NEW ZEALAND'S PERSONAL COMPUTER MAGAZINE

BITS & BYTES

August 1985 $2.00

AMSTRAD SHOOTS FOR THE SMALL BUSINESS MARKET

Also reviewed

Bondwell 16
HP's Integral PC

Software Reviews

'Outstanding' NZ written range for Apple
Cashlink — accounting package which accounts for GST

Columns for top selling micros

NEW SANYO COLUMN — starts this issue

New Amstrad CPC 664

The low cost computer for home and business

$1895 with Colour Monitor

$1495 with Green Screen

FIRST COMPLETE LOW COST COMPUTER WITH BUILT IN DISC DRIVE.

If you know anything about computers you'll know that disc drives are up to fifty times faster than cassette when you're loading and saving program. In fact, a disc drive makes computing faster, more reliable, more efficient and more fun. But up till now the only way to gain these advantages for a home computer was to buy a separate disc drive attachment. Now Amstrad are pleased to announce the first complete home computer with built-in disc drive: The Amstrad CPC 664.

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You'll get everything you need, including a monitor (green screen or full colour). We'll even give you a free CPM and Logo disc, so all you do is plug in and you're in business.

BUSINESS OR PLEASURE

Although a disc drive will make games more fun (and there are loads of them to choose from) it also makes the CPC 664 a serious proposition for the business user.

There are accounting, word-processing spread-sheet and database programs (to name but a few).

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Wordprocessing with Amsword can improve the productivity of everyone from unskilled typist to trained secretary.

AN EXPANDING SYSTEM

There is a complete range of peripherals available to CPC 664 users which plug directly into the built-in interfaces.

These include a joystick, additional disc drive (to double your on-line storage) and the Amstrad DMP-1 dot-matrix printer. (There's also a cassette interface so that you can use CPC 464 program on tape). And there are many more peripherals from Amstrad and other manufacturers which can be used to enhance the CPC 664.

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As a member you'll enjoy regular magazines, competitions for valuable prizes and contact with other Amstrad users.

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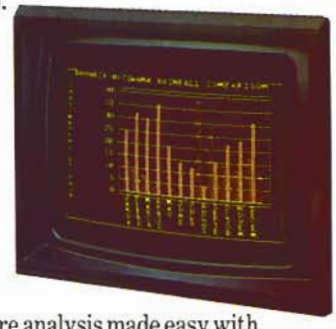

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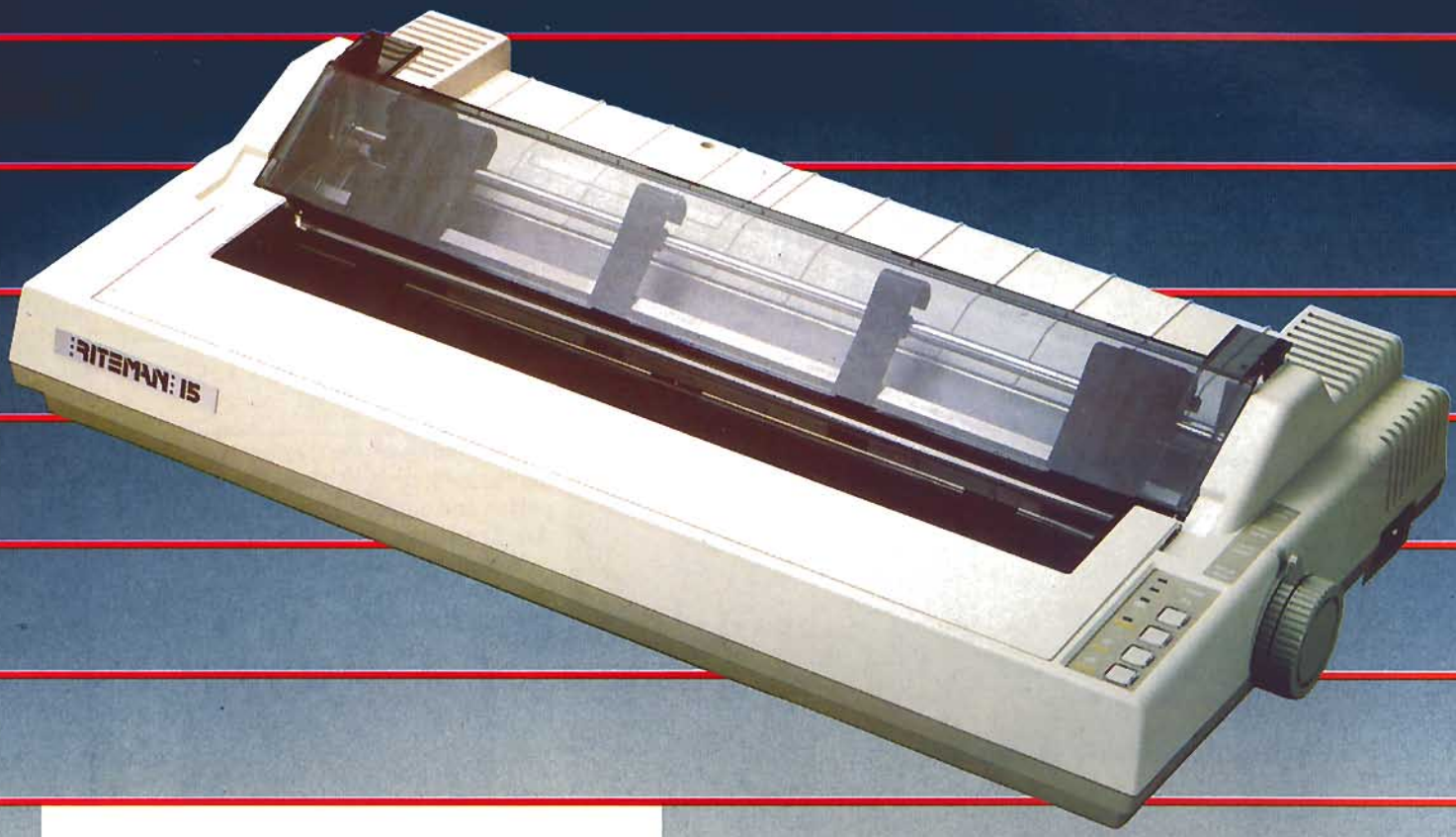

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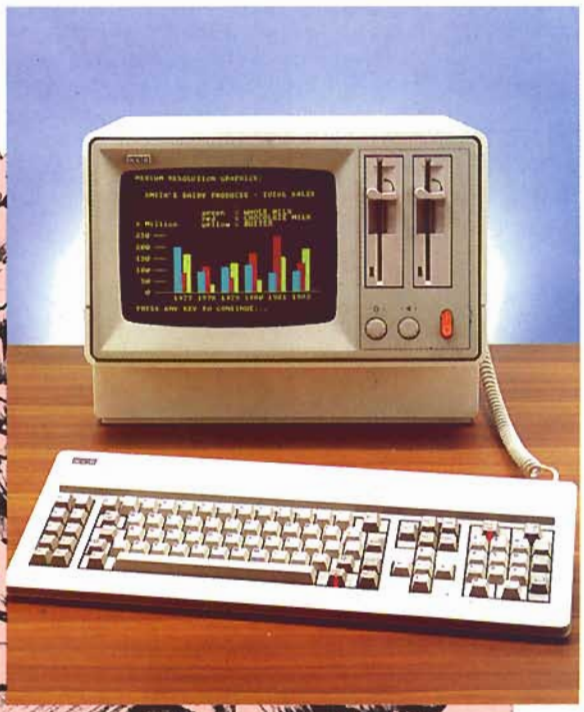

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BITS & BYTES

August, 1985 Vol. 3, No. 11

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Hard on the cursor of the Amstrad CPC464 comes the CPC664, the second wave in Amstrad's assault on the home computer market. Peter Ensor has been comparing the newcomer with its pathfinding brother. He tells about the family relationship. 21

Bondwell has maintained a low profile in the computer market until comparatively recently. Rodney Lincoln strips away some of the mystery as he tackles the keyboard of the new Bondwell Model 16. 18

Peter Brown reckons the Hewlett Packard Integral PC looks more like a sewing machine than a computer at first glance. But once beyond the wrapping, he maintains it's a deceptive package. Peter unveils. 16

A speech synthesiser card which will talk back to you if you're not careful what you're doing. That's the Speech Synth with which Alex & Fred Wong have been deep in conversation. They report. 24

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Integrated packages
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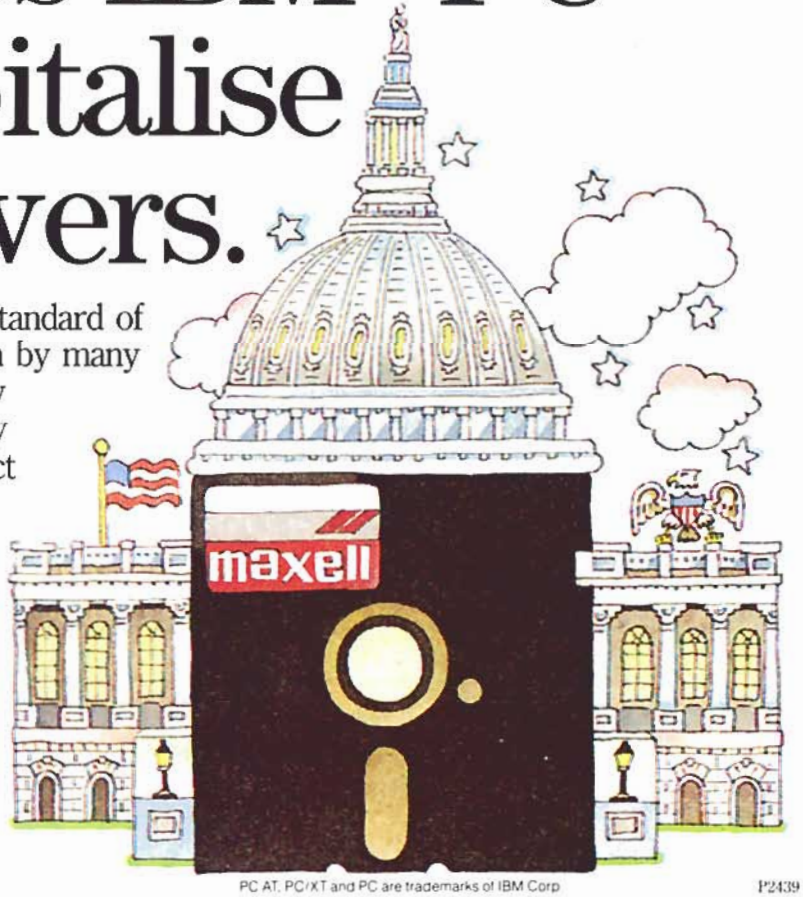

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Bits & Bytes changes

The growth of *Bits & Bytes* magazine, and our expansion into computer exhibitions and videotex, has necessitated a shift to larger offices in Auckland.

Our new Auckland street address is:
Third Floor, Denby House
156 Parnell Road

Our new Auckland telephone numbers are: 796-775, 796-776.

The box number, P.O. Box 9870, remains unchanged as does our Christchurch address.

However all production and printing of the magazine is now based in Auckland so only subscription, book club and program enquiries should be directed to our Christchurch office.

Bits & Bytes wishes to stress that we have no connection whatsoever with any other computer publication that has ceased or begun publication recently, and that we remain New Zealand owned and produced.

Next month is the third anniversary of *Bits & Bytes* and you will probably notice a few changes. We also hope to make it a bumper issue. Thanks also to all those people who have written in with their comments on improving the magazine. We always take note and welcome these.

Videotex at last!

As this issue of Bits & Bytes went to press negotiations were concluded for the establishment of a videotex service for computer users.

All those people that responded to the Videotex advertisements in Bits & Bytes earlier this year will receive details of the service by mail this month. The September issue of Bits & Bytes will also include further details.

New advertising manager

***Bits & Bytes* has appointed a new advertising manager based in Auckland.**

He is Paul Harris, who has previously worked for Olivetti in Britain and Australia, and Canon Data Products in New Zealand.

Paul has considerable experience in the publishing industry, having worked on publications in Canada and New Zealand.

MICRO MOMENTS — BY MATT KILLIP

Bits & Bytes — the reader-friendly magazine

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Airmail — Australia and South Pacific, $49 a year; North America and Asia, $76 a year; Europe, South America, the Middle East, $98 a year.
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Pizzaz with Jazz

By Alex Wong

Everyone has trumpeted it from the rooftops and shouted it in the streets. Jazz, the software package from Lotus Corporation that Apple is depending on to place the 512K Macintosh solidly in the business office environment, is finally playing in our town!

Through a concert-ed effort, Imagineering and CED Distributors launched Jazz at the Regent Hotel over breakfast with speeches, videos, hands-on demonstrations and a modern jazz dance-set from the Limbs Dance company.

Jazz is written by Lotus Development Corporation, "the minds who brought the simplicity of 1-2-3 and the power of Symphony to the world of business" (not to mention the IBM PC!) sells for $1450 and is distributed in New Zealand by Imagineering.

It is a completely integrated full function business application package that requires a 512K Macintosh computer and external disk drive to run. An ImageWriter printer is recommended and it supports a hard disk drive, both as a data and a program disk.

The Jazz word processor is similar to MacWrite — and at least as sophisticated, with many features including word-wrap, 150 columns, global search and replace, justification, several fonts, automatic headers, footers, page numbers, data and time. It is also capable of several different formats in one document.

The Jazz worksheet is Lotus' own, world-renowned spreadsheet, 8192 rows by 256 columns. It has 94 listed mathematical, text, financial, statistical, calendar and special functions including every command I ever knew — and I'd never heard of.

It has 11 cell format options, variable column widths, grid or clear screen, complete string manipulation and the ability to move or copy a whole range at once.

The database stores more than 8000 records (all in RAM), in up to 100 fields. It has three sort levels as well as a possible 100 search criteria, and includes seven statistical functions. It can generate two types of labels.

The business graphics application takes data from the spreadsheet or the database to draw six major graph types, with horizontal or vertical orientation and free-form text annotation. It can scale each axis independently and gives 24 fill patterns, as well as various line types and grid lines.

Jazz communications software can set all standard protocol commands as well as preform terminal emulation. It transmits data over phone lines using most modems and also transfers 1-2-3, Symphony and SYLK files for use with Jazz.

All these applications are integrated so that many files — and file types may be on the desktop at once, and by a special, exclusive function called HotView. With HotView, data can be copied from one to another yet a link retained so that when information is updated on one, it is also updated on the other document! Jazz should do extremely well, for Lotus, for Apple's Macintosh, and for business people.

With the introduction of the 512K Macintosh and the new System and Finder, version 4.1, and the current abundance of software, most of the Mac's old problems have disappeared.

The new Finder runs more quickly and efficiently, especially when moving files (which may be displayed as words which can be dragged around) as it no longer asks for apparently unnecessary disk swaps.

Other features have been improved or added, including one-step disk ejection and an elegant system restart. Not to mention the Switcher system software that lets different applications reside in memory to provide lightning speed program switching.

Loads of peripherals designed especially for the Mac are now emerging, and utility programs (like Copy II Mac) which let users inside the Mac and the mouse and icon combination have proved so successful almost every machine has some sort of emulation.

While there is still no colour, it has the highest resolution of any machine in widespread use today — and the software to drive it.

(A full review of Jazz will appear in the September issue).

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Rene out front

The Freepool courseware exchange for Poly courseware recently topped one megabyte (1 million) words in size. This is spread over about 150 titles.

To mark the occasion, Polycorp New Zealand Ltd's general manager, Dick Greenbank, made an award to the author contributing most programs. Rene Sjardin, of Tauranga Boys' College, was sent a box of 8in floppy disks.

The Freepool, operated for Polycorp by Wellington Teachers' College, covers programs in many categories from maths to games, English to geography.

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'Title' of software program .....

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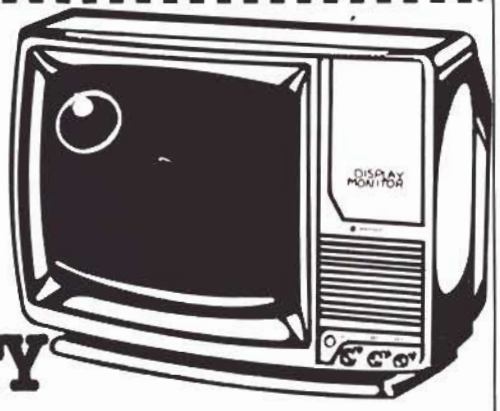

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No. 2 selling PC on the way?

Given the incredible number of computer brands available in New Zealand it is ironic to astute industry observers (such as editors of *Bits & Bytes)* that probably the world's second largest selling office personal computer has never reached our shores.

More than 200,000 of these computers have been sold worldwide; it ranks second behind the IBM PC in USA and third in Britain behind the IBM and Apricot.

Yet the company that manufactures these computers has been in business only two and a half years, and last year sold $US329 million worth of its computers.

We are talking about the Compaq computer, made by the Compaq Computer Corporation which had the sense to jump on the IBM PC compatible bandwagon very early in the piece. In late April, Compaq released a range of IBM PC/AT clones – again one of the first companies to do so.

But while other far less successful brands have proliferated here, Compaq computers have never been available on computer store shelves although a few have been imported by companies and individuals.

However, *Bits & Bytes* understands that siutation may be about to change with one of the country's largest computer organisations seriously considering importing and distributing the Compaq range.

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Home computer wars?

The New Zealand home computer marketplace has taken an interesting turn with the news that Jedi Corporation has purchased half the shares of Grandstand Leisure, the New Zealand distributor of Amstrad and Sega computers.

Now one of the subsidiaries of the Jedi Corporation is Fountain Marketing which distributes Commodore computers here, along with Commodore Computers (NZ) Ltd.

Commodore Computers (NZ) Ltd, which was recently listed on the stock exchange, has been saying for some time that from the end of this year, it will be the only distributor of Commodore computers in this country.

Fountain Marketing has been denying that. But perhaps this latest move indicates it is at least hedging its bets.

Managing-director

Chris Wilkinson was recently appointed managing-director of ICL Australia Pty Ltd. Wilkinson, 42, was formerly vice-president, marketing, for the Asia Pacific region.

Before that, he was ICL's general manager, southeast Asia, based in Singapore, and has also worked in Saudi Arabia. He has been with ICL more than 18 years.

Incidentally, he first visited Australia in 1962 as a member of the British Commonwealth Games swimming team.

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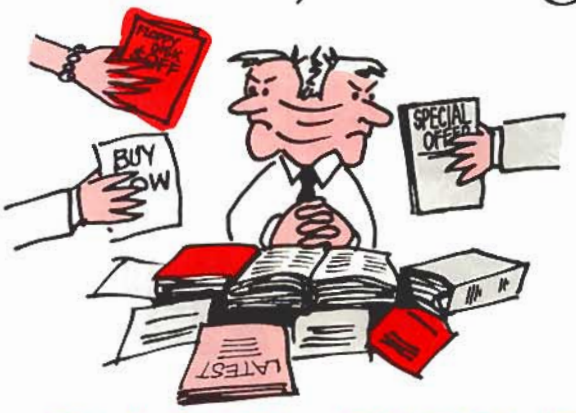

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New Lotus 1,2,3, and Symphony

New versions of Lotus 1, 2, 3 and Symphony software are due for release, the Lotus Corporation International business development manager, Stephen Kahn revealed while in New Zealand for the Jazz launch.

The new Symphony will be released this month, with Lotus 1, 2, 3 to follow in November.

The upgrades will allow the software to address up to an extra four megabytes of memory (Lotus research has shown 15% of users are running out of memory) and to support an 8087 processor that will allow the spreadsheets on both packages to run up to five times faster.

Users will require hardware modifications to take advantage of these new features. The four megabytes of extra memory will be available on a plug-in board soon to be released by Intel.

In addition, the revised version of Lotus 1,2,3 will be able to read Symphony files while the new Symphony version will have revised documentation and a tutorial that will allow the typical user to be up and running in 17 minutes, according to Mr Kahn.

Meanwhile, Lotus 1, 2, 3 has now been at the top of the Softcell best selling software list for two years, while Jazz entered the list at number three in May and Symphony was at number five.

Lotus v Osborne

Lotus Corporation is not worried by potential competition from Adam Osborne, according to its international business development manager, Stephen Kahn.

In fact, he seemed to find Osborne's promise to sell a fully compatible Lotus 1,2,3 package for $US99 (Lotus 1,2,3 sells in USA for about $450) as very ho-hum – but no doubt they have heard it all before.

Nonetheless, at least one New Zealand company is known to be negotiating with Osborne to release his software range here.

Sperry PC plant

Sperry Systems Corporation (P.O. Box 3960, Wellington) has announced that its Brisbane factory to produce Sperry PCs for the Australian and New Zealand markets is expected to be operational early next year.

Meanwhile, in USA, Sperry and Burroughs Corporation are having a war of words about their failed merger negotiations.

Each is blaming the other for the failure of the negotiations which, if successful, would have seen the creation of the world's second largest computer company with an annual $US10.5 billion revenue (which incidentally would still have left it well behind IBM which last year turned over $US45.9 billion).

Amiga magazine

Believe it or not, but the first issue of a new magazine called *AmigaWorld*, based on the yet-to-be-produced Commodore Amiga computer, is scheduled for publication in USA in August.

Mind you, the first issue of a magazine (since defunct) based on the IBM PC Junior appeared months before the computer.

But given that rumours about the Amiga, Commodore's answer to the Apple Macintosh, have been around for over a year, the decision to publish a magazine seems optimistic — unless someone knows something we don't.

Suffering in US

Many US computer companies, *from IBM down, have warned* shareholders that 1985 earnings will be less than 1984 profits.

Share prices have fallen as a result and some companies have had to take more drastic action. Among the latter is Apple Computer which recently laid off 1200 employees and closed two of its manufacturing plants. Sales of the Macintosh computer are still reported to be slow.

Chip manufacturers — National Semiconductor, Motorola, Mostek and Texas Instruments — have also laid off workers.

IBM blamed its lower earnings on "the fact that too much of (US) demand is being met by imports". It expects any growth this year will be in operation outside U.S.A.

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He went on to say "Did ya not know they both use yer same operatin' system (MS/DOS). So they both run exactly the same software" (Lotus 1-2-3, Wordstar, Symphony, d Base III – in fact all the popular software).

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More Apricots

Just when you thought computer model names had become as silly as possible, Barson Computers (P.O. Box 36-045, Auckland) has announced the Apricot Xi1OS, Xi20 and Xi20S, three enhanced versions of the Apricot Xi.

The Xi1OS includes 10 Megabyte 3.5in Winchester and 720K double-sided floppy disk drives, and new electronics offering 512K of on-board RAM as standard.

The more powerful models, the Xi20 and Xi20S, include 20 Megabyte 3.5in Winchester and 720K double-sided floppy disk drives, and the same electronics as the Xi1OS. The Xi20 includes 512K of on-board RAM whereas the most powerful model, the Xi2OS, includes 1 Megabyte.

Each computer has two spare expansion slots, allowing them to be connected to a local area network or house an on-board modem.

The new models offer the same features as the original Apricot Xi, including a 16-bit Intel 8086 processor and MS-DOS.

Prices for the new models (including tax) are: Xi1OS, $13,860; Xi20, $15,695; Xi2OS $17,585. All are available now.

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Sinclair out

Sinclair Research, headed by Sir Clive Sinclair, has reportedly been taken over by publisher Robert Maxwell "for a nominal sum" in further evidence that British home computer companies are having a lean time.

Hollis Ltd, a subsidiary of Maxwell's Pergamon Press group, has agreed to take a controlling share in Sinclair Research, manufacturer of the Spectrum and QL computers.

Sinclair Research would raise £12 million ($NZ26 million) by issuing new shares, most of which would be taken up by Hollis under the deal. Sir Clive Sinclair said recently he was trying to raise up to £15 million to fund growth and restructuring plans.

Several months ago, Sinclair asked his sub-contractors to stop supplying components while a backlog of computers in stock after a poor Christmas selling season was cleared.

That same poor Christmas was one of the reasons given for the Acorn group, manufacturer of the BBC and Electron computers, having to be rescued by the Italian company, Olivetti, earlier this year.

And what's going to happen to Sinclair himself? Apparently, he has been named life president of Sinclair Research and will act as research consultant, but will no longer be on the company's board of directors.

Electron networking

A new interface developed in Australia by Barson Computers (P.O. Box 36-045, Auckland) allows the Acorn Electron microcomputer to connect to the Acorn Econet network.

The interface enables the Electron to operate in a network in exactly the same way as a BBC microcomputer, although the Electron is slightly slower because it is run by a 1Mhz processor compared with the BBC's 2Mhz chip.

The "Plus 1e" interface plugs into one of the cartridge ROM sockets on the Plus 1 expansion unit for the Electron and costs about $400.

Built into the Plus 1 unit are a parallel printer port, two cartridge ROM sockets and an analog/joystick port.

Barson has also developed an Eprom cartridge which allows the Electron to run ROM-based software such as LOGO, Pascal, word processors and spreadsheets. The cartridge costs about $75.

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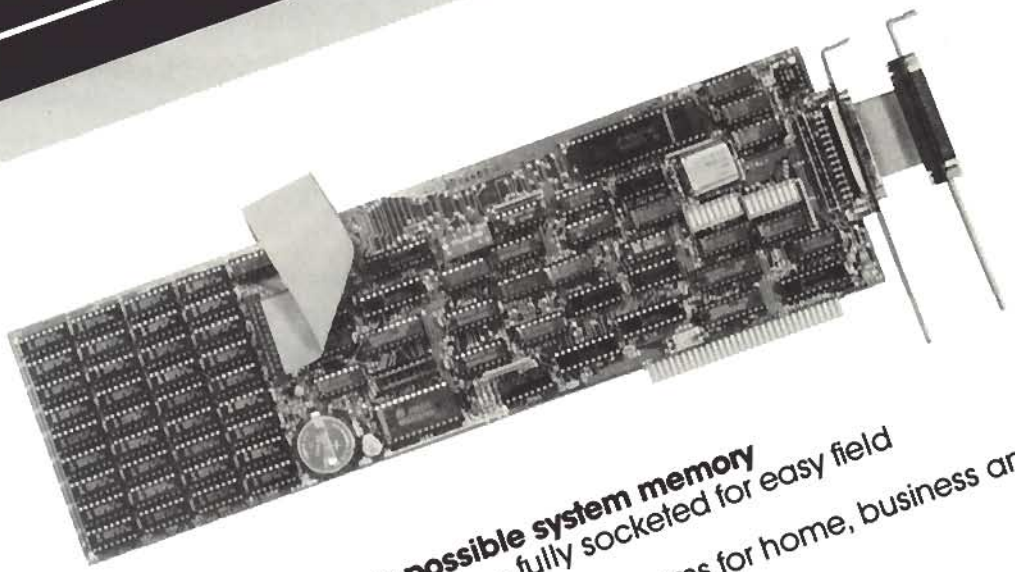

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HP INTEGRAL PC

A deceptive package

By Peter Brown

At first glance, Hewlett-Packard's Integral PC looks more like a sewing machine than an extremely powerful UNIX-based personal computer. Appearances, however, are very deceptive.

The basic unit comes in one 11.5kg package which can be easily carried from place to place — from office to home; factory or laboratory to office; or from town to town — as part of your personal luggage.

Once you've arrived at your destination, assembling the machine is easy. Unclip the top and fold it back, then just fold down the keyboard and plug it into the front of the machine. Thank goodness — I can never understand why some manufacturers insist on plugging everything in at the back). There is also an input for the optional mouse at the front.

Disk drive, screen, and printer are build in, so all that remains is to plug in the PC, place a disk in the drive, switch the machine on, and you're ready to go to work.

The built-in disk drive is a 3.5in double-sided, double-density, microfloppy drive that gives 710 Kbytes of storage.

Floppy bias

I'm biased towards these microfloppy drives because they are almost foolproof to use, and the diskettes are well protected against damage and careless handling. Because of their design, the microfloppy diskettes have the potential to be a very high-capacity mass-storage medium less vulnerable to mishap than others in use.

The screen is a 9in amber electroluminescent (EL) display built into the front of the machine. The angle can be altered for more comfortable viewing by touching a switch.

Depending on the font chosen (there is quite a range available) and the window size, the screen can display around 24 lines each of 80 characters. On the 9in screen,the 255 x 512 pixel display gives a fairly high resolution — very necessary considering the amount Hewlett-Packard has crammed into the display area.

The HP Integral PC

Despite its small size, the screen is reasonably easy to read, even from 3ft or 4ft providing natural lighting is used, and the angle of the display adjusted to avoid reflections. Under any other conditions, however, a certain level of concentration is needed to pick out letters and words especially when you've been working at the machine for a while. Even high-contrast, flicker-free amber screens are fatiguing if they are too small.

And 9in is a bit small for an 80-character by 24-line display.

The built-in dot-matrix printer uses an ink-jet printing method which makes it quite fast (150 characters per second) and relatively quiet. It's also versatile and has a good range of print modes and character sets.

Tutor disk

A tutor disk is included and provides a useful introduction to correct use of the machine, including using the printer, disk operations, using the "windows" HP provides to help manage the system, a helpful guide to the operating system and PAM (Hewlett-Packard's Personal Applications Manager — the user interface to the UNIX operating system), and so on.

Also included among the software provided (on microfloppy diskette) with the system are a utilities disk, diagnostics disk, HP-UX commands, and a system disk (which contains a variety of useful functions including the HP graphics language (HPGL).

Microcomputer summary

Name	Hewlett-Packard Integral Personal Computer
Manufacturer:	Hewlett-Packard
Processor:	Motorola 68000 16/32-bit microprocessor
Clock speed:	8MHz
RAM:	512KBytes expandable to 1.5MBytes (up to 5.5MBytes with bus expanders)
ROM:	256KBytes
Input/output	Keyboard (detachable, 90-key, typewriter style); built-in ink-jet dot-matrix printer; Hewlett-Packard interface bus (IEEE-488); two Hewlett-Packard Interfa human interface loops; 9in built-in amber EL display (24 lines x 80 characters)
Operating system:	A version of UNIX interfacing with the user through PAM
Storage:	Built-in double-density, double-sided, 3.5in microfloppy disk drive
Languages:	BASIC, C
Graphics:	16-bit graphics processor with 32KBytes of dedicated RAM
Cost:	$14,827 (recommended retail)
Options:	Numerous — printers, plotters interfaces, extra microfloppy drives and hard disks, memory expansion, communications
Reviewer's ratings (5 the highest):	Documentation 4; ease of use 4; languages 3; expansion 4; support 4; value for money 3

There is also a standard applications disk which holds a couple of editors, together with some games (including "Adventure").

