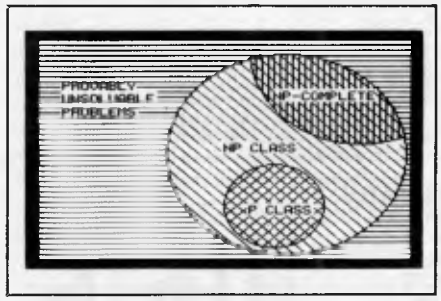


*Fig 11 A Venn diagram*

Another subset of the NP class of problems is known as NP-Complete. It is often found that NP problems have some relationship to each other. For example, as we have seen, the travelling salesman problem could be regarded as finding the least-cost Hamiltonial Circuit on a graph where each point is connected to every other point.

Using a mathematical language known as Propositional Calculus, the mathematician SA Cook was able to describe the workings of a Nondeterministic Turing Machine. From this, mathematicians have been able to show that a number of NP problems are special in that they can all be converted to a common problem in propositional calculus. What's more, this conversion is in polynomial time. It follows from this, that if a polynomial-time solution to any of the NP-Complete problems could be found, then it could be used to solve all NP problems.

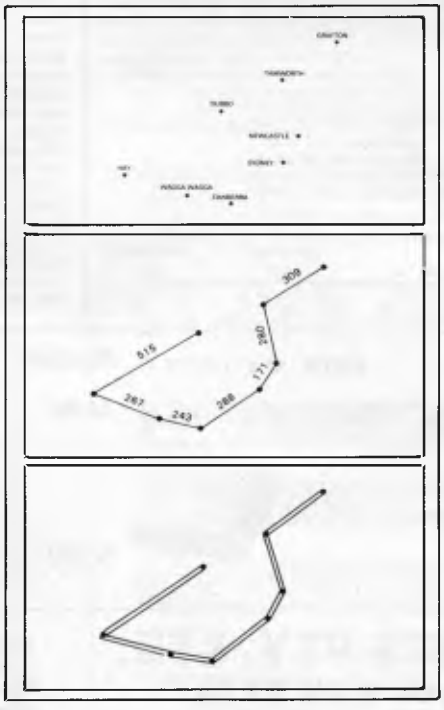


*Fig 12 A process to provide solutions of no more than twice an optimum length*

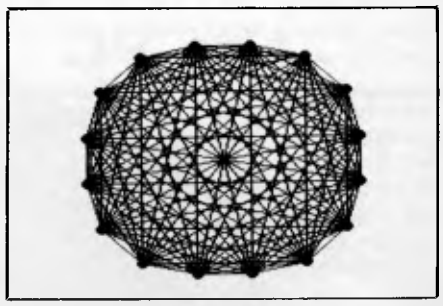

*Fig 13 A city layout*

## Solutions

This theory is all very clever, but not much help to the poor computer scientists who still have to implement these problems. Consequently, many methods of finding sub-optimal solutions have been developed. These are usually of two types, both of which have the advantage of being computable by polynomial-time algorithms.

The first type are those that guarantee solutions near to the optimal in all cases. For instance, the travelling salesman problem has already been demonstrated to lie in the class NP (unless you can prove differently, of course!), so a number of sub-optimal solutions are used. One technique is guaranteed to provide solutions which are no more than twice the optimum length. This process is shown in Fig 12, and consists of the following steps:

(a) Generate a Minimum Spanning Tree to connect the cities. This is done by connecting the closest cities, then the next

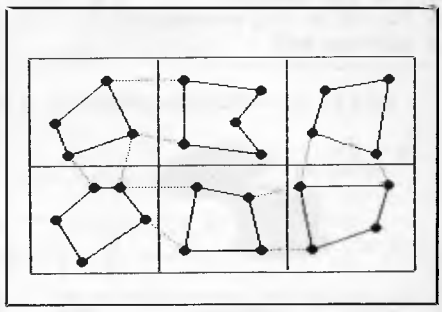

*Fig 14 A map of 26 cities split into areas*

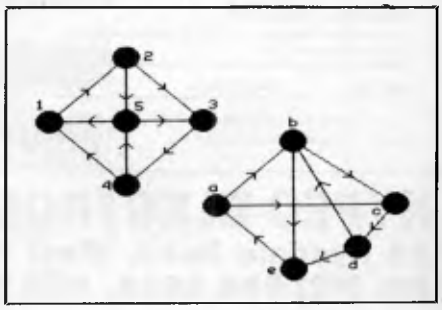


*Fig 15 Isomorphic graphs*

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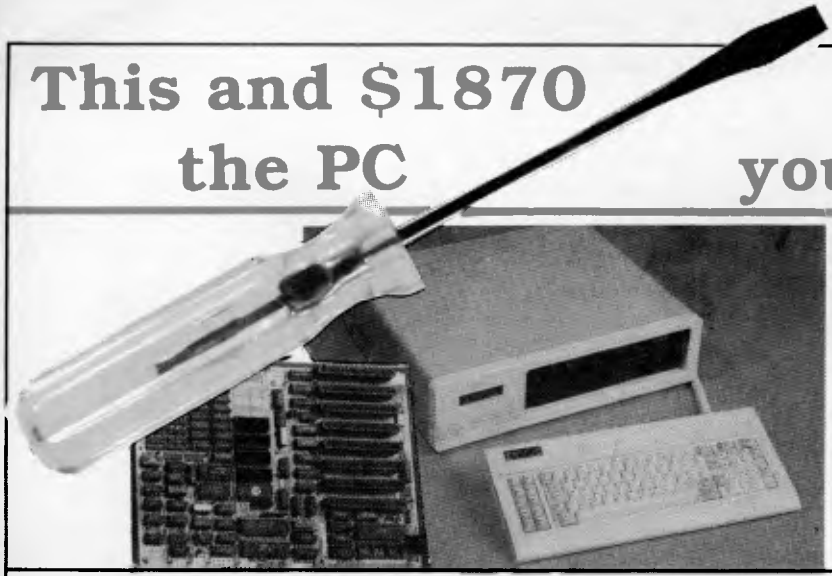

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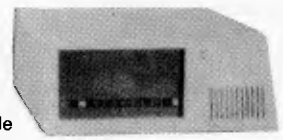

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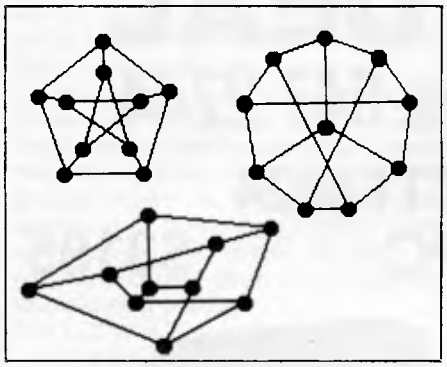

*Fig 16 Are these graphs clearly isomorphic?*

closest, and so on, but a connection is only made if the city if not already connected to the graph.

(b) Each of these lines is then traversed in both directions to form a cyclic route.

The Minimum Spanning Tree, which is generated in polynomial time, is known to be shorter than the length of an optimum tour. This can easily be seen by finding the optimum tour (using the program in Fig 4), then omitting any one of the lines. This will form a spanning tree of shorter length, so the minimum spanning tree must be shorter than any possible tour. Consequently, traversing this tree in both directions will give a tour which is less than twice the optimum. The tour shown in Fig 12 (b) can then be further improved by taking short-cuts. This is done where cities are visited twice (that is, in both directions), where the two lines travelling in one direction can be reduced to one line which bypasses the city.

Techniques also exist which will give solutions to the majority of problems. This type of solution arises because in most practical cases the problems are not the worst cases. For example, if you were given the city layout shown in Fig 13, the shortest path is fairly obvious without having to work through the 15! possible routes. For large maps, one typical method is to divide the map into a number of territories, calculate a route for each, then join the territories, if, for example, a map contained 26 cities, an exhaustive search would be required to check 25!, or $1.55 \times 10^{25}$ (approximately) possible routes. If this map were split into the areas, as shown in Fig 14, then an exhaustive search of each area would only have to analyse 3! + 4! + 3! + 4! + 3! + 3!, or 72 possible routes. Another algorithm is then known to connect the areas together in polynomial time.

Many other solutions exist for which only NP solutions are known. How many colours are required to colour a given map, such that no two adjacent areas have the same colour? It is fairly easy to see if a map can be coloured by one or two colours, and it was known for many years that five colours were sufficient to colour any map. However, no-one has been able to produce a map requiring more than four colours, and it was recently proven that four colours were indeed sufficient. However, choosing between three and four colours is still an NP problem. Look back to the pentonimoes in Fig 1. They have been coloured using four shades, but can they be coloured using only three?

