ZEALAND'S PERSONAL COMPUTER MAGAZINE

BITS & BYTES

February 1984: $1.25

1984 — What to expect on the computer market

Computers reviewed

Sega

Sharp hand-held

Franklin Ace 1200

TI Home Computer

Printer review

Epson FX-80

VZ 200 programs

Editorial index in this issue

Round-up Part 2 — comprehensive guide to computers $5-10,000 in New Zealand

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BITS & BYTES

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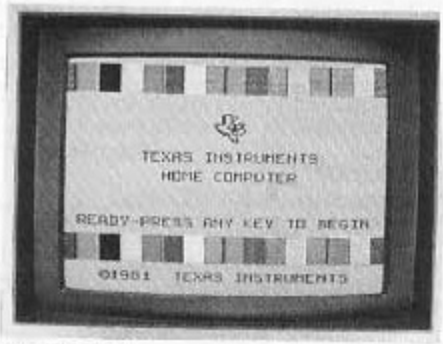

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MICRO NEWS

New one soon from Commodore?

Commodore International Ltd, should have announced its latest personal computer by the time this edition of *Bits & Bytes* is on sale.

Code-named TED and expected to be sold as the Commodore 444, it will have a large amount of on-board software and the rumours in America are that it will sell there for about $US500 at first, compared with $US669 for a stripped-down version of the new IBM PC junior.

In 1983, Commodore sold about a million 64's, but is believed to be hoping to sell three million of the new machines over the next two years.

Some informed sources in the American computer business have been saying the 444 will have built-in word processor, financial analysis and graphics programs. It is not expected to be able to run most of the 64 software.

Commodore is said to be looking to sophisticated built-in software to help an expected invasion of Japanese micro's, priced in America about $US250

Educational conference

The World Conference on Computers in Education is being held in America later this year. This, the fourth such conference, is sponsored by the American Technical Committee for Education of the International Federation for Information Processing. Participants are expected from more than 60 nations, and *Bits & Bytes* would like to hear from anyone who is going. At present, technical papers are being solicited. Fields to be covered will include computer science, computer engineering, and information-systems education; computer use in the sciences, mathematics, social sciences, and humanities; national programmes related to computers in education; computers in education at all levels and in all disciplines; computer literacy; computers in educational research; computer education and job opportunities for the handicapped; administrative data processing n education; and computer-based education.

For details of paper requirements and news about the conference write to: John McGregor, Department of Computer Studies, Murray state University, Murray, Kentucky, 42071. U.S.A. The deadline for papers is August 1.

The new 16-bit Apricot

The Apricot

The new British 16-bit microcomputer, the Apricot, made by Applied Computer Techniques, is expected to go on sale in New Zealand this month at about $6000.

The Apricot is almost unique among British micros in being exceptionally attractive to look at; not unlike the Epson 8-bit. It carries a lot of power for its size (256K expandable to 648K with a true 16-bit 8086 processor). It runs MSDOS 2.8, a spreadsheet and planning package, system configuration software and optional CPM-86 and concurrent CP/M free plus entry to the P-system (including BASIC and PASCAL compilers). Total software compatibility with the Sirius and a high level of IBM PC compatibility through an emulator ensure a large software base.

Most noticeable feaures are the 800x400 screen, the 3½in. disk drives and the keyboard. The keyboard includes a small micro-screen of its own, which can either be used for displaying the time or as a calculator scratch pad or can be used to lable the special function keys directly below it.

Reports from Britain indicate that ACT has received overseas orders for the machine worth more than 25 million pounds. ACT is expanding its plant at Glenrothes, Scotland, 50 per cent, and hopes to be producing 10,000 of the machines a month by the northern-hemisphere spring. Apricot sales have been running at 200 to 300 a day.

ACT consists of 10 operating companies with activities including bureau services, software development, computer supplies and minicomputer software research team.

Barson Computers has obtained the Australian and New Zealand franchise in a three-year £5.6 million deal. Inquiries should be directed to Barson's, P.O. Box 36-045, Auckland.

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3. A complete range of business software including word processing, information handling, financial modelling, accounting and many more specific application packages.

4. Other computer languages such as LOGO, UCSD PASCAL, COMAL and ASSEMBLER are being developed. Existing VIC and 40 column PET BASIC programs can be easily converted.

5. The powerful sound chip gives 3 totally independent voices each with a range of 9 octaves. User control over music envelope, pitch and pulse shapes provides the ability to make your Commodore 64 sound like a variety of musical instruments, solo or in harmony.

6. 62 predefined graphic characters plus full alpha numerics with upper and lower case letters, all available directly from the keyboard and displayable in normal or reverse video in any of 16 colours.

7. 40 column by 25 lines colour display. In high resolution graphics mode, a bit mapped screen gives 320 x 200 individually addressable pixels.

8. The dedicated video chip allows the use of high resolution multi-coloured "Sprites" (moveable object blocks). Sprites can be moved pixel by pixel, independently of anything else in the screen.

9. Sprites can also be set up in 8 "layers" giving full 3 dimensional effects with, if required, automatic collision detection between sprites and any other screen object.

10. Machine bus port will accept ROM cartridges for many applications, including business, educational, home and leisure software.

11. A second processor option using the Z80 gives the Commodore 64 the ability to support CP/M.®

HOW THE COMMODORE 64 LINES UP	
FEATURES	
Base Price	$995
ADVANCED FEATURES	
Built-in user memory	64K
Programmable	YES
Real typewriter keyboard	YES (66keys)
Graphics characters (from keyboard)	YES
Upper & lower case letters	YES
Function keys	YES
Maximum 5¼" floppy disk capacity per drive	170 K.B. to 1 M.B.
AUDIO FEATURES	
Sound Generator	YES
Music Synthesizer	YES
H-Fi Output	YES
VIDEO OUTPUT	
Monitor Output	YES
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MICRO NEWS

Genie problems

The filing for bankruptcy of the maker of the Genie computers in Hong Kong has ended Rakon Computers' plans to bring the Genie III to New Zealand. It still has Colour Genie machines available, however, and can obtain more from stocks in Britain. It will be continuing with full servicing and support for this machine, and there are unconfirmed reports that another Asian firm may continue producing Colour Genie machines, replacing the bankrupt EACA International, whose products included the System 80, as Dick Smith called his version of the Video Genie.

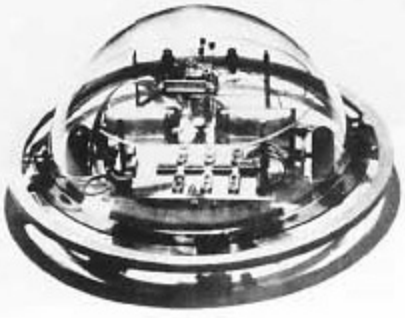
Instead of the Genie III, Rakon will be bringing in a Taiwanese business machine, the Multitech MIC500 series. This runs CP/M. The 501 version, selling in New Zealand for $2340 before tax, has two 250K disk drives and a version selling for $3100 before tax will have two 1-Megabyte drives. Both are Z80, 64K machines. They come with lots of software but without keyboard/screen, which costs another $1300 before tax. They are in the Morrow tradition of solid, no-frills work horses for business.

Farm market

American microcomputer firms are jockeying for market positions in their country's huge farmer market. One American market analyst predicts that the country's farmers will spend $US428 million between now and 1987 on software and about 95,000 microcomputers. Only about 5 per cent of the country's farmers now own micros. Another source puts the present market share as: Apple, 47 per cent; Radio Shack (TRS80) 22 per cent; IBM, 15 per cent; and Digital Rainbow, 1 per cent, but aggressively seeking a much bigger slice.

Sinclair statistics

Sinclair has now sold more than 2.2 million computers round the world. The ZX80, launched in February, 1980, and out of production in August, 1981, brought Sir Clive Sinclair's firm in sales of 130,000 units. Sales of the ZX81, launched in March, 1981, had reached 1.1 million by late last year. Sales of the ZX Spectrum, launched in April, 1982, had reached 1 million by late last year. The machines are manufactured under contract to Sinclair Research in Britain by Timex, and in lesser amounts, by Thorn-EMI Datatech. The Sinclair has largely been responsible for the proliferation of home-computer ownership in Britain: nearly 12 per cent of British households now have a personal computer. Sinclair's latest project is a flat-screen pocket TV set. Others in the pipeline include a new range of microcomputers.



The Tasmar Turtle from Flexible Systems

Tasman Turtle

An Australian manufacturer of an educational computer device called the Tasman Turtle is seeking a New Zealand agert to handle the product. Flexible Systems, of Hobart, manufactures the device, which also has promotional and hobby uses. The Turtle is the size of a large dinner plate and is mounted on electrically driven wheels. It carries a clear dome through which the circuitry and mechanics are visible. On a horizontal surface, it can move in any direction, toot its horn, and show two small headlights. A peripheral ring carries several cut-out switches. A sophisticated but inexpensive speech system called Turtle Talk has also been developed. The standard system has a capacity of 150 words with a provision to expand to 500 words.

Inquiries should be made to Flexible Systems, 219 Liverpool Street, Hobart, Tasmania 7000.

Modem

Energy Control (Box 12153, Wellington) is offering Rockwell International modems for microcomputers. Two basic signal-processing devices boost these modems into fully fledged peripherals. They are available at 1200, 2400, and 9600 baud levels. The Australian prices are as low as $Aust450 a unit for the 1200-baud units in bulk purchases.

TI supplies

The TI/99 home computer is expected to be available in New Zealand at least until the end of March, according to the local agent, Grandstand Electronics.

Late last year Texas Instruments ceased production of its home computer but large stockpiles still have to be cleared.

Also Grandstand Electronics says the Australian Government has forced TI to guarantee software availability for the home computer for the next five years and thus TI owners in New Zealand can expect continuing availability of software.

Legal accounting

The BHL legal accounting software that runs on the IBM PC is now being sold throughout the country. With the microcomputer, the system costs under $30,000. The functions include trust; disbursement and credit accounting; investment management; mortgage management; time and fees accounting; credit control; labels and mailing; mortgage payments; and recovery functions. A time/cost module allows fee earners to record chargeable and non-chargeable time.

Inquiries can be directed to Computer Information Services, Ltd, P.O. Box 644, Christchurch.

Price Increase

Sorry readers due to the lifting of the price freeze our costs will increase so we have to make another small adjustment to our cover and subscription prices.

As from the March issue BITS & BYTES will cost $1.50 in computer and book shops.

The new subscription rates will be $12 for adults and $10 for school students.

These rates take effect from March 1 so you have until then to take out a subscription or renew your subscription at the old prices.

We still feel that BITS & BYTES is good value at these prices especially with our growth in pages and the expansion plans we have for this year.

MICRO NEWS

Punchcard landmark

The closing of the IBM punchcard factory in Lower Hutt in December is a milestone in New Zealand computer technology. Set up in 1956 when cards were the sole means of getting information into data-processing equipment, production grew steadily, peaking at 300 million cards in 1974. Today, most information is entered at keyboards, and demand for the cards late last year had fallen to below that in 1958.

Epson subsidiary

The Epson Corporation of Japan has established a new subsidiary, Epson Australia Pty, Ltd. Epson of Japan is one of the major corporation members of the Seiko group and has annual sales of about $NZ 1 billion. Epson Australia will control the corporation's business activities in Australia, New Zealand, Papua New Guinea, and the South Pacific. Epson products evolved from mechanical printer mechanisms and liquid crystal displays to printers for personal and business computers, and then portable and desktop microcomputers.

The EC-80 printer

Australian printer

Energy Control, of Australia (P.O. Box 12153, Wellington) has recently released a dot-matrix printer that is selling for less than $Aust 250 in batches of 50. The EC-80 is a compact desk top, dot-matrix, impact printer. It will print upper and lower case alpha-numeric characters in normal and italic fonts, in condensed, normal or enlarged sizes, and in normal or enhanced modes. It features full bit-image graphics under software control. In addition the built-in graphics set includes a range of standard graphic symbols. Features include: Both friction and adjustable sprocket feeds as standard; high print quality from carbon film ribbon; logic seeking for faster throughput; high resolution bit image graphics (640 dots/line); built-in graphics symbols; self-stacking paper basket; square pin print head for improved character registration.

Sinclair software

Macmillan Education, one of the world's leading textbook publishers, and Sinclair Research Limited, designers of Britain's number one-selling ZX Spectrum personal computer, have introduced a range of jointly-produced educational software for children aged from five to 12. Five programs, forming the Learn to Read series, derive from Macmillan's widely-used primary school reading course entitled *Gay Way*. The four *Science Horizons* programs explain key scientific ideas using graphic displays.

MEC — PANSONIC JR 200

The Microcomputer Electronic Company expects to release the Panasonic 200 in N.Z. at the end of February. Aimed at the home market the JR 200 is a 32K memory, colour machine with good sound capabilities — 5 octave, 3 channels. Software will be about 40 to 60 programs covering 3 categories — educational, home and personal finance, and games.

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MICRO NEWS

Zenith Z–100

Zenith Data Systems, a subsidiary of Zenith Radio Corporation, of the United States, has been awarded a contract to supply the U.S. Navy and Air Force with 6,000 Zenith Z–100 stand-alone microcomputers over the next three years. The contract, worth $US29.3 million, is for two models of the dual 16-bit and 8-bit computer — one with floppy disks, the other with Winchester drives. Zenith estimates that 60 per cent of the order will be equipped with the hard disks.

The Zenith Z100 features as standard both 8 and 16 bit processors, a 5 slot S100 expansion chassis, 2 built-in 320K byte 5.25in floppy disk drives, 128K bytes of RAM, 8-colour graphics with a resolution of 144,000 pixels, and keyboard, all in a single integrated housing less than 7in high. The second version has a built-in green screen monitor with the disks to the right of the screen. Both models may have memory expanded up to 768K bytes. Earlier this year, a 5Mbyte Winchester drive became available in place of one floppy drive, for both models. While pricing is not yet final, the suggested price of a Z100 system including software will be less than $NZ10,000.

Imagineering arrives

Look for more software becoming available, especially for home computer users, with the arrival of Australia's largest software company, Imagineering, in New Zealand.

The New Zealand operation is in fact a joint venture between Imagineering and a New Zealander, Mr Paul Dixon, who will be general manager.

Imagineering sells both business and home software, books and peripherals (mainly memory cards and Davong disk drives for Apple and IBM computers).

On arrival here, Imagineering took over the distributorship of Visi Corp products including VisiCalc and the much-talked about Lisa-like Visi On (see separate micro news item).

On the home side, Imagineering has a stock of more than 2000 computer games suitable for Atari, Commodore, and Apple computers. These will be aggressively promoted and dealers will be supplied with a list of the top-selling computer games.

Under an agreement signed with Fountain Marketing some of these games wil be manufactured in cartridge form in New Zealand by Fountain and exported to Australia. The agreement should also mean lower prices for games cartridges in New Zealand.

64 portable

Portable 64

The portable version of the Commodore 64 is now available. The standard unit includes 64K of RAM, a 5 inch colour screen, one disk drive (170K), a cartridge slot, printer port and an output for a large screen (if required) in the $3295 price tag

Spectrum language

Micro-PROLOG, a version of the advanced logic programming language, PROLOG, is now available for the Sinclair ZX Spectrum. The first PROLOG adaption for micros, Micro-PROLOG employs simple "English" phrases as the basis for a dialogue between computer and user. PROLOG is the language used by the Japanese in sophisticated artificial intelligence machines and we think it sets a standard for future computer languages," says Alison Maguire, software development manager for Sinclair. While traditional computer languages consist of sequences of instructions to the computer, Micro-PROLOG communicates directly, using familiar concepts and ideas. The program is initially available by mail order only from Sinclair Reseach Limited, Stanhope Road, Camberley, Surrey, GU15 3BR, Britain. The price is £24.95.

New Atari agents

The agency for Atari computers in New Zealand has been secured by Monaco Distributors of Auckland who also handle Atari video games. The computer agency was previously handled by David Reid Electronics.

The managing director of Monaco (Mr N. Wamsteker) said Atari computers would be very aggressively marketed in New Zealand and he also indicated there would be a number of price reductions.

The Atari 400, which up until a year ago was being sold for $1295, will sell at "under $500" although stocks could become scarce in the next few months as the 400 is now out of production.

Meanwhile the new Atari 600XL, some stocks of which have reached computer stores, will also be reduced from the present $749 price tag.

More pleasing to the eye than its predecessor, the Atari 400, the 600XL also comes with a full typewriter keyboard rather than the touch-sensitive version on the 400.

But the new model is fully compatible with existing Atari software and peripherals, giving the user a large range to choose from.

The Atari 600XL includes 16K of RAM, 24K of ROM (including Atari BASIC), a software cartridge slot, and an expansion connection (for ading up to another 48K of memory and peripherals). A useful provision on the keyboard is a HELP key.

The Atari 800XL which has 64K as standard is also expected to be on sale here within a few months.

Another significant price reduction is on the Atari data cassette (the only one compatible with Atari computers) which will be reduced from $299 to $199.

Monaco expects to have a large range of Atari peripherals and software available but expects it will take up to three months to arrange.

The Atari 600XL

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15. Automatic repeat on cursor function keys.

16. User-definable input/output port.

17. Machine bus port for memory expansion and ROM software.

18. Standard interfaces for hardware peripherals.

19. VIC 20 is truly expandable into a highly sophisticated computer system with a comprehensive list of accessories (see panel below).

20. Full range of software for home, education, business and entertainment on disk, cassette and cartridge.

21. Books, manuals and learning aids from Teach Yourself Basic to the VIC programmers' reference guide (a must for advanced programmers).