Built into ROM is HP-UX/RO — Hewlett-Packard's version of UNIX which gives the Integral PC so much of its power. There is also PAM, which acts as a buffer between the user and HP-UX, saving the user a lot of the heartache often associated with UNIX. The HP window-manager is in ROM as well.

The HP Integral PC can be used as either a standalone microcomputer or as an intelligent terminal to a larger system. Designed primarily as a scientific or engineering machine, it is built around a Motorola 68000 16/32-bit microprocessor with a clock rate of 8MHz.

Multi-tasking

A multi-tasking facility allows you to have several jobs under way at once. For instance, you could be using the computer in instrumentation control and, at the same time, be compiling a report or analysing a spreadsheet. The windowing system HP has built into ROM makes this easy and simple to handle.

Hewlett-Packard offers BASIC and C as languages, with others on the way. The BASIC is an extended version of ANSI BASIC with additional maths, graphics, and instrumentation input/output facilities.

Once you have the basic system, you can add on an enormous array of peripherals, as well as significantly upgrading internal memory (RAM). A range of hard disks is offered, with or without tape backup. I would like to see tape backups made compulsory for hard disk users but HP is to be congratulated for offering it as an option — I hope other manufacturers follow.

Excellent manuals provide a clearly written and thorough guide to setting up and using the machine. Sometimes depth may be sacrificed for simplicity but more detailed information is available for the curious. My only complaint is that I couldn't find any explanation of what some of the games were about!

Although designed for technical use, the Hewlett-Packard Integral PC could easily fit into an office environment and several general business packages are available. At $14,827 for the basic unit however, it costs a little more than the average business machine. It will be up to business people to decide whether the extra power and facilities of Integral PC merit the additional cost.

I enjoyed working with this machine and was a little disappointed when Hewlett-Packard reclaimed it at the end of the review period. The screen is too small to use for hours on end, and I always wonder whether such high prices can be justified. However, it was easy to use, very powerful and can be packed up and put away in a space no bigger than that occupied by the average sewing machine.

Pass Bits & Bytes to a friend

BONDWELL MODEL 16

A business attraction

By Rodney Lincoln

A review of a computer like the Bondwell 16 has to be handled with some care, especially when the computer is such a recent release the manufacturer has not fully completed the documentation. Of all the manufacturers represented in New Zealand, the Bondwell Company has been one of the least well known until recently.

The Bondwell Company was formed in 1975 and at that time, manufactured electronic watches. Its growth has been dramatic since. In 1982, Bondwell formed a joint venture with the New York-based Spectravideo Inc. in response to the large demand for video games and computers, and later acquired Spectravideo.

In October 1984, Bondwell introduced its Model 12 and model 14 computers – both Z80A, CP/M-based portables with a 9in screen, and two disk drives – to New Zealand. Earlier this year, the model 2 – a lap computer with a single disk drive and LCD screen – was released.

More recently, Bondwell released the Model 16 (based on a similar concept to the Model 14) with 128K of onboard RAM and two disk drives. The major difference is that the second drive is a formatted 10 megabytes Winchester hard disk on the Bondwell 16.

The floppy disk on the Bondwell 16 is a standard 5.25in double-sided, double-density with 360K formatted capacity. The operating system is the later version of the popular CP/M 2.2. Called CP/M plus or CP/M 3.0, it is a friendlier version of CP/M which takes full advantage of the Model 16's 128K RAM. The CP/M operating system and its utility programs are distributed on the hard disk.

Four portions

Because of its tremendous capacity, the hard disk is subdivided into four portions – "logical disk drives" which are partitioned this way.

Logical Drive	Capacity
A	2048K
B	2048K
C	2048K
D	3584K

The Bondwell Model 16

The design of the hard disk requires software to make use of the product. Some of these programs are:

- COPYALL – which enables you to copy all the files from a logical disk to a floppy disk, or vice versa.
- HDINIT – which reformats the hard disk if a small portion gets damaged.
- BYE – which moves the read/write head of the hard disk to the inner tracks of the disk where no data is stored. Normally run before turning the power off.
- HDDIAG – which is a diagnostic program.

The Model 16 is a very competitive package, partly because of its impressive hardware and also because of the software which comes with it. This software includes:

- WordStar – a flexible and powerful word processor program.
- MailMerge – a WordStar option which helps produce customised form letters for multiple mailings.
- DataStar – a data handling program to help store and retrieve information quickly. Helps you design forms for your data.
- ReportStar – uses data files maintained in DataStar to produce clear professional reports.
- CalcStar – an electronic spreadsheet which can act as a variable sized scratchpad, and help in planning, analysis and forecasting.
- Setup – a utility program included in the CP/M package that helps program the function keys. Also used to configure the RS232 ports and reformat disk drives to access information on disks from other computers.
- Speech – the Bondwell 16 talks, through the program, with two modes of speech. In English, the speech is extremely mechanical but still intelligible; in Phoneme, you can customise the speech which is a great improvement.
- Accounts – a software package produced by SL Microsystems, of Rotorua, containing five programs handy for business: stock control, debtors' control, debtors' reports, invoice entry, and payments/journal entries.

Number of Files	Contents
704	System programs
704	Own use
704	Own use
1024	Own use

Note: Orchid Trading, the New Zealand agent for Bondwell, informed me that further software is being made available soon to handle GST.

There is also a vast range of software obtainable on floppy disk, including games, BASIC, Fortran, Forth, COBOL, Pascal and others.

Amber monitor

The Bondwell 16 has a built-in amber monitor which I found easy on the eye even after extended use. The monitor is 9in CRT with a non-glare face clearly legible from 3-4ft – no

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peering is required.

Brightness and contrast controls are built in and provide enough adjustment for all lighting conditions. However, the Model 16 is disappointing in the graphics department as the monitor is only medium resolution and only "chunky graphics" are supported. The screen has 80 characters or columns and 25 lines.

Bondwell packages the Model 16 adequately in a 55cm x 65cm x 35cm box. The computer itself is a far smaller package which looks like a small instrument case, 45cm x 39cm x 20cm. It weighs in around 14kg, with a nondescript, grey, plastic casing giving the impression of being able to take most of the knocks which come the way of portable or luggable computers.

On unlatching the rather flimsy plastic catches, the front cover, which is also the keyboard, detaches to reveal the business end. The keyboard is attached to the computer by a self-coiling, detachable cord which allows movement over a 30cm radius.

The keyboard is super. It has just the right feel to its full travel keys and is not cluttered. The keys are arranged in a standard QWERTY layout. The extra keys are: LINE FEED, DEL, ESC, HTAB and ALPHA LOCK. The ALPHA LOCK key (shift lock) indicates its condition with a miniature LED which is imbedded in the key – very useful for non-typists.

On the right side of the keyboard is the numeric keypad with four in-line cursor control keys positioned at the top. Above the keyboard are 16 sculptured, programmable function keys. Bondwell suggests their functions should be labelled in the indented plastic slot immediately above. However, a much nicer option would have been some type of on-screen software label.

In all, the Bondwell 16 has 63, standard typewriter keys plus 16 user-definable function keys. It also

Turn to page 70

Microcomputer summary

Name:	Bondwell Model 16
Manufacturer:	Bondwell Ltd.
Processor:	Z80A
Clock Speed:	4Mhz
RAM:	128kB (2kB video RAM)
ROM:	4kB
Input/output:	Parallel Centronics; RS232C; modem ports; external video port; speech synthesiser.
Keyboard:	16 function keys; 63 QWERTY keys; numeric keypad.
Display:	80 by 25, 9in amber monitor.
Graphics:	Chunky graphics only; medium res.
Language:	CP/M 3.0 system; BASIC, COBOL, Forth etc supported.
Cost:	$5995 (includes 10Mb hard disk, floppy disk and modem).
Reviewer's ratings (5 the highest):	Documentation 3, ease of use 5, language 4, value 5, support 5.

(Review unit supplied by Orchid Trading, Auckland).

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AMSTRAD CPC664

Second time round

By Peter Ensor

In a continuing effort to attain its goal of 25% of the British market, the Amstrad company has released a second computer based on the popular CPC464.

The CPC664 was released in New Zealand by Grandstand Computers Ltd at the end of June. This new model – an upgrade of the CPC464 – retails for $1500, or $2500, printer included.

The main difference between the two machines is noticeable as soon as it is taken out of the packing. The tape drive which occupied the righthand side of the keyboard unit has been replaced with a 3in disk drive.

In addition, the red-green-blue coloured keys have been replaced by blue keys, and the cursor keys are more prominent.

Apart from this, the machine is much the same as described in the April issue of *Bits & Bytes*.

The Amstrad CPC664

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The in-built BASIC has been upgraded with the addition of new commands such as the FILL and MASK graphics commands.

The unit is supplied with the CP/M operating system and LOGO, also from Digital Research. Even when CP/M is not being used – as when running straight from the in-built BASIC – the format on the disk is still compatible with CP/M.

For those familiar with CP/M, the beginning of the BDOS is at 8F00H which leaves about 36K available for programs.

Extra ports

At the rear of the machine are a connector for the second disk drive, a five-pin DIN plug for connection to a standard audio cassette, and the plug and cord for the 12V supply from the monitor – as well as the ports on the CPC464.

The second disk drive socket is able to transfer information from 5in disks as 3in drives have the same data plug connectors as their 5in counterparts. The signals are the same, except the CPC664 makes use of an additional READY* line not present on a standard interface.

The operating system supports three disk formats – a system format which contains the CP/M operating system which has 171K of storage available; a CP/M-compatible data only format; and the format used by the IBM PC range of computers and look-a-likes.

Three packages

Three other packages were supplied for review with the unit but are purchased separately.

Microcomputer summary

Name:	Amstrad CPC664
Manufacturer:	Made in Korea for Amstrad UK
Processor:	Z80
Clock Speed:	4HMz
RAM:	64K
ROM:	32K
Input/Output:	Stereo sound, joystick, Centronics printer, second floppy disk, RBG and B/W composite video, cassette drive.
Keyboard:	Typewriter style QWERTY, numeric and cursor.
Display:	Three modes: 80 by 25 characters; 40 by 25 characters; 20 by 25 characters.
Graphics:	Three modes as listed above: 640 by 200 pixels in two colours; 320 by 200 pixels in four colours; 160 by 200 pixels in 16 colours from a palette of 27 colours.
BASIC:	Locomotive BASIC
Sound:	Three voice of seven octave, plus white noise.
Cost:	With RBG monitor, $1895; with green screen $1495.
Options:	Second disk drive $550; printer $695; joystick $29.95; Advanced Amsword $89.95; Microspread $189.95; MicroPen $189.95.
Reviewer's ratings (5 the highest):	Documentation 4; Ease of use 4; language 5; expansion 5; value for money 4; support 4.

(Review unit from Grandstand Computers Ltd, Auckland.)

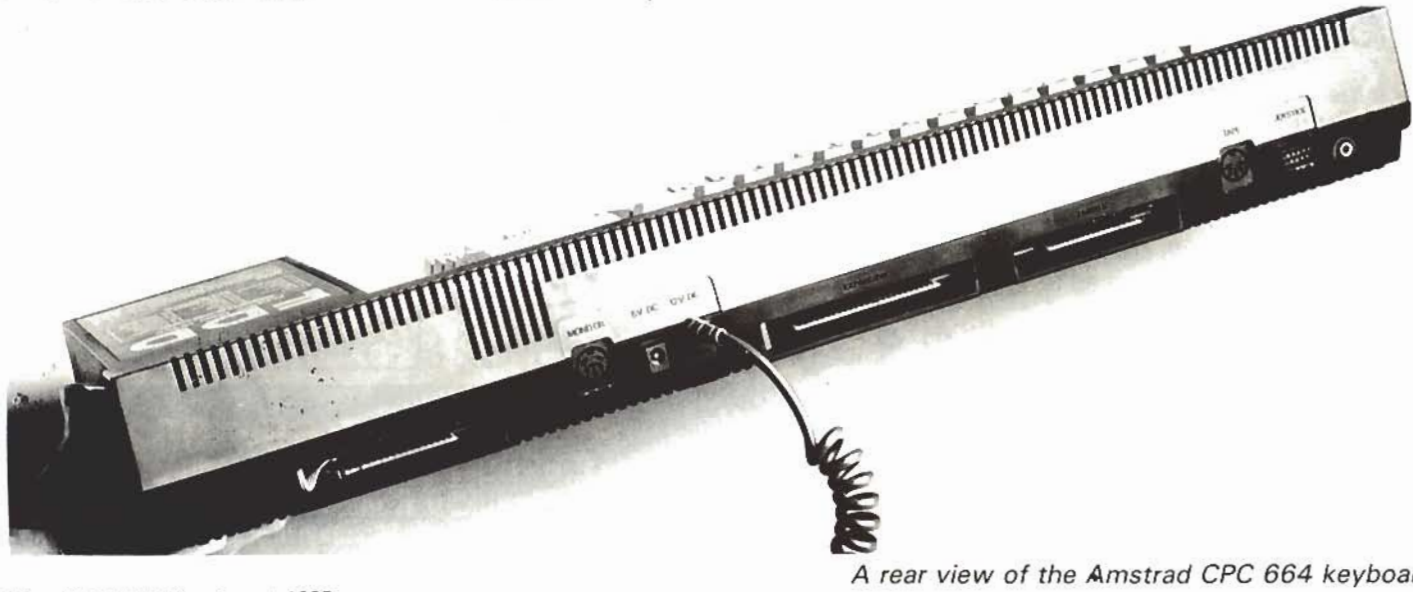
Advanced Amsword is a word processing package which has a strong resemblance to the CP/M WordStar program. It does not run under CP/M and it was clumsy to have to change between AMSDOS and CP/M to use it and the other CP/M programs.

Microspread is a spreadsheet that runs under CP/M. Unfortunately, it did not come up to expectation. There were no examples to get the first-time starter under way – only a description of each of the commands. Two demonstration files were included on the disk – but again no working examples. However, the program provided a good selection of features. The method of entering formulas by cursor position is the main difference facing experienced users of a spreadsheet.

The third package was a database manager. Micropen runs under CP/M to provide a method of manipulating the data for stock inventory or telephone lists. It supplied all the features necessary for keeping a small database.

As the amount of memory available to run the program is limited to 36K, any decision to use CP/M programs not sold by an Amstrad agent should be checked to see if sufficient memory is available, as well as other possible restrictions.

The basic machine is value for money. The hardware is sound and, if you are contemplating buying an Amstrad, the built-in disk drive is superior to the tape drive for speed and ease-of-use, for a reasonable increase in price.



A rear view of the Amstrad CPC 664 keyboard

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— Shane Doyle
BITS & BYTES
July'85

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Talking back to you . . .

By Alex & Fred Wong

If you aren't careful, that's exactly what the Speech Synth from BC Micro will do. This latest product in the BC Micro range is a speech synthesiser card and driving software that plugs into the Apple II Plus or IIe to provide it with an artificial voice.

The Speech Synth card is neat and simple with only three chips (and a few assorted bits and pieces), one 2in speaker and a socket to connect the card to an external output such as a stereo amplifier for a bigger, bolder sound.

It may be installed in any slot, simply by plugging it in although the driving software defaults to slot 4.

There are two ways of using the Speech Synth's capabilities — by using the software supplied with the DOS 3.3 system disk or your own programs in either BASIC or assembly language.

When the System Master is booted, the animated, two-page title presentation appears and the two machine language binary files that drive the Speech Synth are loaded. Press any key and the main menu comes up.

Eight choices

The eight choices are: change slot — so that the software will know where the card is; change pitch — to give the voice a higher or lower tone; change speed — to speed up or slow down the speech; hear set-up — to hear the results of these actions; save set-up — which saves the results of these actions to disk as the default values everytime the disk is booted; talker — which makes the Speech Synth speak what is typed, with a choice of either English words or phonetic input; demo — to hear a "control" sentence, programmed in phonetics, which is always spoken at the same pitch and speed; and exit to BASIC — which is where the Speech Synth gets exciting.

For anybody familiar with BASIC, programming the Speech Synth is a breeze and it takes very little time to come up with some worthwhile (or at least fun) applications.

While I was still wondering what to make it say, Fred was programming it to read AppleWorks word processor files which had been converted to DOS text files.

Fred's simple 10-line BASIC program firstly loads the two Speech Synth driver files. Then it loads in part of the text file and reads it into a string. After that, a machine language routine is called at 38131 and the Speech Synth speaks as the words scroll by on the screen! It then loops back to read more. . . and more . . . and more . . . It's like having this little alien inside your computer that won't stop talking.

Bearable English

The Speech Synth card speaks bearable English. Its vocabulary is unlimited because, rather than having preset words, it follows certain rules of pronunciation. From the keyboard, it recognises the entire alphabet, all the numbers and the full-stop, comma, dash (or hyphen, depending on how it is used) and question marks. Nineteen will be said as "one-nine" so 19 must be typed to achieve a vocal "nineteen".

Although the voice is definitely metallic, the speech is clear and easy to understand — with a few exceptions. When programmed in English, "ask" had to be spelt "aask" to be understandable, for instance. And devil sounds like 'DeVille" and "kate" and "hate" sound indistinguishable when spoken individually.

However, clever spelling (if you are creative) can correct all but the most stubborn of the mis-pronunciations. For the fanatic phonetic who wants 95% accuracy when programming seriously, there is the international phonetic alphabet. This gives control over the stress and inflection of a word in eight degrees, and is placed as numbers after a syllable in a phonetically spelt word. "Good Morning" in English becomes "GUH4D MOHRNIHNX" in phonetics and for an even friendlier greeting can be typed as "GUH4D MOH3RNIHNX".

Little casual

The instructions may seem a little casual to the uninitiated, but all the necessary, pertinent information is there. The very brief programming example may lead to some consternation at first but can be mastered without too much pain.

Operation of this voice synthesiser could perhaps be improved to sound more human and understandable but only at a much greater cost to the consumer. Considering it costs less than $80, it provides an excellent learning tool for anyone wanting to know more about speech, and adds another dimension to your BASIC programs.

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Making maps on micros

By Pip Forer

One of the more serious uses of computer graphics is to allow the display of information. Integrated programs with business graphics, generally simple charts such as pie graphs and histograms, have gained a great deal of limelight in the last year and are very good for summarising business trends, market shares and the like.

A lot of information of wider interest however is spatial data – data collected for a particular place, say a suburb or a region of a country. Yet programs that draw maps illustrating spatial patterns are much less common, even though the census produces major amounts of such data. This is in spite of the fact even quite humble microcomputers can produce useful maps while models with good graphics can prove extremely good at the job.

This article looks at some of the problems microcomputer mapping poses. For this purpose, we will restrict ourselves to one particular sort of map, the shaded map as shown in figure 1. To give some context to the discussion, we will consider two particular teaching projects we have been involved with in the geography department at Canterbury University – mapping census data for New Zealand counties (figure 2) and results for New Zealand electorates (figure 3).

These two examples reflect a common sort of mapping problem where you have a set of areas for which you want to display data. In the census case (a suite of programs called MAPSTAT), there are many possible variables you may want to display.

In the election example (called Hustings 84), you are probably interested in just one variable – which party wins in each seat. Producing a shaded map in either of these cases has four components:

- Making the data you need available to the user. In the census case, that may mean loading information from a data bank on disk and asking the user what classes they wish to divide the data into. In Hustings, we have a program that shifts voters around, and then calculates what party wins each electorate. We will not discuss the issues raised by this operation here.
- Drawing the outline map. There are two options for this which we can discuss.
- Shading in the colours. Usually, this needs some extra software above and beyond the microcomputer's standard facilities.
- Getting a final copy. The main problem here is whether to use a plotter or printer, and finding a standard way of driving whichever you choose.

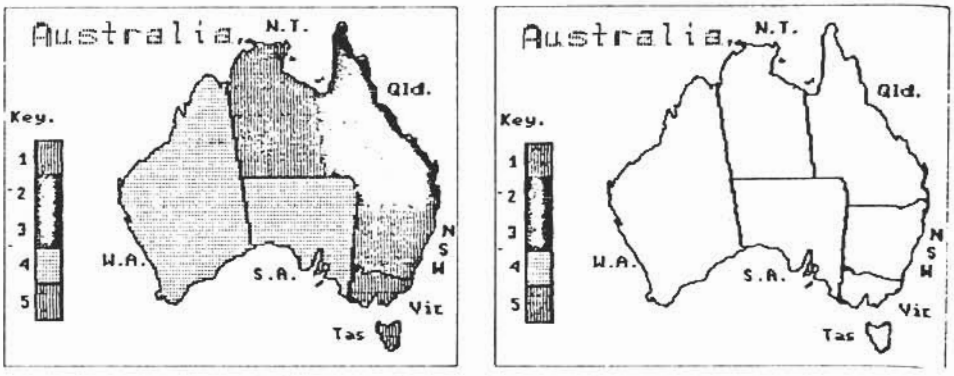

Figure 1: Australia: Before and After. A simple outline and a consequently shaded map for data display on an unexpanded Apple IIe.

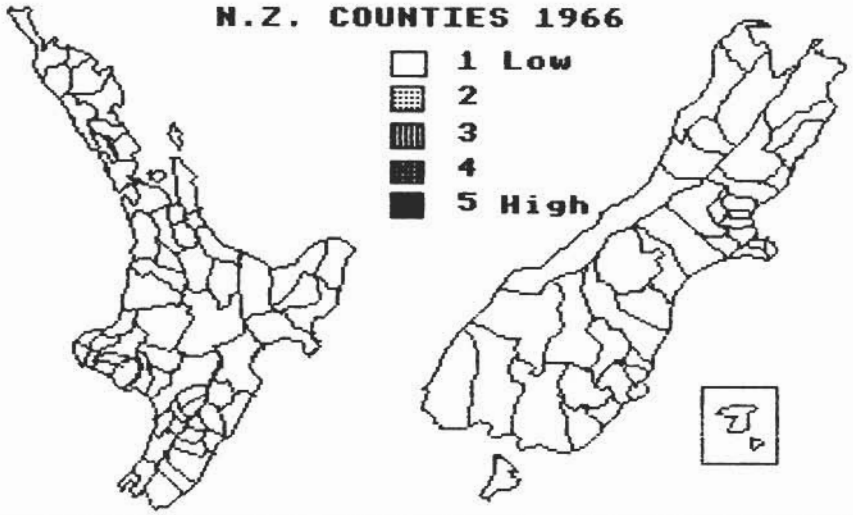

Figure 2: A more demanding case for colour shading . . . 106 areas mapped on BBC Mode 1 shown before shading.

For any given set of data, you will have a set of areas representing where the data was collected from. In the counties case, we use 106 local authorities; for Hustings, there are 95 constituencies. You need to draw these on a map.

First, you will need a microcomputer that can cope with the level of detail needed for your data, and that is partly defined by the smallest area you need to draw (look closely at figure 2). With four colours available and 100 areas to map, you would need at least 300 by 250 screen resolution. If you are going to use monochrome graphics with patterned fills to replace colours, you may need twice that.

You will also be helped if you have a pure bit-mapped screen, not a hybridised mapping. The BBC, QL and graphics NEC-APC meet the bill, as does the IBM-PC if you add on a graphics card. Apple IIs, Polys and Commodore 64s might have a bit more trouble but the off-the-peg Macintosh can cope (and has useful on board routines) if monochrome is acceptable.

Next, you need to decide how flexibly you want the user to look at the data. There are two ways of presenting an outline to the user.

You can recall an existing screen image from disk. With this option you completely control what the user sees. You can use standard sketchpad software and a graphics tablet (figure 4) to lay out and view the eventual map and ensure optimal design and clarity (a graphics tablet is essential for map outline creation – try creating Fiordland's outline by hand if you doubt me). In the display program, the map is placed on the screen by a single command and usually loads from disk in a second or less.

The other option is to draw the outline and areas for the user from a set of points saved on disk. With this option, you actually see the map being drawn up. A crude program will just play dotto by linking the outline points up; a more sophisticated one will smooth the points using techniques such as splines or fractals. This option has two drawbacks and one great advantage.

The inevitable drawback is that it is slower – often very much slower, sometimes even go-and-make-a-cup-of-coffee slower. The second problem relates to its great advantage which is that the user can be allowed to draw the map back at any scale and even look at just a section of the map. The user can zoom in on one area, or the database can cover a much wider area than could usefully appear on screen at any one time.

However, this flexibility presents a problem – handling the positioning of things like labels and the key. You do these latter things intuitively when you draw up the outline using method one, but here the machine must supply the intelligence so that if the user expands the map up a size, the map title does not appear in a position where it would now obscure some key detail, or equally be written off the screen.

All this can be done, and scientists at the Ministry of Works science centre in Christchurch are doing it on PCs using land inventory data. But it takes time.

For interactive applications such as our examples, we might choose to stick with the pre-drawn map notion. Figure 2 is just that – a map of counties drawn with a graphics pad. In our programs, this map is simply loaded from disk and is the only display option the user gets. However, it is quick and guaranteed effective. On some machines, we may still want to draw outlines from points, but not allow the user flexibility. This relates to the way in which colour fills are generated, which leads us on to . . .

Colouring the areas

There are two popular ways of colouring areas in on microcomputers. The less common relies on being given a series of points (at least three but as many as several hundred) which when linked up, define an area on a map. Filling an area with this method involves passing the co-ordinates of all the points around the area's outline to a routine, along with colour or pattern code. The routine draws the outline in and fills the area inside the points. This method requires that you have the area's co-ordinates and draw them, hence the comment at the end of the last paragraph. Poly, the MS-DOS Grafix kernel, Filevision on the Macintosh and the BBC (with triangles only) offer this facility.

Far more common are flood fills which require just a bounded area (say a local authority outline). The programmer passes the machine the location of a seed point within the area. The flood fill starts at the point and fills the area with a specified colour or pattern by sensing where the borders of the area are.

The only danger with flood fills is if you have a hole in your perimeter, the fill escapes and your map looks awful. Few BASICs and even fewer other languages have flood fills as standard but all machines now have software available

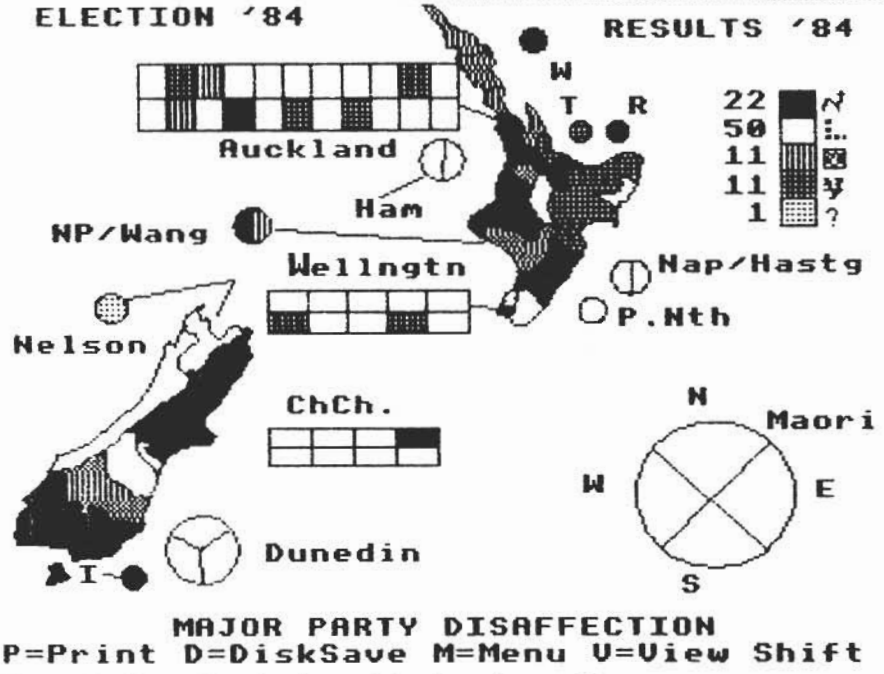

Figure 3: How the election might have been. The shaded results from a hypothetical result of the 1984 election where strong swings against the major parties have been simulated.

to produce flood fills. A good fill can fill a complex area in a very short time.

An important aspect of such fills is that they can be used to increase the range of colours available. Many eight-bit micros offer only four colours at acceptable screen resolution. With one needed for background and one for the outline, this leaves two shading colours. The usual trick is to alternate these in certain ways to give a new hue. On a bad monitor, the dots may merge so that red and yellow may actually appear orange . . . the only saving grace I know of with bad monitors. On a good monitor, the result is a hatching effect. Colour undoubtedly produces the best results, but a good monochrome pattern fill can also be very effective.

There are a couple of technical problems. Patterns and "new" colours (often termed quilted fills) need more space to be recognisable. On a machine with eight colours for eight shading classes, an area with just one dot can be recognisably shaded. With patterns or quilted colour fills, an area several dots square may be needed to clearly establish its classification.

Figure 4: A typical graphics tablet or digitiser. The pen can be used to trace an outline and send the co-ordinates of points back to the computer.

The other problem is that on machines without pure bit mapping (among them the Apple II and Poly), a change of one dot can interfere with neighbouring dots (so that you can colour one area neatly but colouring its neighbour may then affect the results). You get round this problem by being careful where you place borders (the state boundaries in figure 1 were very carefully placed). But with many, small areas, this can be awkward if not impossible to do perfectly.

In our case, we chose flood fills and to fit in with other users, we adopted a quilted colour fill for the result. This would be the standard programming response to this kind of problem.

Making the map

The user can experiment with some data and then produce a map. The maps take about 15 seconds to draw up and sit there in glowing colour. What then? To be useful in talking to others, the maps need to be copied out permanently. What options are there here?

The prettiest and fastest is undoubtedly to direct capture the screen image using high-quality photographic techniques (instant slides are best). However, this is expensive per copy and still does not give a large, printed result. If you want colour and size, you are probably talking about plotting or printing.