The Knapsack Problem involves placing a number of objects into a knapsack without exceeding the capacity of the knapsack. Each object has a weight and profitability; the idea being to find the best possible combination of objects which maximise the profit. The exhaus-

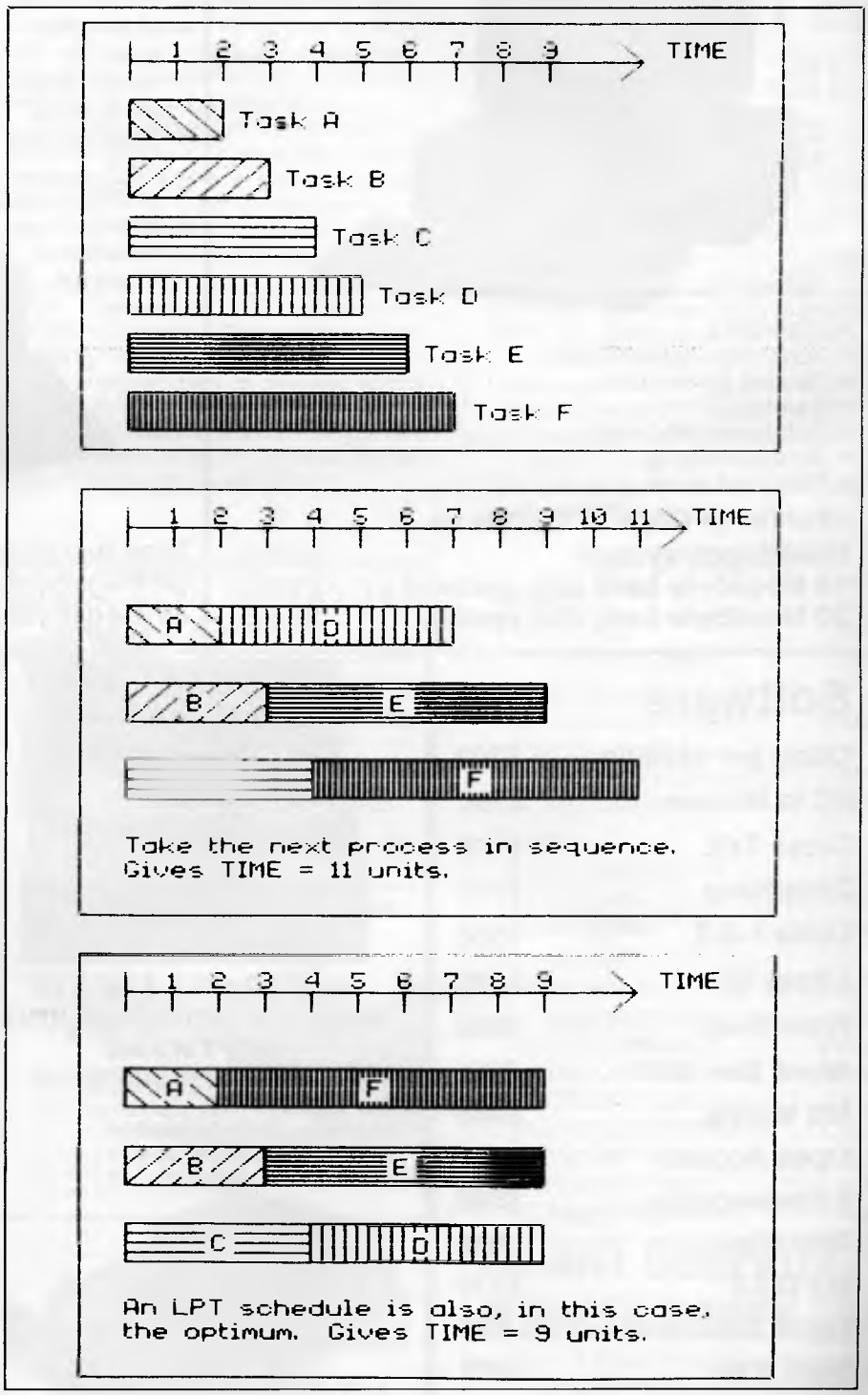


*Fig 17 Tasks for a multi-tasking computer system with three processors*

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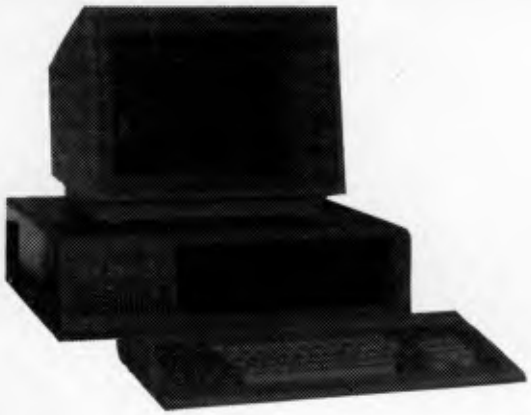

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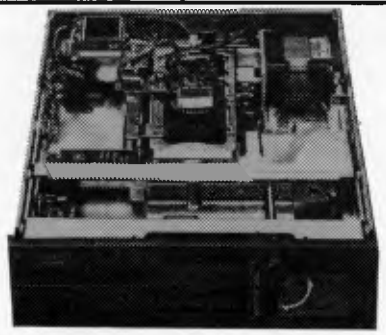

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tive solution would require picking each of the original objects, followed by any of the remaining objects, and so on.

Two graphs are said to be isomorphic if there exists a direct mapping between the points and lines in each graph. To see this more clearly, consider the two graphs shown in Fig 15. Although appearing dissimilar, they are isomorphic, and graph A can be transformed into graph B by changing the following points:

1 = c, 2 = d, 3 = e, 4 = a, 5 = b

It is possible to reduce this problem using some techniques. For example, if the graphs are isomorphic, then they must have an equal number of points and lines, and each point must have the same number of lines emanating from it. Many other techniques exist which will work with specific types of graph, but the best general solutions still take exponential time to compute. Is it clear that the three graphs shown in Fig 16 are isomorphic?

## Conclusion

A multitude of other problems exist, but let's finish by considering a problem of particular interest to computer software designers.

Imagine a multi-tasking computer system with three independent processors, each of which is capable of handling any particular job. Imagine that the three processors are given the tasks shown in Fig 17. If, each time a processor became free, it just took the next available job in the queue, then the overall finish time would be 11 units. However, by using a system known as LPT scheduling (Longest Processing Time) the overall time can be reduced to nine time units, which in this case is also the optimum. Using the LPT rule, whenever a processor becomes free, it will always take the job with the highest processing time.

The LPT system will not always produce an optimum ordering but it can be implemented using a polynomial-time algorithm, whereas an exhaustive search would be in exponential time.

Many problems which may appear to be quite difficult can be solved using such techniques and Divide-and-Conquer, Dynamic Programming, Backtracking, and Branch-and-Bound. But some problems defy all the best efforts to find polynomial-time solutions. It is these, and especially those lying in the NP-Complete class, which pose the real questions. Is NP identical to P?

SCREENTEST

# Samna+

**Kathy Lang looks at Samna+, an impressive word processing package with the capabilities to rival other dedicated systems on micros.**

An increasing number of word processing packages are becoming available for micros which rival in power and flexibility the software available on dedicated word processors. Indeed, some of the newer packages provide a level of facility not common even on dedicated word processors. Such a system is Samna, a word processor available at present only on the IBM PC. Samna comes in four versions: Samna I, II and III are increasingly powerful word processing packages, while Samna+ is Samna III word processing plus two extra features — a spreadsheet and a document indexing facility.

Samna III requires a minimum of 256k memory; Samna+ needs 384k. Samna is not cheap — Samna III is $850 while Samna+ is $1,095 — but, as you will see, an impressive set of facilities is provided for your money.

Installing Samna is straightforward: you just run a program called Instal that is provided with the package. This carries out the initialisation procedures such as installing a printer, and sets up a directory called Samna, together with (on hard disk systems) a program in the root directory which automatically takes you into the right directory and loads the program.

Unlike most systems, you are immediately placed in an editing mode rather than having to go through a menu option first — all functions in Samna are carried out as commands within the ambit of the editing mode. The screen displays the word READY! in the top left-hand corner and the current column, line and page number in the top-right, together with the name of the document being edited. Initially, this will be the so-called 'scratchpad'. You can start typing this in right away and create a file in which to store the text later, or print out what you have typed without storing it. Alternatively, you can set up a file by pressing a function key and naming the file (Samna sensibly checks that you do want to create a new file) and then enter text for that file. If the file already exists, you can enter its name rather than the name of a new document — you have access to directory information at this point if you need it. Another option is to go into spreadsheet mode and create a model, but more about this later.