22. National dealer network providing full service and support to VIC owners.

23. Expertise and experience — Commodore are world leaders in microcomputer and silicon chip technology.

24. Commodore is the leading supplier of micro-computers in New Zealand to business, schools, industry and the home.

25. VIC 20 is the best-selling colour home computer in the world.

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- Programming aid packs, machine code monitor cartridge, programmers' aid cartridge, high resolution graphics cartridge.
- ROM Expansion cartridges.
- RS 232C communication cartridge.
- Memory expansion board.
- 1EEE/488 interface cartridge.
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MICRO NEWS

Window program

Visi On, the first of the new window programs to reach New Zealand, is being released this month for the IBM PC and XT by Imagineering (P.O. Box 8497, Auckland).

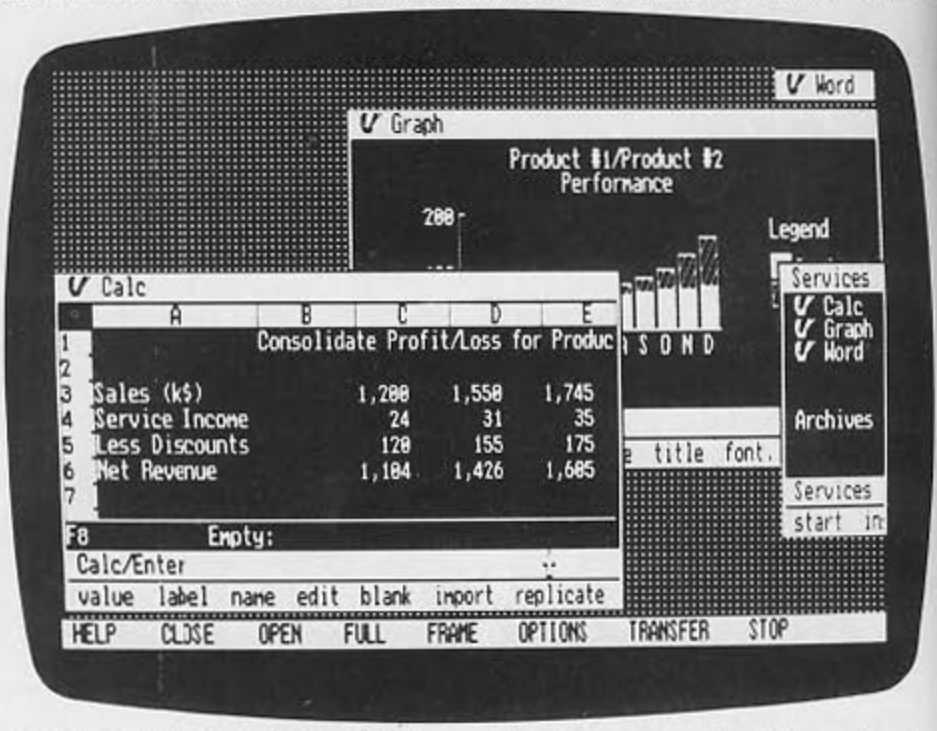
Using the technology first seen here on the Lisa, window programs enable the computer user to split the screen into rectangular blocks or windows each running different applications programs (for example spreadsheet, word processing, graphs, database etc).

The advantage of windows is that information can be easily moved from one program to another without having to change disks and use a large number of commands. The user just pushes a mouse, which controls the cursor, across a desk (again shades of Lisa) although the data still has to be keyed in.

The price for this technology is $2373, which includes the window program plus four applications programs: Visi On Calc, Visi On Word, Visi On Graph and Visi On Query (database manager). The mouse costs an extra $600.

The window program can be purchased separately at $1092 and users can develop their own applications packages. VisiCorp the developers of Visi On, expects third-party software companies to write specialised applications packages for Visi On such as for lawyers, accountants, architects, etc, leading to a large software library.

Visi On won't be exclusive to IBM. VisiCorp expects Visi On to be available on an increasing number of different computers.



What you see through the Visi On window program.

Micsosoft has also developed a window program (called simply Windows), but it is not yet available in the United States, and other software companies are expected to follow.

Accounting software

Commodore Computers New Zealand (Box 33-847, Auckland) has also released a complete range of New Zealand produced general accounting software for the Commodore 64.

Marketed under the Meridian brand name, there are five packages in all: debtors' system; invoicing and sales analysis; creditors; general ledger; stock control.

Each package will cost $195 in New Zealand, and Commodore expects good export sales. It believes there is no software available up to a similar standard overseas.

Computerland IBM

The giant American retail chain, Computerland, is not yet represented in New Zealand but that hasn't stopped its Australian subsidiary from trying to sell computers here.

One large New Zealand company has been looking at buying 50 IBM PCs from Computerland Australia — much to the annoyance of IBM New Zealand.

Usually reliable sources indicated IBM New Zealand moved quickly to point out problems with such a deal including on-site support but *Bits & Bytes* was unaware of the outcome at the time of going to press.

Our apologies

To those readers who received their December/January issue with some pages repeated and others missing.

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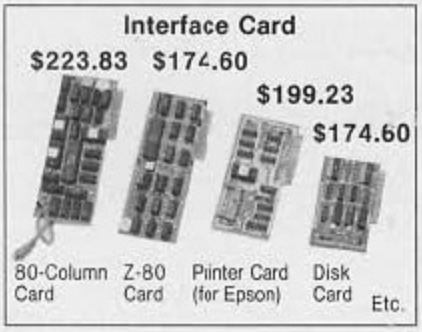

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The first round-up: part B

Introduction:

This is the second part of the *Bits & Bytes* buyer's guide, this time covering computers in the range from $5,000 to $12,000. Obviously, few of these are likely to be bought for home use, but rather for the small business, group of researchers or engineers, a department in a larger business, or for personal use in a business setting. They are still personal computers in the sense that they are best suited for use by one person at a time. Another important function that several have is to communicate with larger, minicomputers or with mainframes. This gives the possibility of an individual drawing on data stored in a central location, for his or her own analysis.

How this was compiled

As with part one, the information in this guide came from distributors and retailers. Rather than mention each model separately, it seems to make sense to describe the range of computers each manufacturer produces. The family similarities are deliberate – often you can move up the range to a larger, faster, or more powerful machine, taking all your programs and data files with you, an obvious advantage. The top limit on price for this part is around $12,000. Of course, there is no particular reason for a line of computers to stop at this figure, and many don't, but above this there is a tendency to move into multi-user systems. The exact price of a system will vary of course, depending on what options are selected.

We tried for completeness, but of course that is impossible. We do hope that we have a wider coverage than other guides.

The hardware or the software?

Which comes first – hardware or software? Most often the software is the most important consideration. There are three ways to get the software you need:

1: Buy it, off the shelf. If you have a need for a word-processing program, this is the way you will probably get one. Programs bought in this way should be error free. It is to be hoped that they will be well written, and they should do the job they are expected to. Of course, some don't. There are bad programs, just as in every field there are good and bad products. Buying off the shelf gives the greatest amount of software in the least time, but you may need to bend your operation to suit the software.

2: Buy a package, such as a spreadsheet or data-base management system, which allows you to interact with the computer in many different ways, as you choose. This requires more skill of the operator than single-purpose software, but a good package will allow a person without much computer experience to use the machine in a variety of ways.

3: Write customised software, or have it written. Writing it yourself takes far longer than you ever thought possible, whereas having it written may cost more than you dreamt of. The benefit of course is that the resulting programs are designed to do exactly what you require, in the way that you want.

Operating systems

Most business programs are designed to operate in a given operating system, such as CP/M, MS-DOS, UNIX, and so on, rather than on a particular machine. The advantage here, of course, is that a program can be sold to many different machine owners, resulting in better returns for the software authors, and better choice for the machine owners.

In the text we show the major operating systems supported by each machine. Some may require additional hardware, such as a second processor, for some of the optional operating systems.

One trap is that not all machines use the same type (format) of disks, and so a program which is available for the right operating system may not be on the right disk format. This is a technical problem, and the best help you can get is from the dealer you bought from or from the agent for the machine.

Prices – or 'what *else* do I need?'

As in the first part of the guide, prices quoted are approximate, and represent a typical "bundle". You must price all the software you need as well! In the business market, machines are often bundled with software, which can change the perspective on a price remarkably. One thing has rarely been included: a printer. Very few users of machines in this bracket will not require a printer, but they vary so much in both price and facilities, that it is pointless to try to even estimate a price, although some computers have printers built in.

Some machines are intended for use with a separate terminal. Prices quoted include a typical terminal, but again you may wish to pay more or less, depending on the facilities you require.

All prices quoted are *approximate*, giving an indication of the sort of cost involved. All prices quoted include (we hope!) sales tax at the higher (40 per cent) rate.

Aren't they all the same anyway?

Well might you ask! There is a large class of basically similar machines: Z80 processor, 64K of RAM (memory) and two disk drives, handled by a separate terminal, with RS-232 interfaces, and operating under the CP/M operating system. That there are a lot of systems meeting that outline specification is a testimony to the ubiquity of the Z80, and of CP/M. It is also a comment on how easy it is to build a computer these days! In practice of course, even machines as similar as that have differences. Look to the number, size and capacity of disk drives, the keyboard layout and number of special function keys, the screen quality, physical size and design, bundled software, and the interfaces which are supplied. Colour may seem like a useless expense in a business setting, along with fancy graphics. They are a waste in many applications, but can be used to enhance the user interaction with the machine, and to make data instantly comprehensible.

Before buying, or even contemplating buying a computer, you must answer the fundamental questions:

- What do I want to do?
- What do I need to do it?
- Who can do it?
- How do I expect to benefit?

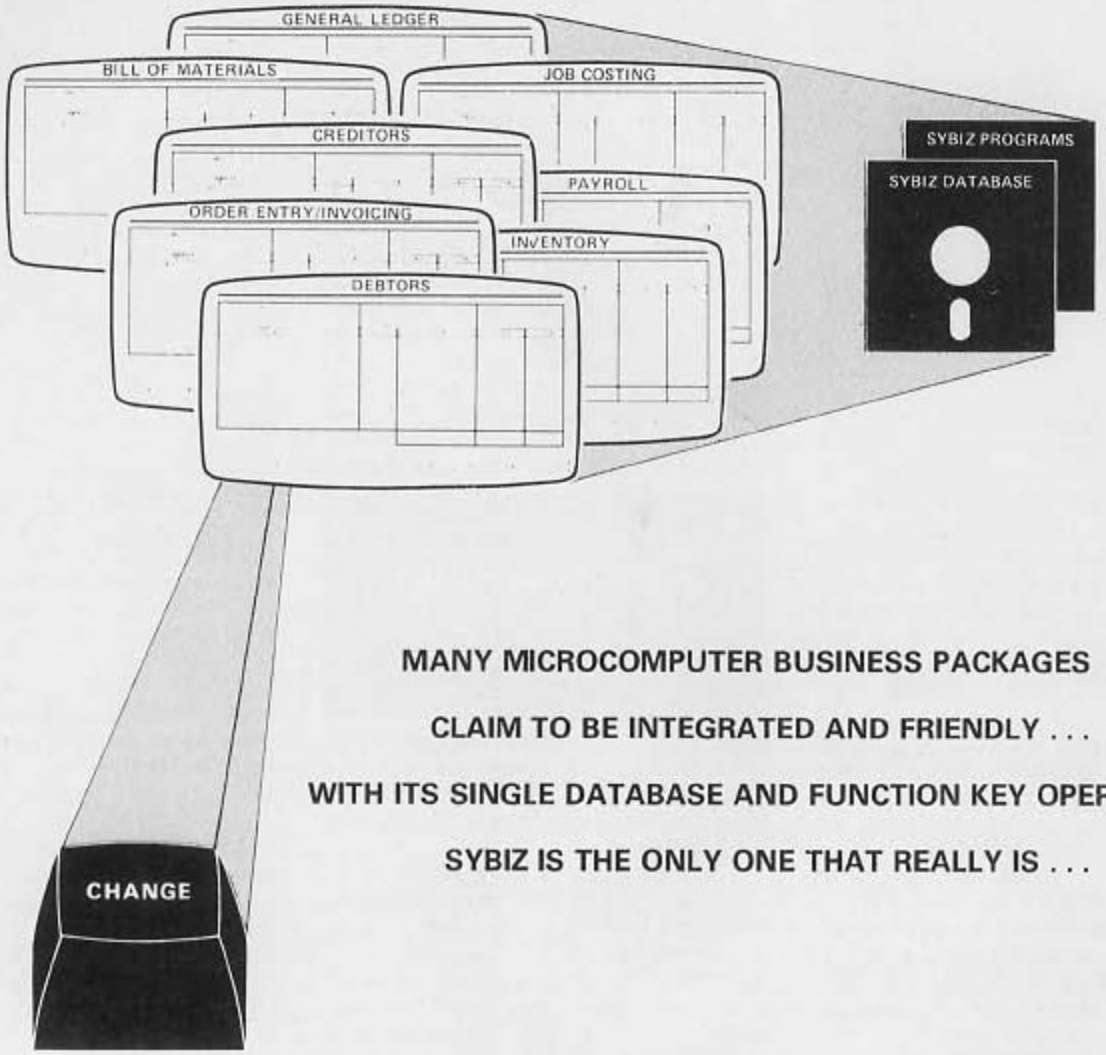
And now, on with the round-up!

— Gordon Findlay

Gordon Findlay, the author of this comparison of microcomputers priced from $5,000 to $12,000 in New Zealand, will be well known to readers as a regular contributor to ***Bits & Bytes****. The first part of the round-up, of microcomputers up to $5,000 in New Zealand, was printed in the December/January edition of* ***Bits & Bytes.***

DON'T BE FOOLED

THE SINGLE MOST IMPORTANT ELEMENT IN BUYING A COMPUTER SYSTEM IS THE SOFTWARE (PROGRAMS), NOT THE HARDWARE



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Access Data

The Access Portable is an integrated unit, with a screen, keyboard, printer, modem and more, all in one compact unit. Physically, it is two units – a detachable keyboard and a roughly cubical unit with a screen, two disk drives alongside, and a printer built into the top. The integrated screen is a 7in diagonal amber phosphor unit, supporting inverse and blinking video, dual intensities, single and double underline and combinations. High-resolution graphics are available, with 64 special graphical characters. The detachable, low-profile keyboard has 15 function keys, and a number of keys for special operations. Two 5.25in disk drives are built in. These are double density, and offer a choice between single-sided format (360K storage in total), or double sided (720K storage total). The usual output ports are there, too: two serial (RS-232), on parallel, IEEE-bus, a video output for using a larger screen, and the possibility of using larger, 8in disk drives.

A modem is standard equipment – acoustic or direct connect, operating at up to 300 baud, with automatic dialling and a number of special features. The built-in printer is an 80 characters per second, dot-matrix type, friction feed (tractor feed optional) with full graphics capability, and a variety of optional fonts and spacings. The whole system can be operated from a battery pack, giving an hour of operation before recharging.

The Access portables come with the CP/M operating system, and the Perfect Software line of application packages. Reviewed in *Bits & Bytes*, November, 1983. Price: $5,800 (single sided disks), $6,260 (double sided).

Access Data also handles the SAM 80 microcomputer. This is a single-user, desk-top unit, running CP/M with two 8in disks, and 64K of RAM – the archetypical CP/M system. With 1.2 megabytes of storage available on each drive, this represents a good amount of on-line storage. Serial and parallel printers are both supported. This unit is $5,800, but you also need a terminal, of course. Access has the ABM 85 terminals with detachable keyboard, function keys, full-screen editing, blinking, inverse, underlined and dual-intensity video. The screen size is 24 lines by 80 columns, with a twenty-fifth line providing a status indication. A typical cost for this terminal would be $1,925.

Altos

The Altos range of computers is very extensive, including very large multi-user systems. The 5-15D microcomputer allows up to three users, each with 48K of RAM, and a total of 192K (the rest is presumably required by the system itself for management). It has two double-sided, double-density 5.25in mini-floppies. The system has full multi-tasking capabilities for up to three users. A hard disk may be added if required. Price: $7,530, presumably not including terminals.

Apple ///

The Apple product line is being promoted overseas as the //e for personal use, the /// for business use, and Lisa for the electronic desk top or office. The /// is a desktop unit, with keyboard, processor, and a mini-floppy drive in a single unit, which acts as support for the monitor. In practice I imagine that very few are used with just the in-

First round-up — part B

built drive. A 5 megabyte hard disk, the Profile, is designed to sit between the main unit and the monitor; external floppy drives can be added.

The processor is the 6502A, with extended addressing hardware. Standard RAM is 256K. This may be expanded to 512K. A choice of operating systems is given: Apple's own, with the descriptive if not self-effacing name of "Sophisticated Operating System," or CP/M, with the addition of a Z80 processor card. SOS is a powerful operating system with quite a bit of software support. CP/M is of course very well known. The standard languages are Business BASIC, and Pascal.

The keyboard includes a numeric pad, and two function keys, and cursor movement keys. The text screen is 24 lines of 80 characters, or 40 characters in colour, and there are various graphics modes, in up to 16 colours.

Interfaces included are printer and RS-232, RGB and NTSC colour video, audio and joystick. Four expansion slots allow for the addition of other interfaces as needed.

Reviewed in *Bits & Bytes*, March 1983. Prices: with green screen and two disk drives (one external) $7,995; with green screen and Profile $9,995; with Profile and colour monitor, $10,995.

BMC 800

The BMC 800 range is made by OKI of Japan, where it is known as the IF800. The model 10 was listed in part one of the guide; the models 20 and 30 are extensions of the range.

The model 20 is an integrated unit – keyboard unit containing the processor, interfaces and three empty bus slots, with twin mini-floppy drives built in to the monitor unit. The keyboard unit includes a built-in printer.

The processor is a Z80A, with 64K of RAM, and running CP/M. As such, a variety of languages are available, including BASIC, Pascal, Cobol, and Fortran. The 64K of RAM may be expanded to 128K, and does not include screen RAM. In fact, a further 48K is used for the screen, which allows full graphic display, with 640 by 200 resolution, in eight colours, which may be mixed to give 32 "hues". Text resolution is 25 lines of 80 characters.