Plotting direct from the screen doesn't work and plotters really relate far more to the "draw-it-each-time" mode of production (even there filling is not simple). Colour printers, able to handle seven colours, are now getting quite cheap. We dump our best maps down on to a normal dot-matrix colour printer

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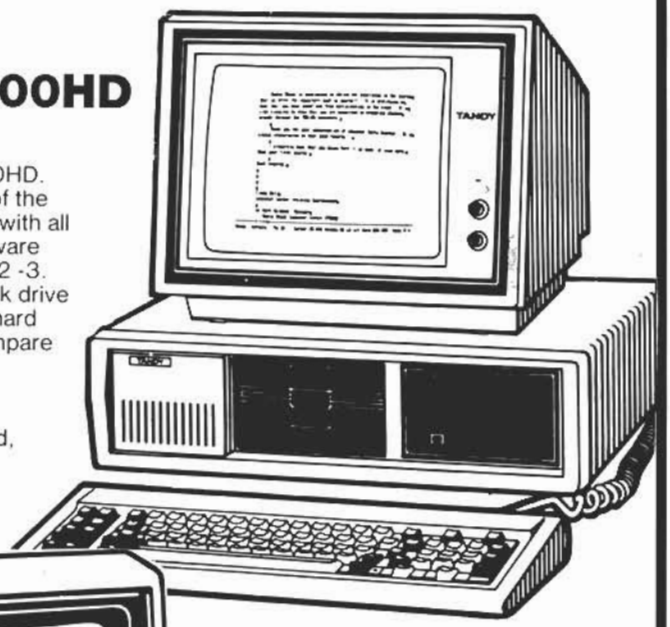

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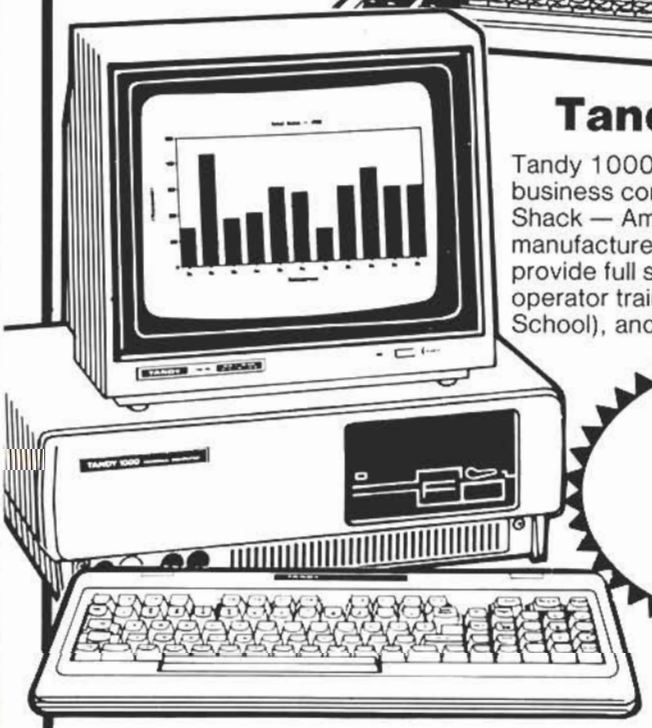

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using a three-colour ribbon when working in colour. Each map takes a few minutes to dump from the screen but the results are quite acceptable.

What you come back to is that for most of us, the best output (because it is the only option) is still a black and white printer. This poses a new problem – how to capture colour on to monochrome paper. Some professional printer dumps use a square of several dots on the printer for each dot on screen and use a graded scale of dot density within that square to represent each colour.

Figure 3 used a different approach. Here, background and one shading colour became white on the printer, the outline and the other shading colour became black. While this loses the outline in some areas where solid colour fills border (down in Southland for instance), the good news is that the colour quilts textures come across differently so that the five shading classes are distinguishable. Black and white printer dumps are easier to get and faster (by an order of four) than colour ones.

The great thing about dot-matrix printers is that they can just grab the screen image (which is coded in dots) and print it out themselves (since they work on dot printing). All that's needed is a printer driver. Alas, while almost all printers will now print graphics, many work differently and a common printer driver does not exist.

By a devious path, we have arrived with a finally printed map. The components needed to assemble it were not that great but the results, in terms of data display, are of general use. Even small micros, as long as their graphics are good, can do a worthwhile job in terms of displaying and analysing spatial data so that more meaningful patterns emerge.

Further information on Hustings 84 or MAPSTAT can be obtained from the author, Department of Geography, University of Canterbury, Private Bag, Christchurch. Figure 1 comes from the author's book, "Applied Apple Graphics", and appears courtesy of Prentice Hall International.

On the move

Selwyn Arrow, the original Auckland editor of *Bits & Bytes* magazine and until recently, chairman of the New Zealand Microcomputer Club, has joined Businessworld World computers as customer support manager in Auckland.

Selwyn remains editor of the Microcomputer Club magazine, *NZ Micro,* which from this month, will be distributed to club members as an insert in *Bits & Bytes*. Any other club interested in distributing its magazine in a similar way should contact Paul Crooks or Gaie Ellis, in Auckland.

CASHLINK

Small business accounting in a single package

By John Slane

In contrast to earlier trends, newer accounting systems for small businesses are moving increasingly towards integrated units so that one software package can give you most of what you are likely to want.

Not only is this convenient, but the integrated package will in many instances cost you less than buying all the modules you want as separate items.

CashLink comes on a single disk. If you are using 720K drives, you will probably be able to fit the program and your data all on one drive. For 360K drives, a separate data or "journal" disk will be required. This can be formatted from a CashLink utility subroutine.

A comprehensive ring-binder manual is provided in which the introductory guide sets out the basics of accounting methods for the uninitiated. This almost amounts to a crash course in accountancy and will be immediately intelligible to anyone with at least a passing knowledge of accountancy terms.

Nothing unusual

There is nothing unusual about the system, which follows normal double-entry book-keeping practice. However, the capacity of the computer to rapidly access and organise data is exploited in the provision made within the program to monitor trends, developments and history of the business. For example, sales results can be monitored by the day, or week, or month. A trial balance can be produced quickly at any time.

Being specifically designed for the small business which does not have full-time accountancy personnel, CashLink is biased to provide on-the-spot management information rather than sophisticated accounting options. To this end, it stores all details of every invoice – a capacity which CashLink claims is unique among small business system packages.

Provision is also made for the choice of either "open item method" or "balance brought forward" system of account handling, or a mixture of both at the same time. There are 128 analysis codes

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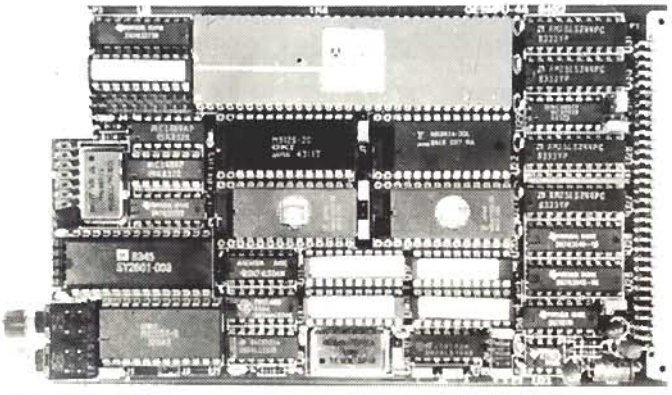

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built in, with provision for a further 256 in the ledger formatting area.

With the likelihood of a goods and services tax less than 18 months away, this British-based program has neatly changed "VAT" into "GST" so that the package is ready for anything Mr Lange can throw at us. Seven codes for GST values are available (including two "exempt"), and all the non-exempt values can be customised. As the proposed GST will, we hope, have only one or, at the most, two codes, CashLink will have the capacity to include GST.

In fact, CashLink is so far ahead, the invoices printed on the demonstration program were actually irrelevant to the current situation. Somehow, "GST" needs to be changed to "sales tax" to be applicable at present. Purchasers will need to check with their dealers that this can be done.

Fail-safe

To keep the tax inspector happy, there is a fail-safe provision for printing audit trails. Critical updating and clearing of old transactions is not allowed until the appropriate audit trails have been printed. Normally, an audit trail is taken weekly or monthly, and then filed for future reference. Each time an audit trail is successfully printed, the transaction file is marked so that the next audit trail is taken from that point on. The audit trail for the sales ledger includes transaction totals and GST or sales tax for the whole of the current period.

In summary, CashLink makes accounting provision for: general ledger, debtors' ledger, creditors' ledger, invoices, statements, trial balance, aged balance, analysis, credit notes, journals, journal adjustments, turnover, audit trail, sales analysis.

In addition, there are various utilities accessed from menus or direct commands to facilitate housekeeping tasks such as back-ups, disk formatting, printer drivers, invoice formatting, and so on. A scratchpad, which holds a maximum of 1500 characters, can be called up from anywhere in the program.

A full WordStar word processor is also included, and can access the scratchpad and data files (for form letters). This is quite a sophisticated feature. A sub-program will print labels from selected data files.

CashLink is clearly a very comprehensive piece of software in the range of tasks it is equipped to carry out. Let's look at what it is like to the operator.

Because the "live" program supplied would not recognise a disk it had just formatted and labelled "journal", as a journal disk, I was not able to examine the setting-up procedures. Obviously, this is a one-off bug and should not concern a first-time buyer since the dealer could reasonably be expected to set up the program to the user's specifications. (There may or may not be an additional charge for this, so it could pay to shop around.)

Summing up

CashLink provides a valid and genuinely useful accounting and management tool. For a small business, it seems admirably well set up to cope with an appropriate range of requirements.

Since it takes a little time to set itself up from power-on, it will probably be best used in block times rather than intermittently if the computer is to be used for other tasks also.

From the operator's point of view, CashLink will be seen to be strictly linear and static. It falls well short of the current "state of the art" for dynamic screen management. However, for a new user to computer accounting, the program should prove quite satisfactory provided a slap-happy approach to data entry is not adopted.

CashLink comes with normal copyright protection and can be operated and backed up only by the registered user.

As a complete accounting system, CashLink has to be seriously considered in the value-for-money stakes.

(Review software provided by MEC, P.O. Box 9224, Auckland).

I had more success with the demonstration program supplied. The program is menu-driven without any bells and whistles – enter the number that stands for the menu choice.

Inconsistent

However, my first criticism is that CashLink is inconsistent in the ways it deals with input. If there are fewer than 10 menu choices, an "INKEY$" routine is used so that the first numeric input is immediately acted upon. A check allows the user to confirm the selection. But if the menu selection is greater than nine (requires one or two digits to be entered), the program does nothing until "RETURN" is pressed. The first rule of good programming is consistency and CashLink does not observe this.

If you remember what to do to make selections from the menus, the program moves you efficiently to where you want to go. As CashLink is used, it is obvious many files are being accessed and data is being tucked away in a variety of pigeon holes for analysis by category as required. Again, this is done efficiently. The complexity of the file handling and program parameters can be assumed from the time it takes to establish the program from power-on – from 30 to 90 seconds depending on the computer (IBM type) used.

One of the first requirements on start-up is to enter the date. It was nice to see that CashLink knows how dates should be written – day, month, year. It also remembers the last date entered and an update simply requires the new day and/or month without putting in all eight characters.

On the other hand, some screens are very static and linear. No dynamic cursor control is available in spite of the fact that on an IBM-type keyboard, this program opens with the cursor keys active – don't try entering the date using the numeric keypad until you've hit the "NUM LOCK" button. On invoices, the only way to do corrections is to step through the current item until you are at the point to change – a series of presses on the "RETURN" key.

Only recourse

If you discover an error in an entry further up the invoice, your only recourse is to abandon ("ESCAPE") the whole invoice and start again. This is an inefficient style of programming on a $1600 package.

Some features for invoicing are very good. To find a customer, any unique string can be used as CashLink uses an "INSTRING" routine to search all customer data to find a match – you don't necessarily have to use the starting characters. If you know the appropriate product code and enter that, the program provides the product description, unit price and tax if applicable. Discount is automatically calculated if previously specified for particular customers. More information is provided on the VDU presentation of an invoice than is printed on the invoice sent to the customer.

A standard pre-printed invoice is available locally to suit the CashLink format – provided you don't mind A4 sheets. No utility is provided to format invoices to any different (lesser) size.

If a buffer is not provided on your printer (as was the case on the supplied machine, a Panasonic Senior Partner portable with thermal printer), then invoice production is frustratingly slow since the printing starts after the first accepted line of entry. Without a buffer, nothing else can be entered from the keyboard until heading data and the first item line have been printed.

The only other problem noted on the invoice routine was that an invoice cannot be given a date other than the one in computer memory. Provision is made for resetting the invoice date but this is actioned only on the remittance slip. I suspect this may be a bug.

All the other facilities, although given a less thorough testing, appeared to work as designed. A remarkable amount of analysis information can be fed back to the user. Effective use is made of wide and bold printing to enhance legibility of reports and balances. These printer commands can easily be customised for any printer.

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Real value for money

By Gordon Findlay

Otakou Software, a small company operating from Dunedin, has produced a package of software for Apple computers which will be of interest to all Apple users. Although advertised as the Otakou Software educational package, with many features specifically designed for use in primary and secondary schools, there is no doubt that most, if not all, Apple users will find something of use and interest in the group of programs.

The package consists of four programs, available together or separately:

- The Sorcerer's Apprentice – a versatile, sophisticated, but easy-to-use picture editor,
- Second Opinion – a spelling checker which works in conjunction with most, if not all word processors.
- Twist-a-plot – a 'story teller', or adventure generator if you like,
- Easy LOGO – a group of extensions and enhancements to Apple LOGO.

These packages are among the best Apple software available. That sounds like a sweeping statement, and while they aren't in the same class as, say Appleworks, they are, in their respective classes, the best I've seen. And because of the nature of my job (I'm a teacher), and my spare time activities (writing for *Bits & Bytes),* I have seen a lot of software. The Otakou software scores heavily for ease of use, usefulness and friendliness.

Second Opinion

Second Opinion, written by John Shanks, is a spelling checker designed to be as convenient as possible for use with only one disk drive. It has an expandable dictionary, starting with about 44,000 words, and can check the spelling of files created by most word processors, whether text or binary files, but not under ProDos.

Booting the computer with the checker disk presents a title page, then the main menu. At the main menu level you can load text from disk to be proofread, save text back again after checking, catalogue the disk, proofread text already loaded, find the amount of free space in the dictionary, or access the dictionary for insertion, deletion or look-up of words.

The dictionary is on the reverse of the program disk, but may be copied to another.

All text must be loaded into memory before proofing can begin. This naturally limits the amount of text which can be checked at once, but isn't a serious limitation. The length of text file which can be loaded isn't given, but seems to be bigger than an Applewriter file anyway.

Once text is loaded, the checker rapidly counts the words and compares them to the 50 most common words in the language. It then prompts for the dictionary disk if necessary, and reasonably quickly, checks all the remaining words against the dictionary. This takes only about 20 seconds for 500 words.

Once this checking is completed, a number of options are presented. They allow for listing of all suspect words, marking all suspect words, viewing of suspects, access to the dictionary to look up words, or use of another dictionary.

Viewing of suspect words shows each word in context, then allows each to be marked for correction, left alone or inserted in the dictionary, and also permits dictionary access. Marked words are indicated by insertion of a marker character, usually '^', at the beginning of the word – the character may be changed. A word processor may be used to locate these markers, and to correct the word appropriately.

Dictionary access allows the listing of all words matching a given pattern – all words starting with T, for example, or all four-letter words starting with T and ending with K. Naturally, words may be inserted and deleted. Specialised or personal dictionaries can also be built to supplement the main dictionary by using the utility menu to create an empty dictionary and then inserting into it.

A disk copy utility is also provided. The manual is small and very clearly written by Kai Jensen. I noticed one or two minor omissions, but nothing difficult.

For the Apple user with one drive, this is a very convenient, powerful and trouble-free checker. I can imagine it being used in schools with no difficulty at all – and it has, I understand, been used in primary schools. The program, with neatly printed, spiral bound manual, costs a mere $40, which is just about too cheap.

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Twist-a-Plot

Twist-a-Plot; an adventure story telling program, takes a story written in a prescribed pattern, and turns it into an illustrated adventure story, in much the same pattern as the twist-a-plot books. The story is written using a word processor, and can include pictures from a 'library'. A library of 84 pictures is supplied; the Sorcerer's Apprentice may be used to make more.

Twist-a-plot was written by a primary teacher, Jim Ferguson, who has used it extensively in his classes. It is hard to imagine a child for whom this program will not have some appeal. The stories may be read – that's one level of interaction. They may be written – another level – and graphics incorporated.

In reading the stories, there are four options at each screen – yes or no if a choice is offered, forward to the next screen (or scene if you like) or back if that option is offered. Readers are asked to type their first name, which is then used throughout the story.

Writers construct their stories using a word processor. Each screen is numbered, and the text typed. The reader's name may be incorporated using the character "^". Regardless of the format in which a story is written, words will not be split across lines when written.

Each screen may include a picture, which will be recalled from a library on disk. Questions may be asked, and the flow of the story redirected depending on the reply (yes or no). The answer will determine which screen is read next. Pages need not be written in order – each page includes a command to "go to" the next.

Adventure stories often include choices which have a delayed effect – pick up the bone at this place and later be attacked by a pack of hungry dogs. Checks of what has happened are made by checking to see if a particular page has been visited. This is simple but versatile in the hands of an imaginative writer.

The manual is simple but complete. It contains full operating instructions for readers and writers, incorporating plenty of examples, notes for teachers, some more technical notes about configuration for various hardware, a complete list of error messages, their causes and cures, and some hints on style.

The supplied picture library has 84 pictures, some of which are used in the example adventures supplied (there are two) and others for general use. Graphics are generated rather than recalled in complete form, at an acceptable speed.

Twist-a-Plot is written primarily in machine code, and represents a major programming effort. No bugs have been found by my play-testers. The program, picture library and documentation retail for just $40 – very reasonable indeed.

Easy LOGO

Easy LOGO is a system of additions to Apple LOGO, designed to enhance the ease of use of LOGO. It was originally developed for teenagers with gaps in their schooling and below average reading and writing skills. While some of the features are similar to parts of the LOGO Toolkit, there are significant differences. It was written by Chris Hilder.

The main feature is a learn mode. Turtle graphics commands are given, and executed. Mistakes may be reversed with the 'undo' command. Once a set of commands has been developed, it can be given a name, using 'call', and becomes a regular LOGO procedure.

The learn mode and the very useful 'undo' command are very powerful and useful extensions to Apple LOGO. Learn mode may be turned off and on at will, provided it was initially loaded (the option is given). It need not be restarted for each procedure.

Other utility commands and minor modifications are also provided. These include auto-quoting, avoiding the need to give that irritating and asymmetrical quote at the beginning of a procedure name to edit it. The editor uses all four arrow keys on the IIe.

Easy LOGO also implements a better version of the "save" command. Music can be incorporated using procedures NOTE, REST, TONE, SILENCE, and PLAY.

A dynaturtle, which knows about inertia and the laws of motion, and can be kicked in a given direction is implemented. Once moving, the dynaturtle keeps moving until it gets another kick – it doesn't know about friction!

A range of programmer's tools is provided to convert between hex and decimal, clear lines or portions of the text screen, scroll the text screen, set a text window, clear the type-ahead buffer, and provide access to machine-code routines called from the monitor.

The Easy LOGO manual was written both as an introductory tutorial, with minimal demands on the reading abilities of students, and as a reference manual. Unfortunately, it has rather fallen between two stools and ended up somewhat disorganised. Of course, the procedures given may all be loaded and listed to see how they work and exactly what they do. From the title pages, it appears the other manuals have been specially edited, but this one was written before the editing started.

Easy LOGO may overlap with the LOGO Toolkit, but is still of interest and very good value at just $20.

That leaves the Sorcerer's Apprentice, the largest of the programs in the Otakou package. Because of its size, versatility

Turn to page 76

otakou software

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That heading is about as intelligible as many of the programs published in magazines. Of course, if you're a whizz, you will have already translated it from ASCII code as:

Readable programs

By Br Bosco Camden

But I am not a "88 72 73 90 90", nor are the thousands of pupils in our schools who ought to be getting an authentic understanding of what programming means. If computers are so clever these days, why do we ordinary non-whizz people have to put up with programs that look like a hybrid of hieroglyphics and a bank statement? And have you been admitted to that inner circle which knows you can save a lot of bytes by omitting all spaces in your BASIC program!

```
10 FORCE=MUTTON:IFEELTHE NEXT
=0:NEXTCE
```

Gone are the days when BASIC forced us into variable names like A1, ZZ and 00, but we still suffer the clumsiness of A$ and A% and GOTO 9999 — where no doubt we will be instructed to GOSUB 45 unless ON ERROR we return to 15000!

Some programs are never intended to be read by humans (the operating system in ROM, for instance) so can be obscure to all except the machine programmer. But my interest is in education, particularly the user end.

Perhaps we should distinguish programs (and programming languages) into two groups: task-oriented and person-oriented. For the former, the objectives may be speed and efficiency, and may necessitate a sacrifice of readability. However, since the maintenance of business and scientific programs accounts for about 40% of total operating costs, readability should clearly be a prime objective here too.

For the person-oriented program — that which all students are dealing with — readability must be the first objective. For the learner, even before correctness.

Ideal marriage

BASIC grew out of machine-assembler code in the early days, and is only now evolving into a language which allows the user to write readable code with any realism. More recent languages,. notably Pascal, have tried to marry the two ideals of efficiency and readability. The particular machine in use will have its own limitations too — no way can a small computer allow any language but one close to its native machine code.

There are more than 200 computing languages in use, and each tries to achieve one or other ideal. They range from APL, which is incomprehensible at first sight but highly efficient in scientific applications, to PROLOG which reads like English but is far too verbose for calculations of any complexity. Of course, the problems of dealing with verbal "strings" are vastly different from those in the scientific field.

So what is it about a language that makes for readability? First, it is the ability to name variables in a meaningful way — if we want to find the interest rate we should be able to use a variable name like INTEREST or INTRATE, rather than some coded name. Some languages allow this on the surface, but only the first two letters are significant — very limiting.

Second, it should be possible to call a subroutine by name:

```
IF INTRATE    14 THEN
 REPORT.NEGATIVE
```

where REPORT.NEGATIVE is a subroutine which may print a report, reset the initial conditions, etc.

Third, the control of repetitive processes should be simple, e.g.:

```
REPEAT  REPORT.NEGATIVE  UNTIL
INTRATE  14
```

Fourth, it should be possible to use helpful words (with values TRUE or FALSE) in conditional statements:

```
IF FINISHED THEN MENU1
```

As even these isolated examples show, the readability and meaning of the program is greatly enhanced. This careful choice of names is often called "self-documentation" and should eliminate the need for further explanation through "comments". The test of a well-written program should be whether your companion can understand it simply by reading the code listing.

One of the worst offenders in microcomputers is that devil, POKE, and its PEEKy brother. Who wants to POKE 53280,4 when in LOGO, you can say SETBACKGROUND :RED! A program loaded with PPs is not likely to inspire the beginning programmer — more likely to push him or her into a very wrong understanding of what programming is all about. And it is about logical structure and human interaction, not about esoteric smart gimmicks.

So if you have a micro with basic BASIC, you must either learn to use that in an intelligible readable way, or replace the BASIC with some language which encourages self-documentation. Unfortunately for the pocket, this means a disk drive and language disk. The options seem to be (at least for the Commodore 64 with which I am most familiar):

- one of several upgraded versions of BASIC;
- COMAL which already supports all the proposed standards for BASIC, and which is similar in appearance;
- LOGO which goes far towards the ideals and was written for use by the young; all-purpose structured and powerful especially in graphics;
- Pascal is the ideal for senior classes — at least six implementations available for C64;
- PILOT which has a more specialised approach but quite feasible for schools;
- FORTH is a user-structured language needing careful learning.

My choice would be LOGO from primer 1 to form 5, then Pascal. And the transition would be easy.

(Brother Bosco Camden is a member of the LXIV User Group.)

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Slot Game

By Chris Miller

In this slot machine game, you bet up to $10 million, and three numbers will rapidly change, finally slowing down and stopping. If two numbers match, you win four times your bet; if all three numbers match, you win the jackpot of 65 times your bet. Of course, if no numbers match you lose your money.

You can obtain this game, plus a longer arcade game, Time Tube, if you send a formatted disk, $5 and a 30c stamp to P.O. Box 690, Gisborne.

```
10 COLOR 2,0:CLS:SYMBOL(10,70),"SLOT GAME
",8,5,1:FOR G=1 TO 2000:NEXT:CLS:GOSUB
300
30 LOCATE 1,1:INPUT "AMOUNT OF BET";A:B=1
:IF A>1E+07 THEN 200
40 FOR C=1 TO 12
50 X=INT(RND*10):Y=INT(RND*10):Z=INT(RND*
10)
60 LOCATE 12,26:PRINT X:LOCATE 12,32:PRIN
T Y:LOCATE 12,38:PRINT Z:BEEP
90 FOR D=1 TO C^2.5:NEXT
100 NEXT
110 W=B
120 IF X=Y THEN B=B*4
125 IF X=Z THEN B=B*4
127 IF Z=Y THEN B=B*4
130 IF B=W*64 THEN GOSUB 400
150 IF B=1 THEN B=-1
160 G=G+B*A
170 LINE(141,120)-(389,130),4,BF:LOCATE 1
6,24:PRINT B*A:LOCATE 16,33:PRINT"("G")
"
200 LINE(0,0)-(639,33),0,BF:GOTO 30
300 LINE(190,85)-(332,96),2,B:LINE(235,85
)-(285,96),2,B:LINE(140,60)-(390,170),7
,B:CIRCLE(140,170),75,-.5,-.75,,7:CIRCLE(
390,170),75,-.75,-1,,7:CIRCLE(265,60),1
25,.5,0,,2,7:LINE(180,150)-(342,145),,BF:
PAINT(265,59),1,7:PAINT(391,169),7:PAIN
T(139,169),7
310 LOCATE 14,25:PRINT "WIN/      AMOUNT"
:LOCATE 15,25:PRINT "LOSS   YOU OWN/OWE
"
350 RETURN
400 SYMBOL(150,65),"JACKPOT!!",3,2,6
410 FOR G=1 TO 3000:NEXT:LINE(150,65)-(35
6,80),4,BF:RETURN
```

SPECTRAVIDEO

Seaside

by David Franks

This routine produces the sound of waves crashing on the shore.

```
10 SOUND0,10
20 SOUND7,1
30 SOUND8,25
40 SOUND12,200
50 SOUND11,0:SOUND12,255
60 SOUND13,0
70 SOUND8,250
75 SOUND13,14
80 SOUND2,150
90 SOUND9,0
100 SOUND11,100
110 SOUND12,55
```

COMMODORE

Contest Log Keeping

by A. R. Mitchell

This program allows amateur radio enthusiasts to keep a log of any contests they may enter. First, you input the current time, using a six-figure number (seconds included). You are then asked to give the number of periods,the length of each period, and the starting time of the contest. Finally, you are asked whether you want locations included, since VHF contests often take the distance between stations into consideration when judging.

If you leave the computer on, it will tell you to begin when the contest starts, and a call sign requested. The log number will be issued for the other station, and the program will wait for you to input the log number from the other station and the location if previously requested. The details will then be displayed on the screen and sent to the printer.

The next call sign will then be requested. A comparison is made of all call signs within the same period, so if you try to call a station which has already been called, you will be told so and the next call sign requested.

If your printer is not a 1515 or you alter the format of the output, print time may change, and you will have to alter the number of seconds added to the variable, A, in line 490.

```
120 PRINT"■■":POKE53281,0:X=1:DIMLG$(1000,5):UR=59000:NF=1:J=1
130 PRINT"■          CONTEST LOGKEEPER              "
140 PRINT:PRINT"WHAT IS PRESENT TIME"
150 PRINT"(EG.  8.00AM = 080000  9.00PM = 210000 )":INPUTTI$
160 PRINT:PRINT"HOW MANY PERIODS IN THE CONTEST":INPUTPE
170 PRINT:PRINT"WHAT IS THE LENGTH OF EACH PERIOD       (IN MINUTES)":INPUTLE
180 PRINT:PRINT"WHAT TIME DOES THE CONTEST START        (USE 24 HR CLOCK)":INPUT
TS
190 PRINT:PRINT"DO YOU WANT LOCATIONS":INPUTLO$:IFLO$="Y"THENLO=1
200 GOSUB530
210 PRINT"■"
220 PRINT"  TIME IS:"LEFT$(TI$,2);":";MID$(TI$,3,2);":";RIGHT$(TI$,2);"    "
230 IFINT(VAL(TI$)/100)<TSTHENPRINT:PRINT"CONTEST NOT STARTED■":GOTO220
240 PRINT"■        ■WE'RE   OFF    "
250 T$=LEFT$(TI$,2)+MID$(TI$,3,2)
260 IFVAL(T$)=>TI(J)THENNP=X:PRINT"■NEW PERIOD STARTED":J=J+1
270 IFJ=PE+1THENPRINT"    ■IT'S ALL OVER FOLKS":END
280 PRINT:PRINT"WHAT IS CALLSIGN":INPUTCA$
290 FORI=NPTOX
300 IFLG$(I,2)=CA$THENPRINT"  ALREADY WORKED  ";CA$:GOTO250
310 NEXT
320 LG$(X,1)=T$
330 LG$(X,2)=CA$
340 UR=UR+1:LG$(X,3)=STR$(UR)
350 PRINT"MY NUMBER TO YOU IS: ";UR
360 PRINT"WHAT IS THEIR NUMBER ":INPUTLG$(X,4)
370 IFLO=1THENPRINT"THEIR LOCATION■(9 TO AVOID)":INPUTLO$:LG$(X,5)=LO$
380 PRINT"■":IFLO$="9"THENLO$(X,5)=""
390 FORI=1TO4
400 PRINT LG$(X,I);" ";
410 NEXT:PRINTLG$(X,5)
420 PRINT:PRINT:PRINT
430 OPEN4,4:CMD4
440 FORI=1TO5
450 PRINTLG$(X,I);"    ";
460 NEXT
470 PRINT#4:CLOSE4
480 X=X+1
490 A=VAL(TI$):A=A+2:
500 B$=STR$(A):B$=RIGHT$(B$,LEN(B$)-1)
510 C$="000000":C$=LEFT$(C$,6-LEN(B$))
520 TI$=C$+B$:GOTO250
530 FORI=1TOPE+1
540 HR=INT(LE*I/60):MI=(LE*I)-(HR*60)
550 TI(I)=TS+MI*(HR*100)
560 NEXT
570 RETURN
```

Bits & Bytes — the reader-friendly magazine

FOUNTAIN *User* NEWS

This month we have a totally different concept. We have received many letters from people who have been unable to obtain copies of the software reviewed in the User News. Your local FOUNTAIN COMMODORE stockist will either stock or be able to order any FOUNTAIN COMMODORE product. For those still unable to obtain this software, we have devoted this month's *issue to a mail order form for COMMODORE 64 and COMMODORE 16* software. All software is at the recommended retail price. Please ensure that your cheque is made out for the correct amount.