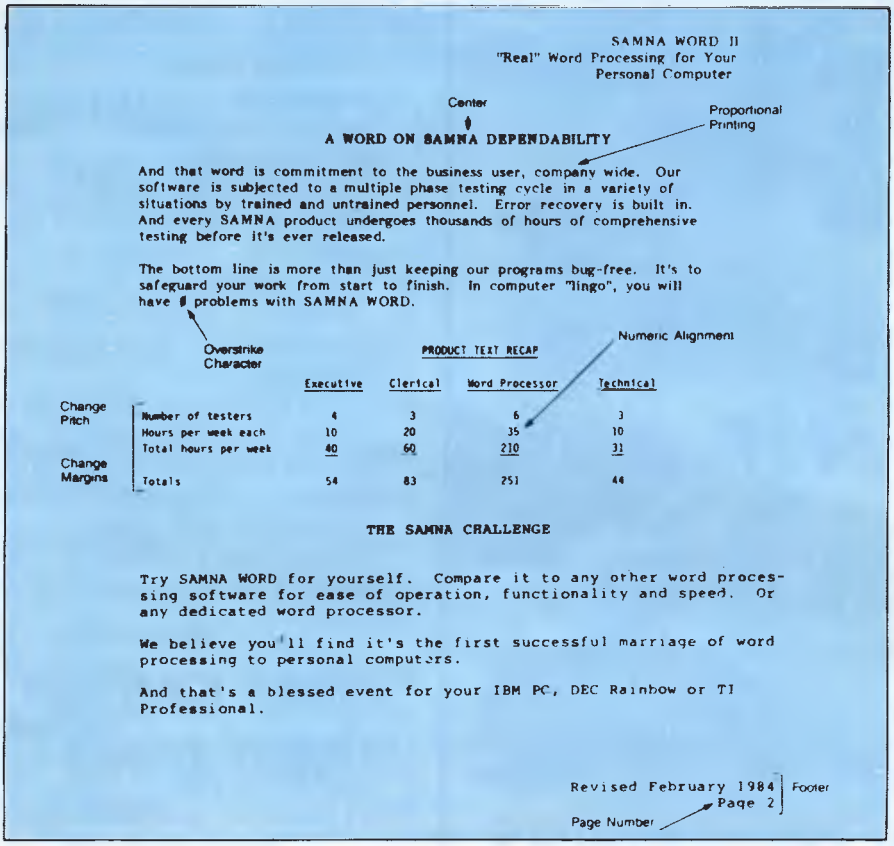


*Fig 1 An example of the Samna general word processing road map*

## General editing

Once into creating or editing a document, Samna provides a good range of features for amending text. The cursor can be moved by character, line, word, sentence, paragraph and page, to a particular page number and to the start and end of the document. All except the character move are circular: that is, mov-

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ing a word left at the start of a line moves to the last word on the previous line. You can also place marks into the text to which the cursor will jump, but these are identified only by their relative position, so you can go forward or backward to the 'next' marker but not to a particular marker. When adding text at the end of a document, you can scroll the text so that some blank screen is in view; this avoids the common problem of having to enter new text on the bottom line, with the whole screen being refreshed after each line.

Samna is usually in Overtype mode: that is, any text entered replaces what is already there. To insert new text, you must enter Insert mode. In this mode, no cursor movement is allowed except backspace (which deletes the character preceding the cursor), so if you want to make several small insertions you have to take the rather tedious approach of invoking and cancelling Insert mode each time. Text may be deleted either by using backspace, or by pressing the DELETE key and then using the cursor movement keys to shade the area to be deleted. This works well, and saves having a lot of special, separate function keys for cursor movement and for deletion, as do most packages. There is also an UNDO command which restores the most recent deletion — a most useful feature.

Powerful automatic search and replace features are provided, allowing you to search and replace forwards and backwards by exact match or ignoring case and emphasis, and by whole words or parts of words. Replacement can be automatic or with confirmation from the keyboard.

Samna allows you to copy or move sections of text, either lines or columns. However, if the amount you want to move is more than a paragraph or so, you must name a temporary file to act as a working area to hold the text being moved. The same mechanism allows copying of text between documents.

One of Samna's most unusual features is the ability to use a number of different sets of keyboard characters; these include several foreign language sets with accented characters which display correctly on the screen, as well as a Greek/Maths symbol set. Invoking a different character set involves just a couple of keystrokes. Another unusual and helpful feature is the ability to draw lines around tables and boxes on diagrams, although the exact representation of these on your printer will depend on the print wheel you use.

When you have finished typing, you save your file with a function key. According to how your package defaults

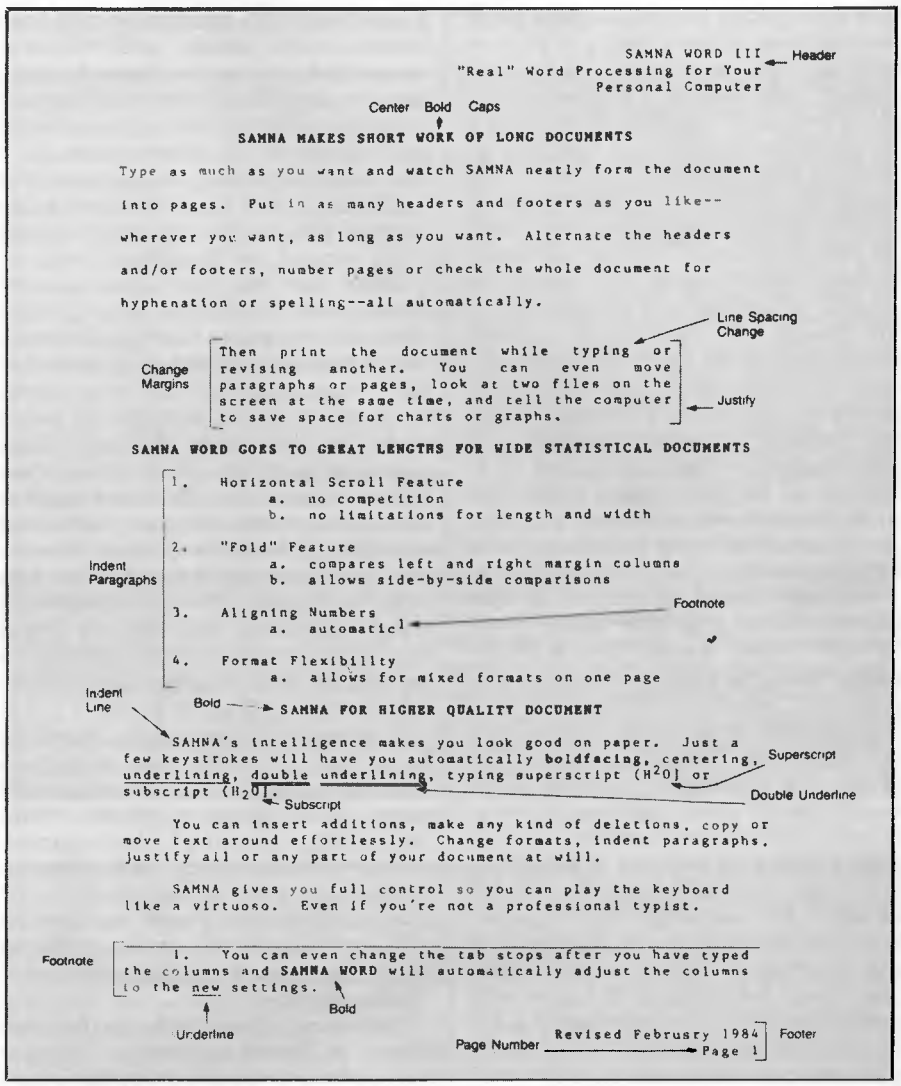



*Fig 2 Samna road map showing formatting indicators*

are set up, Samna will either keep no back-up copy of your text, or two (so that you have grandfather-father-son copies) — there doesn't seem to be a way to keep just one back-up copy! If you have made a complete mess of your editing session, you can exit without saving your changes, but Samna will ask you to confirm that you really want to do that. There is no way to save an interim copy of your document and then continue editing without re-specifying the file name.

## Text formatting

Samna displays on the top of the screen a ruler which shows the left and right margins, and tab positions. You can change these at any time while typing a document; changes are stored with the text and automatically activated as the cursor moves around the document. The package also displays a border around your text so that you see the text plus two hashed borders covering the area which would otherwise be blank — I found this quite a helpful approach, but you can turn off the border display if you don't like it. The same shading is used to show page breaks. Unlike many packages which mimic dedicated word processors, Samna treats a document as a continuous whole, so that you can at any time see the end of one page and the beginning of the next together on the screen, with the shaded boundary between.

Text is formatted to the current margins onscreen, including justification if that is set on — again, many packages do not show text justified on the screen. As text is inserted and deleted, reformatting automatically takes place. Sometimes Samna seems to get in a muddle with the reformatting and spreads a line out with far too many spaces, but invoking and cancelling Insert mode puts the problem right.

Samna allows you to have lines of text spaced in increments of 1/48th of an

inch if necessary, but this is specified in units of lines where a line is 1/6 of an inch. So, if you want one-and-a-half line spacing, you ask for 1.5 spacing and that's fine; but if you want something a bit more complicated, it is less easy to work out what is needed. This should not worry the average user, who tends to think in terms of single, one-and-a-half, double-line spacing, and so on. More esoteric requirements are harder to specify, but at least you can specify the full range of daisywheel printer capabilities, unlike the majority of packages of this type which prevent you from exploiting the printer's abilities to the full. Samna is a little less generous with pitch variation — you can choose 8, 9, 10, 12 or 15 pitch, again more than most packages will allow, but a smaller range than most word processing printers can handle.

You can indent paragraphs to tab markers, either directly or by using the Section Outline feature. This is a very useful facility for anyone who has to prepare long, numbered documents like manuals, as it allows you to specify up to six levels of numbered indentation (1, 1.1, 1.1.1, and so on), using three different styles of which the wholly numeric is one. Section numbers are not displayed during editing, only at print time, but the corresponding indentation is displayed. As sections are inserted, removed or moved to different parts of the document, Samna automatically renumbers the sections to match. You can also mark these or any headings for inclusion in a table of contents, for which you can specify a special layout.