The keyboard includes a numerical keypad, 10 programmable function keys, special keys for hard copy from the printer, and for screen editing. A further 10 function keys are built-in to the monitor enclosure.

Disk drives are double sided, double density, with 380K of storage each. The built-in printer is 80 characters wide, and prints at 80 characters per second, using a 5 x 7 matrix, tractor or friction feed. It also has a graphics capability, allowing hard copy of graphics displays. The standard interfaces are RGB colour, RS-232 serial, and a light-pen port. A battery backed-up clock is also standard equipment. Additional accessories abound, including digitiser, plotter, light-pen, analog to digital converter, and more. The model 20 is available with either a green screen or full colour monitor.

The model 30 is a similar computer, with increased specifications all round. The processor is the faster Z80B, RAM is 128K, expandable to 256K, the built-in printer is 132 characters wide, with a better dot matrix, and faster, too, at 120 characters per second. The disk drives are larger 8in units, each capable of storing 1.2 megabytes. Five and 10 megabyte hard-disk drives are also available.

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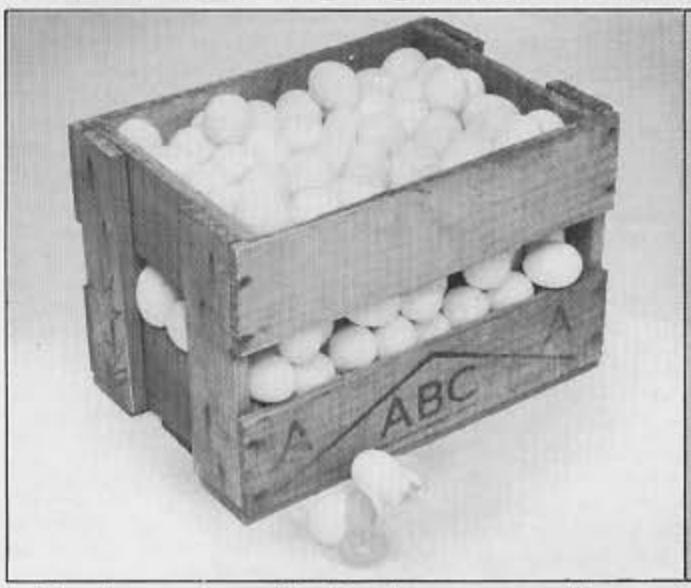

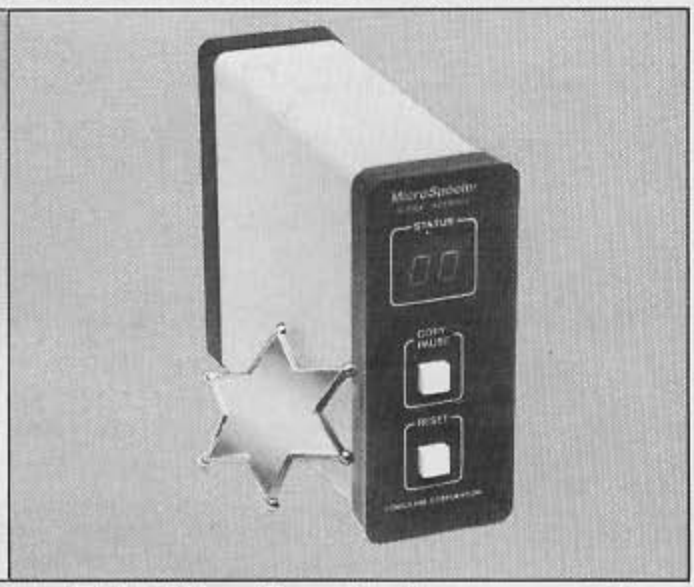

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- Multiple Copy Function:—runs up to 99 duplicate copies of the data in the buffer.
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Prices: model 20 with green screen $6,276, with colour monitor $7,608. Model 30 with green screen $8,775, with colour $9,689.

Casio FP 1000/1100

The Casio FP series consists of two models, identical except for graphics capabilities. I will write about the FP1100, with the FP1000 details in brackets when different.

The FP1100 is a low-profile unit, with a separate keyboard, and optional box containing disk drives. The monitor may be conveniently stacked on top of the keyboard unit. The system is CP/M based, using a Z80 compatible processor, and a separate (proprietary) processor for input and output. The memory is the usual 64K of RAM, with a separate 48K (FP1000 only 16K) of screen RAM. BASIC is to be found in a 32K ROM, so presumably some sort of bank selecting is used in BASIC programs. The main unit has two bus slots (one of which will be used for the floppy drives); an eight-slot expansion box is available.

The keyboard has a separate numeric pad, with cursor and other special-purpose keys, and 10 programmable function keys. Sixty-three special graphics characters are obtained from the keyboard by using a special command key.

Text display is the usual 25 lines of 80 characters, or 40 characters may be selected under program control. Graphics display resolution is 640 x 200 (with three screens) and eight colours (FP1000: monochrome only); or an interlaced mode with 640 x 400 resolution (FP1000: not supported).

The standard interfaces are video, cassette, and parallel printer. External memory packs, RS-232 interface, PROM board and other accessories are also available.

The version of BASIC in ROM is a large one, with some unusual commands (such as for communications processing) and a lot of functions, including statistical functions such as standard deviations, correlations and so on. Fourteen commands are provided for graphics processing. Up to 10 programs may be in memory at once.

First round-up — part B

The (optional) twin disk drives are double sided, double density types, holding 320 Kbytes each.

The FP1100/1000 could have been included in the under $5000 range of the first guide *(Bits & Bytes,* Dec/Jan), but it is most commonly sold in this country as a package deal: CPU, dual disk drives, CP/M operating system, 80 character per second dot-matrix printer, and monitor: FP1100 version (14in colour monitor) $8,240; FP1000 version (12in green monitor) $7,330. Separate prices: FP1100 CPU $2,200; FP1000 CPU $1,800; dual disk drives $2,950. Reviewed in *Bits & Bytes,* October, 1983.

Commodore

Commodore Business Machines produces a range of computers, disk drives, and printers which may be mixed and matched to whatever configuration is desired.

The PET 4000 series of computers is a low-cost system, based on the 6502 microprocessor. It is an integrated unit – keyboard, processor, screen all in one. BASIC is in ROM, so the machine is in BASIC when turned on. Memory may be 16K (the 4C16) or 32K (4032). The keyboard has a numeric pad, and keys to suport a full screen editor. Input and output facilities include a parallel port, a serial port, and expansion bus; and two cassette ports.

The screen display has 25 lines 40 characters wide. 128 graphics characters are provided, but pixel ("dot by dot") graphics are not supported. The screen is green; there is no colour option.

The Commodore 8000 series is a business computer, with monitor mounted on a pedestal on top of the main unit, and detachable keyboard. The processor is also a 6502, with 32K (8032 model) or 96K (8096 version) of user memory. The keyboard has a numeric pad, and cursor keys. The display tilts and swivels, and is a full 80 characters by 25 lines, with the same graphics as the 4000 series. BASIC is still in ROM.

The Commodore 700 series is similar to the 8000 in appearance. The screen is the same, the keyboard has many additional keys, including 10 function keys. There is an extensive capability for sound generation. The processor is upgraded to a 6509, and a second processor may be added. User memory in the B710 is from 128K to 896K, in the B720 is from 256K to 896K.

Processor prices: 4016, $1,995; 4032, $2,395; 8032-SK, $2,695; 8096-SK, $3,195; B710, $3,695; B720, $3,995.

Disk drives come in a variety of styles. All are for 5.25in disks; all are controlled by built-in processors; and all have operating system in ROM. This has advantages, and also disadvantages. The 2031 is a single drive, with a capacity of 170K. The 4040 is a dual drive, with a capacity of 170K each, for a total of 340K. The 8050 is a dual drive with 500K per drive. Other models are also available including hard disks, with capacities up to 5 megabytes.

Drive prices: 2031, $1,295; 4040, $2,595; 8050, $3,295.

Corona

Corona produces a range of IBM PC compatible machines: the PC1 (single disk drive), PC2 (two drives), and portable versions of both (PPC-1 and PPC-2), and a version with a hard disk (PC-HD). These comments will relate mainly to the PC-2, which seems to be most readily available in God's Own, and the PC-HD.

As is to be expected, to be an IBM compatible machine, the PC's have

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an 8088 processor, with 128K of RAM, a detachable keyboard, green screen, an IBM-type parallel printer interface, serial interface, and four expansion slots. The text display is 25 x 80, or 640 x 325 graphics. The standard display is monochrome, but colour display drivers are available for the IBM. The video display has reverse, high-intensity, underlining, and blinking attributes.

The operating system supplied is MS-DOS, with GW-BASIC ("Gee Whiz Basic", known to IBM as BASIC-A).

The disk drives (5.25in) each provide 320K of storage. The PC-2 has two, the PC-HD has 1, and a 10 megabyte winchester disk.

Prices: PC2: $6,734; PC-HD $12,195.

Digital

The Digital personal computers cannot really be summed up in brief. These are high-end systems, which can be tailored very much to the requirements of the buyer, and his pocket. One thing is clear:— these are intended for the serious user, not for the games addict! .

The Rainbow 100 is a dual processor machine, with a Z80 and an 8088 to allow the use of CP/M and CP/M-86, giving the best of both eight and 16-bit worlds.

It may be used as a stand-alone desk top machine, or as a terminal – a very smart terminal! The display is from 80 to 132 characters wide, and very high quality. The monitor screen may be tilted and rotated to suit the user. High resolution colour graphics (800 x 240) are provided. The disk drive has a capacity of 400K bytes, on 5.25in disks. The drive has two openings, for two diskettes using a common drive mechanism. Another drive may be added, giving 1.6 megabyte capacity on four diskettes.

First round-up — part B

The basic unit has 64K of RAM, expandable up to 256K, and it seems that most users expand at least some of the way. The keyboard is large, but has a low, streamlined shape. It has to be large to accommodate all the keys – 105 of them! There are numeric keys, editing keys, and over 30 function keys, some of which are predefined. One of the keys is labelled HELP, and it is to be hoped that the software produced for the Rainbow will fully support this key.

The Professional series is a more expansive system, with the Digital F11 CPU, noted for its number crunching power. Memory is an impressive 512K of RAM. There is also a high-resolution graphics option, and multi-tasking.

The DecMate 2 is a word-processing system which can also function as a computer. The system comprises two disk drives (400K each), a monochrome monitor and keyboard. The processor is a 6120, with a Z80 as an option – I imagine that is required to run CP/M. Standard memory is 96K. Special word processing software/operating system is supplied, giving a professional word processing capability, supported by special keyboard functions. Serial interface is standard, other options are legion, including colour graphics, hard disk, and so on. It has the same monitor as the Rainbow 100, and a similar keyboard.

Prices: these are only indicative of typical systems – on this range, you get what you need, and you pay for what you get!:

- Rainbow 100, two drives, 128K, monitor: about $8,400
- Professional, two drives, 512K, monitor: $10,900
- DecMate 2, two drives, 96K, monitor: $9,600.

Epson QX-10

Epson is noted for its printers, but has recently branched out into computers – the HX-20 portable (see part 1 of this guide) and the QX-10. The QX-10 is a CP/M machine with a difference. Physically, it is a low-profile unit containing two slim disk drives, a detachable sculptured keyboard, and a monitor which sits on the main unit. The outstanding feature of the QX-10 is the deliberate attempt to make the machine as easy for a layman to use as possible.

The processor is a Z80A, helped out by a 8049. Main memory is 64K or 192K or RAM, expandable to 256K, with a further 32K dedicated to the video screen. When expanded to 256K, part (56K) of the RAM is used as a pseudo-disk, speeding operation. There is also 2K of battery-backed-up RAM for storing "important information" – presumably the user can choose. The keyboard is tiltable, and has a numeric keypad, cursor keys, and 18 function keys. The text display is the usual 25 lines of 80 characters. Graphics can be displayed with a 640 x 400 resolution on a 12in green screen, which is in my opinion at least just about the best around.

The twin 5.25in disk drives give 640K storage altogether. Standard interfaces are serial (RS232), parallel printer, and light pen. Options include networking, colour display, modem, analog-digital converters, instrumentation bus, and more.

The QX-10 may be had with a

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MultiFont character generator, which allows the use of 16 different typefaces. A built-in clock and calendar are also supplied. The clock may be programmed to start specified functions at a pre-set time.

Reviewed in *Bits & Bytes*, October, 1983. Prices: 64K, $5,120; 192K with MultiFont, $5,851.43; 256K with MultiFont, $6,034.29; 192K with colour monitor, $8,295.71. Also available "bundled" with various printers and software.

Franklin Ace 1200

Basically the Ace 1200 is an extended version of the Ace 1000 Apple "workalike", having two disk drives built in, and with the addition of a CP/M capability.

Obviously therefore the Ace 1200 has two processors – a 6502 for use in Apple mode, and a Z80 for running CP/M. For details of the machine in Apple mode, you should refer to part 1 of this Guide.

An 80-column card is standard equipment, as is an RS232 serial interface, and a parallel printer interface. Memory is 64K of "normal" RAM, with an additional 64K on the Z80 processor card, making a total of 128K. The second bank (on the Z80 card) is available to skilled programmers when in Apple mode; in CP/M mode some of the "normal" RAM is used to store peripheral drivers, to make more RAM available to CP/M. Disk capacity is 143K each drive, which is not all that large by CP/M standards.

Reviewed in this edition of *Bits & Bytes*.

Price: (including green-screen monitor): $5,175.

First round-up — part B

Hewlett Packard

The HP series 80 is a range of personal ccmputers with three models. The HP-85B and 87XM have small screens in a large desktop, calculator-style housing; the HP-86 has a separate 9 or 12in monitor.

All have the HP-enhanced BASIC language in ROM; the 86 and 87 can also run the CP/M and USCD p-system operating systems. Memory ranges from 32K for the 85, 64K-640K for the 86, and 128K - 640K for the 87. All will accept extra memory to use as an electronic disk. Other additions allow for communications, parallel or serial printers, and various special-purpose interconnections.

Graphics capabilities vary: 256 x 192 for the 85, 544 or 400 x 240 for the 86, and the same for the 87.

The HP version of BASIC is very extensive, with an extremely large number of programming statements. There is provision for an action to occur at a particular time; for graphics manipulations; file handling and many more.

A large number of options are available for disk storage, ranging from 3.5in micro-floppies to 9.6 megabyte winchester drives.

Plotters, printers, a graphics tablet, interfaces to all sorts of things, speech-synthesis modules, special purpose ROM packs, and a wide variety of software are also produced by HP.

Typical prices for bundled systems: HP86 with 128K RAM, electronic disk, 12in video monitor, single 270K microfloppy drive, $5,998; with dual micro-floppy drives, $6,785.

The series 100 are marketed as personal office computers. They have dual Z80 processors, and operate under CP/M. A wide variety of configurations are available, with various options as to memory size, disk storage, built-in printer and so on.

IBM

The entry of IBM into the microcomputer market certainly caused a stir. The advent of the IBM-PC (for Personal Computer) gave rise immediately to a major industry in third-party hardware and software, to the extent that the PC had, after just a few months, more support available than almost any other computer you can name. Just look at the size and number of the specialist magazines devoted to the PC!

This was, of course principally due to the IBM name. Big Blue has built a first-class, but not technically adventurous, personal computer. The basic parameters are quickly told:

16-bit processor (8088) with provision for the auxiliary mathematics processor (8087); 64 to 544K of RAM, 40K of ROM, a

apple][+, //e
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WORD-PROCESSOR The word processor you choose should be powerful, yet simple to use and at low cost. And it should be able to run on any Apple II computer without requiring you to spend hundreds of dollars on additional hardware to make the program compatible with the computer. Whatever the configuration the program should "look" and run the same.

This is the essence of the FULLTEXT-55 word processing system. It is sold at a price that every Apple owner can afford, and yet it has the sophistication of word processors many times the price. There are absolutely no hidden costs because NO extra hardware is required -- NO lower-case chip, NO 80-column card. Yet FULLTEXT-55 gives you upper and lower case and 55 characters per line on the screen. If you have a language card FULLTEXT-55 now makes full use of it, hence it is ideal for the Apple //e.

Because it is so simple to learn, FULLTEXT-55 can be used by anyone who can use a typewriter. Even the inexperienced user will begin word processing without delay and be able to write documents, from reports, accounts and business correspondence to society circulars and personal letters. In minutes you will be able to insert, delete, modify and move text with great ease and speed. The package includes its own Mailer system and allows full easily-varied formatting of the printed output. You can even insert pictures directly into your text! A clear 75-page manual includes fully illustrated descriptions of all features and a tutorial for using the Editor.

FULLTEXT-55 uses key-letter commands (e.g. press J for Jump, F for Find, D for Delete, etc) and avoids wherever possible strange control-character commands which are both unnatural and difficult to remember. In addition you are prompted, at all times, with your options.

While the Apple][+ does not permit the user to enter lower-case characters from the keyboard, FULLTEXT-55 does. What is more, it gives you temporary-upper-case and upper-case-lock, recognises the standard shiftkey modification and allows you to generate characters like [\ ] { | } ~ from the keyboard. It also features a type-ahead buffer and recognises and takes advantage of enhanced keyboards like that on the Apple //e or some Apple-copies.

You can easily insert any printer commands (for controlling underlining, line spacing, italics, character size, etc.) directly into your text -- all control characters (including the carriage-returns) are shown on the screen with their own easy-to-read symbols.

Compare with other systems. We are sure you will have to agree that FULLTEXT-55 represents the most economical word processing system for the Apple without losing any sophistication. Don't miss out on this one!