SO LET'S TURN OVER AND START SHOPPING !!

VOLUME 1 — ISSUE 7

FOR THE COMMODORE 64

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V64-0151	Intro To Basic Part 1 (C)
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V64-1851	M02 Multiplication (C)
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V64-1853	M04 Addition & Subtractio
V64-1854	M05 Division (C)
V64-1855	M06 Multiplication (C)
V64-1856	M10 Shipmaths (C)
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V64-1863	L03 Spellstart (C)
V64-1864	L04 Spellstart (C)
V64-1865	L10 Rocket Spell (C)
V64-1866	L11 Anagram Fun (C)
V64-1867	L12 Anagram Fun (C)
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V64-3060	Super Base 64
V64-4216	The Manager — Database
V64-7001	Bank Manager (C)
V64-7011	Bank Manager (D)
V64-7002	Expense Manager (C)
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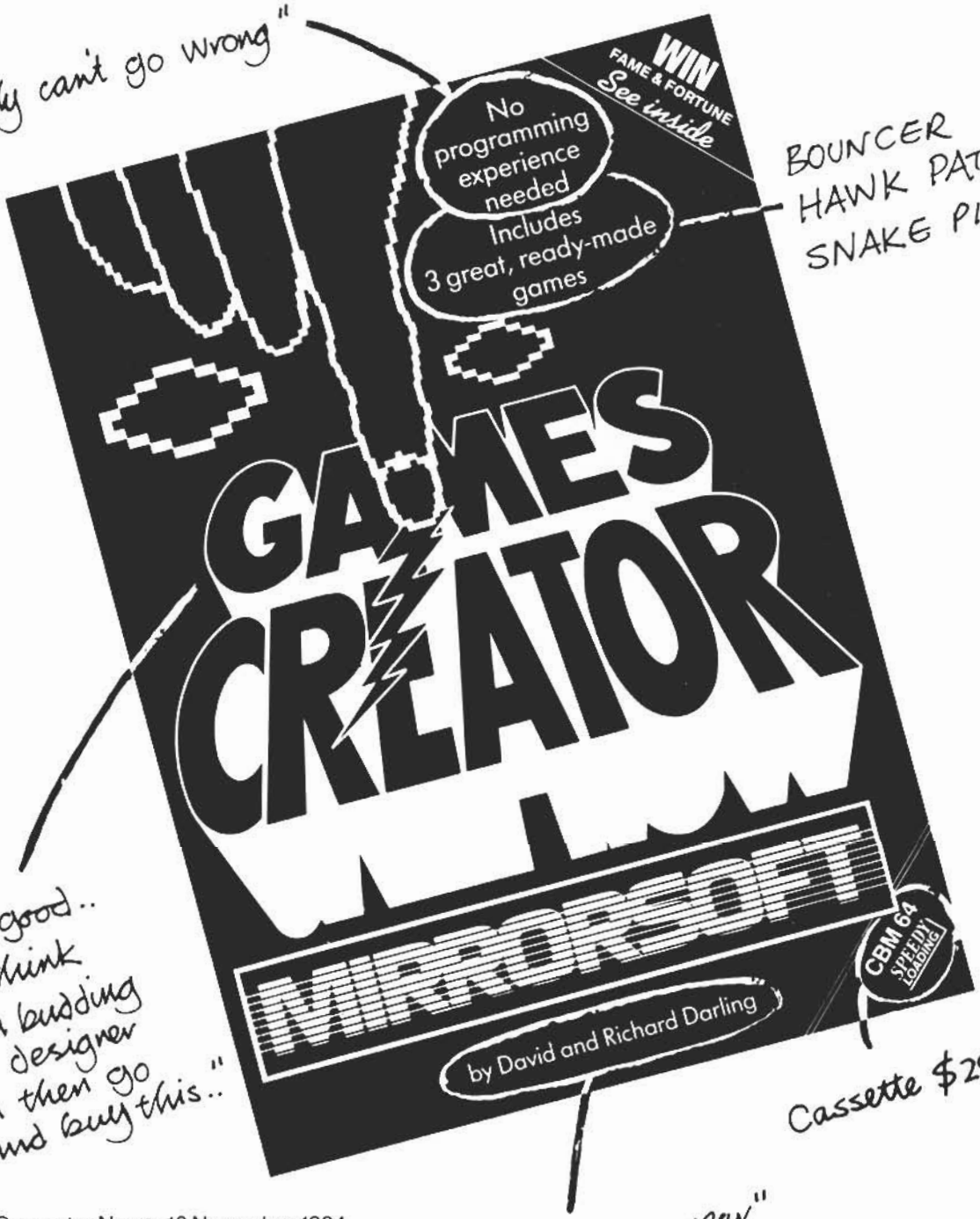
GAMES WITHOUT END..

"You really can't go wrong"

CCI Magazine, November 1984



BOUNCER
HAWK PATROL
SNAKE PIT

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If you think
there's a budding
games designer
in you then go
out and buy this.."

Personal Computer News, 10 November 1984

Cassette $29.95

"Programmers of the year"

CCI Magazine, December 1984

ZX81

Moon Patrol

By Bruce Priddy

This excellent program, for use with 16K, is a fast version of the well-known coin arcade game where you drive a moon buggy over the lunar surface while avoiding craters, mines, and crevasses. The keys to use are A for brake, S for thrust, and J for jump.

```
  30 LET C=0
  40 LET SC=0
  50 LET SKILL=1
  60 LET B=1
  70 LET LIVES=3
  90 GOSUB 1000
 100 FOR N=0 TO 10
 110 PRINT AT N*2,0;"[illegible]"
 120 NEXT N
 130 PRINT AT 17,6;"[illegible]";AT
18,5;"[illegible]";AT 19,6;"[illegible]
";AT 20,6;"[illegible]"
 140 LET A$(8 TO 13)="[illegible]"
 150 PRINT AT 0,5;"SCORE-";SC
 210 PRINT AT 21,0;A$( TO 32)
 215 IF A$(8)<>"[illegible]" OR A$(11)<>"[illegible]
" THEN GOTO 900
 220 LET C=C+1
 230 LET A$=A$(B+1 TO )+A$(B)
 240 IF INKEY$="J" THEN GOTO 510
 250 IF INKEY$="S" AND B<2 THEN
LET B=B+1
 260 IF INKEY$="A" AND B>1 THEN
LET B=B-1
 480 IF C>=LEN A$ THEN GOTO 2000
 500 GOTO 210
 520 PRINT AT 20,6;"[illegible]";AT
17,6;"[illegible]";AT 18,6;"[illegible]
";AT 19,6;"[illegible]"
 530 FOR N=1 TO 8
 540 PRINT AT 21,0;A$( TO 32)
 550 LET A$=A$(B+1 TO )+A$(B)
 560 LET C=C+1
 570 NEXT N
 580 PRINT AT 17,6;"[illegible]";AT
18,6;"[illegible]";AT 19,6;"[illegible]
";AT 20,6;"[illegible]"
 585 PRINT AT 21,0;A$( TO 32)
 590 IF A$(9)<>"[illegible]" OR A$(12)<>"[illegible]
" THEN GOTO 900
 600 GOTO 241
 900 PRINT AT 17,5;"[illegible]";A
T 18,6;"[illegible]";AT 19,6;"[illegible]
";AT 20,5;"[illegible]";AT 21,8;"
[illegible]"
 905 PRINT AT 0,5;"SCORE-";SC
 910 FOR N=1 TO 100
 920 NEXT N
 921 LET LIVES=LIVES-1
 922 IF LIVES=0 THEN GOTO 3000
 930 GOTO 100
 999 STOP
1000 LET A$="[illegible]"
1100 FOR N=0 TO 10
1110 PRINT "[illegible]"
1120 NEXT N
1130 PRINT AT 4,5;"[illegible]"
1140 PRINT AT 6,5;"[illegible]"
1150 PRINT AT 14,2;"[illegible]"
1155 PRINT AT 16,4;"A-BACK  S-TH
RUST J-JUMP"
1160 PRINT AT 18,10;"[illegible]"
1170 PRINT AT 21,0;"[illegible]"
1180 LET B$="..............PR
ESS ANY KEY TO START THE GAME."
1190 PRINT AT 2,0;B$( TO 32)
1200 LET B$=B$(2 TO )+B$(1)
1210 IF INKEY$="" THEN GOTO 1190
1220 RETURN
2000 LET SC=SC+(C*10)
2010 PRINT AT 0,5;"SCORE-";SC
2020 LET SKILL=SKILL+1
2025 IF SKILL=1 THEN LET A$="[illegible]"
2030 IF SKILL=2 THEN LET A$="[illegible]"
2040 IF SKILL=3 THEN LET A$="[illegible]"
2050 IF SKILL=4 THEN LET A$="[illegible]"
2060 IF SKILL=4 THEN LET SKILL=0
2090 LET C=0
2100 GOTO 100
3000 FOR N=1 TO 40
3010 PRINT AT 10,10;"GAME OVER";
AT 10,10;"GAME OVER"
3015 NEXT N
3020 PRINT AT 0,5;"SCORE-";SC+C
3030 FOR N=1 TO 50
3040 NEXT N
3050 PRINT AT 0,0;
3060 RUN
```

Innovative award

ICL has won the Queen's award for technological achievement for innovative work in developing the CAFS-ISP information search processor.

CAFS-ISP (content addressable file store-information search processor) enables data files held on ICL computer systems to be searched and the information retrieved up to 100 times faster than possible with other computers.

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SPECTRUM

Four in a row

By David Stevens

The aim of this two-player game is to be the first to produce a row of four markers, on a vertical grid where each marker will drop to the lowest possible position. Players take turns to press a number corresponding to the column down which they wish their marker to be dropped. The computer takes several seconds between each turn to check whether anybody has won. Four-in-a-row works on the 16K and 48K Spectrum.

The following notation is used to indicate graphics characters:
Characters which are to be entered in graphics mode are surrounded by asterisks, such as line 160, where *ABC* indicates the user-defined graphics characters, A, B, and C, are to be entered.
Pre-defined block graphics characters are preceded by 'g', such as line 150, where *g5* indicates that the graphics character on the 5 key is to be entered.
Block graphics characters which require CAPS SHIFT to be pressed, are indicated by 'sg', such as line 150, where the character indicated by *sg5* is the opposite of that shown previously in the line.
Characters which are to be entered in INVERSE VIDEO mode are indicated by 'i', such as line 320.

```
  10 DIM B(4): DIM C(4): DIM D(4): DIM E(4): DIM F(4): DIM G(4):: RESTORE : FOR
N=1 TO 4: READ B(N),C(N),D(N),E(N),F(N),G(N): NEXT N: FOR N=USR "A" TO USR "H"+7
: READ X: POKE N,X: NEXT N: READ W1,W2
  20 DATA 3,1,7,3,1,43,21,7,1,21,7,7,21,7,1,24,8,4,21,7,-1,18,6,1
  30 DATA 0,0,0,1,7,15,15,31
  40 DATA 0,0,126,255,255,255,255,255
  50 DATA 0,0,0,128,224,240,240,248
  60 DATA 31,63,63,63,63,63,63,31
  70 DATA 248,252,252,252,252,252,252,248
  80 DATA 31,15,15,7,1,0,0,0
  90 DATA 255,255,255,255,255,126,0,0
 100 DATA 248,240,240,224,128,0,0,0,0,0
 110 GO SUB 650: LET PLST=INT (RND*1)+1
 120 DIM Z(49): LET PLST=(PLST=2)+2*(PLST=1): LET PL=PLST
 130 BORDER 7: PAPER 7: INK 0: CLS
 140 FOR N=3 TO 21 STEP 3: PRINT AT 0,N+4;N/3: FOR Z=6 TO 24 STEP 3
 150 FOR X=N-2 TO N: PRINT AT X,5; PAPER 7; INK 5;"*g5*";AT X,27;"*sg5*": NEXT X
 160 PRINT AT N-2,Z; PAPER 6; INK 0;"*ABC*";AT N-1,Z;"*DsgBE*";AT N,Z;"*FGH*"
 170 NEXT Z: NEXT N
 180 PRINT  PAPER 7; INK 5;AT 20,4;"*AsgB*";AT 20,27;"*sgBC*";AT 21,3;"*AsgBsgB*
";AT 21,27;"*sgBsgBC*"
 190 BRIGHT 1: PAPER 4: INK 0: FOR N=2 TO 30 STEP 28: PRINT AT 5,N;"P";AT 6,N;"L
";AT 7,N;"A";AT 8,N;"Y";AT 9,N;"E";AT 10,N;"R";AT 11,N;" ": NEXT N: PRINT AT 12,
2;"O";AT 13,2;"N";AT 14,2;"E";AT 12,30;"T";AT 13,30;"W";AT 14,30;"O": GO SUB 750
 210 PRINT  PAPER 4; INK 0;AT 16,1;"WON";AT 16,29;"WON";AT 18,2;W1;AT 18,30;W2:
BRIGHT 0
 220 LET D=CODE INKEY$: LET D=D-48
 230 IF D<1 OR D>7 THEN  GO TO 220
 240 IF Z(D)<>0 THEN  GO TO 220
 250 FOR N=D+7 TO D+42 STEP 7
 260 IF Z(N)<>0 THEN  LET N=N-7: LET Z(N)=PL: GO TO 300
 270 NEXT N
 280 LET N=D+42
 290 LET Z(N)=PL
 300 LET N=N-.1
 310 LET N=(INT (N/7))*3
 320 PRINT  INK PL;AT N+1,D*3+3; PAPER 6;"*ABC*";AT N+2,D*3+3;"*D*";("*i1*" AND
PL=1);("*i2*" AND PL=2);"*E*";AT N+3,D*3+3;"*FGH*"
 330 GO SUB 420
 340 IF PL=2 THEN  LET PL=1: GO TO 360
 350 LET PL=2
 360 GO SUB 750
 410 GO TO 220
 420 FOR Z=1 TO 4
 430 LET B=0: LET R=0
 440 LET A=1
 450 IF Z=4 THEN  LET A=7
 460 LET T=A
 470 FOR N=T TO T+B(Z) STEP C(Z)
 480 IF N=T+B(Z) THEN  LET A=A+D(Z)
 490 FOR M=N TO N+E(Z) STEP F(Z)
 500 IF Z(M)=1 THEN  LET B=B+1
 510 IF Z(M)=2 THEN  LET R=R+1
 520 NEXT M
 530 IF R=4 OR B=4 THEN  GO TO 590
 540 LET B=0
 550 LET R=0
 560 NEXT N
 570 IF (A<=6(Z) AND Z<=3) OR (A)=3 AND Z=4) THEN  GO TO 460
 580 NEXT Z: RETURN
 590 IF B=4 THEN  LET WIN=1
 600 IF R=4THEN LET WIN=2
 610 BORDER 6: PAPER 6: INK 0: CLS : PRINT TAB 4; BRIGHT 1;"PLAYER ";WIN;" IS TH
E WINNER";AT 2,2;"HIT ENTER FOR ANOTHER GAME"
 620 IF WIN=1 THEN  LET W1=W1+1
 630 IF WIN=2 THEN  LET W2=W2+1
 640 GO SUB 690: GO TO 120
 650 BORDER 1: PAPER 0: CLS : INK 6
 660 INVERSE 1: PRINT AT 0,11;"4-IN-A-ROW";AT 2,6;"1984 DAVID STEVENS"''': INV
ERSE 0
 670 PRINT "Make a row of 4 counters on the grid horizontally, vertically  or d
iagonally."''"Press the column number (1-7)  in which you wish to place your co
unter."
 680 PRINT  PAPER 4; INK 0;AT 20,5;"PRESS ENTER TO CONTINUE"
 690 LET D=CODE INKEY$: IF D<>13 THEN  GO TO 690
 700 RETURN
 750 BRIGHT (PL=1): FLASH (PL=1): PRINT  PAPER 7; INK 1;AT 4,1;"  ";AT 15,1;"
": FOR N=5 TO 14: PRINT  PAPER 7; INK 1;AT N,1;" ";AT N,3;" ": NEXT N: FLASH 0
 760 BRIGHT (PL=2): FLASH (PL=2): PRINT  PAPER 7; INK 2;AT 4,29;"  ";AT 15,29;"
  ": FOR N=5 TO 14: PRINT  PAPER 7; INK 2;AT N,29;" ";AT N,31;" ": NEXT N: FLAS
H 0: BRIGHT 0
 800 RETURN
```

SPECTRAVIDEO

Draw and Paint

By Roger Browning

This is a picture-drawing program for the 318 or 328. It allows you to draw lines in any colour, wipe lines, and paint shapes. RUN the program, and enter the colour you wish to use. If it is a single-digit number, press the space bar. Then use D for down, U for up, R for right, and L for left.

If you want to alter the colour, press C and then type the number. To clear the screen, press C and then 1. To wipe a line, press W and then move over the line. To paint an area, move into the centre of the area and press W and then P.

```
70 SCREEN1:X=10:Z=5
80 GOSUB240
90 PSET(X,Z),F
100 A$=INKEY$
110 IF A$="R"THENX=X+1
120 IF A$="L"THENX=X-1
130 IF A$="D"THENZ=Z+1
140 IF A$="U"THENZ=Z-1
150 IF A$="C"THENA$="":GOSUB240
160 IF A$="W"THEN200
170 IF A$="P"THENPAINT(X,Z),F
180 IF S=1THEN200
190 GOTO90
200 S=1
210 IF A$="S"THENS=0
220 PRESET(X,Z)
230 GOTO 100
240 A$=INKEY$
250 IF A$="L"THENCLS:RETURN
260 B=VAL(A$)
270 IF A$=""THEN240
280 A$=""
290 A$=INKEY$
300 IF A$=" "THENF=B:GOTO90
310 C=VAL(A$)
320 IF C<0 OR C>5THEN290
330 IF A$=""THEN290
340 IF B<1 OR B>1THEN240
350 D=B*10
360 F=D+C
370 RETURN
```

VIC 20

Space Ranger

By R.M. Doull

This is an adventure game which fits into the unexpanded VIC. Because of memory constraints, the program should be entered exactly as listed without adding any spaces or expanding abbreviations.

You are a space ranger who has been captured by rebels intending to invade Earth. You are being held prisoner in a cell on the moon, and must try to escape, find the rebels' plans, and return to Earth.

Instructions can be entered in the format of verb and noun, apart from directions which are entered as N,S,E,W, and U,D. Ten verbs are available: Examine, Get, Drop, Shoot, Lift, Hit, Oil, Fill, Use, Give. The nouns to use will be obvious from the game.

```
1 POKE36879,26:PRINT"sp";:O=16:N=19:H=10
:I$="UDNEWS":DIME$(H),B$(N),D$(N),L%(N),
C%(H),L$(N)
2 FORI=1TOH:READE$(I):NEXT:FORI=1TON:REA
DB$(I):NEXT:FORI=0TON:READL$(I),D$(I)
3 NEXT:FORI=1TON:READL%(I):NEXT:K$="OK"
4 G=1:L=0:PRINT"RJ AM AT THE:-":PRINTL$(
O)
5 PRINT"RJ CAN SEE :-":FORI=1TON:IFL%(I)
=OTHENPRINTB$(I);":";:L=L+1:G=0
6 IFLTHENPRINT:L=0
7 NEXT:IFGTHENPRINT"NOT MUCH"
8 PRINT"RJ CAN GO:-r":FORI=1TOLEN(D$(O)
):PRINTMID$(D$(O),I,1);":";:NEXT:PRINT
9 IFU=0THENPRINT"NOWHERE";
10 PRINT:PRINT"RJ CARRY:-":L=H:FORI=1TOH
:IFC%(I)=1THENGOSUB15
11 NEXT:PRINT:PRINT"RWHAT NOW":INPUTO$
12 PRINT"s":P=-1:FORI=1TOLEN(O$):IFMID$
(O$,I,1)=" "THENP=I
13 NEXT:IFP<0THENGOSUB17:GOSUB19:GOTO4
14 V$=LEFT$(O$,3):W$=RIGHT$(O$,LEN(O$)-P
):GOSUB26:GOSUB19:GOTO4
15 R=LEN(B$(I))+2:L=L+R:IFL>21THENPRINT:
L=R
16 PRINTB$(I);":";:RETURN
17 K=0:V$=O$:FORI=1TO6:IFV$=MID$(I$,I,1)
THENK=I
18 NEXT:IFK=1THENGOSUB59:RETURN
19 IFO=8ANDX=6ANDC%(2)<>1THENPRINT"HE SH
OOTS YOU":GOTO76
20 IFA=1AND(O=NORO=18)ANDC%(3)<>1THENPRI
NT"NO SPACESUIT":GOTO76
21 IFA=1AND(O=NORO=18)ANDC%(6)<>1THENPRI
NT"NO AIRTANK":GOTO76
22 IFO=17ANDC%(9)<>1THENPRINT"SECRET PLA
NS NOT HELD"
23 IFO=17ANDC%(9)=1THENPRINT"gQQ11CONGRA
TULATIONS      QYOU WON":END
24 IFZ=2THENB=B-1:Z=3
25 RETURN
26 K1=0:C=0:FORI=1TOH:IFV$=E$(I)THENK1=1
:K=I
27 NEXT:FORI=1TON:IFW$=B$(I)THENC=1:W=I
28 NEXT:IFK1=0ORC=0THENPRINT"NOT UNDERST
OOD":RETURN
29 IFX=3ORX=4THENGOSUB70:RETURN
30 IFX=1ANDO=16ANDT=0ANDW=11THENPRINT"KE
Y BEHIND MIRROR":T=1:L%(1)=16:RETURN
31 IFX=9THENGOSUB44:RETURN
32 IFX=6ANDW=12ANDC%(2)=1ANDO=8THENPRINT
"HE'S DEAD":D=1.D$(8)="NS":RETURN
33 IFX=2THENGOSUB49.RETURN
34 IFX=7ANDW=14ANDZ=1ANDO=1THENPRINT"HE
MOVES":D$(1)="SWE":Z=2.C%(7)=-1:B=B-1:RE
TURN
35 IFX=HANDW$="WINE"ANDO=9ANDC%(7)=1THEN
GOSUB42.RETURN
36 IFX=8ANDW$="BOTTLE"ANDO=2ANDQ=1ANDC%(
7)=1THENPRINTK$.Z=1:B$(7)="OIL".RETURN
37 IFX=5ANDW=NANDO=18ANDF=0ANDC%(4)=1THE
NPRINT"HE'S DEAD".F=1:D$(18)="EW":RETURN
38 IFX=5ORX=6THEN40
39 PRINT CAN'T DO THAT":RETURN
40 IFO=9ORO=1THENPRINT"A PATROL HEARS YO
U":GOTO26
41 PRINTK$:RETURN
42 PRINT"HE FALLS DOWN DRUNK":B$(7)="BOT
TLE":S=1:O=1
43 C%(7)=0:L%(7)=9:RETURN
44 IFW=1ANDO=16ANDC%(1)=1ANDU=0THENPRINT
K$:U=1:D$(O)="N":RETURN
45 IFW=5ANDO=12ANDC%(5)=1THENPRINTK$:D$(
O)="NSE":RETURN
46 IFW=HANDO=14ANDC%(H)=1ANDL%(9)=-1THEN
PRINT"OK,FOUND SECRET PLANS":L%(9)=14:RE
TURN
47 IFW=8ANDO=15ANDC%(8)=1THENPRINTK$:D$(
15)="DS":A=1
48 RETURN
49 IFO=16ANDW=11THENPRINT"HAS HINGES"
50 IFO=8ANDW=12ANDD=1THENPRINT"HAS PISTO
L":L%(4)=8:D=2
51 IFO=2ANDW=13THENPRINT"ITS HEAVY"
52 IFO=1ANDW=14THENPRINT"HE'S RUSTY"
53 IFO=9ANDW=15ANDS=1THENPRINT"HAS SPANN
ER":S=2:L%(8)=9
54 IFO=15ANDW=18ANDA=0THENPRINT"BOLT JAM
MED"
55 IFO=14ANDW=16THENPRINT"IT'S STUCK"
56 IFO=9ANDW=15ANDS=0THENPRINT"HE'S THIR
STY"
57 IFO=HANDW=17ANDL%(H)=-1THENPRINT"FOUN
D CROWBAR":L%(H)=H
58 RETURN
59 K=0:M=LEN(D$(O)):FORI=1TOM:IFV$=MID$(
D$(O),I,1)THENK=1
60 NEXT:IFK=0THENPRINT"NO WAY":RETURN
61 IFU$="U"ANDO=4THENU$="E"
62 IFU$="D"ANDO=5THENU$="W"
63 IFU$="U"ANDO=11THENU$="S"
64 IFU$="D"ANDO=15THENU$="N"
65 IFU$="E"THENO=O+1
66 IFU$="W"THENO=O-1
67 IFU$="S"THENO=O+4
68 IFU$="N"THENO=O-4
69 RETURN
70 IFW>HTHENPRINT"I CAN'T":RETURN
71 IFX=4ANDC%(W)=0THENPRINT"NOT CARRIED"
:RETURN
72 IFX=4THENC%(W)=0:B=B-1:L%(W)=0:RETURN
73 IFB>5THENPRINT"TOO MUCH":RETURN
74 IFL%(W)<>OTHENPRINT"WHAT ";W$:RETURN
75 C%(W)=1:L%(W)=-2:B=B+1:RETURN
76 PRINT"YOU ARE KILLED":END
77 DATALIF,EXA,GET,DRO,SHO,HIT,OIL,FIL,U
SE,GIU,KEY,STOOL,SPACESUIT,PISTOL,CARD
78 DATAAIRTANK,WINE,SPANNER,PLANS,CROWBA
R,MIRROR,GUARD,OILDRUM,ROBOT,PLUMBER,BUN
K,BED
79 DATAAIRLOCK,OFFICER,STORE,E.LAB,SE.WO
RKSHOP,W,KITCHEN,S,STAIRS.US,FOYER
80 DATADNE.LOUNGE,SWE.HALL,NSW,GUARDHOUS
E.S,BATHROOM,E,BEDROOM,NSW,STAIRS,UN
81 DATACORRIDOR,NSE.CUPBOARD.W,BUNKROOM,
N,CHANGING ROOM,D,PRISON CELL,,SPACESHIP
.E
82 DATAOUTSIDE,E,AIRLOCK,NW,-1,16,13,-1,
-1,0,3,-1,-1,-1,16,8,2,1,9,14,10,15,18
```

ATARI

DOS Plus

By Steven Kendall

This is an improved disk operating system for any Atari. It simplifies DOS procedures, and handles loading, saving, erasing, protecting, unprotecting, and renaming.

For the program to work, there must be some sort of DOS already in memory (load for example NASA DOS, go into BASIC and run DOSPlus). Since the program is in BASIC, it can be easily modified to suit the user.