Samna does not hyphenate text while typing, but will suggest hyphenation points while proof-reading (for spelling errors) if you request it. Awkward page endings can be prevented in several ways. You can specify that widows and orphans (single lines at the start or end of a page) must be avoided, or that page breaks must occur only between paragraphs. You can also specify that a specific number of lines must be kept together, either to avoid an unwanted page break or to allow space for a separate figure which must appear on a single page. You also have the opportunity to dynamically adjust page breaks if you request the Repagination option.

Tables can be typed using text or decimal tabs, and automatically reformatted if the tabs are changed. Columns can be moved or copied as desired. For extra-wide tables which will not fit within the width of the screen, Samna has a useful feature called 'folding' which allows you to see the left-hand side of the table (where you usually enter the titles) together with the right-hand side, and with the middle 'folded' away. There is also a Calculator mode which allows you to carry out arithmetic operations, using a totalling register plus two user registers which can store intermediate results; the effect is rather like a pocket calculator with two memories.

Headers and footers can be created, to be printed on every page or just on specified pages, and you can have several in the course of one document. Samna also allows true footnotes, a very unusual feature which not everyone needs, but which is indispensable for some applications. Footnotes can be printed either on the page on which the reference occurs, or in a list at the end of the document.

Formatting instructions are not displayed in Samna unless you request them, although you can tell by inspection if text is to be underlined (underlined text is shown underlined on a monochrome monitor, and in a different colour on a colour monitor), subscripted or superscripted, or emboldened; forced carriage returns are also shown. As marks for change of pitch and so on are shown only on request, you don't get problems with the marks interfering with formatting during normal typing.

The upshot of all this is that Samna has, in my view, succeeded in getting the extent of WYSIWYG (what you see on the screen is what you get on the printer) just about right. Apart from things you physically cannot display, such as changes in character size and true proportional spacing, the major omission is in displaying changes in line spacing, and here it seems that the disadvantages of showing double-spaced text as such onscreen outweigh the advantages.

## Printing

Samna supports a wide variety of printers, and allows you to specify six different printwheels for use with each one. If you want to change printwheels within the text — for instance, to use a different character set — you must place a 'change wheel' mark in the text, and Samna will stop printing for you to make the change. When printing, text can be emphasised by single or double underlining or emboldening, or you can overstrike text.

If you want to type short letters or if you are a beginner, there is a Typewriter mode which simply echoes what is typed on the screen directly to the printer.

## Repeated text

Samna allows you to store up to 10 abbreviations which are accessed by pressing a function key followed by a digit. The total length of all 10 items accessed in this way may be a maximum of 500 characters, which should allow sufficient scope for most needs. The stored characters can include instructions as well as text, so you can use the abbreviation facility to put together sequences of commands which you fre-

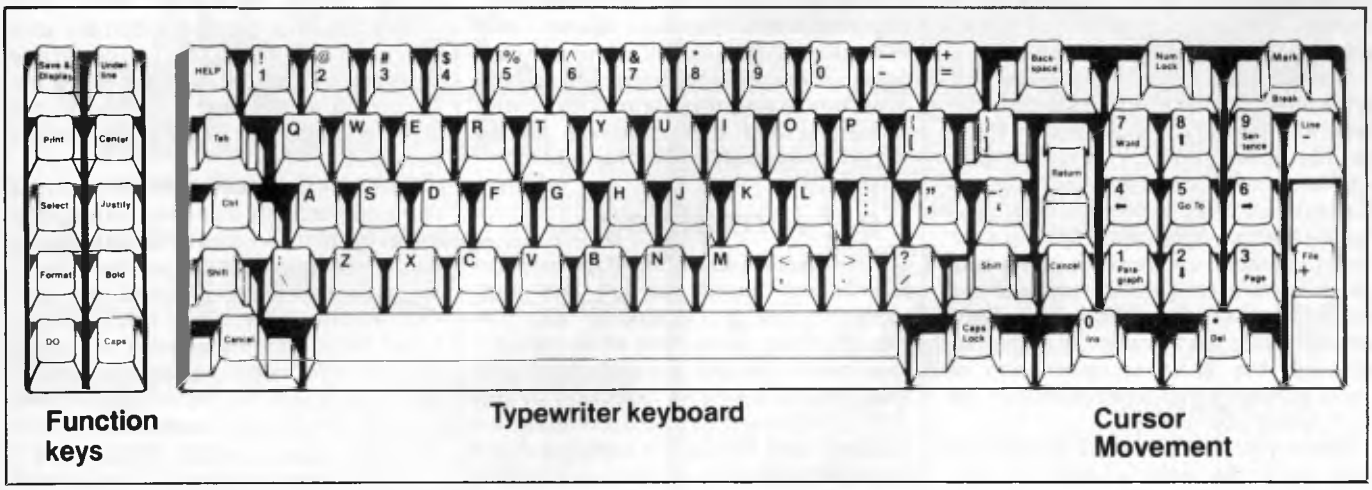



*Fig 3 The Samna keyboard layout*

quently execute.

For longer sections of text which are used in many places in one document or in several documents, you can create standard paragraph libraries, called 'glossaries' in Samna. These consist of sets of named paragraphs or longer sections of text, recalled by name from named glossary files.

Samna also provides a mail-merge facility, which allows you to create a template document to be merged with variable information to create several different copies of the same basic letter or report. Variables to be entered in the template document are referred to by name; you can then use the same names to create a form, to be filled in, for each set of values to fill those variables. This approach is much easier for novice users than simply entering strings of names and addresses interspersed with commas, as most micro packages require, and quicker than those which oblige you to use variable names in each record but do not use a form with these already provided. Records are stored in order by the first field in each so that you can retrieve individual records for editing. You can also specify start and end points for the values of this field if you want to print just a subset of your letters; this provides a very primitive selection capability.

You can request that the records be reordered by any one field before merging — useful if, for instance, you want to output labels by post office sorting code. However, I couldn't find a way to get multi-column labels printed — there is a simple multi-column feature, but I could not see how to apply it to automatic merging.

## Housekeeping

Documents can be copied within Samna; you can also copy whole directories, or parts of them, using the same wild code facilities as those provided in DOS. Files do not need to be in the Samna directory — you can set up path names, and edit documents from other directories. Samna allows you to import ASCII text files, and to output documents in ASCII format.

Samna+ provides an extremely powerful method of finding documents which meet particular criteria. You can use a feature called Word-base to create an index of all the documents in one directory, or just some of them. If you did this with, say, a set of reports on individual projects, you could then use the index to find all the projects with deadlines in the next three months or with a priority greater than a specified lower limit. Or you could index all committee minutes for the last three years, and then pull out all references to a particular discussion topic. Wordbase thus provides simple, text-oriented data management features within the context of a word processor. Like many of Samna's more sophisticated features, not everyone will need it — but in many applications it could justify the cost of the software by itself.

Samna also provides a spelling checker, which is invoked from within the package. You can use your own dictionary in addition to that provided with the package, and add words to your dictionary. You can only have one dictionary of your own on each disk, so on a hard disk system you would, if you needed more than one dictionary, have to store all but one under pseudonyms until you needed them. Again, not a problem for most people, but irksome if you do not have this requirement. While checking, the speller offers alternatives to misspelled words if it can, and Samna automatically reformats paragraphs as words are corrected.

You can create a printable index based on the contents of any document. Most packages which allow this expect you to mark every occurrence of words to be indexed. Samna takes the opposite approach of allowing you to enter a list of words to be indexed; it then creates an index, showing the page numbers on which each reference occurs. This index is an ordinary Samna document which can be edited in the usual way.

## Spreadsheet

The Samna+ spreadsheet works in partnership with the word processor so there is always a text 'view' of the spreadsheet, and you can take copies of it or parts of it and insert them in the text as needed. These copies can be kept in step with changes in the calculation version of the spreadsheet if you wish. You can also specify 'floating' cells for insertion within the actual text of the document, which can also be kept up-to-date as the cell values change — perhaps to include varying figures such as total profits in textual descriptions.

The maximum size of the spreadsheet is 6400 cells, with a maximum of 250 characters on each row. The usual range of arithmetic features is included, plus a number of functions such as net present value, load rate, standard deviations and variances. Recalculation may be automatic or manual, and you can determine the order in which recalculation takes place.

## In use

Samna commands are invoked by function keys, or by a function key followed by a character key. Throughout, extensive help is provided for beginners, although you can decrease the level of help as you become more experienced. If the prompts provided are insufficient, you can access more information by pressing a help key — surprisingly, this is the ESCape key. When you need to cancel commands, the ALT key, rather than ESCape, is used. The modes of use are the same for both the word processing and spreadsheet parts of the package, including cursor movement, block copying and moving, and so on, so it's quite easy to move between the two.

Other aspects of the package will be of particular interest to experienced users. You can have two windows open at once, allowing you to view either two parts of the same document or a section of each of two documents. I've mentioned the fold facility; if you have a graphics board, you can also zoom pages of a text document to see the shape of a complete page on the screen (though of course without being able to read the text).