& ASSEMBLER The FULLTEXT-55 Assembler has to be seen to be believed. It is fully integrated with the whole system and it runs incredibly fast (250 lines of source in just 9 secs). Errors trapped during assembly can immediately be corrected by the powerful editor. Using standard 6502 assembly language, the FULLTEXT-55 Assembler would be great value alone (and yet you get the full power of a word-processor!).

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First round-up — part B

range of disk drives. The keyboard is detachable, and has caused controversy in some quarters, not because it is no good (it's excellent) but because it follows the European standard rather than the American, which was started by IBM with its Selectric typewriters. The PC has an 80 character by 25 line text screen in 16 colours, and up to 640 x 200 graphics resolution (monochrome: 320 x 200 with four colours.) The standard interfaces are serial, parallel printer, video (monitor or RGB), and communications. There are five expansion slots, and the number of products available to occupy them is enormous.

As for software, the PC supports three operating systems: CP/M-86, the USCD p-system, and PC-DOS, alias MS-DOS (for Microsoft). This gives any amount of software: I have in front of me a list of over 230 major packages which are supported in Christchurch. This list includes a lot of alternative languages and operating system options, too. The same firm, one of the IBM dealers, has a list of hardware options. It is over five, closely typed pages, with just one line for each option. In other words, you aren't buying a computer, you are buying into a major system.

The PC has a larger brother, the XT, with a hard disk, and a younger brother not seen in New Zealand yet, the PC JR, or "Peanut".

An important application of the PC is in communications, and this is an area we can expect to see increasing in importance. PC's can be networked to each other with almost no limit to numbers; and can also be used to communicate with other (larger) computers.

The PC was reviewed in *Bits & Bytes* in April, 1983. A typical price, for comparison purposes only: system unit with 128K of RAM, two disk drives, and monochrome screen, about $7,600. the configuration you need can really be determined only by a reliable, qualified adviser.

ICL

ICL is another major mainframe computer manufacturer to enter the micro market.

The ICL Personal Computer appears in a range of four models. All have a 16-bit processor (the 8088), from 64K to 512K of RAM. In addition, further RAM may be added to act as a "virtual disk", up to another 512K. Interfaces are by RS-232: the initial complement is four, an extra four may be added later. A separate 80-character-wide, green-screen monitor and detachable keyboard will occupy at least one. Colour output may be obtained by adding a suitable monitor. Communications facilities are built in.

Floppy disk drives are 5.25in, double sided, with 764K byte capacity.

The ICL uses CP/M as its operating system for the single user, and MP/M for multiple users (up to three). The standard programming language is BASIC. Cobol, Fortran, and others are also possibilities.

Four models are listed:

Model 15 – 64K RAM, two floppy disk drives.

Model 25 – 64K RAM, 1 floppy drive, 5 megabyte hard disk.

Model 26 – 256K RAM, 1 floppy drive, 5 megabyte hard disk.

Model 35 – 256K RAM, 1 floppy, and a 10 megabyte hard disk.

Any model can be expanded upwards.

Typical price: Model 15 (single user) about $8,800 (excluding a printer, which is normally included).

ICL also has a desk-top computer system, the DRS 20. The name comes from Distributed Resource System, and clearly this device is intended for use in a local network. This is beyond the scope of this guide.

IMS

The IMS 5000 series is a desktop system, which can also serve as an intelligent terminal into a network or mainframe system. The VDU, processor, and disk drive form one unit, with a detachable keyboard, complete with numeric pad, editing and function keys. This is an S100 system, with an eight-slot mother board, all of which are used. This allows upgrade if required.

The screen has 24 lines, with a twenty-fifth status line. The processor is a Z80, with 64K of RAM. More RAM may be added. An 8088 processor may be substituted if desired, although no New Zealand price is listed. A wide variety of storage options is given: 800K mini-floppy disks, 6, 12 and 24 megabyte

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hard disks.

Prices: with two floppy drives and CP/M, $9,418; with Turbodos instead of CP/M, $10,293.

Intertec

Intertec Data Systems produces two computers: the Superbrain II and the Compustar, each available with a variety of disk storage capacities. The two are very similar, the main difference being that the Compustar is intended for use in a multi-user network.

Both units are in appearance rather like a terminal, with the keyboard, screen, processor and drives all in one unit. The Z80 processor supports 64K of RAM, and two disk drives (5.25in style), under the CP/M operating system. This gives a formatted storage capacity of 680K. A second Z80 is used to handle disk I/O.

As well as the main 64K of RAM, there is a 2K block of static RAM, used to preserve set-up parameters, and as a disk buffer under the control of the second processor. A 2K ROM is used for initial program loading, then switched out. The 12in green screen has 24 lines of 80 characters, with reversible video. The character set is contained in an EPROM, so could be changed if desired. A clock provides time and date, and is battery backed.

The keyboard has a numeric keypad, and cursor control keys. Some at least are reprogrammable. The standard interface is a serial (RS-232) interface. A parallel interface may be added.

Under CP/M, 52K of RAM is available for applications programs. Within this restriction, most CP/M packages and languages can be used. BASIC is supplied, an extended Fortran is also sourced by Intertec.

The Compustar is virtually identical, except for the communications aspects. The Compustar can be used in a network, along with hard disk units.

Prices: Superbrain II Model QD, $8,995; Compustar Model 30, $10,995.

Kaypro

The Kaypro 2 portable was listed in part 1 of this guide. The Kaypro is similar, but with twice the disk storage on floppy disks. The Kaypro 10 has a built in 10 megabyte hard disk, which is remarkable in a portable computer of this size (and appearance!) For other details, refer to the December, 1983 issue of *Bits & Bytes*.

Prices: Kaypro 4, $5,088; Kaypro 10, $7,640. All Kaypro computers come with a collection of programs from the Perfect Software series.

First round-up — part B

Morrow

The Morrow Micro Division range starts with the MD2, which was described in part 1 of the buyer's guide, in the December, 1983, issue. The MD3 and MD11 are similar over all, and only the additional features will be listed here, in the interests of space.

The MD3 differs in the storage capacity of the disk drives, which is 384K per disk, rather than the 200K of the MD2.

The MD11 has 128K of RAM (against 64K for the MD2/3), 1 floppy disk of 384K capacity, and a 10 megabyte winchester disk.

Both the MD3 and MD11 are supplied with the same terminal, and same set of software, as the MD2, so the decision is simply one of storage recuired.

Prices: MD3, $5,300; MD11, $7,995.

NEC APC

If all the favourable comment on the APC (Advanced Personal Computer) were stretched end to end, it would reach the factory, I'm sure. It comes in three versions: monochrome with one or two 8in floppies; or colour, with two floppies. The CPU is the 16-bit 8086; standard RAM is 128K, expandable to 640K. Four kilobytes of battery protected RAM is also provided. A parallel printer, and serial (communications) interfaces are standard. Numerous other options can be added. A music generator and a hardware clock are included.

Each of the drives has a capacity of 243K or 1.2 megabytes, depending on the type chosen. The display is 25 lines, plus a status line, with a number of special characters, and user-definable characters. If a graphics option is added, it gives a 640 x 475 resolution display, with eight colours (unless the monochrome display is chosen!). The keyboard is detachable, with a numeric keypad, 22 function keys, special graphics keys, and provision for the use of a second, user-defined character set.

There are a lot of hardware add-ons, and software packages. Operating systems supported (directly) are CP/M-86, and MS-DOS, each costing $140.

Reviewed in *Bits & Bytes*, October, 1983.

Prices: 1 disk, monochrome, $7,378; two disk, colour, $10,952 (both with 128K memory); monochrome graphics system, $1,628; colour graphics system, $2,738.

Combinations of options attract special prices.

Olivetti

The Olivetti M20 is interesting in its use of the Z8000 chip, which is the less common 16-bit processor. With keyboard and drives in a unit looking rather like a typewriter, with a monitor supported on a circular column, so as to rotate and tilt for best viewing angle, the M20 has a very striking appearance.

Standard memory size is 128K of RAM, expandable with plug-in boards to 512K. The keyboard is not detachable, has a numeric pad, and is completely programmable. The video display may be monochrome or colour, and is capable of graphic displays with a 512 x 256 resolution. The colour version has eight colours. In text mode, the display may be either 25 x 80, or 16 x 64 as required.

Most users seem to choose two disk drives, although apparently the

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M20 can be had with just one. These are 5.25in, double sided units, giving 340K capacity each. The M20 can be upgraded with a 9-megabyte hard disk.

Olivetti has its own operating system, PCOS, with BASIC and Pascal languages. Alternatively, CP/M-86 or MS-DOS can be used. Serial and parallel interfaces are supported by the languages, as is the graphics display. An instrumentation bus, and a wide range of scientific and engineering peripherals are also available.

Reviewed in *Bits & Bytes,* June, 1983.

Price: $9,765.

Osborne

The Osborne Executive is an upgraded Osborne 1, described in Part 1 of this guide. The most obvious differences are the screen size (seven inch), and colour (amber), and memory size (128K).

The screen is 80 columns wide, and the operating systems are CP/M and the USCD p-system.

For other details, see Part 1. Price (including software): $5,950.

Panasonic

The Panasonic JB-3000 is a 16-bit computer (8088 chip), with a number of storage options. Physically it is four separate units: processor box, containing 128 to 512K of RAM; monitor (monochrome or colour); keyboard; and disk drive(s).

First round-up — part B

The keyboard has a thin profile, with a numeric pad and function keys. The display format is selectable by software: 20 or 25 lines, of 36, 40, or 80 characters. Two graphics resolutions are supported (640 x 400 and 320 x 200) in up to eight colours. Interfaces in the standard unit are video, RGB colour, parallel printer and three expansion slots. These may be augmented by adding a six-slot expansion unit.

The disk options are: 5.25in or 8in floppy, or 10 megabyte winchester. The JB-3000 will support up to four drives, of any size. The minifloppy drives have a variety of capacities, ranging from 160K to 720K each; the eight inch drives are 1.2 Mb units.

As well as its own operating system, the JB-3000 supports both CP/M-86 and MS-DOS, making a wide variety of software available, as well as the BASIC, Pascal, Fortran, Cobol, and C programming languages. Accessories are available to provide communication facilities.

Prices: moncchrome, one 5in disk, $5,610; with a second 5in disk, $6,581; colour monitor and one disk, $7,364; or with two disks, $8,190; with dual 8in disks, monochrome monitor, $9,279.

Proteus

The Proteus, made in New Zealand by Progeni, is a fairly standard business system, with a few novelties. Based around the Z80, 64K RAM, one or two 8in drives with CP/M standard, the Proteus is a cuboid box, containing processor and disk drives, for use with a separate terminal. Each drive has a capacity of 630K bytes (under CP/M: see later). A disk extension interface allows connection of another two drives if required.

Other interfaces are three serial ports, one parallel, and a networking port for the POLY network.

As well as the Z80, the Proteus has a 6809 processor, which allows it to run the FLEX operating system. POLYSYS, Progeni's own operating system for the POLY machines, is also supported, and the Proteus may be used in a POLY network.

The standard terminal provided is the Lear Seigler ADM23, with a 24-line display, half-intensity, reverse and blinking, and underlining. The keyboard has function and editing keys, and cursor control keys.

Reviewed in *Bits & Bytes,* November, 1983.

Price: CPU, terminal, dual disk, etc, $8,077. Other configurations are possible.

Sanyo

The Sanyo MBC 1200 series computers are virtually identical to the 1100 series considered in Part 1

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First round-up — part B

of this guide, with the addition of a graphics facility. This gives a 640 x 400 resolution screen, in monochrome. The 1200 has a single 640K minifloppy disk drive; the 1250 has two. CP/M is the operating system used.

The MBC4000 series is a 16-bit range (8086 processor) with physical arrangement as the 1100 and 1200 series, and 128K of RAM which may be expanded to 512K. An RS-232 interface, and a parallel printer port are standard, as is the same detachable keyboard, and screen display of 25 lines (no graphics capability). This series uses CP/M 86 as the operating system. The MBC 4000 has one 640K minifloppy, the MBC 4050 has two.

Prices: 1200, $5039; 1250, $5564; 4000, $5547; 4050, $7,384. Five and 10 megabyte hard disks are available as accessories for all Sanyo computers.

Sharp

The Sharp MZ-3540 is a business machine, using a Z80 processor as the main CPU, with another for handling peripherals, and a special processor doing duty in the keyboard. The keyboard is detachable, and has a full complement of numeric keypad, cursor and user definable keys etc.

The 12in screen has a text display of 25 lines, 80 characters wide, and a graphics resolutions of 640 x 400. The version of BASIC used provides many graphic commands, including colour commands, presumably for an optional colour monitor. There is a CRT interface, as well as the serial and parallel ones; an interface for eight inch drives is an optional extra.

Each of the built-in minifloppies has a capacity of 320K; RAM is 128K, expandable to 256. A calendar-clock function is also built in. Space is left for up to 32K of ROM for use by peripheral devices.

The price of $7,339 includes a 120-character per second, dot-matrix printer.

Sirius

The Sirius 1 computer looks like a refined system, and so it is. It is housed in three components: processor box, display (which often sits on top), and keyboard, and offers a variety of disk storage options.

The processor is the 8/16 bit 8088; the minimum amount of memory is 128K, expandable to 896K. This does not include 4K of screen RAM, and an 8K boot ROM.

The display can be tilted or rotated, with 25 lines in text mode, or 800 x 400 resolution for graphics. The character fonts are in RAM, so may be altered. The display may be half or ful intensity, reversed, or underlined. Colour doesn't seem to be supported. The keyboard is fully programmable, and has the usual numeric pad, editing and function keys.

Standard disk drives are 5.25in single sided, with a capacity of 610K each. Two drives are housed in the processor unit. Double-sided drives may be installed instead, giving a capacity of 1.2 megabytes each. Serial communication ports, two parallel ports, and analog-digital speech and sound conversion are included.

Operating systems are CPM-86 and MS-DOS, and a module is available to support CP/M (the 8-bit version!) A very large number of software packages and programming languages, together with add-on accessories are also available.

Prices: with 128K, 2 single-sided disks, $8,895; with 256K and double-sided disks, $10,550.

Sperry

One of the oldest names in computing is Sperry-Univac, which was in the business in 1950. It concentrates on larger machines, although one of its intelligent terminals, the UTS-30, may be programmed, and converted to run CP/M.

The terminal is an intelligent one, meaning that it can be programmed to operate in many ways. The display may be formatted from two to 24 lines, two to 80 characters wide. The character generator may be programmed, and will store two sets of 256 characters. The keyboard has a number of special function keys, including some related to word processing.

Up to two 655K disk drives can be added. The terminal is programmable in Cobol, although the compilation needs to be done on a larger host machine. Once CP/M is added, it becomes a stand-alone device.

Price for a typical CP/M system: About $8,000.

Tandy

Tandy Radio Shack's Models 3 and 4 are available in New Zealand. The model 4 is virtually an enhanced model 3, so let's look at the M3 first.

This is the successor to the pioneering Model 1, with the same 48K, Z80 base. BASIC is still in ROM. Two disk drives, each storing around 130K are built in (disk-less models don't appear to be around in N.Z. anymore.)

This is an all-in-one unit (as opposed to the Model 1), with a numeric pad, auto repeat keys, and some other minor enhancements. Any number of hardware add-ons are produced, and the amount of software is staggeringly high.

Interfaces to cassette and parallel printer are standard; these can be augmented as desired. The Model 4 has additional memory, and is able to run CP/M directly, without the alterations to the hardware needed for the M3.

Price: Both models are priced at

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$6,250, the model 3 including a serial interface.

Televideo

Televideo has two 8-bit computers, and a 16-bit machine, all with the option of a hard disk.

The TS 802 is a single-user computer which could become a work station in a network if desired. It is in two units: a separate keyboard, and a monitor box with two 5in disk drives built in. It is another in the well-known "Z80, CP/M, two disk" family.

The disks have a formatted capacity of 368.6K bytes each. The display has a twenty-fifth line for status information, numeric keypad, editing and special function keys. Two serial, RS-232 interfaces are provided, and one RS-422 port for communication purposes. The display has reverse, half intensity, blinking, and underlined characters, and 15 graphic characters.

The TS 802H has one floppy disk replaced by a 7.47 Mbyte winchester drive.

The TS 803 has similar basic specifications. RAM is expandable to 128K if desired: 32K of screen memory is additional. Only two serial interfaces are standard: one for printer, one for modem or "mouse". The graphics resolution is 640 x 240. A major difference is physical appearance – the keyboard is still separate, but the monitor is mounted in a U-shaped frame, with the drives mounted vertically on the end of the frame. This allows the screen to tilt. The 803 has a 14in screen, against the 12in screen of the 802. The 803 can also be used in a network, by adding an interface card.

The 802 and 803 both use the CP/M operating system.

The TS 1603 is similar to the 803, using instead the 8088 8/16 bit processor, and the CP/M-86 operating system. Other operating systems are options. The drives have a slightly greater capacity – 737K, but are the same size. The same graphics resolution is obtained, but as an add-on option.

All three computers have an "H" attached to their number when one floppy disk is replaced with a hard disk.

Prices: TS803, $5,980; 803H, $9,125; 1603, $7,179; 1603H, $10,021; 802, $8,374.

Texas Instruments

TI has abandoned the home computer market, but is still alive and kicking in the business field, with the TI Professional computer.

Rather than using a TI special processor, as the TI 99 did, this time TI has opted for the 8088 processor, and 64 to 256K of memory. This allows the use of MS-DOS, CP/M-86, or the UCSD p-system as the operating system, giving access to a lot of software. The display is capable of graphics display, with a resolution of 720 x 300 pixels, *provided* that the graphics controller is added. Colour is also supported, up to eight being possible, presumably also requiring the additional board. The detachable keyboard has all the usual features, and tilts to sit at the desired angle. The built in disk drive has a capacity of 320K, which is a bit small by comparison with some of the other machines listed here. There is room for a second drive, or a ten Mbyte hard drive.