Note that lines 10, 40, 100, 200 and 1010 contain the clear screen character between the "empty" quotes.

```
3 GRAPHICS 0:DIM E$(100),F$(11)
4 POKE 710,0:SETCOLOR 1,0,14
5 DIM CAT$(1000)
10 PRINT " ":OPEN #2,6,0,"D:*.*":COU=0
11 POKE 752,1:POKE 712,14
15 ? :? :? :? :? :? :?
20 PRINT "        Enhanced DosPLUS 1.0"
30 PRINT "            Soft Arts 1985"
40 FOR DE=1 TO 2000:NEXT DE:POKE 752,0:P
RINT " ":POKE 712,0
50 INPUT #2;CAT$:TRAP 75
55 COU=COU+1
56 IF COU=18 THEN GOSUB 1000
57 IF COU=18*2 THEN GOSUB 1000
58 IF COU=18*3 THEN GOSUB 1000
60 PRINT "        ";CAT$
70 GOTO 50
75 POSITION 2,20:PRINT "----------------
----------------------"
80 POSITION 2,21:PRINT "START to load, O
PTION to exit, SELECT to handler."
85 CLOSE #2
90 IF PEEK(53279)=6 THEN 110
100 IF PEEK(53279)=3 THEN ? " ":END
101 IF PEEK(53279)=5 THEN 200
105 GOTO 90
110 PRINT "Filespec ";
120 INPUT E$
130 IF E$(1,2)="D:" OR E$(1,3)="D1:" THE
N 150
135 F$="D:"
140 F$(LEN(F$)+1)=E$
150 F$=E$:LOAD F$
160 END
190 REM DOS PLUS DISK HANDLER
200 PRINT " "
205 COU=0
210 PRINT "(1)ERASE,(2)PROTECT,(3)UNPROT
ECT,(4)RENAME,(5)EXIT TO DOSPLUS."
230 INPUT CD
240 IF CD=1 THEN CMD=33:PRINT "D:Fil.ext
"
250 IF CD=2 THEN CMD=35:PRINT "D:Fil.ext
"
260 IF CD=3 THEN CMD=36:PRINT "D:Fil.ext
"
270 IF CD=4 THEN CMD=32:PRINT "D:old,new
"
280 IF CD=5 THEN PRINT "  ":OPEN #2,6,0,
"D:*.*":GOTO 50
290 PRINT :PRINT "FILESPEC";:INPUT F$
300 ? :? "XIO ";CMD;" ";F$;","
310 XIO CMD,#1,0,0,F$
320 ? :? "XIO ";CMD;" ";F$;" EXECUTED."
330 FOR DE=1 TO 1000:NEXT DE
340 GOTO 200
1000 PRINT "Press SELECT for more";
1002 IF PEEK(53279)<>5 THEN 1002
1010 PRINT " ":RETURN
```

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COMMODORE 64

Pie Man

By Robert Boere

In Pie Man, you must try to catch falling pies with your pie van. You use the joystick to move the van. The variable Y1 in line 30020 can be altered to make the game harder or easier.

```
2 REMxxxLINE30020.LOWER NUMBER=EASIER.
HIGHER NUMBER=HARDER
10 PRINT"s":NO=1:SC=0
20 POKE53280,6:POKE53281,0
30 PRINT"QQ↑                    PIE MAN"
40 PRINT"QQ              BY ROB 6 MARK BOERE
"
50 PRINT"QQQQr     USE THE JOYSTICK TO CO
NTROL THE"
60 PRINT"Q               PIE VAN, AND TRY"
70 PRINT"Q         TO CATCH THE FALLING PI
ES."
80 PRINT"QQQQ↑         RPRESS SPACE BAR TO
 START r"
90 GETA$:IFA$<>" "THEN90
100 PRINT"s":POKE53281,0
105 POKE53265,PEEK(53265)AND239
110 FORX=1864TO2023
120 POKEX,224:POKEX+53272,5
130 NEXT
132 POKE53265,PEEK(53265)OR16
135 U=53248:POKE2042,13
136 FORN=0TO62:READQ:POKE832+N,Q:NEXT
140 POKE2041,14:FORN=0TO62:READA:POKE896
+N,A:NEXT
5000 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,127,255,240,127,254,16
5010 DATA113,70,16,117,94,16,113,78,16,1
19,95,254,119,71,254
5020 DATA127,255,254,127,255,254,127,255
,252,7,0,56
5030 DATA0,0,0,0,0,0,0,0,0,0,0,0
5040 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,6,0,0,233,0,1,16,128,2,0,64,15
5050 DATA255,224,4,0,64,2,0,128,1,255,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
5060 DATA0
10000 IFNO=1THENGOSUB25000:GOSUB30000:PO
KEU+21,6:POKEU+3,Y1:POKEU+2,X1
15000 Y1=Y1+1:IFY1>193THENGOSUB60000:GOS
UB30000:GOTO15000
15010 GOSUB50000
15020 IFX>254THENX=254
15030 IFX<85THENX=85
15040 POKEU+5,Y:POKEU+3,Y1:POKEU+4,X:POK
EU+2,X1
15050 GOTO15000
25000 Y=200:X=160
25010 POKEU+21,4:POKEU+5,Y:POKEU+4,X
25020 RETURN
30000 X1=INT(RND(0)*254)+1
30010 IFX1<90THEN30000
30020 Y1=100
30100 RETURN
50000 JU=PEEK(56320):POKE53278,0
50005 JU=15-(JUAND15)
50010 IFJU=4THENX=X-1:RETURN
50020 IFJU=8THENX=X+1:RETURN
50090 RETURN
55000 PRINT"s":FORX=1864TO2023:POKEX,224
:POKEX+53272,5
55010 NEXT:RETURN
60000 IFPEEK(53278)<>6THEN61000
60010 SC=SC+10:PRINT"SQQQQQQQQQQQQQQQQQQ
QQQQ":SC
60015 POKE53278,0
60020 RETURN
61000 POKEU+21,0:PRINT"s"
61005 PRINT"YOU GOT ";SC
61010 PRINT"DO YOU WANT TO PLAY AGAIN?
61020 GETA$
61030 IFA$="Y"THENNO=1:GOSUB55000:SC=0:G
OTO10000
61040 IFA$<>"N"THEN61020
61050 END
```

COMMODORE 64

UFO

By C. Wright

This routine simulates the sound of a UFO landing.

```
10 REM UFO LANDING - C. WRIGHT
20 S=54272
30 FOR I=0 TO 22:POKE S+I,0:NEXT
40 POKE S+24,15
50 POKE S+5,80
60 POKE S+6,243:POKE S+3,7
70 FOR T=50 TO 17 STEP -1:POKE S+4,65
80 POKE S+1,T:FOR I=1 TO 200:NEXT
90 POKE S+4,64:FOR I=1 TO 50:NEXT
100 GET A$:IF A$="" THEN NEXT
```

No JX — yet

IBM has no immediate plans for a New Zealand release of its JX personal computer. There has been speculation on its local release since one appeared at a dealer show in Queenstown.

The JX is a cut-down version of the IBM PC, developed in Japan. When — and if — the machine is sold here, it could be in a modified form.

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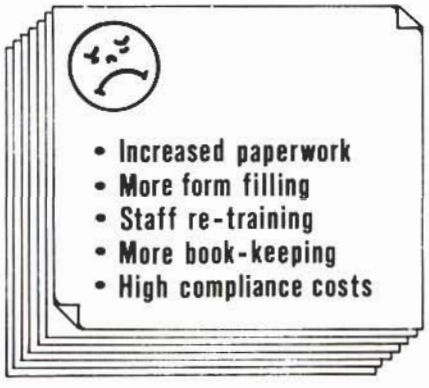

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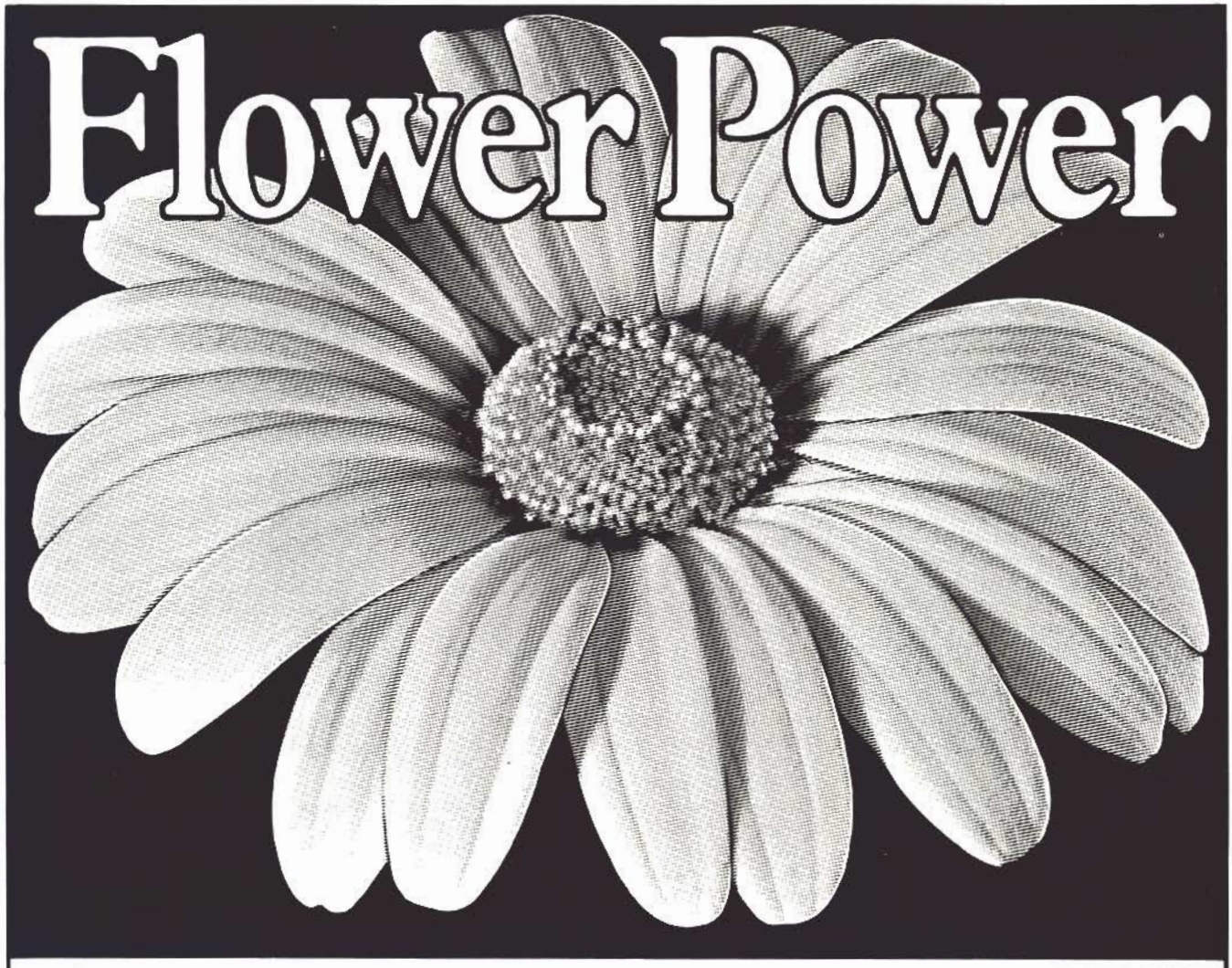

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A calculating type

By Gordon Findlay

Let's really speed up the onward rush of technology and write a program to turn our expensive computer into a simple, four-function calculator. That isn't as easy, or as silly, as it sounds.

Why bother? The BASIC input statement has many limitations, as do the equivalents in most other languages. It is not generally possible to type in an expression, such as "2 + 3" in response to the statement

1 INPUT A

Often, it would be useful to be able to do so. It would be nice to be able to type in a string and have the computer work out its value. The only common function anything like that is the VAL () function, which converts a string to its corresponding numerical value: VAL ("123") is 123, converting the string to a number.

Unfortunately, in all but a very few dialects of BASIC, the function stops converting once a non-digit character, other than a decimal point, is found. In other words, VAL("12+3") is 12, as the conversion process stops at the "+" character. The aim of the program we write should be to take a string, such as "12+3", and evaluate it.

One or two BASIC dialects do have this capability built in. If this applies to yours, you may still be interested in the program to learn a little about string handling and error trapping.

The tools

What tools do we have? The string typed in — call it X$ — can be broken up using LEFT$, RIGHT$ and, if necessary, MID$. Its length can be found using LEN(X$), and string comparisons work in the usual way, with X$ < Y$ meaning that X$ comes before Y$ in extended alphabetical order.

This extended alphabetical order is based on the ASCII character code. All strings are stored in this encoded form, in which each character is represented as a number between 0 and 255. The exact details of the code aren't important, but we can test to see if a character is a digit by asking if it is between 0 and 9, inclusive, in a construction such as:

```
1 IF Y$ > = "0" AND Y$ < = "9" THEN
. . .
```

Simple suggestion

Mr V. Best, of Auckland, writes to suggest a simplification of the program in the June issue, dealing with bridge hands. His method avoids shuffling the cards at all, and so avoids sorting the four hands once they are dealt.

His program takes each card in turn, and assigns them to a randomly chosen hand. Once a hand is full any card destined for it is passed to the hand next around.

This is much faster, but I have a suspicious nature, and wonder what happens when there are three cards left, and only one hand, North say, isn't already complete. This means North must get the remaining three cards, which will be, as the cards aren't shuffled, the 4, 3 and 2 clubs. This will reduce the randomness of the deal a little.

Mr Best uses an Amstrad, and his program deals a hand in about three seconds, which is quite respectable. He has also incorporated a printer routine for interesting hands.

Remember, this column is supposed to be interactive!! Write to me (Gordon Findlay), c/- *Bits and Bytes*, (P.O. Box 9870, Auckland, with your suggestions, improvements, programming tricks and ideas.

Remember to compare with the strings "0" and "9", not their numerical values.

How do we evaluate a string? We need to isolate the first and second numbers ("operands") and the operation (addition, subtraction or whatever) from the string. To help allow for a bit of "free form" typing, anything else — blanks or garbage — will be ignored. The string " ##ab21# + 5GGGk " will yield the operands 21 and 5, and the operation "+". Each operand will of course be a string still, but the sort which can be converted to numerical form with VAL().

As we go, there will be cases in which things go a little astray, such as "12+", in which there is no second operand. There are lots of things which could be done in this case — the program will give some sort of answer, but you might prefer to abandon the conversion altogether.

Getting started

Here goes then. First, input a string, and make sure there is something to convert:

```
30INPUT X$
40 IF LEN(X$)=0 THEN GOTO 30
```

Now we must strip off all the characters in the string up to, but not including, the first digit:

```
60 IF LEFT$(X$,1) > = "0" AND LEFT$
(X$,1) < = "9" THEN GOTO 110
70 IF LEN(X$) > 1 THEN X$=RIGHT$
(X$, LEN(X$)-1) ELSE X$=""
```

Line 60 checks to see if the first character of what remains is a digit, and if so, moves to line 110 at which the first operand is isolated. Line 70 has the effect of replacing X$ by all but its first character. It is possible nothing is left, so include:

```
80 IF LEN(X$) = 0 THEN RS=0:GOTO
370 'exit
```

so that the result (RS) is zero, and jump to the end of the program.

If some of the string is still left after the

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first character is removed, we must check again in case the new first character isn't a digit, so include:

```
90 GOTO 60
```

Now we can be sure the spaces, letters and so on — anything not a digit — has been stripped off the start of the string, and can split off the first operand. The strategy is to split off the first letter, add it to the operand (which can be called 01$), and repeat this process until a non-digit is encountered. Here's one way of doing so:

```
110 01$=""
120 IF LEN(X$)=0 THEN GOTO 190
130 X1$=LEFT$(X$,1)
140 IF (X1$ < "0") OR (X1$ > "9") THEN GOTO 190
150 01$=01$+X1$
160 IF LEN(X$) > 1 THEN X$=RIGHT$(X$, LEN(X$)-1) ELSE X$=""
170 GOTO 120
```

We start (line 110) with a null string — length zero. If the string being evaluated has been exhausted, this part of the program is complete. The remainder simply looks at the first character (X1$), checks to see if it is a digit (line 140) and if so, tacks it onto the operand 01$. The string can then be shortened (160) and the process repeated.

Next, the remains of the string must be scanned, character by character as usual, until an operation (+, –, * or /) is found. If there isn't an operation, the result may as well be just the first operand found which can be converted to a number using VAL. Otherwise this is just like the first part:

```
190 IF LEN(X$)=0 THEN RS=VAL(01$):GOTO 370
200 OP$=LEFT$(X$,1)
210 IF LEN(X$) > 1 THEN X$=RIGHT$(X$, LEN(X$)-1) ELSE X$=""
220 IF (OP$<>"+") AND (OP$<>"-") AND (OP$<>"*") AND
    (OP$<>"/") THEN GOTO 190
```

Now the process is repeated, to find the second operand, 02$. Again, we must check that there is still something left to convert:

```
240 02$=""
250 X1$=LEFT$(X$,1)
260 IF X1$>="0" AND X1$<= "9" THEN 02$=02$+X1$
270 IF LEN(X$)>1 THEN X$=RIGHT$(X$,LEN(X$)-1) : GOTO 250
```

Now the operands may be converted to number form, using VAL, and the appropriate operator selected. The operation is at this point stored as a string, and cannot be used directly. There is one obvious error to avoid — division by zero doesn't make sense.

```
290 01=VAL(01$)
300 02=VAL(02$)
310 'make calculation
320 IF OP$="+" THEN RS = 01+02:GOTO 370
330 IF OP$="-" THEN RS=01-02:GOTO 370
340 IF OP$="*" THEN RS = 01*02:GOTO 370
350 '(must be division)
360 IF 02 <> 0 THEN RS = 01/02
```

There are two subtitles here. It is possible the second operand is null — in other words, the string ran out before the operand was found. In that case, 02$ = "", and the VAL function can cope — VAL("") = 0.

Important jump

After the appropriate operation is selected and carried out, it is important to jump around the rest, with "GOTO 370".

All that remains is to output the result, and (right at the beginning) clear some string space if required:

```
20 CLEAR 10000
- - - - - - - -
370 PRINT "Result: ";RS
380 END
```

Now the program is complete. What can be done with it? First,the program isn't absolutely foolproof. There are odd inputs which will cause trouble, and a few more tested can be added.

Another useful improvement would be to use a subroutine to strip spaces, letters and so forth, rather than repeating the code for the first and second operands, and perhaps the operation.

The program doesn't cope with decimal points, but the VAL functions used in lines 290 and 300 could. Decimal points are filtered out, as in line 60. A useful project would be to allow points and negative signs, which are also filtered out.

In use, of course, this would be converted to a subroutine and the subroutine used in place of ordinary input statements. Surprisingly, the program isn't unbearably slow.

Macintosh challenge

Much of the project planning work for New Zealand's America's Cup challenge is being done on an Apple Macintosh.

Apple's New Zealand distributor, CED has lent the challenge a Macintosh 128K, Imagewriter, Multiplan, MacWrite, MacPaint, MacProject and an external disk drive.

"The Macintosh is perfect for my needs. Using MacProject, I can design and schedule the whole project," says project organiser Aussie Malcolm.

MacProject allows the user to draw a project schedule on the screen and enter project beginning dates and required task completion dates, resources and fixed and variable cost data for each task. The program then calculates the beginning and ending dates for each task as well as for the entire project.

The Macintosh will also help in communication between Ron Holland in Ireland and Laurie Davidson in Takapuna, especially in the latter stages. Holland is using a Macintosh and is is expected the two machines will communicate via a modem.

Aussie Malcolm planning with the aid of his Apple Macintosh.

TOOLBOX

```
10 'input of arithmetical expressions
20 CLEAR 10000
30 INPUT X$
40 IF LEN(X$)=0 THEN GOTO 30
50 'strip everything before first digit
60 IF LEFT$(X$,1) >= "0" AND LEFT$(X$,1) <= "9" THEN GOTO 110
70 IF LEN(X$) > 1 THEN X$=RIGHT$(X$, LEN(X$)-1) ELSE X$=""
80 IF LEN(X$) = 0 THEN RS=0:GOTO 370 'exit
90 GOTO 60
100 'get first operand: read digits only
110 O1$=""
120 IF LEN(X$)=0 THEN GOTO 190
130 X1$=LEFT$(X$,1)
140 IF (X1$ < "0") OR (X1$ > "9") THEN GOTO 190
150 O1$=O1$+X1$
160 IF LEN(X$) > 1 THEN X$=RIGHT$(X$, LEN(X$)-1) ELSE X$=""
170 GOTO 120
180 'find operation
190 IF LEN(X$)=0 THEN RS=VAL(O1$):GOTO 370
200 OP$=LEFT$(X$,1)
210 IF LEN(X$) > 1 THEN X$=RIGHT$(X$, LEN(X$)-1) ELSE X$=""
220 IF (OP$<>"+") AND (OP$<>"-") AND (OP$<>"*") AND (OP$<>"/")
THEN GOTO 190
230 'find second operand
240 O2$=""
250 X1$=LEFT$(X$,1)
260 IF X1$>="0" AND X1$<= "9" THEN O2$=O2$+X1$
270 IF LEN(X$)>1 THEN X$=RIGHT$(X$,LEN(X$)-1) : GOTO 250
280 ' convert operands to numerical form
290 O1=VAL(O1$)
300 O2=VAL(O2$)
310 'make calculation
320 IF OP$="+" THEN RS = O1+O2:GOTO 370
330 IF OP$="-" THEN RS=O1-O2:GOTO 370
340 IF OP$="*" THEN RS = O1*O2:GOTO 370
350 '(must be division)
360 IF O2 <> 0 THEN RS = O1/O2
370 PRINT "Result: ";RS
380 END
```

SORD

Sord info

Dear Sord user,

The Sord User Group has collected material about Sord computers for some time now, mainly about the M23, PIPS 3, and Sord BASIC. Most of this information has gone to dealers but little has come through to users.

It really is a question of time and money to get it out to you. Newsletters and meetings do not seem to have met this need fully, so we're on to a new idea of sending you an index of available material, and then sending copies of information on request and payment.

There is no charge for any Sord owner to be on the mailing list (please let me know of any more users who would like to be added to it.) The information will be sold at a cost of $25 for 50 pages with index of material, and copies will be supplied two to four weeks after ordering. The index to the first collection of information available is complete and further indexes are being prepared.

I am a user of Sord equipment and not a dealer, so my aim is to get information from all available places and send it to other users.

Please return this letter with your cheque for $25 for the first copy of Sord information — GRAEME HALL (P.O. Box 391, Manurewa).

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Columbia

By Richard Pierre

This program will draw a space shuttle and label it with the name, Columbia.

```
10 COLOR 3,1
20 CLS
30 LINE(170,75)-(424,75),7
40 LINE(170,75)-(90,40),7
50 LINE(90,40)-(65,40),7
60 LINE(65,40)-(100,75),7
70 LINE(100,75)-(100,93),7
80 LINE(100,93)-(430,93),7
90 LINE(430,93)-(430,85),7
100 LINE(430,85)-(459,85),7
110 CIRCLE(425,80),15,,.75,1,.308,7
120 LINE(440,80)-(459,85),7
130 LINE(460,86)-(475,89),0
140 CIRCLE(470,93),12,,.75,.25,.308,0,F
150 LINE(470,97)-(100,97),0
160 LINE(431,94)-(431,86),0
170 LINE(431,94)-(100,94),0
180 LINE(431,86)-(460,86),0
190 LINE(100,94)-(70,95),0
200 LINE(100,97)-(70,96),0
210 PAINT(468,93),0,0
220 PAINT(170,80),7,7
230 LINE(190,75)-(190,85),0
240 LINE(191,75)-(191,85),0
250 LINE(190,85)-(400,85),0
260 LINE(400,85)-(400,75),0
270 LINE(399,85)-(399,75),0
280 LINE(242,75)-(242,85),0
290 LINE(243,75)-(243,85),0
300 LINE(294,75)-(294,85),0
310 LINE(295,75)-(295,85),0
320 LINE(347,75)-(347,85),0
330 LINE(348,75)-(348,85),0
340 LINE(77,45)-(104,70),0
350 LINE(78,45)-(105,70),0
360 LINE(77,45)-(70,45),0
370 LINE(104,70)-(95,70),0
380 LINE(438,76)-(420,76),0
390 LINE(440,79)-(420,79),0
400 LINE(420,79)-(420,76),0
410 LINE(421,79)-(421,76),0
420 LINE(430,79)-(430,76),0
430 LINE(431,79)-(431,76),0
440 LINE(80,75)-(100,77),0
450 LINE(80,83)-(100,81),0
460 LINE(80,85)-(100,87),0
470 LINE(80,93)-(100,91),0
480 LINE(80,75)-(80,83),0
490 LINE(80,85)-(80,93),0
500 LINE(100,77)-(100,81),0
510 LINE(100,87)-(100,91),0
520 PAINT(81,77),0,0
530 PAINT(81,87),0,0
540 SYMBOL(10,5),"SPACE SHUTTLE",6,3.5,6
550 SYMBOL(10,140),"COLUMBIA",10,4,4
560 GOTO 560
```

Indexed addressing

By Joe Colquitt

The loop at the end of the last column is an example of indexed addressing. The target address is actually the stated address + X or Y bytes, depending on the index register used. Here is the loop again, with a full explanation.

Most 6502 machines will run these routines as long as absolute addresses are taken into account. Atari users should double-check routine syntax as there are some differences.

```
C000 LDA#$07      ;SET THE ACCUMULATOR VALUE TO 'YELLOW'
C002 LDX#$00      ;SET THE INDEX'S INITIAL VALUE
C004 STA$D800,X ;STORE THE CONTENTS OF THE ACCUMULATOR AT $D800+X
C007 STA$D900,X ;STORE THE CONTENTS OF THE ACCUMULATOR AT $D900+X
C00A STA$DA00,X ;STORE THE CONTENTS OF THE ACCUMULATOR AT $DA00+X
C00D STA$DB00,X ;STORE THE CONTENTS OF THE ACCUMULATOR AT $DB00+X
C010 INX          ;INCREMENT THE VALUE IN THE X REGISTER
C011 BNE$C004     ;TEST THE INDEX
C013 RTS
```

The object of this loop is to fill colour RAM (55296-56295) with yellow. The simplest way to do this is in four quarters, as there are 1000 locations to fill, and the index can only perform a count of 0-255.

The first thing to do is put the colour code into the accumulator. Next, set the counter (index) to 0. Now the meat in the sandwich. The contents of the accumulator are stored at an address which is incremented each time the index is — the first time through the loop, the target addresses are $D800+0, $D900+0, $DA00+0, and $DB00+0. The index is increased at $C010, then tested at $C011.

The process of testing in loops involves checking flags in the status register and will be dealt with in full later. In this example, the "zero" flag is checked to see if the index has "rolled over" from 255 to 0, as the datasette counter does at 999.

"BNE$C004" means "branch if not equal [to zero] to $C004". At the end of the first time through the loop, index has become "1" (obviously not 0), and the routine has branched back to $C004. The target addresses are now $D800+1 (55297), $D900+1, $DA00+1, and $DB00+1. This continues until the target addresses are $D800+255 etc and the index is incremented once more. It has now "rolled over" from 255 to 0, the zero flag is set and instead of branching, the "RTS" is executed. The basic equivalent is:

```
10 A=7:X=0
20 POKE55296+X,A
20 POKE55296+X,A
30 POKE55552+X,A
40 POKE55808+X,A
50 POKE56064+X,A
60 X=X+1
70 IFX>255THEN90
80 GOTO20
90 RETURN
```

This is a form of looping that uses the Y register and a pair of consecutive zero-page bytes. Zero-page means the address is less than 256 ($0100). As a simple example of indirect indexing, consider the problem of shifting a block of data, 256 bytes in length, from $C100 to $3000 (49408 to 12288). This situation could arise if you were using redefined characters and wanted to change them. The ML for the loop looks like this:

```
C000 LDA#$C1      ;SET THE HIGH BYTE OF THE PAIR $FE,$FF
C002 STA$FF
C004 LDA#$30      ;SET THE HIGH BYTE OF THE PAIR $FC,$FD
C006 STA$FD
C008 LDA#$00      ;SET THE LOW BYTES
C00A STA$FE
C00C STA$FC
C00E TAY          ;SET THE COUNTER TO 0 (TAY=TRANSFER ACCUMULATOR TO
C00F LDA($FE),Y ;LOAD ACCUMULATOR WITH THE CONTENTS OF '$C100+Y'
C011 STA($FC),Y ;STORE IT AT '$3000+Y'
C013 INY          ;INCREMENT THE COUNTER
C014 BNE$C00F     ;IF LESS THAN 256,BRANCH BACK INTO THE LOOP
C016 RTS          ;RETURN
```

This type of loop is not really suited to short loops, because of the space needed to set it up ($C000-$C00E). The shift could have been more easily written with indexed addressing, as in the first example. Indirect indexing is, however, pure magic when many kilobytes need to be transferred, such as moving a bit-mapped screen. This example transfers 8K from $8000 to $2000 in 0.14 seconds. The BASIC equivalent takes 133 secs.

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```
C000 LDA#$80      ;SET HIGH BYTES
C002 STA$FF
C004 LDA#$20
C006 STA$FD
C008 LDA#$00      ;SET LOW BYTES
C00A STA$FE
C00C STA$FC
C00E TAY          ;SET COUNTER
C00F LDA($FE),Y   ;PERFORM TRANSFER
C011 STA($FC),Y
C013 INY          ;INCREMENT COUNTER AND TEST
C014 BNE$C00F      .
C016 INC$FD       ;IF Y=0,THE HIGH BYTES ARE INCREMENTED
C018 INC$FF
C01A LDA$FF       ;TEST $FF TO SEE IF IT HAS REACHED THE UPPER LIMIT
C01C CMP#$A0      ;THIS MEANS 'COMPARE MEMORY CONTENTS WITH #$A0'
C01E BNE$C00F     ;IF LESS THAN #$A0,IE $FF'S CONTENTS-#$A0 <>0,THEN LOOP
C020 RTS
```

As the routine progresses,the contents of $FF are incremented by one each time the Y register cycles through 0-255, $FF starts at $80, then $81,$82,$83,etc. Similarly for $FD ($20,$21,$22 . . .). The upper limit is set by $8000+8K=$A000 (32768+8192=40960). To fully appreciate these loops do some experimenting.

Anyone who would lke a copy of the public domain monitor, "Supermon", for the C-64, should send a disk or cassette, and a stamped return envelope, to:
Joe Colquitt,
5 Martin Ave,
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256K 2nd processor

Solidisk has announced a 256K, internally fitted, tube compatible, 6502 second processor for the BBC, with facilities for partitioning memory between sideways RAM, silicon disk and normal program use. The UK price is only marginally higher than an Acorn second 6502 processor. This places the BBC alongside Atari, Commodore and Apple which all now offer 128K versions of their eight-bit machines.

Franklin out of Chapter 11

Franklin Computer Corporation, which manufactures the Apple-compatible Franklin range of computers, reportedly left Chapter II in USA in March.

Chapter II is a section under American law allowing a company protection from its creditors to give it time to sort out financial problems.

Many companies don't overcome those problems but Franklin joins Osborne Computers in managing to trade its way out of trouble.

Franklin is represented in New Zealand by Hitec Micro (P.O. Box 1978, Auckland) but the computer is sold almost exclusively to schools here.

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The sound of music

By Barbara Bridger

The last two articles have described how to use the PLAY command; now it is time to look at the SOUND command which allows you to write values directly into the registers of the PSG (programmable sound generator) and is very suited to producing special sound effects.

It is, of course, possible to produce the same sounds using either PLAY or SOUND statements because they are both giving values to the same set of registers; the PLAY statements are just a more indirect method. For example:

PLAY 'SOm512o4d' or

SOUND 7,254:SOUND 0,172:SOUND 1,1:SOUND 8,16:SOUND 11,255:SOUND 12,1:SOUND 13,0 give the same effect.

The 16 registers associated with the PSG are numbered 0 to 15, but registers 14 and 15 are used by the Spectravideo operating system as input/output registers and cannot be accessed by a BASIC program.

The format of the SOUND statement is:

SOUND register number, value

which is quite straightforward. But determination of the value to go into the register is a little more complicated and depends on the register used.

Two by two

The register pairs, R0:R1, R2:R3 and R4:R5, are for tone generator control for channels A, B and C respectively. R0, R2 and R4 give fine tone control, and R1, R3 and R5 coarse tone control. The fine tone and coarse tone values for a particular tone frequency are determined from the following relationships:

fine tone = (3579545/(32*Frequency)) AND 255 coarse tone = (3579545/32*Frequency))/256

(Now it becomes obvious why playing music is easier with the PLAY command). The frequency of a note one octave higher is doubled, so this piece of program will play the note of A at octave intervals.