Samna comes complete with a reference manual, a reference summary and a set of stickers to identify the special keys. There is no tutorial guide as such, although there is a 'Read Me First' booklet to get you started, and a tutorial disk is provided which contains a set of self-paced lessons. These allow you to select sections of the package which you want to learn about, and provides a reasonable way of getting started with the word processor. There are however, no tutorials on the spreadsheet.

## Conclusion

Samna III provides a powerful range of word processing facilities with a high degree of WYSIWYG, and includes a spelling checker, the ability to create an index for a document, and some unusual formatting features such as outlining and true footnotes. It is remarkably easy to use for such a powerful package. Not surprisingly there are a few small glitches, but these should not affect its use to any significant degree.

The spreadsheet which forms part of Samna+ also has a good range of features, and is well integrated with the word processor. The Word-base facility would be invaluable in a wide range of applications.

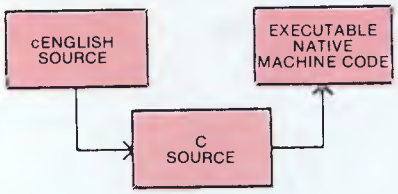
All in all, other packages providing word processing facilities on micros to rival the dedicated systems had better look out.

END

# cENGLISH.
# The C Generation Language.

**What is cENGLISH?** cENGLISH is a comprehensive fourth generation procedural language based on dBASE II syntax. It is portable to a wide range of micros and minis. The language features user-transparent interfaces to a wide range of popular C compilers, operating systems, and data base managers.

**How is portability achieved?** cENGLISH through it's compiler interface translates cENGLISH into documented C source and uses a host C compiler to produce native machine code.




C source can be embedded in cENGLISH source.

Differences in the operating system and data base manager are handled by the runtime libraries.
The result is that cENGLISH source can be compiled without modification on any micro or mini configuration supporting cENGLISH.

**What about performance?** cENGLISH executes FAST, just like any compiled C program.

**How easy is cENGLISH to use?** While cENGLISH is a powerful high level language that can accommodate complex software development, it remains simple and straightforward to use.

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**Also available: the dBASE II to cLINE/cENGLISH Converter to ease the conversion task.** Up to 95% of dBASE II code is automatically converted to cLINE/cENGLISH. It requires about the same effort as converting to dBASE III and provides many more benefits.

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## SAMPLE cENGLISH PROGRAM

```
IDENTIFICATIONS
   MODULE    Mininame
   AUTHOR:   bcs
   DATE:     8/29/84
   REMARKS: Sample cENGLISH program that adds first
            names to a file
END IDENTIFICATIONS


GLOBALS
   FIXED LENGTH 1 ans
   FIXED LENGTH 15 Fname
END GLOBALS


MAIN PROGRAM

   BEGIN
      CLEAR SCREEN
      SET ECHO OFF

      USE "NAMES"
      VIEW BY "ID_FNAME" ASCENDING

      AT 23, 1 SAY "Add a record? Y or N"
      AT 23, 25 ENTER ans USING "!"

      WHILE ans EQ "Y"
         CLEAR GETS
         AT 6, 1 SAY "Enter first name"
         AT 6, 20 GET Fname
         READ SCREEN

         INSERT
            Fname = Fname
         END INSERT


         AT 12, 10 SAY "Welcome to cENGLISH", & Fname
         WAIT
         AT 14, 10 SAY "HIT ANY KEY TO CONTINUE"
         STORE "                " TO Fname
         STORE "  " TO ans
         AT 23, 1 SAY "Add another record? Y or N"
         AT 23, 30 ENTER ans USING "!"
         CLEAR ROW 1 THRU 23

      END WHILE

      AT 12, 10 SAY "That's all for now!"
      UNUSE "NAMES"
      SET ECHO ON

END PROGRAM
```

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cLINE™ Inc.


# McMill 68008 card

**The McMill package for the Apple II+ and the Apple IIe comprises an economically-designed 68008 processor card, software and a variety of books and manuals. Mike Liardet looks at this ideal aid to learning 68000 code.**

A co-processor card transforms the Apple II into a different machine. The card contains a processor with as many support chips as is necessary to interface it to the Apple, and can be inserted into the Apple via one of the expansion slots. When the machine is activated, the processor mounted on it takes over the running of the system, replacing the Mostek 6502 processor that is normally in control. The processor is the most fundamental component in a computer, so the effect of installing a co-processor card is quite profound — the computer equivalent of a transplant.

With the exception of the Z80 and super-6502 cards, most of the co-processor cards offer access to only very limited software. They are aimed more at the assembler programming and hardware enthusiast rather then the application user.

This is the thinking behind the McMill 68008 card. With the assembler included in the package, it provides an excellent vehicle for learning 68000 assembly language. Utilising the Apple's versatility, it can also form the nucleus of a 68000 development environment, with the possibility of 'downloading' the code to 68000-based home computers such as the Sinclair QL. The McMill's name implies that it offers the same 'mill' (processor) as the Apple Macintosh, and broadly speaking this is true, but be warned: it does not enable you to run Macintosh software on the Apple II.

## The McMill package

In addition to the co-processor card, the McMill package includes a number of manuals, books and software: everything you need to develop, test and run 68000 code, plus a little more besides.

The McMill card is surprisingly small, about the size of an Apple disk controller card, and contains just eight socketed ICs which are dwarfed by the giant 68008 processor. It was designed by an ex-Apple engineer, Ron Nicholsen, and has an economy of design worthy of Apple originator Steve Wozniak himself. Unlike some 68000 co-processor options, all the circuitry is on a single card (half a card, really) and there is no need for a separate power supply. The only snag is that the card doesn't contain any extra RAM, so its range of operation is limited to the amount of memory in the Apple — just 48k or 64k for many systems.

The software accompanying the card comprises a 68000 macro assembler, a monitor/debugger and a 68000 version of the Forth programming language.

The rest of the package is the system's weak point, namely the documentation and manuals. There is a short leaflet giving technical information about McMill; the assembler manual; a guide to programming the 68000; a hardware technical manual for the 68008; a software technical manual for the 68008 instruction set; and miscellaneous leaflets. The quantity is certainly present — it's just that the quality is lacking in some quarters.

The McMill is compatible with both the Apple II+ and IIe, but not the IIc. Installation is very simple — you just slide it into a vacant slot in the Apple. The McMill does not affect the normal operation of the Apple until it is activated under software control. In particular there were no problems with a Microsoft Z80 card alongside it: both cards operated normally, ignoring the presence of the other, and both remained 'off' for normal 6502 operations. With the two cards in place it was possible to run CP/M applications, normal Apple programs and 68000 software without once opening up the Apple or flicking any switches. All three processors can be activated under the appropriate software control embedded in the application programs.

All disks supplied with McMill are in Apple DOS 3.3 format and can be copied

```
PR#3
1000   .OR          $4000
1010   .TF          APCDEMO
1020 ADD64
       MOVEM.L      D2-D3/A0,-(A7)
1030   MOVEA.L      12(A7),A0
1040   MOVEM.L      (A0)+,D0-D3
1050   ADD.L        D3,D1
1060   ADDX.L       D2,D0
1070   MOVEM.L      (A7)+,D2-D3/A0
1080   ADDI.L       #16,2(A-7)
1090   RTS
PR#1
LIST
PR#3
SAVE APCDEMO.SOURCE,D2
ASM
RUN MONITOR,D1
```

*Fig 1 Setting up a simple 68000 subroutine*

in the normal way using Apple DOS utilities. There are no instructions for doing this, but anyone contemplating work with the 68000 assembler ought to be enterprising enough to manage this with instructions from Apple's own manuals. When the disks are copied, any one of them can be booted in the same way as any other Apple DOS disk. It is natural to choose the macro assembler disk first.

## The macro assembler

The macro assembler was produced by S-C Software, and one of its most surprising features is that it does not actually use the McMill card at all. It is implemented in 6502 code and will operate even if the McMill card is not present, but of course the output-executable code is only usable by a 68000 processor such as the one on the McMill.

When the macro assembler disk is booted it presents a menu which includes the option to 'load the assembler into l/c'; attempting to discover the meaning of 'l/c' introduces the manual. Although the assembler manual is well written it only documents the S-C 6502 macro assembler, and the only 68000 acknowledgement is a few short introductory pages. This is not as bad as it seems: about 75 per cent of the assembler is unchanged for 68000 operation and the other manuals in the package make up the shortfall, but it is still not easy to get started. Eventually you will find that 'l/c' stands for 'language card', and this is the preferred option (if you have one) as it frees more of the main board memory for the text of the program, allowing bigger programs to be created.

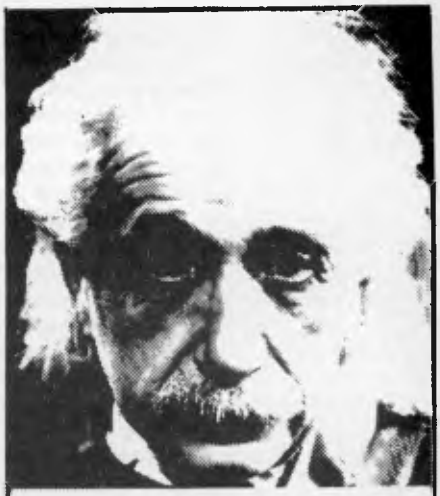
One of the most appealing features of the S-C assembler is that the input, editing and other activities involving the creation of an assembly source program are as similar as possible to the normal Applesoft DOS procedures for developing an Applesoft Basic program. This makes it very easy for seasoned Applesoft programmers to adjust to the new system.