Internal interfaces include a parallel printer port.

Some interesting peripherals are either available or under development. These include communications hardware, a "mouse", telephone management hardware, and voice recognition.

Price for a 64K system, monochrome display, with one drive: $5,950.

First round-up — Part B

Torch

The Torch is a computer in a computer. It comes as separate item, or as a Torch Pack, which is a bolt-it-on addition to the BBC microcomputer.

This gives a Z80 processor, with an operating system called "CPN" in ROM. This is supposed to be close to CP/M – just how close is hard to say. At least some CP/M software has been persuaded to operate though, as the Torch Pack has been bundled with the Perfect Software line.

The BBC has a lot of disk options; the Torch Pack includes dual double density 5in disk drives. Communications, both through a modem and in a network, is one of the Torch specialities.

The Torch Pack has been on sale for around $3,000, including the Perfect Software package, which alone retails at around $2,000. The Torch Net system, and a Super Torch, with the 16-bit 68000 processor, are also available.

Xerox

I'll resist any temptation to make cracks about duplicating machines and the like! Xerox has two products in the range we are looking at: the 820 Information processor, and the 821 Word processing system.

The 820 first. Three boxes make up this system: keyboard, drives and monitor. The processor, memory, etc, are built into the display unit. Another CP/M machine, 64K of RAM, Z80 processor, two serial and two parallel ports. Communication is supported with appropriate software and hardware additions.

Dual disk drives are mounted in a separate box. Either 5in or 8in may be selected, with a variety of capacities depending on the density chosen.

The usual screen display of 24 lines by 80 characters, displayed in white on black, without graphics capability.

The 821 is similar to the 820, with dedicated text editing facilities: keys, built in dictionary etc. It still runs CP/M when not being used for text processing.

These units may suit a small business with need for both computer and word processor, but not enough need to justify separate facilities.

Prices: including dual 5in drives: 820, $5,500; 821, $6,675, including operator training and software.

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Who is in the 10 p.c. tax bracket?

Does your industry qualify for a microcomputer at the 10 per cent sales tax rate rather than 40 per cent?

The following list includes most of the categories to which the reduced tax applies. Individual consideration is to be given to hotels and restaurants catering substantially for the tourist trade, and to data processing firms which achieve substantial exports of software.

Agriculture, hunting, forestry and fishing

Dairy and pig farming; sheep farming; beef farming; mixed and other livestock farming, including horse breeding, deer farming, goat farming, broiler production, other poultry (including turkeys, ducks, etc), small animals breeding; cropping; fruit and vegetable growing, including market gardening, citrus orchards, other orchards, tomato growing, mushroom growing, grape growing and vineyards, berry fruit growing, fruit and vegetable growing; other horticulture, including tobacco farming, hop growing, flower growing, orchid growing, plant nurseries, landscape gardening and bee keeping.

Agricultural services

Physical improvement of land contracting services, including bush clearing and scrub cutting, fencing, drain and ditch maintenance, and other land improvement services; livestock contracting services, including herd testing, and shearing; grain, fodder and pasture cropping, vegetable and horticultural contracting services, including crop cultivation, crop harvesting, grain drying and seed dressing, and horticultural contracting services; topdressing and spraying contracting services, including aviation topdressing, groundspread top dressing, aviation spraying and groundspread spraying.

Commercial hunting and trapping

Mutton-birding, commercial hunting and trapping, noxious animal control and game propagation.

Forestry and logging

Forestry, services to forestry, felling trees and bush hauling of logs, and other logging.

Fishing

Ocean and coastal fishing, including fishing with towed or dragged gear, fishing with encircling gear, fishing with other mobile gear, and fishing with static gear, including gill netting, rock lobster potting, snapper lining, squid jigging and fishing with other static gear; fishing in inland waters; fish farming, including oyster farming, mussel farming, salmon and trout farming.

Mining and quarrying

Includes coalmining, exploration and drilling for crude petroleum and natural gas; extraction of crude petroleum and natural gas; iron ore mining; non-ferrous ore mining; extraction of stone, clay, gravel, sand, limestone etc; chemical and fertiliser mineral mining; salt mining and evaporating.

Manufacturing

Includes slaughtering, preparing and preserving meat; manufacture of dairy products; canning and preserving of fruit and vegetables; canning, preserving and processing of fish, crustacea and similar foods; vegetable and animal oils and fats; grain mill products, including grain milling, prepared grain breakfast foods; manufacture of bakery products, including bread bakeries, cake, pastries and pie (other than meat) factories, cake and pastry kitchens, biscuit factories, uncooked pasta products and pastry; sugar factories and refineries; cocoa, chocolate and sugar confectionary; other food products; prepared animal feeds; distilling, rectifying and blending spirits; wine industries; breweries, malting, etc; soft drinks; tobacco manufacturers; spinning, weaving and finishing textiles, including wool scouring, woollen fibres spinning and weaving, man-made fibres, spinning and weaving, dyeing, printing and finishing yarns and textiles; spinning, weaving and finishing textiles; manufacture of made-up textile goods except clothing; knitting mills; carpets and rugs; cordage, rope and twine; other textiles; clothing; tanneries and leather finishing; fur dressing and dyeing; leather and leather substitute products excluding footwear and clothing; manufacture of footwear except vulcanised or moulded rubber or plastic and wooded footwear; sawmills, planing and other wood mills, including chipmills, builders, carpentry, and builders' joinery; prefabricated and precut buildings, plywood, veneer and board; manufacture of wooden and cane containers; manufacture of cork products and wood products; furniture and fixtures except primarily of metal; manufacture of pulp, paper and paperboard; manufacture of containers and boxes of paper and paper board; manufacture of pulp, paper and paperboard articles, including wallpaper; printing, publishing and allied industries including newspapers, periodicals and books, job and general printing, service industries for printing trades; manufacture of basic industrial chemicals except fertilisers; manufacture of office, computing and accounting machinery; industrial machinery and equipment (except electrical); manufacture of electrical industrial machinery and apparatus; manufacture of radio, television and communications equipment and apparatus; manufacture of domestic electrical appliances and housewares; manufacture of electrical apparatus and supplies, including electrical cables and wires, storage and primary batteries; shipbuilding and repairing; manufacture of railroad equipment; manufacture of motor vehicles, including assembly plants, body building and caravans, and motor vehicle parts; manufacture of aircraft; manufacture of transport equipment; manufacture of professional and scientific, and measuring and controlling equipment, including medical and surgical equipment and supplies, and laboratory equipment; manufacture of photographic and optical goods; manufacture of watches and clocks; manufacture of jewellery and related articles; manufacture of musical instruments; manufacture of sporting and athletic goods; manufacturing industries including brushes and brooms and toys and games; manufacture of fertilisers and pesticides; manufacture of synthetic resins, plastic materials and man-made fibres except glass; manufacture of paints, varnishes and lacquers; manufacture of drugs and medicines; manufacture of soap and cleaning preparations, perfumes, cosmetics and other toilet preparations; manufacture of chemical products, including ink; petroleum refineries; manufacture of miscellaneous products of petroleum and coal including bituminous paving and roofing materials; tyre and tube industries, including retreading; manufacture of rubber products; manufacture of plastic products; manufacture of pottery, china and earthenware; manufacture of glass and glass products; manufacture of structural clay products; manufacture of cement, lime and plaster; manufacture of non-metallic mineral products including precast concrete, concrete masonry, ready-mixed concrete, plaster and fibrous plaster products, monumental masonry and asbestos articles; iron and steel basic industries, including forgings and castings etc; non-ferrous metal basic industries including forgings and castings etc; manufacture of cutlery, hand tools, and general hardware; manufacture of furniture and fixtures primarily of metal; manufacture of structural metal products, including metal joinery, fixtures and fittings, sheet metal roofing and related products, structural steel fabricating, and plate metal and boiler shop products; manufacture of fabricated metal products except machinery and equipment including wireworking, nail and fastener manufacturing, household and kitchen utensils, servicing industries to the metal trades; manufacture and reconditioning of engines and turbines; manufacture of agricultural machinery and equipment; manufacture of metal and woodworking machinery, including food, dye, and pulp making; manufacture of specialised industrial machinery and equipment except metal and woodworking machinery.

Electricity, gas and water

Electric light and power; gas manufacture and distribution; steam and hot water supply; water works and supply

Building and construction

Building–residential, non-residential; construction other than buildings; bricklaying, blocklaying, other stone work and concrete work; plastering; carpentering; glazing; roofing; electrical; plumbing and drainlaying; heating and airconditioning; painting and paperhanging; flooring; insulating; ancillary buildings and construction services, including demolition work, scaffolding, structural steel erecting, reinforcing steel bending and placing, precast and prefabricated component assembly.

*Restaurants and hotels

Restaurants, cafes and other eating and drinking places; takeaway food stores; tearooms, coffee houses, cafeterias and unlicensed restaurants; caterers; licensed restaurants and cabarets; licensed taverns and chartered clubs; motels, hotels, guest houses, hostels, camps, caravan parks, and other accommodation.

* See qualification above regarding export content.

Transport, storage and communication

Railway transport; urban passenger bus services and route passenger bus services; taxi services; school bus contractors; bus tour operators; freight transport by road, including logging haulage, stock haulage, refrigerated haulage, heavy haulage, bulk haulage, furniture removal, route haulage, general carrier; pipeline transport; supporting services to land transport, including car and truck rental services, vehicle parking facilities; water transport; inland water transport; supporting services to water transport, including harbour board operations, maritime safety operations, stevedoring; air transport carriers; supporting services to air transport, including aero clubs, airport operations and

other supporting services to air transport; services allied to transport, including travel agencies and freight agencies; storage and warehousing; communication, including the post office, other communication activities.

Research and scientific institutes

Institutes primarily engaged in basic and general research in the biological, physical and social sciences, including meteorological offices and medical research organisations.

***Data processing and tabulating services**

Provision of programming, system development and data processing and tabulating services (computers, etc.) of a general nature, on a fee or contract basis.

* See note above regarding export qualification.

Note that the Customs Department requires those who buy a computer at the 10 per cent tax rate to enter a bond with the department. Under this, they must pay the full 40 per cent tax if they dispose of the computer within two years of purchase.

Software duty plan shelved

A plan to abolish import duty on computer programs and revalue them has been shelved while the issue is reconsidered.

In August, a Customs Department committee proposed that the present 27.5 per cent import duty on software be dropped, but that programs be revalued to reflect the cost of developing them rather than just the cost of the tapes or disks they are stored on.

At the time computer industry leaders complained this could boost the present 40 per cent sales tax on software from, for instance, $6 to $400 on a $1000 program.

In November, Mr Mervyn Kemp, the chief customs officer for the Customs Department's trade division said the issue had been referred back to the committee to consider the effects of revaluation on sales tax.

At the time he said the committee would also take account of recent discussion on the valuation of software at the General Agreement on Tariffs and Trade (GATT) talks in Geneva.

In December, he told *Bits & Bytes* an internal paper had been completed addressing three major issues:–

- The basis for evaluation.
- The structure of the tariff itself such as what items would be involved and what the terminology would be.
- The sales tax question including what the effect would be on computer software.

This paper had been forwarded to the Minister of Customs and was likely to have formed part of his Christmas break reading, Mr Kemp said.

New from ICL

By Shayne Doyle

"In the new computer business, the best customers are satisfied customers," says ICL, which held its own customer fair late last year. Unlike the usual type of trade fair, ICL ran this one in its own offices so that those who attended could see just how the technology was improving ICL's own productivity and customer services.

While much of the customer fair concentrated on existing products and how to obtain maximum benefits from them, ICL also launched new software products.

A particularly interesting integrated set of programs is aptly called Quickbuild. This is a product designed to enable computer applications to be developed much more quickly than previously in a form which is less prone to error and far easier to maintain and develop, in a way that ensures the end user is completely involved in all stages of the development process. The user can ensure the system matches real needs and expectations. ICL Quickbuild breaks down the barriers of misunderstanding between system developer and user, enabling each to understand the business requirement and the computer solution to that requirement.

The data processing department takes up more of a consultancy role in relation to its users. This makes more effective use of scarce manpower resources, and cuts the backlog of systems awaiting implementation which plagues most EDP departments.

The Quickbuild toolkit is centred on ICL's Data Dictionary System (DDS), which is used as an active dictionary to the business activities of the organisation and the information which is used to support these activities. After the business requirements are recorded in the DDS, computer programs and database structures are generated from it, using the other tools in the Quickbuild kit.

Turn to page 58

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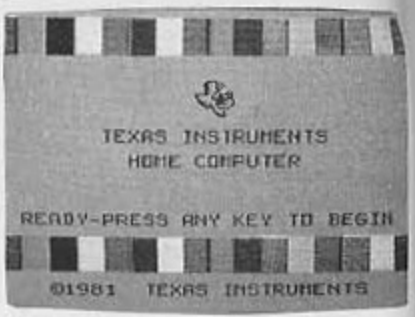
Dealer Enquiries Welcome

The 16-bit TI-99/4A: dead on arrival

By Martin Downey

The TI-99/4A keyboard (above) and colour monitor display (below).



A 16-bit personal computer with proper keyboard, colour graphics, and sound for under $600? Certainly impressive, but this price is more a reflection of the computer's poor performance over several years rather than a genuine bargain.

The TI-99/4 ("THE Home Computer" as Texas Instruments modestly calls it) was first mooted in the late 1970's. Expectations were high, TI was still revelling in the success of the "Speak 'n' Spell", and many people expected a low-cost micro with full-speech capabilities as standard. The actual computer fell well below these expectations and its launch was very much an anti-climax. The price was too high, speech was only an option, and the computer had many design faults. The 16-bit processor used was certainly ahead of its time when first released but its limited addressing (only 64K) considerably reduced any advantages over 8-bit competitors, and it certainly falls well short of today's 16-bit processors.

TI, desperate to recover its former glory, soon produced the upgraded TI-99/4A at a lower price and embarked on an extensive advertising campaign, pitched at the home-education market, using the comedian, Bill Cosby. But it was too late. Apple, Tandy, and Commodore had cornerec most of the market and the Asian and British products were starting to make an impact.

The latest development in this saga was the announcement that TI was finally cutting its losses and leaving the home computer market. As a resut of all this Britain, Australia and now New Zealand have the chance to pick up TI-99/4A computers at much discounted prices. But even at this new price is it worth buying a computer that is on its way out? It is to be hoped that the following notes will help you make the right decision.

Hardware

The computer itself is very compact and attractively finished in black plastic and brushed aluminium. However, a bulky power supply and VHF modulator are external making a more cumbersome system. The keyboard is the proper typewriter type but has only 48 keys including a half size ENTER key. CONTROL and FUNCTION keys are used to counteract this limitation but with the associated inconvenience.

A socket on the left of the machine takes two joysticks. On the right is the socket for the optional speech synthesiser. At the back are sockets for the VHF modulator (or a VDU), power and cassette recorders. Two ordinary recorders can be connected although the second can only be written to, not read from. The speed of the cassette interface is not indicated and I did not get a chance to try it but I suspect either 300 or 500 baud.

When the computer is first switched on a title page is displayed then a menu. If no EPROM cartridge is present then the only option is TI BASIC. Otherwise you have the choice of running the cartridge programs. Once it is up and running you will notice two majo deficiencies. The screen is only 3 characters wide (28 when enterin programs) and there is no lowe case. Rather, there is small uppe case. The characters can b redefined but default values ar restored upon return to the BASI prompt. The advertising boasts 32 o 40 characters per line, but th documentation never even mention 40 and in fact gives warning that yo may lose up to four of the 3 characters off the sides of your TV. I could get only 31 characters on m screen.

Definitely the most excitin feature of the TI-99/4A is the speech option. It is very modestly priced and when used with the terminal emulator cartridge offers direct text-to-speech capabilities. The type of voice can even be varied all the way from robotic to male or female.

One interesting feature of the computer is that the display will automatically clear if the computer is left for about 10 minutes. This is to prevent damage to the TV. Pressing a key on the keyboard restores the display.

Two major manuals come with the computer. The "Beginner's BASIC" gives a good introduction for the novice. "User's Reference Guide" gives detailed information on all the BASIC commands but fails to go any further. No pin-outs, memory maps or other technical information is given.

JOHN GILBERT ELECTRONICS

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Software

The version of BASIC used is ANSI rather tha Microsoft but the two are very similar. One noticeable difference is that rather than introduce new commands to handle the graphics and sound the CALL statement is used (e.g. CALL COLOR, CALL SOUND). This is a little cumbersome but keeps to the ANSI standard.

The BASIC is limited by today's standards; it is very reminiscent of its mainframe origins. It does, however, have some good features: variable names can be up to 15 characters (all significant), file handling is quite comprehensive, definable functions are well implemented, and the editor is fairly powerful.

Certainly plenty of software is available from TI to run on its machine particularly, in education. However, independent suppliers have been hesitant to produce software or hardware for the TI-99/4A. Suppliers in New Zealand have promised supplies of most of the TI range of software but do not expect the same broad software base that exists for Apple, Tandy, Commodore, or BBC machines.

Graphics, sound

When it comes to graphics and sound the BASIC is very weak. Only definable character graphics are supported and there is only limited control of the sound envelope. The colour of individual pixels cannot be changed, only the colour of groups of characters. The system used is very hard to explain and even harder to use. This may be a reflection of the hardware. However, the games cartridges I saw suggested greater flexibility at the machine-code level.

Conclusions

- Limited colour graphics and sound.
- A weak version of BASIC.
- Good expansion possibilities, but be wary of supply problems.
- Excellent speech options.