```
10 SOUND 7,&B11111110
20 SOUND 8,15
30 FR = 55
40 FOR I=1 TO 8
50 F = (3579545/(32*FR))
60 FINE = F AND 255
70 COARSE = F/256
80 SOUND 0,FINE
90 SOUND 1,COARSE
100 FOR J=1 TO 200:NEXT J
110 FR = FR*2
120 NEXT I
```

A digression into bits and bytes is needed at this point. Each of the PSG registers is an eight-bit (or single byte) register and can therefore hold numbers in the range 0 to 255 — in binary notation, 00000000 to 11111111. Each 0 or 1 in this notation is termed a bit, and for some registers, not all bits have an influence on the PSG. Where it is necessary to refer to individual bits, this naming pattern will be used:

b7b6b5b4b3b2b1b0
0 0 0 0 0 0 0 0

Noise control

Register 6 gives control of the

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frequency of the noise source but only bits b0 to b4 inclusive have an effect — SOUND 6,48 SOUND 6,112 SOUND 6,144 will all be the same as SOUND 6,16.

	BINARY	DECIMAL
001	10000	48
011	10000	112
100	10000	144
000	10000	16
	significant bits	

Register 7 is the "mixer" register. It determines which channels are open for noise, tone or both. It is b0 to b5 which are the significant bits as tabled below.

CHANNEL	TONE ON/OFF	NOISE ON/OFF
A	b0 = 0/1	b3 = 0/1
B	b1 = 0/1	b4 = 0/1
C	b2 = 0/1	b5 = 0/1

eg. SOUND 7,&B11111101 Channel B open for tone
SOUND 7,&B11000111 All channels open for noise
SOUND 7,&B10000110 is equivalent to
SOUND 7,&B00000110

Surprisingly, closing channels to both noise and tone does not always turn them off completely. This is done by putting the value, 0, in the volume registers.

Registers 8, 9 and 10 determine the volume for channels A, B and C, or whether a particular envelope shape is used. Values for volume range from 0 (softest) to 15 (loudest) as for the PLAY command, but if b4=1 (decimal 16 is one possibility), the control of volume is determined by the envelope shape.

Registers 11 and 12 serve the same function as the M parameter in the PLAY command — they control the envelope frequency. The values to be put into these registers are determined this way:
Register 11 value = (3579545/(512*Envelope Frequency)) AND 255
Register 12 value = (3579545/(512*Envelope Frequency))/256.

Register 13 sets the envelope shape chosen from the same range 0 to 15 as for the PLAY command.

So much for the theory! In practice, a bit of experimentation is required to achieve the desired result. These examples could serve as a starting point:

```
10 CLS:LOCATE 15,7:PRINT'SIREN'
20 SOUND 7,254:SOUND 8,16
30 SOUND 0,0:SOUND 11,0:SOUND 12,200
40 FOR I=255 TO 60 STEP -5
50 SOUND 0,I:SOUND 13,0
60 NEXT I
70 GOTO 20
```

```
10 CLS:LOCATE 15,7:PRINT'BIRD CHIRP'
20 SOUND 7,251:SOUND 10,15
30 FOR I= 1 TO 50
40 FOR J= 10 TO 60
50 SOUND 4,J
NEXT:NEXT
```

```
60 SOUND 10,0
```

```
10 CLS:LOCATE 15,7:PRINT'BUZZER'
20 SOUND 8,15:SOUND 7,62
30 FOR I= 1 TO 10
40 SOUND 1,14
50 FOR J= 50    115
60 SOUND 0,J
70 NEXT:NEXT
80 SOUND 8,0
```

```
10 CLS:LOCATE 15,7:PRINT 'SHELL'
20 SOUND 8,15:SOUND 7,62
30 FOR I = 50 TO 255
40 SOUND 0,I
50 NEXT I
50 SOUND 8,0:SOUND 6,15:SOUND 7,7
60 SOUND 1016:SOUND 12,70:SOUND 13,
```

Music Mentor

Reviewed by Barbara Bridger

This ROM cartridge certainly gives a good idea of the music-making potential of the Spectravideo.

There are three main modes — piano, replay and record — in which to operate, and within each mode there are options to alter rhythm, octave, instrument and tempo.

The rhythm choices are march, waltz, tango, disco or swing, and are fun to change and demonstrate one facet of the infinite variety of music. You can try a tango Blue Danube and compare it to a march Blue Danube. Not quite what Strauss had in mind!

The piano and organ (labelled as regular) were the most realistic instrument types. The flute, gong and brass required a bit of imagination but were certainly different types of sound.

The program has an excellent system of menus controlled by the function keys, making it very easy to move from one mode to another or to alter the rhythm, tempo or whatever.

The program does its best to allow the Spectravideo keyboard to simulate a piano or organ keyboard (there is a double row of keys) and the screen display shows which "piano" key is being pressed.

After a bit of practice it's possible to play the melody line from sheet music in the record mode, then use the replay mode to play it back with different combinations of rhythm, tempo etc.

The cost of this cartridge is $69.95. Easy to understand instructions are provided but are not really necessary because of the menu instructions on screen.

Review cartridge supplied by Einstein Scientific (P.O. Box 27-138, Wellington).

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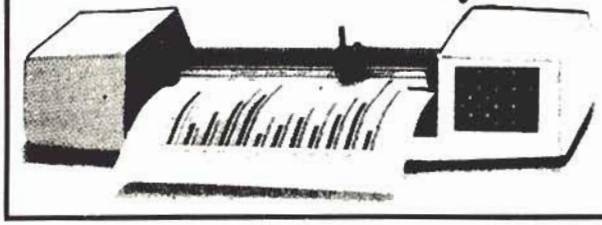

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SANYO

Profile of a Sanyo

By Noel Weeks

This is the first of a series on the Sanyo MS-DOS version computer.

In May last year, we saw the arrival of the 550/555 series with 128K RAM, one or two 160K disk drives and bundled software. The 550-2/555-2 series, with 320K drives and even more bundled software, followed in October.

I saw the need for a user group, so off to Sanyo NZ I went, and in January, armed with 40-odd names from around the country, the first meeting was organised. Membership has since progressed to 70-odd, with monthly meetings, workshops and a newsletter. The group keeps in contact with American user groups and is frequently updating the public domain library.

Let's take a look and see what the Sanyo is all about. On first glimpse, you will find that there are three IBM-compatible levels:

- Level 1 is the stock-standard 55X series and the least IBM-compatible. The 55X will quite happily run various IBM programs, provided no IBM machine-specific calls are used. This is the most popular of Sanyo's MS-DOS computers.
- Level 2, the 55X with video board (sometimes called Lotus board because it allows you to run Lotus 1-2-3) definitely moves quite a lot closer to IBM compatibility.
- Level 3, the MBC-775, is a totally new machine which looks similar and is a lot closer to IBM. Unfortunately, in transition, it lost its compatibility with the 55X series.

Is the 55X dead?! No way. Rumours flourish about new accessories for the 55X and we wait in eager anticipation. Not a week goes by without something new appearing on the market for the 55X. As purchased, the 55X is pleasantly functional, so let's look at some of its general capabilities.

The standard machine has 128K RAM, upgradeable to 256K (minus the 16K used for the video RAM). If you're into large financial spreadsheets, a RAM upgrade will probably be needed, although you should check with MS-DOS version you're using first!

Lot smaller

Early Sanyos use MS-DOS 1.25 which is significantly smaller than the later version, MS-DOS 2.11. A memory upgrade can often be avoided, simply by reverting to MS-DOS 1.25. This would probably be one of the few occasions when you will use 1.25 instead of 2.11.

The early versions of MS-DOS supplied with the Sanyo had four files missing. This has now been corrected. These MS-DOS utilities – Find, Sort, More and Recover, are well worth getting. But don't play with Recover unless you know what you're doing.

The 55X comes standard with a Centronics port (the RS232 is an optional extra). With a printer plugged into the Centronics and Wordstar on the 55X is a touch slow in screen handling, although recently, a patch was released to correct this.

InfoStar, MailMerge, CalcStar and SpellStar complete the bundled software supplied with the Sanyo. As purchased, the Sanyo is capable of handling word processing, financial spreadsheets, database management and mail management.

Each program works fine on its own and, used in combination, they become even more powerful.

Turn to page 76

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The protection business

By Gary Parker

Several people have written to me asking how they can protect BASIC programs from being stopped or listed, so I will show a few simple methods of doing this.

It is difficult to get a BASIC program to ignore the BREAK key, but it isn't too hard to get the Spectrum to "seize up" when BREAK is pressed. If the user presses BREAK, the screen turns black and the program must be re-loaded.

This may annoy the user, but the BREAK key is unlikely to be pressed by accident on the Spectrum, so if someone tries to list your program and has to re-load it, it probably serves the user right! Most commercial programs are in machine code and simply ignore BREAK, but I have seen some which react to BREAK in this manner.

Getting the Spectrum to seize up when BREAK is pressed usually involves manipulating the system variables in some way so that an error occurs if the program is stopped. The interpreter becomes confused, and somewhere in the ROM, a machine code routine goes wrong and seizes up the computer (of course no harm is done, the computer just has to be turned off and on again to restore control). I know of two easy ways to do this.

POKE 23659,0 sets the number of lines on the bottom of the screen to zero. If BREAK is then pressed, the computer tries to print a message on the bottom of the screen and finds there are no lines there to do so, and so seizes up. The POKE must be in the first line executed, usually the first line of the program.

An advantage

This method has the advantage of allowing the program to use all 24 lines of the screen, instead of the usual 22, but it has the disadvantage that no BASIC commands can be used which use the bottom two lines. So you can't use INPUT and suchlike. To demonstrate, enter this:

```
10 POKE 23659, 0
20 PRINT AT 21,0; "this is line 21 as usual", but this is line 22 "," and this is line 23!"
30 GO TO 30
```

RUN this, and you'll see that all 24 lines (numbered 0 to 23) can be used. Now press BREAK – oh no! the computer seizes up.

POKE 23613,0 produces similar effects. It corrupts the error stack, so that when an error occurs and the computer refers to the error stack, it becomes confused and seizes up. This method does not alter the screen or anything else, so you can still use INPUT and so on. Unless you want to PRINT on all 24 lines of the screen, this POKE is probably the best one to use. Try this example:

```
10 POKE 23613, 0
20 PRINT AT 0,0; INK (RND*7); "Try BREAK"
30 GOTO 20
```

Okay so now you can prevent a program being stopped while it is running. If you save the program using LINE so that it auto-starts when loaded, your program is fairly secure. But many Spectrum users know that auto-start programs can be loaded and listed by using MERGE."".

How can you overcome this? A good way is to save the BASIC program as a CODE file which auto-runs. This cannot be stopped with MERGE, and has the added advantage that a user loading your program will think it is machine code.

Memory map

To save a BASIC program in this way, you have to work out where in memory the program begins and ends. The Spectrum manual contains a diagram of the memory map which shows that the starting address to use is 23552, the address of the system variables, which must be saved with the BASIC program.

After the system variables come the microdrive maps, channel information, and then the program itself. After the program come various bits and pieces, all of which must be saved. So to find where all this ends, you have to find where memory is empty. Empty memory contains nothing but zeroes, so you need a program which will scan the memory until it finds a lot of zeroes in a row:

```
9999 FOR k= 23552 TO 60000: PRINT k, PEEK k: NEXT k
```

(Use 30000 instead of 60000 if you have a 16K Spectrum). Since you have a program in memory already, you should add this line to the end of it, and access it with GO TO 9999. Addresses and their memory contents will be displayed, and when you see a lot of zeroes in a row in the contents column, you can press BREAK to stop the line.

Take note of the addresses near where the zeroes started, since this is the address you will use when you save the program. The actual address is not critical. Since the program may contain quite a few zero bytes, make sure you have the true start of empty memory by allowing quite a few zero bytes to appear on the screen before you note the address.

It doesn't matter if you save too much, but saving too little will mean the program won't work. I usually allow a couple of screenfuls of zeroes to appear before noting the address. Even if you end up saving several hundred bytes of empty memory, it will take only a few extra seconds to load.

Once you have worked out where the program ends, you can save it. Work out the length of the program by subtracting 23552 from the end address you found, and save the program with:

SAVE "name" CODE 23552, length: RUN linenumber

where "name" is the program name, "length" is the program length, and linenumber" is the line number at which you want the program to start (often 10).

Important

It is important to have the RUN on the same line, separated by a colon. This will cause the whole line to be stored by the interpreter. Since this stored line will be re-loaded when you re-load the program, the program will RUN as soon as it is loaded, whether the user likes it or not!

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Of course, since the program has been saved as code, you will have to load it with LOAD "" CODE. If the first line is one of the POKEs discussed, the program cannot be broken into once it is running either, so you have a foolproof system of protecting programs.

Here is an example you may want to try:

```
10 POKE 23613,0
20 PRINT AT 0,0; INK (RND*7); "test program"
```

Add line 9999 above, and use GOTO 9999 to find out where empty memory begins – say about 24000 to be on the safe side. Then save the program with:

SAVE "test" CODE 23552, 450: RUN 10

(450 is roughly 24000-23552). Now load this with LOAD "" CODE. Voila! It auto-starts and cannot be broken into. However, don't forget that once you have saved a program in this way, you won't be able to get at it yourself. So keep an unprotected saving of longer programs for your own use!

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New Atari

The Atari 130XE, a 128K RAM version of the Atari 800XL, was released in New Zealand last month.

The 130XE is fully software compatible with the 800XL and retails for $659. At the same time, Atari's New Zealand agent (Monaco Distributors, P.O. Box 4399, Auckland) has slashed the 800XL price to $429 (previously $699) and the Atari disk drive to $549.

Meanwhile, there is still no word on a release date for the Atari 520ST, the Macintosh-like computer expected to sell in USA for $599.

A prototype model was shown to local Atari dealers in June but it appears the computer has still not been released in USA, and Monaco, even if it knows, is not saying when it will be released here.

Unix address

The correct address for the NZ Unix Users Group is P.O. Box 7087, Wellesley St, Auckland. The address was incorrect in our May issue.

The address regarding membership of the Unix Group is: The Secretary, NZ Unix Users Group, P.O. Box 13-056, Hamilton.

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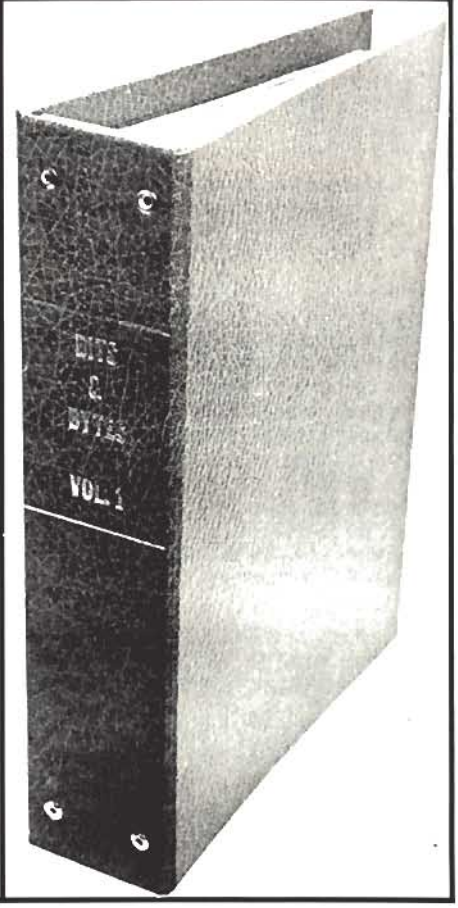

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Potentials of vision

By Pip Forer

In spite of working with many, sometimes more sophisticated microcomputer systems, one of the constant sources of pleasure from Acorn is the ease with which the BBC can interface to a wide variety of non-standard peripherals. From floor turtles to mice and from IEEE laboratory BUSes to servo motors, there seem very few additions needing more than 10 minutes (and occasionally a chip extractor) to get working. Usually too, the cost of interfacing new equipment is low.

One expansion option is systems to capture real-world images and process them on the micro. Such systems are available on a limited number of eight-bit and an increasing number of 16-bit machines. They allow the user to capture images directly from the environment, normally in black and white and normally using modifications of existing photographic and video equipment.

The ideal system has the user pointing a camera at a scene or diagram, and the image appearing at once on the screen. Once there (and also, of course, coded in memory), the image can be quickly analysed. This analysis can seek to detect all areas of a certain brightness (say cloud cover on a meteorological satellite) and may be used to estimate the area of a photograph or image that fit this criterion. Equally, the image can be scanned for recognisable shapes, such as square outlines of houses in an aerial photograph.

These ideas have been extended in manufacturing to try to give vision capabilities to robots. At the engineering school of Canterbury University, image processing with shape recognition is being used to try to recognise defective kiwi-fruit for grading. Security firms have already developed simple alarm systems based on comparing consecutive images of a view and testing for changes — appearance of men in striped jerseys and *masks, for example.*

Most applied systems are expensive and use costly sensors and powerful processors. The micro scene offers lower cost options, normally in the $200 to $1000 class. Two common options of image capture exist — capture via video camera and via light-sensitive RAM. Video capture is most prevalent but also costlier. On the BBC, images will typically be captured as a 256 by 256 matrix of dots, each dot coded either on a binary scale (on or off) or by grey levels.

Video capture

Video capture works by taking the video image signal (itself composed of a matrix of pixels) and sampling it so that brightness levels are recorded for each pixel in the computer. On video cameras, the exposure is quite well controlled and

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information on brightness can be obtained from the signal in many grey levels. However, because of the memory needs of colour and the complexity of the signal, true colour systems are rare (a common trick, used by the Digithurst Micro-sight system, is to get the same effect by using filters to extract red, blue and green components and then merging them).

The other path to vision is by light sensitive RAM (LSR), a matrix of RAM cells sensitive to light intensity. Light is focussed on an exposed LSR which has been primed so that each element in the RAM is "on". Prolonged exposure to light turns some cells "off". If a suitable exposure is used (the micro waits long enough between priming and sampling), a black and white image composed of patterns of on and off cells can be obtained. With suitable adjustments, pictures can be captured and, with several samples of the same image, grey shade levels built up.

The Commotion MicroRobotics EV1 system uses this technique. It is relatively cheap ($NZ390 in Britain) and looks tempting. The RAM is sited in a small camera housing behind a Pentax lens. For the BBC, the connection is made by the user port. The RAM is composed of two units, each 128 by 256, giving a 256 by 256 resolution with a "join line" noticeable between the two areas. The system takes 30 seconds to install since it comprises just the camera and disk-based software. However, is it of any real value?

The software

The software which comes with it offers the user four main programs — a simple black/white image grabber; a grey scale (auto-exposure controlled) grabber; an object recognition package; and a movement detection security program. The machine language routines used by the programs are also fully documented to let you patch together different routines. It is simple to plug the camera into the user port, and boot and use any of the programs.

The time taken to create images may be longer than you might expect. A simple black-white image can be captured in eight seconds in a typically well-lit room, with a three-second refresh rate. The scanning needed for grey scales means the full redraw period is about 12–15 seconds, with an initial 20-second calibration period. The main determinant in this is the speed of decay in the LSR. The state of the RAM can be scanned in a few hundredths of a second; the crucial delay factor is the exposure time needed to let adequate numbers of cells decay to give a picture. This is very lighting sensitive.

The programs in general work quite well. The security and pattern recognition systems, while primitive compared with professional systems, have some nice features, and all the programs can be modified to the user's needs. Once you have set up your camera to capture a suitable image, you can get some enjoyable, and even useful, results. The pattern recognition program, for instance, could easily be modified to classify river pebbles by their shape.

The main problems are not with the software but with the hardware — getting the best image possible — and then the inherently limited quality of even this. The LSR sensor is plagued by its inflexibility to different light

Turn to page 76

More LOGOS & Fortran.

1985 is the year of the new language for the BBC, and the first six months have seen it emerge as one of the best-equipped eight-bit machines in terms of the range available. Latest to arrive are Logotron LOGO, a fast, one ROM implementation, and Fortran under the UCSD p-System (for the traditionalist, "Fortran fortifies the over-40s").

Compared with Acornsoft's offerings, the LOGO seems to gain on speed plus its editor (and has a disk version) at the cost of some options in its command vocabulary. Logotron has promised to overcome this deficiency, and add much more, through a series of related products including a sprite board and disk-based extensions to the language.

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Learning with the Muppets

By Jeff Whiteside

Let's look at some of the products intended for younger age groups.

I have recently used (and observed the use of) the Muppet Learning Keys, a device which plugs into a joystick port.

This must be by far the best aid for pre- and primary schoolers, as it is a whole new keyboard with a much more logical layout of letters. No more must they struggle to find a letter they want (although I've seen four-year-olds having little difficulty with our cumbersome typewriter layout). The Muppets make learning fun!

On the learning keys is a slate with the letters looking as though they were written in chalk! And they are laid out in alphabetical order (knew my lessons in remembering the alphabet would come in handy one day!)

Above the slate is a paintbox showing eight colours. Each block of "paint" is a button which is pressed to change colour. There is even a paintbrush pictured! Above that is a ruler with the numbers 0 to 9 on it.

Cursor keys are cleverly represented by an "official model" frog scout compass, looking as though you could pick it up off the board. Above that is a pencil eraser (delete key) and a mysterious-looking badge with "ZAP" marked on it.

Below the compass is a little comic showing four pictures: Kermit on a motorcycle with a green light marked "GO"; Fozzie in a policeman's hat holding up a hand and a "STOP" sign; Gonzo being fired out of a cannon towards a brick wall shouting "OOPS"; Miss Piggy (who can resist her charm?!) tied up on a railway track crying "HELP" as a train bears down on her!

Sticky fingers

The whole unit is very sturdily constructed in plastic and appears to be durable. And if sticky fingers get all over it? Why, then, a damp cloth brings it up good as new!

It comes in with disk-based Muppet discovery software providing three different "games".

In the first, a stage is depicted on the screen and whenever a letter is pressed, a picture appears (and moves, playing music, when "START" has been pressed). For example, press "K" and Kermit appears, waving at you while a kite flies in the background. Pressing a number displays that number of kites. Pressing a colour changes the colour of the kite(s) (but not Kermit — a frog is a frog is a frog! And besides, Miss Piggy might not like him in another colour!)

Other pictures are of ghosts (and Gonzo), zips, walruses, yoyos, pretzels (and Miss Piggy), noses and fire (with Fozzie).

The second game displays one of the objects from the first game. The child must type in the starting letter of that object, and is rewarded with the object becoming animated.

The third game displays several of the objects and asks how many? Similar rewards are involved.

Enjoyed it

Although the keys are recommended for children older than three, my 14-month-old son enjoyed using it. It's difficult at the best of times to keep him away from the computer but it became nearly impossible when he found that leaning on the keys in certain places did things and played music. He particularly enjoyed waving to Kermit and I particularly enjoyed wiping the board clean afterwards!

One comment — it was rather distracting looking at the help function screen several times. He had a tendency to lean his elbow on the comic book while reaching with his left hand for the letters. I can imagine older children doing the same.

I also observed others using the keys, and they not only enjoyed them but also (more importantly) wanted to use them again on other occasions. They became noticeably more skilled in the "games" too (also important).

Koala Technologies, the US-based manufacturer, deserves to be congratulated on a fine product. The only detraction it seems to have is that additional software is still under development and is not yet available. Atari users get a utility which allows the keys to be interfaced as real keys (but not the Muppet Discovery software — C64 only). No doubt this facility will be extended to Commodore too to allow young children to use existing software more easily.

The New Zealand price is $210.

CBS arrives

By Jeff Whiteside

The excellent CBS software range is now available in New Zealand. Several programs were produced by the Children's Television Workshop and, not surprisingly, feature Sesame Street characters.

A novel feature of this software is that use is made in some of an "Easykey" keyboard overlay designed to make it easy for young hands to find their way around the keyboard by limiting their choice of keys to press. Next best thing to the Muppet Learning Keys. My one reservation is that occasionally the overlay slips, leaving the child wondering why the part he pushed before worked then and not now. However, readjusting it sets things right again.

The range includes "Big Bird's Funhouse", a memory improvement and character recognition game which has Sesame Street characters hiding behind windows, ringing bells, running and sliding down a slide into a bucket of water! The Count even turns into a bat.

If the child's choice of a character (pictures of them are on the overlay along with a yellow outline of the appropriate key) is wrong, Big Bird appears (on skates!) and shakes his head. There are different types of game and levels.

Also included is "Astro-Grover", designed to help with numbers and arithmetic. Counting the zips saves Earth from being invaded by them, and completing the "game" successfully results in some great up-tempo music while Grover appears in a space helmet and disco-dances!

Other titles are "Sea Horse Hide and Seek" (the child has to guide a sea horse to a sunken ship, while avoiding being eaten by hiding in certain areas and matching the sea horse's colour), "Ernie's Magic Shapes" (recognition of shape and colour) and "Dinosaur Dig" (a two-disk exploration of the world of dinosaurs for eight-year-olds up which teaches names, giving pronunciation guides, characteristics, and even includes a brief treatise on continental drift – wish I'd had one when I was into dinosaurs at school!)

The cost of these programs is about $50.

In a later article I shall go into the Spinnaker range of software (also excellent children's learning tools).

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You've got to talk

By Jeff Whiteside

Let's take a trip . . . and we don't even have to leave the living room (provided your computer is in it!!) I am referring to a "trip" via satellite to USA and a public database called Compuserve.

First step — we must be a registered user of the Post Office's PACNET system (a replacement for Oasis involving packet switches). The Network User Address (NUA) we need is 0311020200202 (a direct line) or 0311061400227 (select a host name CIS). Of course access codes from Compuserve are necessary too.

Remember the advertisements in US magazines for Compuserve?? Well, they're all true. But as the man says, "you ain't seen nothing yet".

Compuserve is a big database which operates rather like a (very) multiuser BBS. But the amount of information is colossal! It covers news, weather (including Hires weather maps), electronic shopping, electronic mail, on-line multiplayer adventure games, stock market information, special interest groups (including astronomy and rock music), computer interest groups and the Commodore information network! I don't believe any one user could see even a cross-section of the information on it.

My experiences centre largely around the CIN (Commodore Information Network) — an area set up and maintained by Commodore. There are three forums — C64, Creative Corner, and Advanced Programming (including telecomms and alternative languages such as Comal). You register for each separately and are greeted personally by name when you return to each section.

Data libraries

The data libraries are a big facet. These are maintained by Commodore (press releases and the like, conference transcripts etc) and by the users who contribute public domain software, most of a very high quality. The selection is vast.

The noticeboards are also vast and many are addressed publicly to other users. Replies are recorded and you can be happily occupied reading several replies to an original message. As was the case with me when I read about Atari's withdrawal from the June Consumer Electronics Show. Plenty was said about that!!

But probably the most interesting section was the teleconferencing area. Here, many people talk to each other at once, much like a CB channel. Of course, there are some unwritten rules, such as avoidance of bad language. In such instances, the offender is likely to end up with no one else to talk to!

Sometimes, following the thread of conversation is difficult as several conversations take place at one. And, as you are talking in full duplex, what you type is mixed up in whatever is incoming. A control character will cause a retransmit in the event of undecipherable text.

Fortunately, COing is not as difficult as on most occasions — many channels are provided and there is also the facility for a one-on-one conversation on which no one can eavesdrop. The computer becomes sociable again!! Instead of isolating people, it is a tool to establish communication with people you have never met.

If you get stuck with any use of the system or simply want to ask a question, there is always at least one SYSOP on hand. Commodore thoughtfully provided them to help if at all possible.

Real power

Probably, the real power of teleconferencing is best illustrated by an on-line conference held some weeks ago featuring the illustrious Jim Butterfield as a guest. He was in Toronto and questions were asked from all over continental USA.

This is formalised conferencing with a SYSOP keeping track of who wants to ask a question (you are allocated a number and are prompted for the question in order) and a moderator who acts as a chairman. Imagine service seminars with a Commodore technician on line, an adventure tutorial with an experienced adventurer or a live aid to new computerists! I even noticed an advertisement for Arthur C. Clarke visiting the Astronomy SIG (special interest group). The possibilities are endless.

Let's return to our own shores. Are we likely to see such things happening in New Zealand? The answer is yes. My own opinion is that you out there would get very bored with a videotex service which did not provide this kind of interaction.

Note the sudden introduction of the word, videotex. Compuserve is a form of videotex service which operates at 300 baud with an option of 1200 baud. Some of the things they are doing are not being done in England with Prestel. Why shouldn't we take a leaf out of both books and provide an even better service here?

In New Zealand, we are sometimes fortunate in being a little behind the times. We can learn from other mistakes. You will see a rapid growth in telecommunications in New Zealand over the next year. I hope to be able to keep you informed of new events and achievements in this area.

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BASIC tips

By Graeme Fleming

Many programmers (myself for example) run out of brain power while converting their basic logic to BASIC logic. In English, this means sticking maths and things into computer programs. My examples are in Commodore BASIC, any version, but will work in any BASIC with a little or no conversion.

First, let's look at string splicing, using the commands LEFT$, RIGHT$, MID$ and LEN. Example program one shows a simple use of these commands which should be described in your manual, but they can be used in a more complex format for other results.

Let's say you want the user of your program to enter three numbers in one input, with the numbers separated by a space, 23 7 541 or 2 1000 64 for example. The program would have to extract each of the three numbers separately by string splicing. Example two does this, incorporating for-next loops. It changes the numbers from strings to variables using VALue.

Some months ago, I wrote a program on a PB-100 in which the user had to enter two numbers as in example two, the second a weight – in kilograms. The problem was: some people entered it correctly, but some insisted on tonnes, so 10000kg became 10.000kg.

To overcome such a problem, which seems to arise from time to time you simply need to get a number in between the 10000 and the 10. The number must be large enough so that weight entered in tonnes never reaches it and too small for the weight entered in kilograms to reach it either. Example three shows this, using 99 as the cut-off point.

While graphing and performing various mathematical functions, I sometimes find I have a set of say, five numbers from zero to 20, which I want to (trying not to be technical) turn upside-down. What I mean by this is to make any 20s into zeros, 19s into ones, 18s into twos.

In example program four, you enter five numbers from 0 to 20, and it then performs this operation. Note the method used in line 30, where A(c) is one of your inputs and B(c) its opposite. Also note how I used two for-next loops for three operations, which increases speed and takes less memory. See if you can shorten it to one, keeping the screen neat and tidy.

Example five is a program which figures out the perfect numbers – numbers which equal the sum of their factors, excluding the number itself. It is a little slow, but if left running a while, it gets quite a few.