The assembler contains some powerful facilities such as conditional assembly and macros, and can respond to a number of directives embedded in the code; these can control the assembly process. The most notable omission is the lack of facilities for referencing labels defined in other files. If an assembler source file gets too big and must be split, the management of external label references between files falls on the programmer. More sophisticated 'relocatable' assemblers can automatically deal with external references. As the assembler source must be fully loaded into the Apple's limited memory space for editing, this could become a problem for the development of medium-to-large applications.

## Coding and debugging

Due to space restrictions, it is not possible here to give a full assessment of all the features and facilities of the 68000-range processors, or of the assembler and monitor provided with McMill. But in order to give a flavour of the complete system, I'll present a short session to develop a simple routine to add two 64-bit integers. This will give some idea of the power in the 68000 instruction set.

Using the S-C assembler we can enter the sequence shown in Fig 1. Except for the actual program content in lines 1000 to 1090, this session should be familiar



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to regular Applesoft users. PR#3 activates an 80-column display card in slot three (assuming one is present — it is not essential to have one), then the lines of code are entered in the normal way. All the normal conventions for line-numbering and editing apply, and the familiar Applesoft screen editing facilities can be used in an almost identical fashion. PR#1 activates the printer, and the next statement, LIST, lists the program on the printer. PR#3 reselects the screen for output, and SAVE saves the program in a file called APCDEMO .SOURCE on the disk in drive two. (In CATALOGs the program is listed as an integer-Basic type, which it is not, but this is a difficulty caused by the Apple DOS filing system which only allows four types of file.)

ADD64 is called by

```
JSR ADD64
.DA $12345678,$9ABCDEF0
.DA $99999999,$AAAAAAAA
......
```

and resumes execution at '.....', with all data and address registers preserved except D0 and D1 which hold the result of adding the two 64-bit numbers following the JSR call to the subroutine.

Line 1020 saves the values of data registers D2 and D3 and address register A0 on the stack. This single instruction can be used to save any combination of registers. Address register A7 is the normal stack pointer, used automatically by JSRs for holding the return address. The '.L' in the instruction means that long (that is, 32-bit) values are to be used. In common with most instructions, '.W' and '.B' for word and byte values are also available.

Line 1030 reads the subroutine return address from the stack into address register A0. This is the location where the numbers are stored.

Line 1040 reads the two numbers into data registers, D0 to D3, and 1050 and 1060 adds them together, with the result in D0 and D1.

Line 1070 restores D2, D3 and A0 from the values held on the stack.

Line 1080 adjusts the return address on the stack so that the return point is after the numbers and not at the start of them, and 1090 causes return from the subroutine with the result.

The ASM command assembles the program at the M68000 address of 4000 hexadecimal, saving the executable code on the disk in a (binary executable) file called APCDEMO (the 'assembler directives' in lines 1000 and 1010 cause this to happen). The RUN command runs a normal Applesoft program that loads the monitor and the APCDEMO program, and then enters the monitor.

At this stage it is useful to use the monitor to run the program for two reasons: firstly, because the program may need debugging; and secondly, because the monitor handles all the details of activating the 68008 processor so that it can execute the code. If the monitor were not used, the executable file would have to start with a few 6502 instructions in order that when it was BRUN from Apple DOS, it could switch on the 68008 and start it running on the right piece of code. This does not involve many instructions, but as the McMill's addressing of the Apple memory is different from the 6502 some careful thought is needed, and this is a complication best avoided in the early stages.

Using single-letter commands, the monitor allows the user to view and change memory locations and registers, start program execution, and so on. The more powerful facilities include the setting of break points (to stop the program executing at a pre-determined point) and a single-step facility (to execute one instruction at a time). Using these monitor commands, it is possible to set up the registers to test the loaded ADD64 routine.

There is one undocumented facility in the monitor which I only hit upon by accident. It has a 'reverse assembly' facility that unscrambles a block of code into a close approximation of the original assembler source. With reverse assemblers it is not possible to be fully accurate, but the output is close enough to help you find your way around if you compare it to the original source.

## The McMill package contents

McMill card for Apple + or IIe with 68008 processor
Three disks: S-C macro cross-assembler 68000; monitor/debugger; version 1.0 Fig Forth
*S-C assembler Manual*
*McMill Operation Guide*
*Programming the M68000* by Tim King and Brian Knight; Addison-Wesley 1983
*S68000 User's Guide;* Signetics Corporation 1982
MC68008 microprocessor (Motorola 1983)
Price: $US295
Contact: Stellation Two, PO Box 2342, Santa Barbara, California 93120. Tel: (805) 569 3132

## Conclusion

For any Apple owner with a tight budget but who wishes to start 68000 coding, the McMill package should prove invaluable. An obvious alternative would be to buy a Sinclair QL with a 68000 assembler which would mean sacrificing the keyboard and disk drives of the Apple for the QL keyboard and microdrives.

Seasoned Apple programmers will quickly grasp the workings of the S-C assembler as it is similar to Applesoft DOS, and they can save all their energy for learning the intricacies of the powerful 68008 processor. The assembler offers some very powerful features and is a delight to work with, for the simpler programs at any rate.

The package's only significant letdown is the rough edges in the documentation. The Forth manual must be ordered separately, but otherwise all the required information is there — it just takes some effort to find it. Any budding 68000 programmer worth his salt should be able to get round this obstacle, but it does slow things down initially. In the long-run it is worth it — the 68000 processor is a generation ahead of its contemporaries. END


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_____

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_____

## Computer thrashes human at the Third Commonwealth Chess Championship. Kevin O'Connell records the first-round upset.

The Third Commonwealth Chess Championship held earlier this year was sponsored by the Hong Kong chess computer manufacturer, Novag.

The tournament was won by the reigning champion, Kevin Spragget of Canada, ahead of the pre-tournament favourites John Nunn and Murray Chandler, both of England and ranked respectively ninth and sixteenth in the world.

One of the perks of sponsoring the event is that Novag is permitted to enter a couple of chess computers. Having micros play in this class of tournament is still rather like trying to rewrite Shakespeare's first folio using a roomful of monkeys seated at word processors, but every so often a chimp does produce a usable scene. That was certainly the case in the following game, the sensation of the first round, in which Novag defeated a master-strength human rated 2210.

**White: A J Stebbings. Black: Novag Monster. King's Indian Defence.**

| | | |
|---|---|---|
| 1 | d2–d4 | Ng8–f6 |
| 2 | c2–c4 | g7–g6 |
| 3 | Nb1–c3 | Bf8–g7 |
| 4 | e2–24 | d7–d6 |
| 5 | f2–f3 | O–O |
| 6 | Bc1–e3 | Nb8–c6 |
| 7 | Qd1–d2 | Rf8–e8 |
| 8 | Ng1–e2 | Ra8–b8 |
| 9 | Ne2–c1 | e7–e5 |
| 10 | Nc1–b3 | Nc6xd4 |

(10...e5xd4 is more common, followed by 11 Nb3xd4 d6–d5!, freeing Black's game: for example, 12 c4xd5 Nf6xd5 13 Nc3xd5 Nc6xd4 14 Be3xd4 Qd8xd5.)

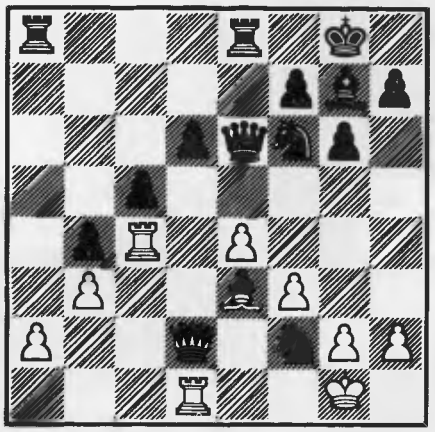
| | | |
|---|---|---|
| 11 | Nb3xd4 | e5xd4 |
| 12 | Be3xd4 | a7–a6 |

(Not now 12...d6–d5 13 Bd4xf6 and 14 c4xd5.)

| | | |
|---|---|---|
| 13 | Bf1–e2 | Bc8–d7 |
| 14 | O–O | b7–b5 |
| 15 | c4xb5 | a6xb5 |
| 16 | Ra1–c1 | c7–c5 |
| 17 | Bd4–e3 | b5–b4 |
| 18 | Nc3–d1 | |

(White would like to put the knight on d5, but cannot do so since that would lose a pawn (18...Nf6xd5 19 Qd2xd5 Bd7–e6, followed by a capture on a2 or b2) or even worse (18...Nf6xd5 19 e4xd5 Re8xe3 20 Qd2xe3 Bg7–d4, winning the queen).)

| | | |
|---|---|---|
| 18 | ... | Bd7–e6 |
| 19 | Be2–c4 | Be6xc4 |
| 20 | Rc1xc4 | Rb8–a8 |
| 21 | b2xb3 | Qd8–d7 |
| 22 | Nd1–f2 | Qd7–e6 |
| 23 | Rf1–d1 | |



*White is already looking vulnerable*

(White cannot prevent the freeing 23...d6–d5.)