Don't Miss

Our second program special next month. Again pages of programs to type and try. In the meantime keep those original programs rolling in (see page 66 of December/January issue for details on submitting programs for publication).

Microcomputer summary

Name:	TI-99/4A.
Manufacturer:	Texas Instruments.
Microprocessor:	TMS-9900 (16-bit).
Clock speed:	3.0 MHz.
RAM:	16K user built in. Expandable to 52K externally.
ROM:	12K BASIC built in.
Input/Output:	Expansion slot. Cassette port. 2 x joystick port. ROM Cartridge socket.
Keyboard:	48-key standard QWERTY.
Display:	Composite video output through VHF modulator to standard TV. Includes sound.
Languages:	ANSI Standard BASIC built in. Extended cartridge available (limited improvement).
Graphics:	Programming mode — 28 x 24 text. Running mode — 32 x 24 definable characters (each character 8 x 8 pixels) 16 colours.
Sound:	3 channels of music plus 1 channel noise.
Cost:	$595.
Peripherals:	Expansion module ($439). Disk Drive — 350K ($849). Joysticks ($50 per pair). Speech Synthesiser ($170). ROM Cartridges ($40–$80).
Reviewer's Ratings: (Out of 5)	Documentation 3, ease of use 4, language 2, expansion 3, value for money 3, support 1.

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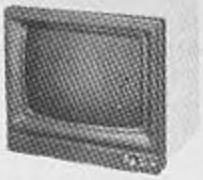

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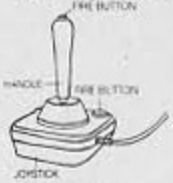

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CP/M and Applesoft on Franklin's Ace 1200

By Tim McMahon

The Franklin Ace 1200. . . catering for two worlds.

The Franklin Ace 1200 personal computer is advertised as being fully Apple II compatible and fully CP/M compatible, too. It is aimed at the small-business user, or the home-computer buyer with a need for a bit more than the usual same things.

Primarily based on the 6502 chip, the Ace 1200 comes with a second processor, a 6MHz Z80B, installed.

The computer has space for two 5.25in floppy-disk drives on top of the keyboard console. One is standard in the United States, but the suppliers tell me that it is usually supplied with both drives fitted in this country. It comes equipped with 64K memory in the main RAM area and a further 64K on the second processor board.

The main boards of both the Ace 1200 and the cheaper Ace 1000 are laid out very similarly to that of the Apple II+. In the case of the 1200, all of the peripheral boards — disk controller, I/O board, Z80 board and an 80 column video board, are plugged into the appropriate bus slots, a la Apple. All the extra boards are standard with the machine. (In the Ace 1000, only the 16K RAM extension board is supplied as standard.)

The Ace 1200 (like the 1000) has a built-in fan. Some users will find the noise it makes a distraction, although it is certainly no more noisy than the motor of a certain well-known electric typewriter.

The Ace has a 72-key keyboard (including upper and lower case) and a separate numeric keypad (which doubles as a set of VisiCalc keys). The RESET switch is under the front left of the keyboard, out of harm's way. Apple II+ Pascal programmers will note the presence of keys for the {comment braces} and the [array subscript brackets]. The keys have a positive feel and are nicely sculpted for comfortable typing.

I find one feature of the Franklin keyboards a little irksome. It is the position of the CONTROL key. In most systems I have used, CTRL is positioned just to the left of A. But Franklin has put it on the bottom left-hand side of the keys, with another row of keys in between. The usual CTRL position is occupied by the ALPHA LOCK key. Many word processors, WordStar for example and even Franklin's own Acewriter, make extensive use of the CTRL key for cursor control. A new position can be hard to get used to!

Franklin's "dual interface" card allows connection to either an RS232C serial or Centronics compatible parallel printers or a modem. For serial communication, both the data framing and the baud rate are switch selectable. It should, therefore, be possible to interface the Franklin to a wide variety of printers. The card comes with hefty D-type connectors which fix firmly to the back of the computer.

The video board comes under the name of the Ace-80 display board.

The machine boots under its default DOS (DOS 3.3) in 40 columns. From the default mode the 80 column format may be invoked by typing PR#3. CP/M and Apple Pascal software come up automatically in 80 column format.

The review machine suffered from a slight synchronisation proble with the result that the vertical ho required adjustment when switchin from 80 columns to 40 and vi versa. I understand that the proble has to do with 50Hz/60H compatibility and is being rectified b the distributors.

The Franklin 1200's default dis operating system is DOS 3.3. A Apple programs I tried, booted u and ran, as in their nati environment.

The computer has a BASI interpreter in ROM. As far as I ca tell, the BASIC is indistinguishab from Applesoft (warts and all!).

The machine's 2nd, Z80 board

The big news though is that th Ace 1200 comes with CP/M a standard. This is made possible b the presence of the Z80B secon processor board. A CP/M 2.2 syste diskette and utilities diskette a provided, written by Digital Researc and complete with a copy of i famous "Sword of Damocles licence agreement.

All of the features and utilitie familiar to users of CP/M a provided, and work as predicted.

This is a huge advantage for th potential small-business user, sinc there is a vast wealth of busines software available which runs und

the CP/M operating system. Digital Research's very nice business-oriented BASIC compiler/interpreter, C-BASIC, is supposed to come (fully documented) with the Ace 1200, too. Alas, this software was missing from the review machine.

Given the perfect compatibility of Apple DOS software with the Franklin, it will come as a surprise to Apple CP/M users to discover that Franklin's CP/M is not identical to Microsoft's Apple CP/M. It appears that the BIOS in Franklin's CP/M is tailored to its own Z80 board, which sports the logo of Personal Computer Products. To make Apple format proprietary CP/M software work on the Franklin, it will be necessary to boot with the Franklin's supplied disk in drive A, and put the software disk into drive B.

Because of the way that CP/M works, once the BIOS is loaded, all other CP/M functions are hardware independent.

Another route would be to patch Franklin's BIOS into the CP/M supplied with the software. This is a simple operation, involving CP/M's SYSGEN facility, and would be necessary in the case of a single drive system.

Notwithstanding the ease with which CP/M software can be transferred from machine to machine, I advise those who would purchase an Ace 1200 with the major intention of running CP/M software, to have the vendor demonstrate the program running on the Franklin before purchase.

(Incidentally, I replaced the PCPI Z80 card with the Softcard from an Apple and found that all the current software then behaved quite normally.)

Franklin's own software

Supplied also with the Ace 1200 is a word-processing program called Acewriter II, written by Artsci. Acewriter works on a hierarchical menu system, with separate sub-menus for editing, file handling, customising, etc, and sub-sub menus for formatting and so on. The program is quite easy to use. The menu system makes a lot of sense, and is well documented, so that first time users should learn it quickly, and would find it very "friendly"! However, ploughing up and down the menu ladder to do periodic updates and so on, can get a little wearying and it would be nice to be able to bypass it once you had become familiar with the program.

The last software package which comes in the 1200 bundle is a VisiCalc lookalike, a spreadsheet program called Acecalc. Acecalc also has been written by Artsci for the Franklin and has the same menu system as Acewriter. Again the menus take some getting used to, but they are very helpful and should suit users who have not been conditioned by other systems.

The documentation supplied with our Ace 1000 is *very* sparse. I was therefore interested to see whether the "professional model" would be accompanied by more professional documentation. The software documentation, on Acecalc and Acewriter II, both written by Artsci and presented in 150mm x 220mm spiral bound books (150 & 60 pages respectively) is very good. Both programs are introduced by a tutorial example, and the instructions are excellent. The Franklin User Reference Manual is, however, brief. It is bound in a 200mm x 230mm loose leaf ring binder format. If you want detailed technical information about the machine, look elsewhere! The only technical data supplied is a comparison between Franklin's monitor program and that of the Apple II and a set of circuit diagrams. For folk who became used to the amount of technical information thrust in their hands by way of the Apple reference manual, the Franklin one will disappoint. (But it may be that a copy of the Apple reference manual is all that is required anyway.)

In summary the Franklin Ace 1200 offers all the facilities of an Apple IIe with serial/parallel I/O interfaces, selectable 40/80 column video display, Z80 second processor, and several very good software packages, including the ubiquitous CP/M all in one bundle.

In many ways, this computer offers the best of both worlds. Folk who are looking for a personal computer with small business applications in mind, or who want a home computer with a bit more power than the common "games machines" should look closely at the Franklin Ace 1200. But look elsewhere for adequate documentation.

Microcomputer summary

Name:	Franklin Ace 1200.
Microprocessors:	6502/Z80B.
Clock speed:	1.02 MHz (6502), 6MHz (Z80).
RAM:	64K, plus 64K on Z80 board.
Input/output:	2 x 5.5in floppy disk drives each 143K bytes. RS232C and Centronics compatible interface. Baud rate and data framing switch selectable. Green screen monitor.
Keyboard:	Full typewriter style keyboard with 71 keys and reset, including numeric keypad.
Display:	24 lines by 40 or 80 characters (software selectable).
Languages:	Applesoft compatible BASIC in ROM. C-BASIC interpreter/compiler.
Software:	Acewriter II wordprocessor, Acecalc spreadsheet, CP/M set-up and utilities suite.
High res. graphics:	Six colours. 280 x 192 pixels or 280 x 160 with 4 lines text. (NB, monochrome monitor supplied as standard.)
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The Proteus

Sir,

In the review of the Proteus microcomputer printed in the November issue of *Bits & Bytes* the reviewer, Bevan Clark, makes a point of asking, "Why would anyone offer yet another new machine to New Zealand's small market for desktop, office or laboratory micros?", and in doing so completely misses the point.

He graciously endorses the performance, utility, and value for money attributes of the Proteus. This is a world-class product matching overseas machines, but why the hesitation to record the real reason for producing and offering the Proteus to the New Zealand market?

The ideal of establishing "hi-tech" electronics manufacture in New Zealand as the base for an export industry is steadily growing in popularity. Those few pioneering companies and their hard-won successes have lately been followed by Industries Development Council proposals and most recently by encouraging moves by the Government, indicating growing awareness by politicians of the importance of high technology in the future well being of New Zealand society.

The New Zealand content achieved in the Proteus is approximately 60 per cent of the manufactured cost. This high level is achieved despite the need to use imported disk-drive assemblies, a major component cost. Every Proteus sold therefore represents significant net foreign-exchange savings when compared with importec machines. Additionally, if only 16 per cent of Proteus production were exported the net cost to New Zealand in foreign exchange would reduce to zero.

Readers will be interested to know that eight Proteus machines were included in a recent $0.5 million export order of Poly computers sold to Australia. Here is a lesson for the knockers and cargo cultists who claim good things only come from overseas!

In producing the Proteus in New Zealand we are providing employment for engineers, technicians, and assemblers. Possibilities for further new job creation exist. We offer the opportunity for practical and rewarding work to retain educated and skilled New Zealanders in this country. And we offer the benefits of local support to our clients — factory-based support not available with imported machines.

Bevan Clark points out the Proteus is good value for money when matched with overseas machines. The very fact it is made in New Zealand should be sufficient reason for its existence!

Several other questions and comments raised in the review deserve comment.

Detachable keyboard, function keys, colour-option and full graphics performance are definitely not limitations of the Proteus, rather features of the terminal used.

One of the concepts in the Proteus is the ability to match specific individual applications by selecte the best terminal for the jo Although we stock the Lear Sieg ADM 22 and 23 terminals, we offer the full range of LSI termina Indeed the Proteus will work with whole range of other termin manufacturers' products. And course it will run on our own f colour Poly.

A distinct advantage of th concept is that the Proteus can b used by people who already have terminal, perhaps in use with mainframe, and who wish to ad local computing power. Simply b adding a Proteus, and in some case a little communications softwar they can have the best of bot worlds without the expense of a additional terminal. The Prote offers a new level of flexibilit permitting specific client needs to b met in the best way possible.

It is this market-oriented approac to the design and the New Zealan origin which qualify Proteus for place in the New Zealan businesses, laboratories, an factories.

Yours sincerel
R.J. Greenban
General Manag
Polycorp, New Zealand, Lt

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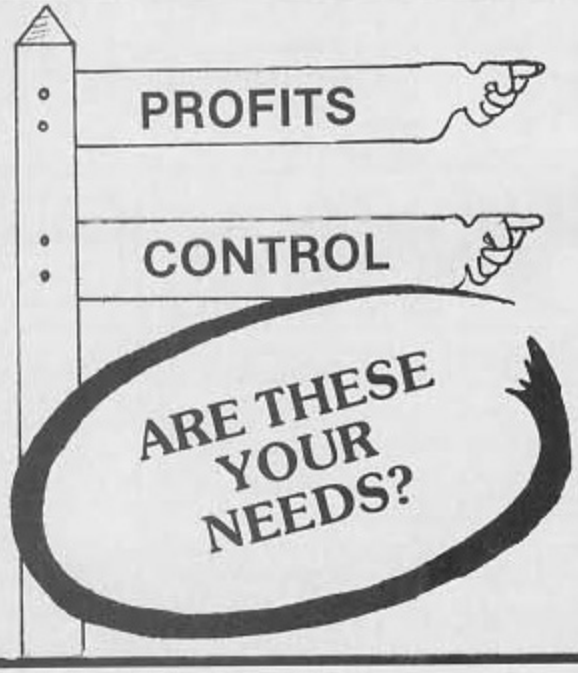

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GERALD FOWLER, a Wellington free-lance indexer, explains how he compiled the first annual index of ***Bits & Bytes****. He also has some tips for micro users who would like to do some indexing.*

Indexing: an art

For the first annual index for *Bits & Bytes,* I used the Proteus system at Progeni, in association with Mr Mike McKee, product services manager, and Mr Michael Harte, customer support manager. Enthusiasts who wish to use micro-systems for indexing will need to determine their own solutions to problems and make their own decisions on software application.

The indexer should be supplied with disposable page proofs or issues, so that he or she can annotate the text before keying-in. (Galley proofs should not be used for page-indexing, but they can be used for paragraph-indexing). At this stage of compiling, cellular circuits in our skulls are better than electronic circuits in boxes. When computers can not merely read but understand writing — the letters, words, punctuation, grammar, syntax, and style of human, literary expression — we indexers may retire from the scene. Maybe.

For the keying-in of the catalogues of names and subjects, that is, the lists of entries in page order, I used Infostar, a data-management system running on Proteus. Compared with keying-in on a mainframe, there is not much on which to comment. The indexer does not see previous entries on screen while keying-in the next entry, which makes it difficult to watch progress. This disadvantage is offset by immediate alphasort on sending each entry to storage, by easy recall on screen of catalogue or alphasort and by prompt printout.

No indexer should offer alphasorts as indexes. So I sit again at the QWERTY, call up the sorts and content-edit them on screen, to produce conventional indexes. On Proteus, I used print-out of the alphasorts, in order to be guided in the editing; on a micro-system, I would call up pages of consecutive entries, with line-numbers.

For this editing, I used Wordstar, a word-processing system running on Proteus. There again, my remarks about using Infostar also apply. This editing involved re-alignment of entries needing lower-case initials, insertion or deletion of sub-entries, and punctuation.

There is a recommendation in indexing circles with regard to strings of pagination: it is that when there are five or more page-numbers, a string should be broken down with sub-entries. I have observed this convention, with variation, in both indexes.

Finally, print-out from Wordstar of the edited indexes was further copy-edited by me. for correction of spelling, punctuation, grammar, and syntax. The print-out of the subject-index was supplied for the typeset indexes, which were included with this issue of *Bits & Bytes.*

The format of print out submitted to a publisher should always be double line-spacing on A4 bond paper, for an index or for anything else.

Do-It-Yourself

You want to have a go on your own micro-computer? You need first to do some studying and learn some different jargon. Start with *Indexing, The Art of,* by G. Norman Knight (George Allen and Unwin, 1979). If you still want to do some indexing, I suggest you search the literature, selecting according to your special interest: for that, use *Indexing and Abstracting: an international bibliography,* by Hans H. Wellisch, (ABC-Clio/American Society of Indexers/The Society of Indexers (UK), 1980). Read, too, *The Indexer,* which is available in six libraries in New Zealand, and, like the books, can be borrowed on interloan.

The word, index, has been defined on several occasions, but we may accept the definition given by the British Standards Institution:

> A systematic guide to the location of words, concepts, or other items in books, periodicals, or other publications. An index consists of a series of entries appearing, not in the order in which they appear in the publication, but in some other order (e.g. alphabetical), chosen to enable the user to find them quickly, together with references to show where each item is located.

This involves a process, a procedure, a technology of a vocation, an art which was being pursued before computers developed as machines of our culture, before Babbage even. The end result, the index, must be a precise guide for the reader, compact, with style and informative.

Development of computerised indexes, compiled by experienced indexers, should not be confused with production of KWIC (keyword-in-context) and KWOC (keyword-out-of-context) and, as some would have it KWIT (keyword-in-title) indexes. These are fine. Such indexing by word-processors produces useful guides to stored bibliographical and other information and assists in retrieval. To use a KWIC index for *Bits & Bytes* would mean printing the equivalent of half an issue of the magazine. The user, fashionably the end-user, the common reader, prefers compactness and demands precision with detail.

Drop into a library some time and scan through a few books, at random or according to your favourite subject or pursuit. Note how many books and periodicals are not indexed at all; see how many indexes are inadequate, badly constructed, repetitive in pagination; look for construction, the syntax of indexing. Judge for yourself and wonder whether you could do better with a KWIC or KWOC, or on a microcomputer.

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Annual Index to *BITS & BYTES*

The following is an index to the first volume (11 issues) of BITS & BYTES (September 1982 to August 1983). We apologise for the delay in printing this first index but we now intend to include an index to each successive volume of BITS & BYTES in the September or October issue each year. (Those people who ordered and paid for an index as advertised in the December issue should have received a refund.)