```
5 REM **** EXAMPLE THREE ****
10 INPUT"WEIGHT";W
20 IFW<99THENW=W*1000
30 PRINT:PRINT"WEIGHT IN KG IS"W
40 PRINT"WEIGHT IN TONNES IS"W/1000
```

```
5 REM **** EXAMPLE FOUR ****
10 DIMA(5):DIMB(5)
20 FORC=1TO5:INPUTA(C)
30 B(C)=A(C)*-1+20:NEXT
40 FORC=1TO5:PRINTA(C)"BECOMES"B(C):NEXT

READY.
```

```
5 REM **** EXAMPLE ONE ****
10 INPUT"TYPE THREE LETTERS & PRESS RETURN";A$
20 IFLEN(A$)<>3THENPRINT"TRY AGAIN !":GOTO10
30 PRINT"LEFT$(A$,1)  IS ";LEFT$(A$,1)
40 PRINT"MID$(A$,2,1) IS ";MID$(A$,2,1)
50 PRINT"RIGHT$(A$,1) IS ";RIGHT$(A$,1)
60 PRINT"LEN(A$) IS ";LEN(A$)

READY.
```

```
5 REM **** EXAMPLE TWO ****
10 B=1:INPUTA$
20 IFMID$(A$,B,1)=" "THEN40
30 B=B+1:GOTO20
40 C=B+1
50 IFMID$(A$,C,1)=" "THEN70
60 C=C+1:GOTO50
70 X=VAL(LEFT$(A$,B))
80 Y=VAL(MID$(A$,B+1,C-B-1))
90 Z=VAL(RIGHT$(A$,LEN(A$)-C))
100 PRINTX:PRINTY:PRINTZ

READY.
```

```
5 REM **** EXAMPLE FIVE ****
10 DIMF(5000):FORA=4TO10000
20 FORB=2TOINT(A/2)
30 FORC=2TOINT(A/2)
40 IFC*B=ATHENF(C)=1:F(B)=1
50 NEXTC,B
60 T=1:FORB=2TOA/2:IFF(B)=1THENT=T+B
70 NEXT:IFT=ATHENPRINTA;
80 FORB=2TOA/2:F(B)=0:NEXT:NEXT
```

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It pays to save regularly

By Dick Williams

It's time to go further with the Sega disk drive model SF7000. Here is the program from last month which you may have already tried.

This is to save to random file:

```
10 A$= "JIM"
20 OPEN "DATA" AS # 1
30 PUT#1, 1; A$
40 CLOSE
```

This is to read from random file:

```
50 INPUT "PRESS CR"; K$
60 OPEN "DATA" AS #1
70 GET#1, 1;A$
80 CLOSE:PRINT A$
90 L=LEN(A$):PRINT L
```

This program is for demonstration purposes only. It will put JIM on the disk and it will read JIM back. Line 50 is there to provide a break between saving and reading.

When you run the program, line 80 will print JIM on screen and line 90 will print the length of JIM. Did you get length of JIM as 255? This is not an error; it's one of the very important problems that can occur when writing and reading with a disk drive unit.

Obviously, JIM is not 255 long because it has only three visible characters. You would expect it to have a length of 3. What went wrong? Have a close look at the string, A$, printed on the screen. It says JIM. Nothing wrong with that because in line 10, we defined A$ as JIM.

Underneath JIM, we have the length of JIM printed as 255. Notice that the length is printed immediately below JIM. If A$ were really 255 long, you would expect six or seven blank lines before the length was printed.

We still don't know whether A$ is 3 or 255 long, but there is a way to test it. If A$ is really 255 long, then adding one more character would make it 256 long and, as you know, the Sega won't allow strings longer than 255.

So we have A$ read from the disk and showing a length of 255. Type (in direct mode) B$="Z": PRINT A$+B$.

Doing this, you will find the "string too long" error message printed on screen.

Need for care

It does appear that under certain circumstances of saving and reading via the disk, a short string can be turned into a long string. But more importantly, it still looks on screen as though it is a short string. This can cause a lot of trouble to anyone not familiar with this kind of problem. Remember I deliberately omitted details from the code to show it.

Line 30 in the save to disk program reads

```
30 PUT#1, 1;A$
```

Notice there are no position indicators after A$.

Last month, I gave details about the use of position indicators to place A$ (or any other string) on the disk at a precise location within a file record. In the following examples, A$ still refers to JIM because it's short and simple, has an obvious length of 3 and, since you already know the answer, it becomes much easier to check your disk efforts.

Alter line 30 to read

```
30 PUT#1, 1; L,0,8; A$,8,L
```

I have placed L, the length indicator at position 0 and allocated eight bytes for it because the manual states that variables take eight bytes. These bytes are used (01234567), so the next free position is byte number 8. This is where I have placed the starting position for A$, and for L number of bytes further on.

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Duplicate this code in the get line and add L=LEN(A$) in line 10 and you should then be able to save A$ on the disk and read it back. It should also show the correct length of 3.

Three choices

If you now wish to save another string, you have three choices — save it in the same record as A$ (1); place it in the next record number (2); or save it in any record number while remembering there is a limit to the number of random file records that can fit on the disk.

If you decide to save further data in record (1), it must be after A$. How do you work out where it should go?

You might say that since A$ starts at 8 and finishes at 10 (8 9 10), you would be quite safe in saving a new string (say B$) at position 11. Unfortunately, this is not correct. With the specific A$ I have been using, it would be OK. But what say A$ happened to be 5 or 10 long? The best plan is to decide on the maximum length which A$ is allowed to be, then you can quite safely save other strings further along in the record. Here is a program, to show the basic idea.

```
5 REM  "------ 15 ------"
10 NA$="HARVEY K D-----"  :REM NAME
15 AD$="10 ARCHER ST---"  :REM ADDRESS
20 TN$="PUKEKOHE-------"  :REM TOWN
25 PH =12345              :REM PHONE
30 SA =200.15             :REM SALE
35 BA =20.75              :REM BALANCE
40 INPUT "SAVE TO DISC ";K$
45 OPEN "SALEDATA" AS #1
50 PUT#1,1;NA$,0,15;AD$,15,15;TN$,30,1
5;PH,50;SA,60;BA,70
55 CLOSE
60 INPUT "READ FROM DISC ";K$
65 OPEN "SALEDATA" AS #1
70 GET#1,1;NA$,0,15;AD$,15,15;TN$,30,1
5;PH,50;SA,60;BA,70
75 CLOSE
80 INPUT"PRINT DATA ";K$:PRINT:PRINT
85 PRINT NA$,AD$
90 PRINT TN$,"PHONE ";PH
95 PRINT "SALE$ ";SA,"BALANCE $ ";BA
```

You can see that the name string, NA$, has been set at a length of 15. Some names will be shorter and the balance of the string is filled with dashes. This makes it easy to identify as a padded string in case you have to do some processing on it later in a program.

Quite easy

Sequential files are, by their very nature, quite easy to use and, with the exception of the append mode, act in a similar manner to any other print in sequence code. For example, this program would print a series of strings

```
ON SCREEN
30 FOR P=1 TO 50
40 PRINT A$(P)
50 NEXT
```

Adding a few extra lines we get:

```
20 OPEN "ADATA" FOR OUTPUT AS #1
30 FOR P=1 TO 50
40 PRINT #1, A$(P)
50 NEXT
60 CLOSE
```

Two extra lines (20 and 60) and an alteration to line 40 and there it is. Very easy to use and once you have created a data file from one program, you can read that file back into another program.

This makes it easy to save valuable data (strings or variables) in bulk and create several programs to process the data in various ways. Sequential files are more suitable for storing lots of short pieces of data because each item of data is stored right after each other with no wasted disk space.

One difficulty with sequential files is that since the file has to be open for the period of a save, there is an ever-present risk of the power failing halfway through.

This should be taken into account when planning your disk save methods. Saving data to a disk is relatively easy. Saving data to disk reliably is a different story.

Imagine how you would feel if you were halfway through saving your most valuable data, and the power failed, someone accidentally pulled the plug, or, as can easily happen, the disk went off line because of a blip on the power supply.

The file would be incomplete and it is not easy to coax a half-written file to give up its contents. Some of the data would have been lost and there would be no easy way to reconstruct it.

Right balance

By striking the right balance between the use of random and sequential files, it is possible to considerably reduce the likelihood of total or partial data loss through power failure during a save routine.

It takes the disk one second to get the disk motor up to speed and have everything ready to save data to a random file. It may take a further four seconds or so to actually write one record in a file, and a further second to close the file.

This gives a total of about six seconds and it is during this period with the disk file open that data could be lost. If you use the disk, say 10 times per hour, you would be at risk for 60 seconds in the hour.

Contrast this with a sequential file which may be open for between 20 seconds and five minutes at a time. A power failure or power disturbances during this file open period could destroy all the data.

At work, we use the disk random files to save data as sales are made and the random files are transferred to a sequential file either at night or next day. This gives the speed and relative safety of the random files at the time and sales data is recorded, as well as efficient disk storage offered by the sequential files.

To be as safe as possible, I copy the working disk frequently, and we also have a printer making a paper back-up copy.

We haven't had a power failure for months but we have had the disk stop because of turning on something on the same power circuit. This used to happen every day and was quite a serious problem.

No problem

We found a computer inline mains interference suppressor stopped this problem. We also found no problem in leaving disks in the drive when it is switched off at night and on again next morning.

Some disk drive manufacturers warn against doing this. But we found no warning in the Sega disk book and so far, have experienced no problems.

Our Sega disk drive at work runs all, day, seven days a week and would be used about 10–30 times an hour, sometimes more on a busy day. We fill up one disk per month with sales data and I have a program to compile the essential details from each month's disk so that we can see any trends in customer purchases and make sure the appropriate stock is on hand or on order.

There is more work associated with running a computer but, to balance out the extra effort, we now get reliable sales information from the computer and disk when we want it.

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A powerful DOS

By Gordon Findlay

The continuing saga of TRS80 disk operating systems divides into two main streams at this point. TRSDOS, Newdos in its various incarnations, Multidos and other, less important operating systems are joined by a group of operating systems which differ significantly in philosophy.

Two new terms — device independence and device drivers — indicate the prime areas of difference. My example is LDOS, written by Logical Systems, and later,in a slightly modified form, adopted by Tandy as TRSDOS 6.2. This was a major change in attitude by Tandy, and indicates the degree of disenchantment which had built up with its own in-house and contract efforts. It also indicates perhaps that LDOS is a very full-featured system.

LDOS is a system which can be appreciated and used at different levels. It is powerful enough to look after the beginner, demonstrating the simplicity which is an indication of real sophistication in software. A beginner will find it a most forgiving system.

It also offers the advanced programmer a very firm, reliable and stable environment to work in, and supplies a powerful job control language, JCL, which can be used to construct a "shell" around a software package to make the whole operating system invisible, and inaccessible if for use by non-computerate users.

In other words, LDOS has many levels at which interaction with the user may occur.

New concept

Device drivers and filters are possibly a new concept to the TRS80 fraternity. The operating system must communicate with peripherals such as disk drives, keyboards, screens and printers through some software.

In TRSDOS, and many others, this piece of software, called a driver, is built into the operating system, and cannot be easily changed. LDOS uses the concept of external drivers, which are separate rather than built into the DOS itself. These are readily customised to whatever is required. Naturally, drivers are supplied for keyboard, display, drives RS232 and printer, but the degree of flexibility is enormous.

I would not attempt to summarise the LDOS documentation here, but as an example, the keyboard driver supplied may be used. This allows the activation or not as desired of a type-ahead buffer, a screen print, setting the auto-repeat rate, and the delay before repeat starts. The full range of TRS80 characters, including the graphics codes, may be typed, using the (CLEAR), or (CLEAR) and (SHIFT) keys.

A filter is another piece of software, inserted temporarily or permanently between the device and a driver. Examples in conjunction with the keyboard driver can turn the keyboard into the Dvorak layout, or provide a "key stroke multiply" feature, which allows phrases, stored in a disk file, to be associated with each of the alphabetic keys. This can save a lot of typing!

The use of filters and drivers allows the configuring of LDOS to a staggering degree of variety. The system can be set up exactly as you want it. Changing also becomes very easy — if you sometimes use a different printer, you can adjust

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output appropriately by changing the associated filter, or for minor changes altering the supplied filter, which for the printer device has 11 parameters, such as the left margin, length of page, characters per line etc.

Difficult

Device independence is a difficult concept at first, but very powerful in practice. Forget any difference between devices such as a printer, and disk files. The use of the LINK and DEVICE commands in tandem with each other allows truly flexible use of the system. Printer output may be rerouted to a disk file, to two printers, or to a modem . . . keyboard input may be sent to the printer, a disk file, down the line through a modem . . . the possibilities are endless.

The use of external drivers and filters means the DOS uses some of high memory. Naturally, the system itself, and its supplied utilities, respect this use,but care must be taken with other software.

Associated with LDOS is a version of disk BASIC called LBASIC. This is a more powerful BASIC than is common on the '80 although missing some features of, say, DOSPLUS BASIC.

LDOS needs to be configured before use with your hardware, but this is straightforward. The system configuration may be changed, temporarily or permanently, using simple commands.

I have found one inconvenience. It does not seem to be possible to boot LDOS from a double-sided diskette. You have to boot from a single-sided disk, then swap disks and "log it on" to establish double-sided operation.

LDOS has numerous other features, many of them extensions of TRSDOS commands. The use of partial file names is extended in LDOS, so it is possible to get a directory, or to copy or kill all files with extension "/BAS" say, or all files with names containing a particular phrase.

Features include such things as a "job log" to record what is done, a spooler, a powerful build command, and the "memory" command which will not only reserve memory but clear, display or edit RAM.

Utilities

Utilities with LDOS include BACKUP, to copy whole disks; CMDFILE, for tape/disk transfers; FORMAT, a communication program; LCOMM, a patch utility; doubler support; and other less important files.

Documentation is extensive, well written and complete. There are extensive examples of almost all the library commands and use of the utilities, and full documentation of DOS routines for the assembly programmer. LDOS runs on any model I or III, and in its TRSDOS guise, on the model IV.

Through use of the supervisor call table, it is possible to ensure software compatibility with all versions of LDOS. Documentation of both advanced and simple features is of an extremely high standard. As well as the supplied documents, which fill a large ring binder, a quarterly journal is published, discussing the system and other topics.

Several sets of "toolbox" programs and utilities have also been marketed, although I haven't seen them in action. The level of support is most impressive.

The review copy of LDOS was supplied by Molymerx Ltd (P.O. Box 60152, Titirangi). The system retails for $215, which compares favourably with its price in USA when exchange rates are considered.

Help!

Now, a plea for help. Several people in Christchurch, including myself, are interested in an interpreter for the C programming language, written and marketed by Tiny-C Associates, of Holmdale, New Jersey, USA. We've written more than once to the firm, but without reply — it seems to be defunct. Can anybody help us with information about Tiny-C? Please write to me, either c/- *Bits and Bytes*, or at 87 Somerfield St, Christchurch 2.

Good news . . .

News recently that the Tandy multiuser system has become one of the biggest selling Xenix (like Unix) systems in USA. The model 2000 and the 1200 also seem to be doing, if not well, at least "OK".

. . . and bad

Infocom, which authored the best text adventures ever (the likes of Zork I, II and III, Deadline, Starcross and Suspended) has advised me it is discontinuing its software in Model I format, and there isn't much left. Several of the recent games, such as the Hitchhikers Guide to the Galaxy, Seastalker and Suspect, don't seem to have been released in M1 format.

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This is progress?

By John MacGibbon

Apple's new ProDOS is bringing us welcome benefits, or so we're led to believe. One benefit claimed for this awkward cow of an operating system is faster working programs.

OK then. So why can't someone write a halfway decent spelling checker for my newfangled, ProDOS style, word processor files?

The other day I put a 2225 word article on a DOS text file through my ancient (1982), Sensible Speller 3.0. I timed how long it took to get the file, count the words and compare it against the dictionary.

Crusty ol' Sensible Speller 3.0 zipped through the job in 69 seconds. Not bad.

Then I converted the article to an AppleWorks file and put it through a friend's newer Sensible Speller for ProDOS. Faster still? Well not exactly; it clocked up 149 seconds — more than double the DOS 3.3 version time.

Not only that. Using the program was decidedly messy. It required a knowledge of ProDOS conventions for a start. A friendly little number!

Anyway, having negotiated the first part of the checker, I thought I should at least add some Kiwi words to the dictionary disk. So I followed the tortuous instructions, and was finally invited to build my enhanced dictionary on a new pre-formatted disk.

Tortuous

Unfortunately, I wasn't given the option of doing it on both my disk drives. "Put the old dictionary in the drive/put the new dictionary in the drive/old/new/old/new" on and on it went. Must have been at least 50 swaps before I gave up and bowed to American spellin'.

There has got to be a better way, I told myself as I trotted off to a friendly computer store in search of other ProDOS spelling checkers. There was only one on offer — MegaWorks, by the Megahaus people. Now they have glossy ads in A+ and InCider. Should be good; and a snip at $300.

A snip? Well, in weak defence of this hefty price, I should point out that the program also does mail merging — not that I often feel an urge to merge (mail that is, Hortense).

I brought out my 2225 word file and booted up Megaworks with eager anticipation. This early in the financial year, the office budget could easily stand $300 for a really worthwhile product.

Long wait

Right from the start things looked better. The screen format was almost identical to AppleWorks, and you didn't have to pussyfoot about with pathnames.

But wait. . . and wait. . . and wait. . .

And wait some more. To be exact, wait for 568 seconds. Shiny new MegaWorks did the job, and it took only eight times longer than my antediluvian Sensible Speller 3.0, running on obsolescent DOS 3.3

This is progress?

I didn't wait to try megamerging.

Pass Bits & Bytes to a friend

Perfect timing

By Fred & Alex Wong

One of ProDOS' more useful and less publicised functions is its ability to time and date-stamp documents and programs in conjunction with a real time clock/calendar peripheral card. This is particularly useful in business applications as it will note automatically (as in AppleWorks) when a file was last modified.

The Time-Piece Clock card, from Innovative Computer Systems (maker of the Innova Drive), is designed specifically to work with ProDOS and programs such as AppleWorks.

The Time-Piece is a nicely manufactured card that contains, besides the usual bits and pieces to make it go, three rechargeable button-sized NiCad batteries that keep the time, regardless of the state of the Apple. When the Apple is on, these batteries are trickle-charged and provided they are full to begin with, will keep going for three months without another charge.

A very well protected Apple style box also contains the operating manual and a utilities disk. The card may be installed very easily by plugging into any slot except the auxiliary slot.

To use the Time-Piece clock card with a Pro-DOS-based program like Apple-Works is simplicity itself. Boot up AppleWorks as usual. Then, instead of staring up at the calendar (as Fred and I both do), simply type RETURN when prompted.

All the files worked with will display not only the date they were saved to disk but also the time, down to the minute! It's quite a change to see so many entries in the previously empty time column – *which gives a much clearer picture of my* strange work habits, as well as the state of progress of my projects.

Four programs

There are four programs on the utility disk. Three of them are written in Applesoft and demonstrate how the Time-Piece may be programmed from BASIC. They read and display the time in ASCII string format, set the time and date and determine which slot the card is in. Any or all of these, which make generous use of embedded ProDOS commands, can be used in other BASIC programs.

The last program on the disk is written in assembly language (with which the card can also be programmed) and displays the date and time to each second, using the Time-Piece's interrupt capability.

The Time-Piece card can generate up to four interrupt rates – 1024Hz, 1Hz, each minute and each hour. Interrupts are enabled by switching one of the four DIP switches on the card and are generated from either Applesoft or *assembly language.*

By the way, I have no idea what interrupts are used for, but Fred intones some mysterious words – "multi-tasking and other stuff!"

The Time-Piece comes with a tastefully produced manual that is short and to the point. It doesn't have fancy diagrams, colour or pictures but does have a large amount of technical programming information useful to everyone. It also contains a tutorial on installation and use of the utility programs.

The Time-Piece clock card is highly desirable hardware. In a business environment (where time becomes a much more important factor than at home) using ProDOS-based applications especially, it would be a great asset. With a competitive price of $270 (as opposed to $600 for a Thunder-Clock), it isn't a great deal to spend.

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WHICH PERIPHERALS?

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Jerald Brown

dilithium Press. $39.95.

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BOOKS

Three for the technician

Microelectronic Systems — Level I by P. Cooke. Technician Education Council in association with Hutchinson. 184pp. $15.75. Microelectronic Appreciation — Level III by Glyn Martin. Technician Education Council in association with Hutchinson. 112pp. $17.50. Microelectronic Principles — Level IV by Glyn Martin and Nick Heap. Technician Education Council in association with Hutchinson. 268pp. $24.50. Reviewed by Gerrit Bahlman.

These three books, part of a series of microelectronics/microprocessors published by Hutchinson on behalf of the Technical Education Council, stem from an expressed concern that the introduction of computer technology in the workplace would leave technicians bereft of the skills needed to adapt to them. The British Department of Industry consequently encouraged the development of educational programmes to meet this need.

Significantly, the Department of Industry was sufficiently concerned to encourage the introduction of computers to British secondary schools to ensure all high school students were given the all important background to the new technology. Interestingly, the Department of Education both in Britain and New Zealand has shown itself unable to embrace the requirements as enthusiastically as the British Department of Industry.

The British educational emphasis on the new technology is remarkably technical. Even in the high schools the emphasis is on building and constructing rather than simply using. The books reflect this.

"Microelectronic Systems — Level I", the first in a series of three introducing the idea of microcomputer based systems, uses a physical approach detailing everyday mechnical systems, measurement transducers, and controllers. Each chapter has associated questions to ensure the concepts have been grasped.

The approach is rigorous and demanding. There is no doubt the book is intended for serious study and it not light reading for the vaguely interested. This first text covers basic systems, analogue/digital systems, microelectronic components, peripherals, microcomputer hardware and programming using the 6500 instruction set.

"Microcomputer Appreciation — Level III" follows on from the systems sequence but takes a pragmatic line in examining how microprocessors may be used. The author expresses the concern that the book will provide an indication of the potential of the microprocessor to provide a basic background for technicians in modern industry.

Once more, the emphasis is clearly on assembly programming aspects without getting too deeply into the architecture and programming. The intention is to retain the perspective that the applications are governed by essentially simple principles. Jargon, such as RAM, ROM, EPROM etc, is dealt with in detail as are concepts such as device interrupts. Once more, a text book that demands study and not in the light-reader category.

"Microprocessor Principles — Level IV" follows on from the two

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books in the "Microprocessor Appreciation" series. Its avowed intent is to extend the student's ability to develop and use software at the machine code level, using the Intel 8080/8085 type of processor for practice, to develop a student's comprehension of microelectronics devices, enable a student to appraise transducers and controllers; and introduce a student to maintenance requirements of microprocessor controlled systems.

Clearly aimed at the technician, the three books are an integral part of a detailed course of study and are used by the British Open University. In all, there are seven books in the course and from this sample, it is clear that mastery of all seven would provide an extensive background to anyone wishing to become familiar with the application of micro-processors to industry.

Logo variety

88 Apple Logo Programs by Mitchell Waite, Don Martin, Jennifer Martin. Published by Howard W. Sams and Co, 1984. Pp422. Reviewed by Gordon

This volume contains detailed development and sample runs of a number of Logo programs, both short and long. Considerable emphasis is placed on careful coding of programs in a — dare I say it — "well structured" way, and on making programs user-friendly.

Several programs are utility or procedures for inputs of various sorts, for text and screen manipulation, and for arithmetical manipulations such as rounding. The main programs cover turtle graphics, short and long games, graphs, data filing, and so on.

Appendices include a summary of Logo commands, ASCII tables, managing the work space and handling the programs on disk (apparently available from the publisher). A final appendix suggests ways of further improving the programs, particularly in their interaction with the user.

Few books contain such a variety of programs in Logo, and this is the only one I have seen which develops lengthy programs outside the Turtlegraphics field. Each program is explained carefully, with structure diagrams and sample runs. Recommended for those who want to go beyond the turtle, but within the friendly Logo environment.

Micro-mainframe links

Skellerup Microsystems Ltd (P.O. Box 19-648, Christchurch) has a number of new products in the area of micro/mainframe integration.

The systems include a facility for Burroughs mainframe computers to allow files to be extracted and interchanged with spreadsheet and database software running on most popular micro-computers.

Terminal emulation has been around for some time but the newer products in this area support what is known as virtual disk technology — the facility where programs running on micro-computers can use the power of the micro-computer's operating system to treat mainframe data storage areas as additional micro disk drives. Separate virtual disk areas in the mainframe can be set aside for public and private (secure use).

Data stored in a "public" disk can be shared freely by many micro-users, while data stored in "private" disk can be restricted as required. These mainframe disk areas can be described as surrogate "hard disk" areas which can eliminate the need to invest in costly hard disk units.

Skellerup is working on a set of software to allow IBM, Burroughs B21 and B25, or Wang micros to act as terminals to Burroughs or Sperry mainframe computers.

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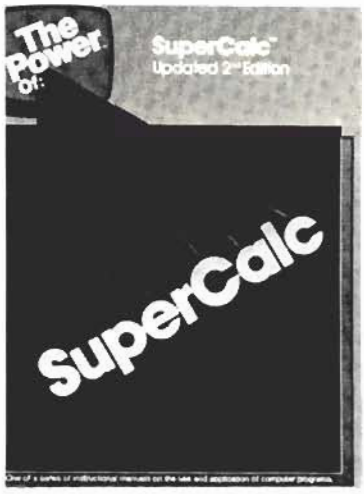

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HARDWARE REVIEW

From page 20

has a numeric keypad. It would have been very nice if the keyboard had rubber feet so that it did not slide when the desk is bumped, or the typist becomes over-enthusiastic.

The NZPO connection

There are two major differences between the Bondwell Model 14 and 16. One is that the Model 16 has a built-in hard disk; the other is that the Model 16 also sports a direct connect modem and has terminal software built in to allow it to make full use of this facility. The modem's role is to connect two computers together via New Zealand Post Office telephone lines. The modem translates between the digital signals used by the computer and the analogue signals used by the telephone equipment. At the time of writing, Bondwell was seeking type approval from the Post Office for use of their modem.

The modem's features include: 300 baud rate; full duplex; CCITT V.21 or Bell 103 compatible; automatic answer and originate operations; analogue or digital loopback for self test; pulse or tone dialling (software selectable); voice (through telephone handset) or data selectable; expandable to 1200bd by modem chip replacement.

The Model 16 has an RS232C port, a parallel Centronics printer port, modem and telephone ports and a port for connecting on a further video monitor. These input/output facilities certainly allow for flexibility and this computer can be used with most printers.

The Bondwell computer range is distributed in New Zealand by Orchid Trading Co (5 Fleming St, Onehunga, Auckland). The latest retail price for this powerful computer is $NZ5995, making it an extremely competitive package. The Model 16 carries a three-month no-cost-to-the-customer guarantee, and is marketed through Andas computer stores. Service contracts are available through ORCHID or NCR Ltd.

It is a little unfortunate that the documentation is so sketchy and a "suck it and see approach" often needs to be used. Let's hope this can be rectified.

This computer must be a very attractive package for many businesses. The Winchester disk, together with the modem and extensive software in a portable computer, is good value indeed.

Multimate 3.3 release

Skellerup Microsystems Ltd, (P.O. Box 19-648, Christchurch) has released version 3.30 of the MultiMate word processing package.

This version includes an English dictionary and the printing option of proportional spacing.

MultiMate's format can now be converted to send MultiMate files via modems, transferring files to and from the IBM Displaywriter and other computers, and from popular spreadsheet and database applications.

Screen colours may now be customised, the merge utility has been improved, there is keyboard macro utility, automatic repagination of header and footers, multiple document directories, and an option to create automatic backups.

New Apple head

Mal Thompson, former sales manager of CED Distributor, the sole distributor of Apple computers in New Zealand has been appointed general manager of the company. He takes over from Mike Lord.

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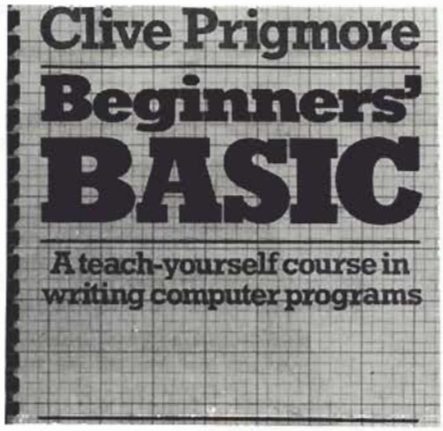

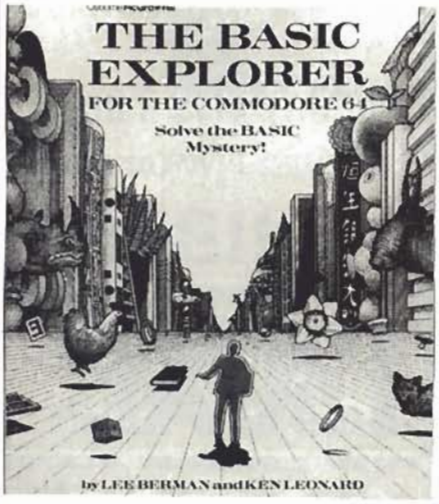

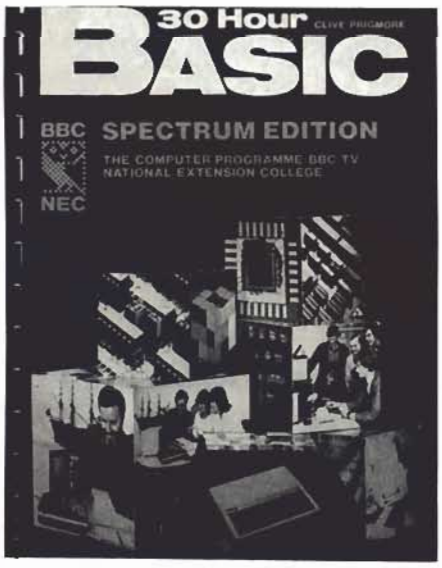

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The BASIC Explorer for the Commodore 64
Lee Berman & Ken Leonard

Combination of suspense novel and instructional text, it teaches introductory programming in BASIC. Elements of Commodore 64 BASIC and the thought processes that go into designing a computer program to solve a problem are introduced through the adventures of three modern-day explorers.
McGraw-Hill **Our normal price $29.95.**

The Complete Programmer: A Guide to Better Programming in BASIC **Mike James**

Explains what's needed to make a program "user-friendly". Emphasises good program structure and gives key information on data types and data structures to help you translate ideas into workable programs. Tips on sorting and searching methods, creating graphics, achieving "randomness" to make games, even recursion. Plus testing and debugging methods.
Prentice-Hall **Our normal price $46.35.**

Armchair BASIC: An Absolute Beginners' Guide to Programming in BASIC **Annie & David Fox**

Introduction which blends many examples and illustrations in a good-humoured examination of programming concepts — and you don't need a computer to learn. Takes you through fundamentals of BASIC programming, shows you how a computer can use your input to produce useful results and presents a glimpse into the computer future.
McGraw-Hill **Our normal price $29.95.**

30-Hour BASIC (Spectrum, Oric eds)
Clive Prigmore

Simple, self-instructional course, teaching you good programming techniques; how to keep, order and sort files, records and directories; how to print letters and addresses; how to invent computer games; how to handle numbers and so on. Special chapter on using the Spectrum's colour, sound and graphics.
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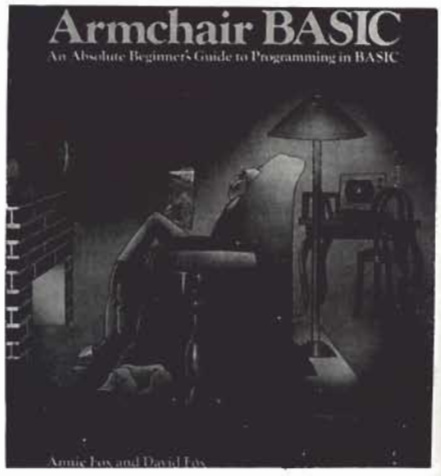

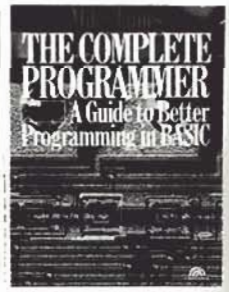

Hands-On BASIC for the DEC Profressional
Herbert Peckham

Provides computer experience through a series of guided activities, each followed by a discussion of the BASIC topic just explored. Includes sections on graphics and files.
McGraw-Hill **Our normal price $60.95**

Beginners' BASIC **Clive Prigmore**

Teach-yourself, step-by-step guide to programming which can be used with the ZX81, Spectrum, QL, VIC-20, Commodore 64, Oric 1, Dragon 32 and 64, Apple IIe, TRS-80, BBC, Electron, Lynx, TI 99/4A, and Atari 400, 600XL and 800. Contains many worked examples and exercises, and can be used without a computer.
Windward **Our normal price $39.95.**

IBM

IBM PC Programming
Richard Heskell & Glenn A. Jackson

Hands-on, step-by-step approach for beginning and advanced programmers. Uses actual photographs taken from the computer screen in graphic examples to develop many fundamental programming concepts. Includes information on string variables and functions; IBM PC DOS: numerical variables and arithmetic; expressions; sound effects; medium resolution graphics; loops and subroutines; bar graphs, animated graphics.

Prentice-Hall **Our price $27.10. Save $2.20**

Handbook for Your IBM PC (includes XT version)
Louis E. Frenzel & Louis E. Frenzel, Jr.

Experienced users will find it a handy reference, with a concise summary of key operational information and as a source book of information about non-IBM accessories. Beginners will find it step-by-guide to using the computer and a source for "what to do and how to do it"

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The IBM PC Connection **James W. Coffron**

From the author of the popular Apple Connection, VIC-20 Connection and Z80 Applications, this book shows how easy it is to use your computer with common household devices. Explains techniques for setting up your IBM to control a home security system, home temperature control system, voice synthesizer to make your computer talk, as well as other home appliances.

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Data File Programming on your IBM PC
Alan Simpson

Presents the techniques for writing BASIC programs for mailing list systems, grade books, library referencing system, graphic displays. Covers adding files, searching, sorting, editing and printing formatted reports.

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Your IBM PC Made Easy **Jonathan Sachs**

Covers the fundamentals and details major features of the system, including coverage of DOS 2.0 and the PC XT. Step-by-step operating instructions, and a guide to resources — what you need to know about dealers, software, services and accessories. Reference guide to operations and troubleshooting for common problems.

Osborne/McGraw-Hill **Our price $29.55. Save $2.40**

Apple

Getting Started With ProDOS
B. M. Peake & D. Rorke

Aimed at Apple II and IIe users, this is intended for someone familiar with the existing Apple DOS 3.3 systems. Comprehensive guide to ProDOS, with exercises for practice. Reference section goes over commands and comments on their use, and there is a discussion of the advantages and disadvantages of the system. A list of further references is included.

Bluewater Press **Our price $6.45. Save 50 cents**

Applesoft Basic: A Teach-Yourself Introduction
B. M. Peake

Second edition revised to cover the Apple II Plus and IIe. A manual for New Zealanders to learn BASIC with the Apple, instead of picking information from two or three sources includes model answers. Enquiries for class sets welcome.

McIndoe **Our price $12.90. Save $1.05**

Fun, Games & Graphics for the Apple II, IIe & IIc.
Paul Garrison

Collection of more than 75 ready-to-run programs which you can use, study, modify, combine and experiment with. Complete listings written in standard Applesoft BASIC and CP/M-supported BASIC-80, and explanations. More than 20 financial and record-keeping programs, and a wealth of graphics and education programs, a word processing program and some small-scale database programs.

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Games

Arcade Games for Your VIC-20
Brett Hale

A 15-year-old whizz kid from Victoria, Australia has put together a collection of 20 arcade games for the unexpanded VIC-20. All programs listed twice — once for straightforward keyboard play, and once for use with a joystick. All games extensively play tested. Selection includes Galaxy Robbers, Yackman, Sub Attack, Fantasy, Pinball, Indi 2000, Leaper and Bullet Heads.

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Tim Hartnell's Giant Book of Spectrum Games

More than 80 programs covering just about every sort of game imaginable — arcade action, mind benders, chance and skill, adventure, space, board and card, fun, simulations. And there are utility and demonstration programs, games to convert notes on error trapping and a glossary.

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The Big Fat Book of Computer Games
Tim Hartnell

Contains 34 games written in the most general form of BASIC, making them suitable for most computers. Includes board, adventure and space games, brain teasers, simultations — and some just for fun. Spread over 389 pages, programs are clearly printed and accompanied by notes.

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Virgin Computer Games Series
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Each book contains a selection of more than 20 games which allow you to hone programming skills as well as have plenty of fun. Contains brief dictionary of computer terms, bibliography and hints on how to improve and extend some of the programs.

Commodore 64 edition $11.05. Save 90 cents
Spectrum, ZX 81, TRS-80, VIC 20, Oric, Dragon, Atari, BBC editions $8.30. Save 75 cents
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More than 40 games compatible with Microsoft BASIC able to run on most micros, including BBC, VIC 20, Oric, Apple II and IIe, Commodore 64, Dragon 32, Tandy Color, IBM PC, Laser, TRS-80, PET, MZ80K and Spectrum. Range covers board, dice, space, brain and adventure games, simulations, artificial intelligence, and some just for fun.

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Commodore 64

Cracking the Code on the Commodore 64
John P. Gibbons

Introduction to 6510 instruction set and how to combine the elements of machine code into commercial-style speed. Full machine code monitor with 14 commands gives you the tools to interface with the 64's architecture. Learn good programming practice and trade tricks while using the sprite, sound and hi-res graphics, and get to grips with interrupt handling for multiple sprites and smooth screen scrolls.

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Arcade Games for Your Commodore 64 Brett Hale

Fifteen-year-old Victorian whizz kid, Brett Hale has put together a collection of 12 extensively play-tested arcade games which are in BASIC and can be modified. Each is listed twice – for keyboard and joystick. Includes Tick, City Terror, Bricklayer and Surface Lander.

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Getting the Most From Your Commodore 64
Simon Potter

Uses diagrams, colour photographs, programs and examples to introduce you to the machine. Moves from starting through writing programs to graphics and sound, printers, disks and extras and troubleshooting.

Penguin **Our price $12.90. Save $1.05**

Commodore 64 Machine Language Tutorial
Paul Blair

Get to grips with the intricacies of machine language programming, helping you overcome the demanding, exacting and sometimes exasperating requirements. But master it and tasks such as sorting, searching and some graphics become much quicker. Judicious use of machine language also allows you to use larger and more complex programs. Demonstration program provided, with examples of short machine language routines.

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Brainteasers for the Commodore 64: Programs to Puzzle & Amuse **G. Ludinski**

Collection of programs built around competition. You are asked questions requiring logic, general knowledge and mathematical skills. Only your quick answers can save the woman on the railway track; escape with the bank takings; break open a safe. Only your powers of deduction can solve the who-dunnit; work out the wiring on the robot; catch the car thief. All programs exploit machine's graphics capabilities and many contain an IQ rating at the end.

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First Steps in Machine Code on Your C64
Ross Symons

Clear, concise explanation of machine code — introduction to the disassembler and its use; instructions for the 6510 chip with the aid of a demonstration program; discussion of the kernal operating system and its applications such as printing, input/output devices and scanning the keyboard. Two complete machine code games show you how to create your own high speed, animated arcade-like games.

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Data Handling on the Commodore 64 Made Easy
James Gatenby

Data processing — sorting raw facts to produce useful information — can be just as rewarding as playing games. Explains how to use the Commodore 64 to process information for the home and small business. Uses straightforward examples to demonstrate storage of large quantities of data, attractive and readable on-screen display, and searching and print-outs.

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Commodore 64 Machine Code Master: a library of machine code routines **David Lawrence & Mark England**

Provides full listing and explanation of Commodore 64 master code assembler, then offers a collection of tested machine code routines to extend C64 BASIC with more than a dozen new commands. All routines fully explained, providing an introduction to a wide range of programming techniques and ways in which the C64 ROM can be used to best advantages by the machine code programmer.

Reston **Our price $24.15. Save $1.95**

Better Programming for Your Commodore 64
Henry Mullish & Dov Kruger

For those wanting to push the 64 to its full potential and improve their own programming techniques. After getting reader started on BASIC, the book looks at structured programming, numeric functions and logical operators, character string manipulation, arrays, nesting loops, audio-visual program enhancement, and debugging. Includes more than 90 programs.

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The Commodore 64 Experience
Mike Dean Klein

The many and varied uses of a home computer . . .programs for the home (recipes, shopping, phone books, kitchen metrics, budgeting); education programs (maths, geography, spelling, languages, graphics); entertainment programs; business programs (appointments, cash flow, interest, cheque books, inventory), utility programs (sprite creation, character design, memory loader, saver and clear; disk menu, menu ideas). All programs can be modified.

Reston **Our price $41.70. Save $3.40**

Commodore 64 BASIC Made Easy **David A. & Marianne L. Gardner**

Hands-on guide to learning BASIC and forming good programming habits. You draw pictures, play songs, play joystick games, draw and control the animation sprite characters, produce a light show with colour and music, manipulate words, do arithmetic and store programs on disks or cassettes. Though a serious book, it sets to be fun to use.

Prentice-Hall **Our price $32.90. Save $2.70**

Basic Subroutines for Commodore Computers
Eddie Adams

Easy-to-use manual which offers access to more than 300 BASIC subroutines — powerful building blocks you can combine and adapt to create programs for a wide range of business, educational and personal applications. Explanations for each subroutine with suggestions for modifying it to your needs. Each program is ready to run on any Commodore system.

Wiley & Sons **Our price $29.55. Save $2.40**

Commodore 64: Basic Programs in Minutes
Stanley R. Trust

Collection of versatile, ready-to-enter programs for more than 65 home and business tasks on the Commodore 64. Programs for home finances, business calculations, real estate, data analysis record keeping and education. No knowledge of BASIC programming needed to use programs which can be entered and ready to run in less than 10 minutes.

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How to Program the Commodore 64 — if you've never programmed a computer before
Robert Young

After an introduction to the bits and pieces of the 64, you move to the process of learning to program on the keyboard. Concentrates on the key words and techniques to have you writing programs as quickly as possible, then allows you to refine the process at your leisure.

Interface **Our price $21.20. Save $1.75**

How to Use The Commodore 64 **Jerry & Deborah Willis**

Introduction to the computer and its basic components, explains what the components do and how they work together; step-by-step instructions on setting up and installation, shows how to load and save programs on diskette or cassetes, tells how to type in, use and modify programs; presents other sources of information.

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Keyboarding for Information Processing
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Enables a person to develop basic touch keyboarding skill in a minimum time. The person who completes the book will be able to key in alphabetic, numeric and symbol information; input numbers on a separate 10-key pad; keyboard information quickly and accurately; understand some of the basic vocabulary used in keyboarding. Can be used for classroom or individual, self-instruction.

Osborne/McGraw-Hill **Our price $12.30. Save $1.00**

Quick Keyboarding **Vonnie Alexander**

Sub-titled "Competent Keyboarding in 6 Hours", this book by New Zealander Vonnie Alexander has a unique method for teach-yourself competent keyboarding. A wall chart of finger positions is included.

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Multiplan: Home & Office Companion
Elna Tymes & Peter Antoniak

Collection of models covering a broad spectrum of business and personal applications, personal finance, household management. Ready-to-use model described and accompanied by the listing needed to create the model and a sample printout. You just replace the sample data with your own. As you become familiar with Multiplan, the modelling techniques help you create customised models.

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Lotus 1–2–3 Simplified **David Bolcan**

Designed for all levels, it starts with installing and using Lotus 1–2–3, then moves through designing and using spreadsheets; formatting spreadsheets and making them aesthetically pleasing; generating printouts; working with oversized spreadsheets; graphics functions; data management; advanced spreadsheet applications and programming with macros. attractive presentation includes many diagrams and graphs.

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Guide to Using Lotus 1–2–3 **Edward M. Baras**

Detailed, comprehensive guide to help you make full use of Lotus 1—2—3's integration of spreadsheet, database and graphic functions. Includes step-by-step instruction on implementing practical application models for financial forecasting, consolidating business statements, simulating dynamic processes, electronic forms management. Equally useful to beginners and experienced users.

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Business Program Portfolio for your Apple IIe; An Integrated Office System **George H. Hildebrand**

Collection of 61 BASIC programs covering such office tasks as interest calculation, financial analysis, depreciation, property management and real estate, cash receipts and disbursements, job cost, payroll. All programs documented for implementation and modification. There is also guide to printing out business forms, creating a menu system, and securing business records with password programs.

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On-Line Computing for Small Businesses — Silver's Wall
Maurice A. Silver, John Jeacocke & Ray Welland

Sets out to provide managers of small businesses with a clear, concise but non-technical instruction in the use of on-line computing based on the practical experience of the authors. No prior knowledge of computing assumed and only essential technical definitions are included.

Pitman **Our price $9.70. Save 70 cents**

Multiplan Made Easy (Macintosh ed)
Walter A. Ettlin

All-in-one tutorial incorporating practical applications and skillbuilding exercises. Covers everything from using basic Mac commands to formatting worksheets, building formulas, and using Multiplan's built-in functions. Fully illustrated to display the program's visual features.

Osborne/McGraw-Hill
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The ABCs of 1-2-3
Chris Gilbert & Laurie Williams

Hands-on approach using detailed, step-by-step instructions. Lessons involve tackling projects such as building a worksheet, displaying the worksheet as a graph, building a database, simplifying several operations using macros, performing calculations and printing graphs and reports. Remains a handy reference once you are familiar with 1-2-3.

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Doing Business With Multiplan
Richard Allen King & Stanley R. Trost

Quick, well set out guide presenting more than 20 accounting and management planning applications for the business user. Each is thoroughly described, and a complete template for setting up the application in Multiplan presented. Many usable "as is"; others can be modified for specific problems. Covers record keeping, financial statement analysis, sales finance manufacturing, master budgeting.

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Taking Care of Business with your Commodore 64 **David P. Dautenhahn**

More than 100 brief BASIC business and financial programs, each documented with a short explanation of what the computer will do and a BASIC listing. A real-life scenario follows, with a sample run and instructions on how to combine two or more applications. Programs include: interest, depreciation, retailing, real estate, loan analysis, savings, lease analysis, time value for money, stocks and bonds analysis, sinking fund analysis, forecasting inventory needs, payroll, insurance, metric conversion.

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1–2–3 Run: 41 ready-to-use Lotus 1–2–3 Models **Robert & Lauren Flast**

Collection of models that run on Lotus 1–2–3. Each model presented with a step-by-step description, complete listing, an illustration with sample data (you simply replace this with your own) and, where applicable, instructions to produce bar and line charts. Designed to simplify work, the models include applications for sales, accounting, real estate and the classroom.

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Databases for Fun and Profit
Nigel Freestone

For users wanting to do their own programming. Provides straightforward introduction to data processing, with explanations of routines in BASIC. Examples of system designs for home and business use, which you can combine and expand. Systems for names and addresses, catalogue index; diary; stock control; bank account/budgeting; debtors list/sale/purchase ledger; payroll.

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Microsoft Word Made Easy
Paul Hoffman

Spells out what the business person needs to know to get the most from Microsoft Word which runs on many personal computers, including the IBM PC, AT and T6300PC and 3B Series, and the Tandy 2000. Covers all basic functions and describes each option, with instructions on glossaries, style sheets and windows, tips on the mouse, and using mail-merge. Practical examples include screen shots and illustrations.

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Language/programming

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Anne Sparrowhawk

Systematic introduction to the facilities and applications of LOGO, including a thorough examination of "turtle graphics". Covers numbers, words and lists, and writing more complex programs.

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An Introduction to Program Design
Rod S. Burgess

Deals with program design, particularly for data processing applications, using the Jackson structured programming technique. Examples of code are given in COBOL, BASIC and Pascal. Each chapter concludes with exercises, with solutions at the end of the book.

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Structured Programs in BASIC **Peter Bishop**

Opens with a discussion of program structure and design. The rest of the book comprises example programs, with the complete program design process (from initial specification to final listing) carried out. Excellent source of programming techniques, algorhythms, program modules, ready-to-run programs and ideas.

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Paul Hoffman & Tamara Nicoloff

Sets out to familiarise you with MS-DOS in all its versions — IBM PC-DOS, and Versions 1.0, 1.1, 1.25, 2.0 and 2.1. Covers each computer running MS-DOS, gives the version it runs and lists any improvements the manufacturer has made to the system. Complete information on IBM PC-DOS. Information on software that runs under MS-DOS and products available to enhance the system.

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Systematic introduction to the facilities and applications of LOGO, including a thorough examination of its famous "turtle graphics". Explains the fundamentals and suggests how the language can most profitably be exploited. Explores command and syntax, and offers some ideas and projects to which LOGO can be applied. Plenty of programs to work with.

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Armchair BASIC: An Absolute Beginners' Guide to Programming in BASIC
Annie & David Fox

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The MBASIC Handbook **Walter A. Ettlin & Gregory Solberg**

Concise, graduated tutorial to help you build programming skills for use in business, education and personal applications. Covers MBASIC tools; describes statements, functions, commands and operators; works with loops, strings, arrays and subroutines, sequential and random access files; debugging and documenting programs. Includes five fully documented business programs which can be customised.

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Play LOGO: An Invitation to Computing for Parents and Children **John Cunliffe**

Anyone who can operate a television set and a typewriter keyboard should enjoy this book written for the young learner and the interested adult. Tells how to choose a computer for LOGO, how to write your own programs, and suggests projects and puzzles. Attractive format and easy to follow.

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Tim Field

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BBC

Handbook of Procedures & Functions for the BBC Micro
Audrey & Owen Bishop

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Kevin Jones

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Getting the Most From Your BBC Micro
Clive Williamson

Introduction intended to complement the User Guide supplied with the machine. Contains many hints and tips on programming and general use. Explores many possible uses and the computer's potential for expansion to suit individual needs. Some features and accessories, undocumented in the User Guide, are investigated, with specific advice on connecting printers, TV monitors and disk drives.

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Games For Your Spectravideo
Damon Pillinger & Danny Olesh

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Spectrum

Practical Spectrum Machine Code Programming
Steve Webb

Designed for programmers who want to write faster and better programs than they can in BASIC. Assumes you have no knowledge of machine code and works through the details to the point where you are linking routines and using routines with BASIC programs. Questions throughout to test progress.

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Adventures for Your ZX Spectrum
Clive Gifford

Six ready-to-run adventure games — Crash! Pearl Diver, The Ring of Power, The Seven Keys of Tarkus, School's Out and Everyday Adventure — plus advice on writing your own adventures and a glossary and bibliography.

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An Expert Guide to the Spectrum
Mike James

Practical introduction to the Spectrum's advanced hardware and software features. Aimed at the user seeking a deeper understanding of the machine and its capabilities. Starts with an inside view of the micro, then moves to a connoisseur's guide to ZX BASIC and an introduction to the machine operating system. Covers ZX video; tape system, RS232 interface, microdrive and advanced programming techniques. Complete program listings and projects for further exploration.

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The Sinclair User Book of Games & Programs for the Spectrum

Sixty games and programs from the Spectrum magazine, Sinclair User; protect your castle from invading soldiers in Siege; test your three-dimensional sense in Labyrinth; improve your geography in Mapwork; face Mr Spec Trum on Wimbledon's centre court; run your own cricket test at Lords; jump a clear round in Olympia; play noughts and crosses against the computer; sink a submarine in Depth Charge; tackle a crash typing course in Touch Type.

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Cracking the Code on the Sinclair ZX Spectrum
John Wilson

Practical machine code programming guide allowing the user to harness the full power of the Spectrum's hardware and escape the confines of BASIC. You are introduced to Z80 instruction set and learn to combine the various elements of machine code in commercial-like programs. Annotated example programs allow you to enter and use fast screen handling routines and sorts in your own programs, debug them with the trace facility, and run them with the on-screen clock. Covers ROM routines, interrupt handling and programming principles.

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Wingard-Hayes

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Introduction provides instructions on running the games and the book ends with a section on how games are made. In between are Moonshuttle, Meteor Shower, Protector, Alien Attack, Red Alert and Invasion – with a couple of sections explaining data and read statements.
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Richard Mansfield

Written for programming with Commodore 64, VIC-20, Atari, Apple and PET/CBM computers, this book contains the powerful LADS machine language assembler. As well as being a sophisticated program, the book is a tutorial on how large, complex machine language programs can be constructed out of manageable subprograms. Extensive documentation provided.
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Assembly Language Programming for the Atari Computers
Mark Chasin

Routines follow the rules established by Atari for assembly language programmers and will work with any Atari computer. Examples given in both assembly language and, where possible, BASIC incorporating assembly language routines to perform tasks in BASIC.
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Mastering the Commodore 64 — **Peter Vernon**

Covers using the 64 for everything from games to finance management. You can create visual displays, graphs and games, and enhance them with sound and music. You enter the Commodore BASIC world and end up programming.
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Your IBM PC Made Easy (includes IBM PC (DOS 2.0) and PC XT) — **Jonathan Sachs**

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Kids and the Apple — **Edward H. Carlson**

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Computers and Young Minds
Gary Clark

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Timothy O. Knight

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Our new selection

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Arthur Godman

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Hank Librach & Bill L. Behrendt

Programs to automate cheque book records; make sense of loans; track family nutrition; make maths, geography and English fun; let you be a wildlife warden; track pirates and arsonists; fly a plane; invade a demon's lair; conduct a symphony orchestra.
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Geoff Simons

This compendium of curiosities is an informative, amusing and entertaining – and sometimes disturbing – account of the wide-ranging activities of computers . . . their uses in science and research, creativity, transport, industry, offices and administration, medicine, and health, monitoring the environment, education and training, games and entertainment, the home, and the future.
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Vince Apps

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Melody Newrock

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Piers Letcher

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James E.A. Lumley

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Henry Simpson

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FOR SALE: "Stellar Triumph" game tape for Commodore 64. 8 Preset Games with option to vary each game. $12. G.N. Wilson, 24 Cairnmuir Cres, Cromwell. Phone 51-016.

WANTED TO BUY or borrow a Technical Manual for a System 80 Blue Label computer. A.J. Brown, 24 Browning St, Cambridge.

FOR SALE: Challenger 1P, sound generator and TV modulator. Ph 56-343 Christchurch.

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SANYO

From page 54

Delightful graphics

Also supplied is Sanyo's own BASIC interpreter which has some really delightful graphics capabilities. I've fallen in love with the Sanyo SYMBOL command. Microsoft and IBM should take a close look at the Sanyo graphics.

One sad point is that Sanyo didn't see the need to implement Sanyo BASIC on the 775 or on the video board. These two items come with GW BASIC which also has some unique features — check the SHELL command.

Various screens are available for the Sanyo – green, amber and colour in low or high resolution.

The supplied manuals can be somewhat lacking and some examples quoted don't work. Unfortunately the manuals detract from an otherwise brilliant machine.

We will look progressively deeper into the Sanyo and its capabilities. Readers' comments and questions are welcome and, where space permits, we will try to include such items.

BBC

From page 58

environments and the slow sampling times that can result from even quite adequate illumination. It also needs very accurate focussing and positioning of the image, a task only adequately attainable on the basic equipment after considerable care. You would also want a range of lenses. The standard one we worked with had an excellently narrow field of view for some uses (confined to about two A4 sheets 14ft away),but would be disastrous for other applications.

Without doubt, there are some areas where the system might prove its worth. These need to involve slow sampling speeds, low resolution and highly predictable lighting conditions however. The EV1 gives a good experimental entry to image analysis systems if you just want to hack around a small system. If you want to experiment widely and practically though, you would be better off going for a video-camera-based system.

SOFTWARE REVIEW

From Page 33

and power it will be reviewed separately.

The Otakou programs can all be copied to allow for back-ups and use on more than one machine in the same location. The licensing agreement is liberal, and avoids restricting the use of the software by foolish "protection". The manuals are well produced and printed on good quality paper, and spiral bound with attractive covers. The programs are of outstanding quality and represent some of the best value ever in software. I strongly recommend them.

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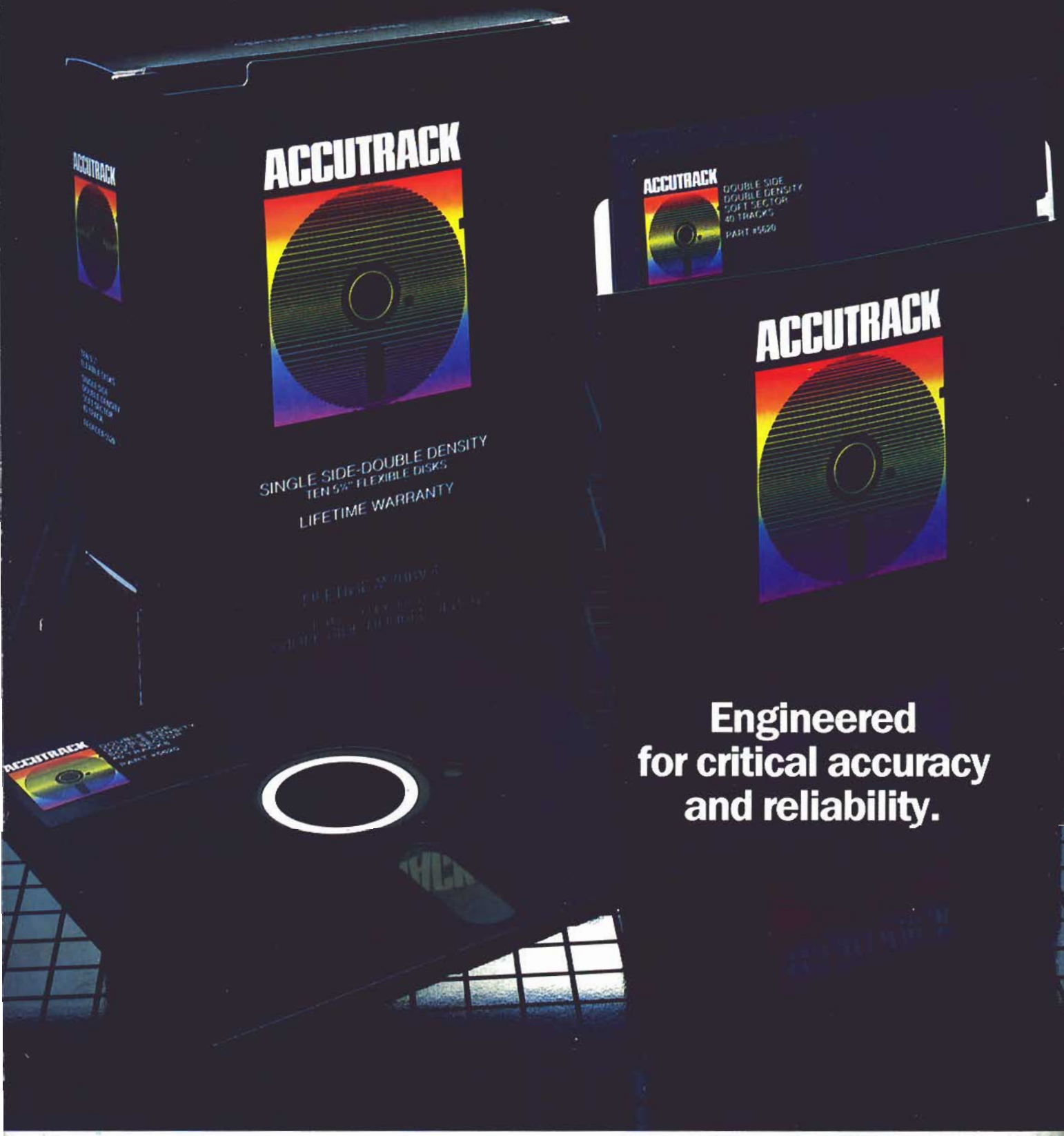

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