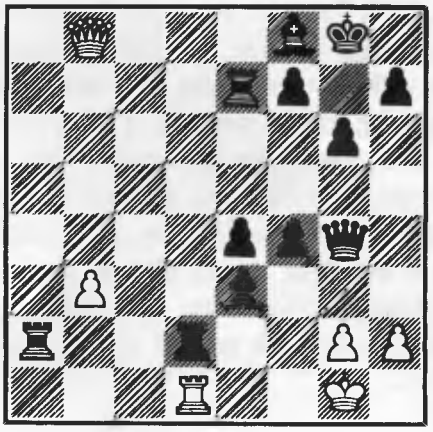
| | | |
|---|---|---|
| 23 | ... | d6–d5 |
| 24 | Rc4xc5 | d5xe4 |
| 25 | f3–f4 | |

(Exchanging on e4 would be much worse, for example 25 f3xe4 Nf6xe4 26 Nf2xe4 Qe6xe4 27 Be3–f2 Bg7–c3, and White is in trouble.)

| | | |
|---|---|---|
| 25 | ... | Nf6–g4 |
| 26 | Nf2xg4 | Qe6xg4 |
| 27 | Rc5–d5 | Re8–e7 |

(The point of this move is quite deep. By getting the rook off the back rank, Black prepares his material-winning manoeuvre at moves 30–32.)

| | | |
|---|---|---|
| 28 | Qd2xb4 | Ra8xa2 |
| 29 | Qb4–b8+ | Bg7–f8 |
| 30 | Rd5–d2 | |



*Black is gaining a material advantage*

| | | |
|---|---|---|
| 30 | ... | Re7–d7 |
| 31 | h2–h3 | |

(White has very little choice. 31 Rd2xa2 fails to 31 ... Rd7xd1 + 32 Kg1–f2 Qg4–h4 + and 33g2–g3 Qh 4xh2 mate or 33 Kf2–e2 Qh2–e1 mate.)

| | | |
|---|---|---|
| 32 | ... | Qg4xd1+ |
| 32 | Rd2xd1 | Rd7xd1+ |
| 33 | Kg1–h2 | Ra2–a5 |

(To stop 34 Be3–c5.)

| | | |
|---|---|---|
| 34 | b3–b4 | Ra5–d5 |
| 35 | Be3–c5 | Rd5–d8 |
| 36 | Qb8–b7 | Bf8xc5 |
| 37 | b4xc5 | |

(Black has a small but clear material advantage. However, White's passed c–pawn could be very dangerous.)

| | | |
|---|---|---|
| 37 | ... | Rd1–c1 |
| 38 | Qb7xe4 | |

(Of course White would like to keep his c–pawn, but if 38 c5–c6 then 38...e4–e3 39 c6–c7 Rd8–e8 and if 39 Qb7–b5 Re8–c8 ensures that it disappears.)

| | | |
|---|---|---|
| 38 | ... | Rd8–c8 |
| 39 | f4–f5 | Rc1xc5 |
| 40 | f5–f6? | |

(Now Black gets a greater advantage. After 40 f5xg6, my money would have been on a draw.)

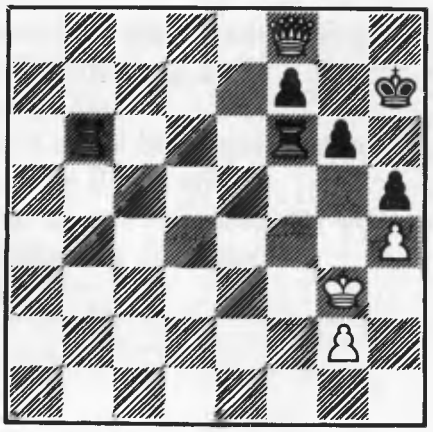
| | | |
|---|---|---|
| 40 | ... | Rc5–c6 |
| 41 | Qe4–e7 | Rc6–e6 |
| 42 | Qe7–d7 | Rc8–f8 |
| 43 | Qd7–d4 | Rf8–b8 |
| 44 | h3–h4 | |

(or 44 g2–g4 g6–g5 and the f–pawn rapidly falls).

| | | |
|---|---|---|
| 44 | ... | h7–h5 |
| 45 | Kh2–g3 | Rb8–b6 |
| 46 | Qd4–d8+ | Kg8–h7 |
| 47 | Qd8–f8 | |

(The days have long done when such a last-gasp effort could prove successful against a chess computer.)

| | | |
|---|---|---|
| 47 | ... | Re6xf6 |



*The end is nigh . . . Novag Monster has now only to avoid stalemate*

## MICROCHESS

(Not only that, but Novag Monster now demonstrates the technique to win this ending.)

| | | |
|---|---|---|
| 48 | Kg3–h3 | Rb6–b3+ |
| 49 | Kh3–h2 | Rf6–f4 |
| 50 | Qf8–e7 | Rf4–f2 |
| 51 | Qe7–d8 | Rb3–b4 |
| 52 | Kh2–g1 | Rb4–b2 |
| 53 | Kg1–h1 | |

(Another 'hopeful'. Now 53...Rf2xg2? would allow 54 Qd8–h8+! Kh7xh8 stalemate.)

| | | |
|---|---|---|
| 53 | ... | Rb2–c2 |
| 54 | Qd8–b8 | Rc2–a2 |
| 55 | Qb8–d8 | Ra2–b2 |
| 56 | Qd8–d4 | |

(Still coveting the h8 square.)

| | | |
|---|---|---|
| 56 | ... | Rf2–e2 |
| 57 | Qd4–d8 | Rb2–d2 |
| 58 | Qd8–c8 | Rd2–d4 |

(Grinding down White's resistance. Now 59 g–g3 allows 59...Rd4–d1 mate while 59 Qc8–h3 Rd4–d1+ 60 Kh1–h2 Rd1–d2, and Black picks up the g–pawn.)

| | | |
|---|---|---|
| 59 | Kh1–g1 | Rd4xh4 |
| 60 | Qc8–d8 | Rh4–g4 |
| 61 | Kg1–h1 | Rg4–f4 |

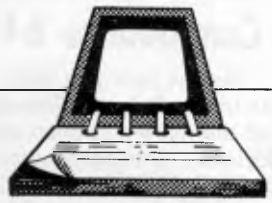
(Black still has to beware of the stalemate possibility.)

| | | |
|---|---|---|
| 62 | Qd8–c8 | Rf4–h4+ |
| 63 | Kh1–g1 | Rh4–g4 |
| 64 | Kg1–h1 | Rg4–f4 |
| 65 | Qc8–d8 | Rf4–f1+ |
| 66 | Kh1–h2 | f7–f5 |
| 67 | Qd8–f6 | Rf1–f2 |
| 68 | Kh2–h1 | Re2–d2 |

(Olé.)

| | | |
|---|---|---|
| 69 | Qf6–f8 | Rf2–e2 |
| 70 | Qf8–f6 | Kh7–h6 |
| 71 | Qf6–f8+ | Kh6–g5 |
| 72 | Qf8–g7 | h5–h4 |
| 73 | Qg7–h8 | Rd2–d1+ |
| 74 | Kh1–h2 | Re2–e1 |

(0–1 (White resigns) )



## 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.**

| | | |
|---|---|---|
| Melbourne | Communications '85<br>Contact: Australian Exhibition Services Pty Ltd<br>Suite 3.2 Illoura Plaza, 424 St Kilda Road, Melbourne 3004<br>(03) 267 4500 | August 6–9, 1985 |
| Brisbane | Ausgraph '85<br>Contact: Ausgraph '85 Conference Secretariat,<br>PO Box 29, Parkville, Vic 3052<br>(03) 387 9955 | August 12–16, 1985 |
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# LAZING AROUND

**Brain-Teasers from J J Clessa.**

## *Quickie*

20 blackbirds are sitting on a fence. The farmer blasts them with his shotgun and kills three. How many live birds will be left on the fence?

## *Prize Puzzle*

Short and sweet: find three positive numbers in arithmetical progression whose product is 11 (for the uninitiated, arithmetical progression means that the difference between successive numbers is constant). And please don't write in to say it can't be done.

Answers, please, on postcards only to *APC* Prize Puzzle, August 85 Lazing Around, 2nd Floor, 215 Clarence Street, Sydney 2000. Entries to arrive not later than 31 August 1985.

## *May Prize Puzzle*

What a load of ball-bearings! There was quite a big response — over 250 entries to the ball-bearing problem.

The puzzle wasn't too difficult to solve by micro; the answer is 19,600 ball-bearings, which is the smallest triangular number that is also a perfect square. The winning entry came from B Joyce of Epping, NSW. Congratulations, your prize is on its way.

# NUMBERS COUNT

**Mike Mudge considers the 'Numeri Idonei' of Leonhard Euler.**

Among the extensive correspondence and papers of Leonhard Euler (1707-1783) there are various strictly arithmetical theorems for which Euler does not have a proof and which he does not even state precisely. Included in these are references to the sequence: d=1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 16, 18, 21, ... 1320, 1365, 1848, containing 65 terms up to this point.