Subjects covered in the first 11 issues are isted alphabetically in the index and each reference to that subject noted with issue number first followed by the page number.

For example an article on adventure games can be found in issue number 3 beginning on page 8.

If you discover an article or articles you want, back issues of BITS & BYTES (except numbers 1, 2 and 6) are still available and can be ordered on the back copy order form elsewhere in this issue. Or simply note the issue numbers you require, enclose $1.50 payment for EACH issue and post to Back copies, BITS & BYTES, Box 827, Christchurch.

Our thanks to Gerald Fowler, a subscriber to BITS & BYTES and a professional indexer, who prepared this index with the help of a Proteus computer made available by Progeni Systems.

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ZX81

Master Mind

Here is a 1K version of Master Mind from D. Montgomery, of Kelson, Lower Hutt. The game starts with the ZX81 choosing four random digits (0-9), and each digit is different from the other three. The play must determine what the four digits are and the correct order they are in. Entry of each digit is one at a time, and after the fourth digit the ZX81 will tell you if:

1. One or more digits is right, but in the wrong place (graphic H)
2. One or more digits is right and in the right place (inverse space).

The print-outs of prior moves are lost after 10 moves, giving the player an incentive to think hard and to get the number in less than 10 moves. If a player can get the number in four moves he is a Master Mind.

Our ZX81 editor, John Mitchell, comments: "Tricky! If really stuck the player could add lines at the end of the program, say:

2000 PRINT A;B;C;D
2010 CONTINUE

Then when enough is enough, STOP program, enter GOTO 2000, new line, will print answer and return to enter it."

```
  1 REM "MASTER MIND"
  3 LET S=0
  5 LET A=INT (RND#9+.5)
 10 LET B=INT (RND#9+.5)
 12 IF B=A THEN GO TO 10
 15 LET C=INT (RND#9+.5)
 17 IF C=A OR C=B THEN GO TO 15
 20 LET D=INT (RND#9+.5)
 25 IF D=A OR D=B OR D=C THEN G
O TO 20
 30 INPUT E
 32 INPUT F
 34 INPUT G
 36 INPUT H
 37 LET S=S+1
 38 PRINT
 39 PRINT E;F;G;H
 40 IF E=A AND F=B AND G=C AND
H=D THEN PRINT "[inverse]",S;
 MOVES"
 50 IF E=B OR E=C OR E=D THEN
O SUB 500
 60 IF E=A THEN GO SUB 1000
 70 IF F=A OR F=C OR F=D THEN
O SUB 500
 80 IF F=B THEN GO SUB 1000
 90 IF G=A OR G=B OR G=D THEN
O SUB 500
 100 IF G=C THEN GO SUB 1000
 110 IF H=A OR H=B OR H=C THEN
O SUB 500
 120 IF H=D THEN GO SUB 1000
 130 GO TO 30
 500 PRINT "[graphic H]": REM (GRAPHIC H)
 510 RETURN
1000 PRINT "[inverse]"
1010 RETURN
```

Plotter

This program, from Andrew Burns, of last year's Form II at Karaka School, Papakura, is written for the unexpanded ZX81. When run, a darkened pixel appears in the bottom left-hand of the screen, and when one of the direction keys (5, 6, 7 and 8) is depressed, the darkened pixel trails itself.

"With a creative person at the keyboard one could make some very interesting effects," says Andrew. "Sometimes the darkened pixel gets lost in a mass of black trail. To avoid the problem we have put in line 65, which makes your little darkened pixel flash on and off when you depress A."

John Mitchell comments: "A good little program for the ZX81, especially for its size. An ideal modification would be to set limits on A and B and test these so that it does not crash when screen limits are reached."

```
  5 REM PLOTTER BY ANDREW BUR
 10 LET A=0
 20 LET B=0
 25 PLOT A,B
 30 IF INKEY$="5" THEN LET A=
A-1
 40 IF INKEY$="8" THEN LET A=
A+1
 50 IF INKEY$="6" THEN LET B=
B-1
 60 IF INKEY$="7" THEN LET B=
B+1
 65      IF INKEY$="A" THEN UN
PLOT A,B
 80 GO TO 25
```

Centipede

```
BY JOHN KAMR

FOR THE 1K ZX81
YOU CONTROL A UNIQUE SPACE CRA
CALLED THE "CENTIPEDE"
YOU MUST FLY THE CENTIPEDE
THROUGH THE TERRITORY OF MINES
IF YOU HIT A MINE YOU DIE
INSTANTLY
THE LONGER YOU LAST,THE MORE
POINTS YOU WILL GET

"6" TO GO RIGHT
"5" TO GO LEFT

 10 DIM D(8)
 20 LET E=PI/PI
 30 LET A=VAL "15"
 40 FOR Z=0 TO VAL "1000000"
 50 LET B=INT (RND#30)
 60 LET D(E)=B
 70 LET E=E+1
 80 IF E=8 THEN LET E=1
 90 LET D(8)=B
 100 LET A=A+(INKEY$="6")-(INK
$="5")
 110 IF A=31 THEN LET A=30
 120 IF A=-1 THEN LET A=0
 130 IF A>=D(E) AND A<=D(E)+1
EN GOTO 170
 140 PRINT AT 6,A;CHR$ 52;AT 1
6;"[inverse]"
 150 SCROLL
 160 NEXT Z
 170 CLS
 180 PRINT "SCORE = ";Z
```

John Mitchell comments: "This is a great program for its size. Note, in case the listing is not too clear the following lines:

90 LET D(8) = B

and also, LINE 140 ends thus:

; AT 12;B;"

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Japan's Sega SC3000

By JOHN WIGLEY

Anyone who has watched television over the Christmas season, must have become aware of the Sega SC 3000. The advertisements make it quite clear the Sega's ancestry is a games computer that has the capability of becoming a home computer as well.

This dual-purpose machine is a slim, 350mm by 210mm box. There are 64 keys of the push-button, membrane type. The "feel" is good for this type of keyboard. The keys are multi-function using the FUNC, CTRL, SHIFT and GRAPH keys to set up the multi functions. These functions are inscribed on the keys. Even though this gives a crowded look to the keyboard, colour coding and clear printing help keep the user on the right track.

The CR (or enter) key is large and easy to find. The SHIFT keys, two of them, are well set out and the space bar is long and accessible. On the right of the keyboard are the arrow keys set out in a logical up down left right cruciform style. The RESET key is brightly coloured, out of harm's way at the top right but still available when needed. The keys "beep" on being pressed.

I presume that games designers have insisted on an easy-to-use well-layed-out keyboard.

At the top back are the plug receptacles. One is for the composite video (with audio) output, the other two for the cassette input/output, the printer port, and, to each side, the joystick sockets. On the right-hand side is the cartridge slot.

For those who are surprised at a printer port, not only is a printer available but in colour as well. It is similar to the printers that come with the larger pocket computers. The paper is 112mm wide. It prints graphics as well as text. It is a remarkable printer and could be quite useful. It sells for $399. The power adapter costs another $30.

How does the Sega SC3000 perform? Plug in the separate power supply and one or two joysticks at $30 each and the game cassette of your choice, let's say N/SUB at $60.

The Sega SC3000

Connect to your colour TV and switch on. The game comes to life and away we go. The object is to stay alive by dodging the fleet which attacks you as the fearless N/SUB commander. Your job is to destroy the fleet. The graphics are good and the submarine looks like a submarine and the fleet looks like a fleet.

When you have tired of this game, or been beaten too many times by the computer, try another game.

The star of the Sega games is Champion Tennis at $70. This game depicts a court in simulated 3D colour, and can be played either against another person or the computer. Drop shots or long shots can be played and the ball's shadow goes across the court to enhance the 3D effect. It's worth checking out the Sega just to play this game. You can play backhand shots, forehand shots, lobs; it really gets exciting. The "just one more game" syndrome had to be suppressed or I would not have got any sleep!

There are other games, some of the shoot'em down Star Wars type or, at $125, a music cartridge. This is quite an intensive music program.

Tiring of games you may want to try your hand at some computer work. Plug in one of the BASIC

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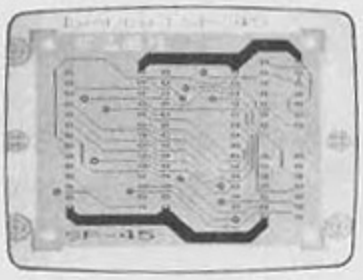
cartridges and off we go. These cartridges are available in three types: BASIC level II, which has the BASIC language plus ½K of RAM at $40. BASIC level III A which has 16K of RAM at $110. And BASIC LEVEL IIIB which has 32K of RAM at $150.

The BASIC is quite interesting, being one of the extended types and including graphics. The Sega has the graphics now common for this type of computer, and text screens.



The instruction book explains, at least covers, every command and function. It is written in JINGLISH and is quite unsuitable for a beginner. The agent is trying to rectify this and hopes to have something better shortly. But at present a basic book on BASIC would have to be bought to replace the manual that comes with the machine. Better still, join a club and get expert help.

This is a pity as it's possible to get some very interesting graphics and games on the screen but it needs a lot of skill.

The BASIC has sound controls as well, 1 channel, 3 voices and covers a range of 5 octaves. Needless to say the display is in colour, 15 and black.

The foreground and background can be missed to give 225 different hues.

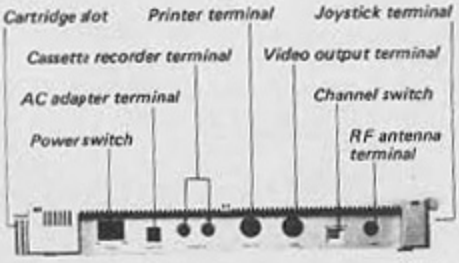
The screen has 24 lines of 38 characters, each character 5 x 7 dots. The high resolution is 256 x 192 dots and up to 32 sprites are available. The VIDEO is hard to tune in and gave some problems but once tuned the picture was good and steady.

Microcomputer Summary

Name:	Sega SC3000
Distributor:	Grandstand Leisure, N.Z. Ltd.
Micro Processor:	280A at 3.57 MHz
ROM:	32K
RAM:	Up to 48K (16K video)
Input/Output:	Cartridge port, cassette, printer and composite video (audio) ports. Joystick (2) sockets. RF out.
Keyboard:	64 key, rubberised. Multi-function QWERTY lay-out plus cursor control.
Display:	38 x 24 lines graphics and text screens. 256 x 192 dots, 5 x 7 dot characters, 32 sprites. 15 colours and black plus 225 hues.
Languages:	Extended BASIC graphics plus sound control.
Sound:	One channel, three voices over five octaves.
Price:	$399, including separate power supply.
Peripherals:	Joystick $30. Printer $399 plus power adapter $30. Disk drive promised. Approximately 12 games cartridges, range $60-125. Three BASIC cartridges, $40-150. Cassettes, $60-100 (more promised).
Reviewer's Ratings (out of 5):	Documentation 1, ease of use 3, language 4, expansion 3, value for money 3.

At present cassettes are available. A Home Pak at $60 and business software at $100 cover the usual simple programs and the agent is working hard to extend the range. Some New Zealand software should be available very shortly.

What is the overall impression? Keeping in mind the price I was certainly impressed. The hardware is good and shows its games background. The video display is good for this price computer. The BASIC is very powerful and the accessories work well. The keyboard is easy to use and the multiple key commands make entering BASIC easy.



Over all this is much better than more expensive computers (e.g. TRS80) of a few years ago.

However, the manuals need improving and urgently. I hope the agent keeps to its promise of a proper manual and a greater range of programs. The video drift problem is common to all these lower priced computers but once you get the correct tuning seems satisfactory.

So at the price of $399 plus cartridges the Sega SC3000 is worth while.

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IBM sales

IBM has told financial analyst America that it expects to t shipments of its personal comp during 1984. It also expect repeat the 34 per cent increa software sales. Where does a firm's money from sales go? I spend $US2.5 billion on resear 1984 and about $US8 billio plant and machinery.

Draughting on screen

By Selwyn Arrow

The possibilities of microcomputer computer aided draughting (CAD, which is also the abbreviation for computer-aided design) were ably demonstrated by Mr Tom Lazear, founder and president of T & W Systems Inc., California, during a recent series of seminars held in Auckland by Powertech Engineering, Ltd.

This led to a "hands-on", one-day workshop with four workstations running IBM-VersaCAD, HP-VersaCAD or CADAPPLE. This "word processor for draughting" has been developed by T & W Sytems to utilise personal computers and so fill the gap between repetitive manual draughting and large CAD, installations which would cost around $250,000.

By adding a $5500 CADAPPLE package to an Apple computer (or workalike), two disk drives, two monitors, a plotter, and digitiser pad, a CAD system can be purchased for just under $20,000.

A more comprehensive system based on the IBM PC would cost from around $24,000 and up, while a Hewlett-Packard system ranges from around $41,000 to $72,000. The prices vary depending on the options chosen.

This package has been described as "high speed draughting with many templates". When an object has been drawn it is saved and can be added to the library of objects for recall at any time. An object can be circles, lines, curves, rectangles, polygons.

These can be grouped into collections, such as a piece of furniture, a hotel room, or a wiring diagram. Approximately 2000 objects can be handled in one drawing at a time. This includes lettering or dimensions. When one dimension is altered all others affected are automatically updated to scale correctly.

Multi layering, or levels, are provided for. These are equivalent to transparent overlays and each level can be switched in or out at will for both screen and plotter. For instance a room can have different levels for each of: partitions, furniture, electrical wiring, plumbing. Then for a multi-story building each floor could use the same basic plan and have its own set of levels.

Drawing details are input directly on to the screen using a bit pad (digitiser tablet), joystick, or keyboard. It is very easy to master

With complex drawings many fine details cannot appear on the screen, but they are in the memory and can be found with the zoom feature. They will, of course, be shown on the final drawing (to the limits of the plotter scale). When completed on screen the drawing is sent to the plotter complete with information for plot scale, line style, pen colour, and density as specified in the drawing so that the final result can be admired. Plotting can be on to A4, A3, or A1 paper, vellum or mylar film, and is very useful for producing overhead transparencies as well.

A complete file management system is provided to save and recall drawings from disk.

The second screen (optional) is used to show the menus of commands available for each function. This is in the form of a tree system and is very easy to use.

The HP200-based VersaCAD offers the widest range of facilities and the fastest performance, with its 32-bit 68000 mircroprocessor and 700K of memory. It features a high resolution (512 x 390) display using colour to highlight different levels and menu information which overlays the drawing when required.

The middle price and performance range is proviced by the IBM based VersaCAD. With its 320 x 200 display (colour is optional) and second screen for menu information it is not as powerful but by adding an 8087 maths co-processor it runs nearly as fast as the HP version.

The standard CADAPPLE system can also be improved upon by adding speed-up cards such as The Mill (1.6 times faster) using a 6809 microprocessor or the Accelerator II (three times faster) using the new 6502C microprocessor.

Turn to page 60

Ian Athewell admires the Dick Smith VZ200 home computer he won in a competition run at the Bits & Bytes computer show in Christchurch in December. Ian, 17, is a pupil at Hornby High School in Christchurch.

The two-day show – the first purely computer exhibition in Christchurch – drew more than 5000 people to view the 40-plus exhibits. Exhibitors were thrilled with the response they got from a steady stream of enthusiastic visitors. BITS & BYTES intends organising another Christchurch Computer Show this year. Watch for further announcements.

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Sharp's PC-1401

By George Barna

Hand-held summary

Name:	PC-1401.
Manufacturer:	Sharp.
RAM:	4.2K bytes.
Keyboard:	QWERTY lay-out, separate numeric pad, function keys.
Display:	LCD, 16 character, variable intensity.
Language:	BASIC.
Cost:	$295.
Peripherals:	Thermal printer with cassette interface.
Rating (from 1 to 5):	Documentation 2; ease of use 4; language 4; expansion 4.

The pamphlet on the PC-1401 describes it as one tool for different tasks, and this is certainly not an overstatement of the machine's capabilities. For a business user, student, scientist, in fact for anyone needing a high powered truly pocket computer this little gem will fill the bill.

First, the hardware: Weighing a total of 150 grams including the hard plastic cover and less than 10 mm thick it will fit in a pocket without making a bulge or making the pocket sag. The CPU is an 8-bit device, obviously a special design for this specific computer. It performs pretty fast, much faster than the CPU in the earlier PC-1211 (which of course was only 4 bit). There is 4.2K of non-volatile RAM on board. One can have up to 18 separate programs in memory, all executable individually with the stroke of a key.

The display is LCD dot matrix, 16 characters maximum, which is quite restricting when you try to debug a program. One consolation is that the cursor points to the offending part of the statement. A printer is available, including a cassette interface for saving programs and data files. One interesting feature is a control on one end of the machine, with which the intensity of the display is variable. If there is no activity for 10 minutes the machine switches itself off to save the batteries. By touching the BRK-ON key one can continue where one left off, without losing any of the data previously entered. The batteries have a life for 300 hours; on my old PC-1211 this was enough for well over 2 years of normal use.

The keyboard is QWERTY lay-out but unless you have match sticks for fingers you will never touch-type on this one. Nevertheless, the keys have a positive feel and are very clearly marked for the functions they perform. Because there are so many functions (59 scientific, plus statistical), almost every key has more than one function, selectable by pressing the SHIFT key first. To insert say 10 characters in the middle of a BASIC statement you will need a total of 30 key-strokes. The same goes for deleting them. This can be quite tedious and a locking SHIFT key would be a worth-while improvement.

A number of modes of operations is selectable: calculator mode, BASIC (in "run" and "program" modes) and statistical calculations. Having the machine in the BASIC "run" mode immediate BASIC statements can be executed, using parentheses for grouping of arguments and operators. Variables and constants can be freely intermixed. The precision of the results can also be defined to the number of decimals desired. Keywords can be selected with a single key (well, SHIFT and a keyword).