These numbers all have the following property:
If d=ab and if a number n can be expressed *uniquely* in the form $n=ax^2+by^2$ where ax and by are coprime (that is, ax and by have no common factor other than unity), then either n is *prime* or it is *twice* a prime or it is a *power* of 2. Any odd number that can be written uniquely in this form must be a prime.

Euler calls these d 'Numeri Idonei' because they can be used for primality tests. For example, d=57=3.19 yields the prime number 1000003 because this can be uniquely written $19.8^2+3.577^2$ where 19.8=152 and 3.577=1731 coprime.

For example, d=1848=1.1848 yields the prime number 18518809 with the unique representation $197^2+1848.100^2$ where 197 and 184.100 are coprime.

It is still unknown whether Euler's 65 Numeri Idonei are the only such numbers. Euler only proved that cases d=1, 2, 3 have the required property.

*Problem* Obtain the full listing of 65 Numeri Idonei less than or equal to 1848. Attempt to find further such numbers.

Generate sub-tables of prime numbers from each of these d-values, and compare their union with a complete table of prime numbers or with an implementation of a sieve technique for the determination of all prime numbers up to the required maximum value.

Readers are invited to submit their program listing, output and hardware details together with their conclusions relating to this problem to Mike Mudge, C/-*APC*, 2nd Floor, 215 Clarence Street, Sydney 2000. A suitable prize will be awarded to the best entry received by 15 September, 1985. Criteria will include accuracy, originality and efficiency, not necessarily in that order.

Expanded reviews of previous problems, together with, subject to the approval of the contributor, copies of detailed programs from the prize-winning entry may also be requested.

# 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 GOSUB220
170 FORL=1 TO 5
180 NEXTL
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 NEXTL
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
```

# CHIP CHAT

*A-maze-ing:* long before mice began to breed on desk-tops, home-brewed versions made their way around mazes. You'll no doubt be fascinated to know that the European Personal Robot Congress is about to get underway. Having watched mice career around fairly simple mazes, it'll be interesting to see how they cope with the Japanese maze being flown in especially for the event. It's not clear whether ritual suicides will be in order for any mice which fail to rise to the challenge, but it will give competitors a chance to tune up for the World Finals to be held in Japan with the assistance of the Japanese Science Foundation — showing that this is serious business as well as fun.

*Ultimate goes to Hollywood:* back-patting, fixed grins, and phrases such as: 'Didn't they do well' were once again the order of the day at this year's Golden Joystick Awards. The ceremony produced few surprises, with Ultimate being voted Software House of the Year and Knight Lore the best game. However, as is customary at these functions, not everyone was happy with the results. While it was all smiles and laughter above-board, downstairs in the gentleman's toilet the losers displayed a bitchiness more appropriate to Hollywood than home software.

Oh well, at least we can be grateful that the winners resisted thanking everyone from their great-grandmother to the inventor of the silicon chip for their success.

*Am I blue?:* little-known music maker IBM, or 'Big Blue' as it's sometimes referred to in its more famous role of computer manufacturer, launched an expensive publicity campaign on the unsuspecting French earlier this year. Musical microchips were used in advertisements published in a French paper — open the page and the chip began to sing the praises of the PC. Reports that sales of ear plugs rose on the same day have not so far been confirmed.

*Following yonder star:* not that it's likely, of course, but we've some good news just in case you should want to find out if you have any family connections with Ronald Reagan or his Irish ancestral home of Ballyporeen. The local priest has produced a database of the relevant records —dBase II is the package used and a Northstar Advantage the machine.

*Sometimes our generosity even amazes us:* we've upped the number of free 12 month subscriptions being given away in the "explain why the young lady's looking so confused" competition (June *APC*) to being the number of people who managed to get their entries to *APC's* Melbourne or Sydney office by the day after that issue of *APC* hit the streets. The winners are:

G YUEN, Glen Iris
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Y NAGUIB, Lower Templestowe
A REILLY, Geelong
P JETSON, Boronia
B MITCHELL, Heathmont
A DAVIES, Creswick
W HOCKING, Weelangera
S SOKER, Gwynneville
K deVIRES, Hawthorn
R SOBCZAK, Milton
M McFARLANE, Terrigal
T SZABO, Bonegilla
M HARLOW, Sandy Bay
M DOHERTY, Waverley
J FRIEDMAN, Maroubra
G O'BRIEN, Carine
A KING, Kingston
I McCROWE, Wilston

*Can-can('t):* Regular readers will recall earlier stories about IBM's 100 per cent club for successful salesmen. The latest rumour concerns one manager who thought his troops deserved a special reward — dancing girls. IBM disagreed and demoted him.

*Foot-loose:* would you believe that 'the demographics of runners and computer users are similar'? We wouldn't, but Adidas and Puma do — both companies are planning running shoes with built-in chips. Run round the block, connect the shoe to your micro on return, and you can find out how far you've run, how many calories you've lost along the way and how long you've been gone. They may be smart shoes but it sounds like a dumb move to us.

*Technically speaking:* always keen to keep abreast of modern technology, we're pleased to pass on news of a parallel-processing machine called the Butterfly. If it takes off it'll need to corner the market for 68000 chips — there's 128 of them inside each machine. And who will get to use all that processing power? You guessed — the military.

*Losing friends and influencing people:* IBM's announcement in the States of bundled PC software went down like the proverbial lead balloon. There were even rumbles that it might well be anti-competitive under American law. Ah well, at least that would make the lawyers happy — but no-one else.

*SOB:* 'You'll have to convince me that the voracious little son of a bitch won't eat my copy', says an American TV newsman cautious about micros. We know the feeling — feeding time in this office sometimes seems to come round about the same time our deadlines do.

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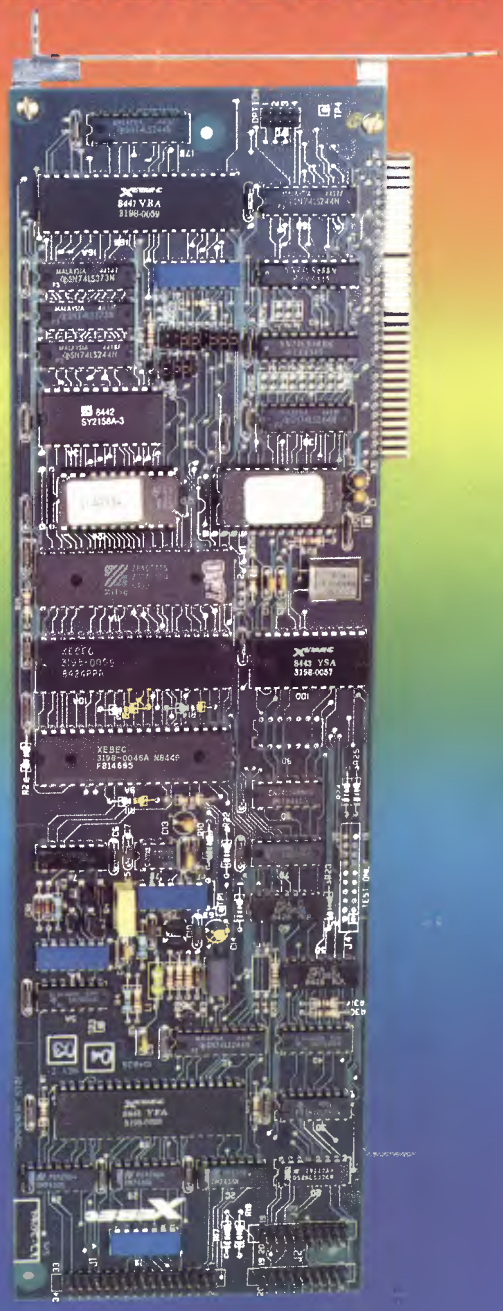

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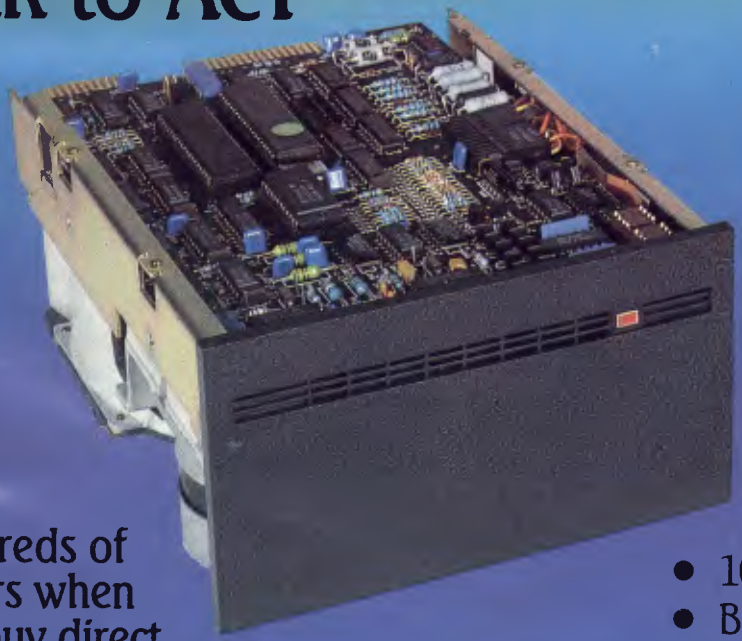

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