The BASIC language supplied is a marked improvement on the earlier PC-1211 BASIC. It is quite extensive and very similar to Microsoft BASIC with additional functions, such as POL for polar co-ordinates, plus a few more. All the logical operators are there, AND, OR, NOT, (no XOR), etc.... For trigonometric calculations DEGREE, RADIAN, and GRADIAN can be selected.

It is in the area of variables where the PC-1401 really overtakes the PC-1211. Variable names with two characters or one character and one digit are allowed. Two dimensional arrays are also supported, so some real programming can be achieved. Arrays have to be dimensioned before use. String handling is also miles ahead of the PC-1211, with LEFT$, RIGHT$, MID$, although I fail to see where this feature can be fully utilised with a 16-character display. But if you can find a use for it, it's there. Programs can be password protected.

Cassette operations can be performed with CSAVE, CLOAD and CLOAD?. This last one (CLOAD?) verifies that the program was loaded correctly. I did not have the cassette interface for this machine, but if the PC-1211's interface is anything to go by, loading or saving using a normal cassette is going to be a breeze; volume or tone settings should not be critical. Data can also be saved on cassette using the PRINT# statement, or loaded with INPUT#.

The user's manual supplied with the machine is excellent, written in an easy and flowing style. But there is an applications book available only in North America. One can take this two ways:

1. Only Americans need a book of programs, anyone else is too clever to need it.
2. Sharp is interested only in the American market.

The first option is too flattering to be true, that leaves only one other and that's not very nice.

While on the "don't likes", I have to mention the error messages. They are numbered 1 to 9 and sometimes they are ambiguous. In an assignment the keyword, LET, does not have to be used but if the same assignment is used in a conditional statement, then not using LET will give an error of "number too large".

On the positive side, top of the list of "likes" is the DEC to HEX and HEX to DEC conversion. Not only can one convert numbers to base 16 and back to decimal, but arithmetic operations are also possible, mixing decimal and hex numbers freely. Hex numbers can range to FFFFFFFE. Now only if we could have BIN as well, with all the logical operators ... that alone, with a bit of scratching could justify the cost of the machine, as the HP-16C (Hewlett-Packard's programmer's calculator), which does similar things costs over $300.

Don't be fooled by the weight of the machine. It gives an impression of being flimsy. It's anything but flimsy. It's just beautiful, efficient engineering. I once dropped my PC-1211 on some concrete steps. After my heart collected all the blood from my feet and started circulating it again I switched the machine on, and apart from some superficial bruising on its case there were no adverse effects. It never missed a beat. That's not flimsy.

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The latest dot-matrix from Epson

By Selwyn Arrow

The Epson FX20

The latest range of dot-matrix printers from Epson, of Japan, includes, as standard, features that were only available as add-ons in the firm's MX range. The FX-80 reviewed is the standard-width model able to take up to 254mm, fan-fold paper, whereas the FX-100 can take up to 405mm paper. Both these printers are otherwise nearly identical. Also available is the lower cost RX-80, with features that place it in between the FX-80 and the now discontinued MX-80. All three printers come with friction feed as well as adjustable sprocket feed.

See the sample print out for examples of most of the print styles and fonts. If these are not suitable then you can design and use your own, and even mix them on the same line. All printing modes can also be mixed on one line.

About 60 alphanumeric printing control codes are provided, half of them also having extensions. Many of the codes can have a series of data values following the control code, i.e. a series of download characters can be defined by sending their data values after the required code.

Utilising the print control codes depends very much on your computer's being able to send the required control character (0 to 1F Hex), or an ESCape character (1B Hex or CHR$(27)) followed by an alphanumeric character and then any value from 0 to 255 decimal. This can be quite a tall order for most word processors, so there is plenty of opportunity for machine-language writers to provide suitable printer-driver programs to achieve this as I had to do.

Access via BASIC is relatively easy as CHR$(x) can be used to send the whole range of values, and all the examples provided are written in Microsoft BASIC for ease of translation if necessary. But again it can be a nuisance to have to dive into a BASIC program from your word processor just because it cannot provide the full range of 256 values. With a disk system it can be easy to select from several print-function programs. Again here is an opportunity for someone to write a range of these to set up the printer for different functions and to design a variety of fonts for downloading fancy character sets.

If the downloadable character set is not required then its RAM can be used as a 2K input buffer by changing a DIP switch setting. This allows a page or so of text to be held in the buffer, and so can allow you to get on with the computing instead of having to wait. The alternate characters in ROM (italics and international character set) are still available in this mode.

If 2K of buffer is not enough then one of the optional serial interfaces can supply even more. These usually just plug on to the circuit board inside the printer.

One very handy feature I have not come across before is the hexadecimal dump. While in this mode all data sent from the computer is printed out in hex codes — very handy for checking if the correct codes are being sent.

The graphics capabilities of this printer extend to seven 8-pin, bit-image modes and two 9-pin, bit-

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image modes. These include four densities and two print speeds.

The handbook is written in easy-to-read English but just occasionally it is obvious that this is not the writer's own language. There are some omissions, especially a proper index (a code summary only is supplied).

The printer seems robust enough, made of tough plastic with a matte finish in a light cream colour. A cover hinged over the ribbon and print head lifts off easily to gain access while a snap-on lid covers the pin feed mechanism and friction rollers. To remove this lid it must be bowed in the middle to free the ends, and this must be done every time tractor-feed mechanism is adjusted.

A smoke-clear plastic paper separator covers the rear of the printer but it does not seem very sturdy. Paper is fed in below this from the rear and emerges out the top.

One useful departure from the MX series is the positioning of the sprockets for pin-feed paper, these are engaged below the print head so that it is possible to tear off the paper one inch above the last printed line. Unfortunately, there is a drawback to this. With the sprockets hidden it is very difficult to feed sprocket feed paper in without some practice. This is made even more difficult if the sprockets are not adjusted to the correct paper width. The only successful way is to do exactly as the handbook says: to fold the paper at a perforation before inserting it.

Friction-feed paper is made easier to load, but for single sheets the paper out function must be disabled. I also used roll paper and found that it tended to skew to one side unless great care was taken to align it correctly.

One notable improvement on earlier Epson printers is that the DIP switches can be accessed from the top by removing the right-hand grooved corner panel.

I found one of the few design faults when changing the settings of the international character set DIP switches. It would be very easy to slip and do some damage to a capacitor and resistor mounted right alongside. Incidently if you change these settings then the printer must be switched off and on again for the change to take effect.

Unlike its early predecessors the top of this printer can easily be removed as the four screws are secured from the top. Also the power plug and connecting cable are installed on either side of the paper. No more fouling of the paper supply by these protrusions.

Inside there is a single printed circuit board.

Printer Summary

Name:	Epson FX-80.
Type:	Dot Matrix.
Price:	$1600.
Printing format:	Text mode — 9 x 9 dots. Bit image — 480/576/640/720/960/1920 x 8 dots per line 480/960 x 9 dots per line.
Character size:	Normal, (H x W) 3.1 x 2.1mm 80 max/line.
Character set:	Full 96 character ASCII with descenders, plus 9 international character sets (40 extra characters), both available in italic. Downloadable character set (definable in a 9 x 11 matrix).
Printing speed:	160 characters per second; 80 cps (half speed/quiet mode).
Buffer:	2K byte DIP switch selectable (disables downloadable character function).
Printing direction:	Normal — bidirectional with logic seeking in text mode; super/subscript — undirectional; graphic mode — undirectional.
Line spacing:	1/6, 1/8, inch DIP switch or programmable from 1/216 (0.118mm) to 255/216 inch.
Paper feed:	Friction feed (single sheet and roll); Sprocket feed 9.5" to 10" (4" to 9" with optional tractor unit).
Copies:	One original plus two carbon.
Ribbon:	Cartridge, black, (3 million characters).
Print head:	Replaceable.
Interfaces:	Standard — Centronics 8 bit parallel 36 pin. Optional — RS232C, IEEE 488.
Dimensions:	W — 444mm x D — 347mm x H — 100mm.
Weight:	7.5kg.

Review model supplied by Microprocessor Developments, Ltd, Auckland.

Summary

In all, this is a very useful, feature-packed printer. Epson has again produced a printer that has raised the standard for dot matrix higher.

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What's in store for 1984

PAUL CROOKS has talked to New Zealand's microcomputer importers and distributors to find what you can expect to see on the microcomputer scene this year.

A proliferation of portables, IBM PC compatible computers and a slowing down in new home computer models will be some of the trends in the New Zealand microcomputer market this year.

Also look for the emergence of a strong market in peripherals and software as the growing number of computer owners look to expand their systems.

The arrival of large software companies such as Imagineering of Australia (see separate micro news item) indicates others see a good future in the software market here.

IBM PC clones

Certainly one of the most interesting of these will be the Dick Smith Challenger due to be released in New Zealand in the next month.

The Dick Smith Challenger . . . due for release soon.

The Challenger will sell in two versions, the basic 16-bit computer with 128K of RAM or a full system including two 320K disk drives, RS232 and Centronics printer interfaces, six expansion slots and WordStar, Calcstar, and Mailmerge software packages (but no monitor).

The Challenger runs the MS-DOS operating system, and according to Dick Smith Electronics is fully IBM PC software and hardware compatible (four of the expansion slots take IBM PC compatible add-ons while the other two allow the user to take advantage of the true 16-bit 8086 microprocessor used in the Challenger).

The Australian price for the full-system version is $2990 and the New Zealand price is likely to be about $4000, or half the price of an IBM PC here.

But Dick Smith certainly won't have the IBM compatible market to himself with strong competition expected to come initially from the Sanyo MBC 555, scheduled for a March release.

Sanyo doesn't claim full IBM compatibility for this 8088 microprocessor-based computer but says it will run 80-90 per cent of IBM PC software (again it runs the MS-DOS operating system). A price tag of $3000 for 128K of RAM, twin 330K disk drives, green screen monitor, and bundled package of MicroPro (WordStar, etc) software will attract a lot of interest.

Bits & Bytes will have detailed reports on the Challenger and MBC 555 soon.

Other IBM PC compatible models are expected to follow, but IBM says it isn't worried by the increased competition. In fact IBM cannot cope with orders for the PC and XT at present, and the situation is not expected to improve until the new IBM plant in Australia begins production in July.

One computer that isn't IBM compatible but should make an impact here after being released this month is the Apricot. This aesthetic looking computer is fully compatible with the Sirius, a big seller, especially in Europe, and at about $6000 here will cost $2000 less. More details on the Apricot soon.

Portables

The round-up of portables in the November issue of *Bits & Bytes* was quickly out of date with the release

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of several new models late last year.

More will follow early this year with IBM compatible models again expected to be popular (the latest rumours on Osborne suggest the company will be restructured to produce solely an IBM-compatible portable).

The ranks of the portables will be swelled further by the "lap" or "briefcase" type models. These computers about the size of this page were heralded by the Epson HX-20 as long ago as November, 1982, and the competitors are now coming thick and fast. The Tandy M-100, Casio FP 200 and National Panasonic JR 800U appeared late last year and will soon be joined by the Olivetti M-10 and an NEC model.

But the portable likely to attract the most interest in the next couple of months is the portable version of the Commodore 64.

All this activity in the portable area is not without a sound economic premise as one American market research company predicts that by 1987 two out of three micros will be portable and portable sales will be $3.1 billion (in 1982 values) annually.

Home computers

After a proliferation of home computer models last year, 1984 should see fewer new models and the disappearance of some existing brands.

In line for early release are colour computers in the mould of the Dick Smith VZ 200 such as National Panasonic's JR200, Mattel's Aquarius and possibly the Tandy MC-10. A couple of importers are also known to be watching the progress of the Coleco Adam, which has created a lot of interest in the United States as its price of $US600-700 includes a tape-recorder and daisywheel printer.

But probably the home computer that will receive the most attention is the smaller version of the BBC, the Electron, which has been finally released in Britain (after several delays) and should be released in New Zealand in April (fingers crossed). The Electron, with 32K of RAM and all the impressive graphics the BBC is renowned for, is expected to cost $799. More details soon.

The Sanyo MBC 555. . . will pose strong competition.

One "home computer" that would attract at least as much attention is the IBM PC Junior. However, reliable sources indicate this is very unlikely to reach New Zealand before 1985. The cost is expected to keep it out of reach of most home enthusiasts even then. A price tag of $3000 plus is envisaged.

Peripherals

Printers, disk drives, monitors (colour and monochrome) modems, and so on are all expected to become more readily available in 1984 — and with the increased competition prices are expected to fall, especially if a line is taken on prices now ruling overseas.

Prices

Generally, computer prices should ease further in 1984, if overseas price trends are a guide (the Atari 400 and 800 now sell for as little as $62 and $199 respectively in America with the Commodore VIC and 64 at $79 and $185 respectively). But don't expect any large price cuts.

The most significant price movement will occur in the $2000-$4000 range.

At present few computers are available in this price range in New Zealand, but by the end of the year this is expected to be a crowded field. And the power and performance of these computers (see earlier comments on IBM PC compatible and portable computers) is expected to approach many of those currently costing over $5000, thus offering significant saving, especially for those interested in small business and professional applications.

Bits & Bytes will cover these trends and new products in 1984, the results of the reader survey guiding us to the topics you want to read about most. More on the survey in the March issue. Thanks to those 2000 readers who returned survey forms.

64 Painting

Another New Zealand produced package for the Commodore that is already achieving good export sales is Paintpic, written by Kiwisoft, but marketed in New Zealand by Alpine Computing (Box 33-865 Auckland).

As its name implies this $49.95 program enables the user to draw intricate paintings on the screen. Paintings so good in some cases that posters of them are now also being sold by Alpine.

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See page 55 for savings on TRS 80 Model 1 & 3 software

Plenty of activity

Apple II mouse

Apple Computer Inc has announced a mouse and new software called MousePaint, which it will offer early this year for its Apple II computers.

A mouse is a pointing device that can be used instead of a keyboard to select computer operations and modify information displayed on the screen. the Lisa has ignited broad interest in the mouse among computer owners, software developers and other computer manufacturers. The Lisa is designed to be almost completely controlled by a mouse.

AppleMouse II will be packaged with MousePaint software that uses the mouse to design charts, diagrams, free-hand drawings and other visual aids for reports and presentations. Users can insert text in a drawing and can choose from a variety of character fonts and fill patterns. MousePaint simulates bit-map graphics.

Apple also is developing a mouse to work with Apple III's.

Plans for 1984

John Sculley, as president and chief executive officer of Apple Computer, Inc, told analysts in New York that Apple plans to increase, significantly the level of investment in the development of marketing of new products in 1984.

"These will include new products which will strengthen Lisa as a significant computer for the office market as well as major enhancements for the Apple II which will be available to current Apple II users," Mr Sculley said.

Price drop

Apple IIe, the workhorse of the Apple family and considered one of the most flexible microcomputers in the industry, has undergone a price reduction in New Zealand.

CED Distributors has advised the industry that the Apple IIe "starter system" will retail for $3995, a reduction of $770. The "starter" system includes a 64K Apple IIe, an 80-column card, a monitor, and a disk drive.

MCP withdrawn

MCP, a Japanese personal computer, has been withdrawn from the New Zealand market under an order of the High Court. The MCP, marketed by Micro Comp Products, Ltd, was the subject of a High Court action filed by Apple Computer and CED Distributors Ltd, the N.Z. franchise holder. That action alleged that the MCP is an Apple "lookalike, workalike" manufactured and distributed in breach of Apple's copyright.

The High Court order, with the consent of both parties, restrains "selling, offering for sale, distributing, advertising, manufacturing, or reproducing MCP computers which are the subject of the proceedings, or computing components, parts and accessories, which are infringing copies of Apple's copyright works."

Several computer retailers, who were also the subject of the action by Apple, have similar restraining orders by consent made against them.

Apple World Council Computer has announced the formation of an independent distributors' council, representing the more than 30 independent distributors in the world.

World Council

The council, consisting of five representatives, includes Mr Brian Eardley-Wilmot, a director of CED Distributors.

Mr Eardley-Wilmot, representing the Pacific, will be joined by a representative from Japan, Latin America, Singapore and South Africa.

The council will meet twice yearly with the president and vice-presidents of the corporation.

Lisa Pascal

Apple Computer has introduced Pascal for the Lisa. The Pascal is similar to versions for the Apple IIe and Apple III. It offers a mouse editor, compiler, code generator, MC68000 assembler, linker, debugger, anc wide range of utilities. It also features fully implemented IEEE numeric calculations.

The second release of Pascal for the Lisa, scheduled for early this year, will include the Lisa Applications Window, a feature that will allow existing applications to be moved quickly to the Lisa "desktop" environment with minimal changes.

Wellington post

CED Distributors has announced the appointment of a national account manager, to be based in Wellington. Mr Steve Garner was previously a shareholder and staff member of Microshop, a Wellington Apple dealership.

CED Distributors has not previously sold direct.

"The computer market is opening up and it is not always possible for a dealer to fully service large corporate inquiries," said Mr Garner.

Mainframe link

It is now possible for Apple computers to communicate with all major industry standard mainframes and mini-computers. This follows the introduction of Lisa Terminal software and Apple Cluster Controller.

The cluster controller allows Apple II, Apple III, and Lisa to exchange and receive information. As the user can dial into the Apple cluster controller via a modem, it is possible to communicate with a mainframe from any location where there is access to a telephone.

Both the systems will be available in New Zealand in early this year.

Franklin case

The makers of the Franklin microcomputer have agreed to a $US2.5 million settlement in a copyright case brought by Apple Computer in the United States. The case relates to 14 operating-system programs. Franklin, which was set up by three former executives of Apple, will withdraw the operating systems concerned from products sold after April 1 of this year. Franklin will now develop its own operating systems. Compatibility with Apple software will continue.

Meanwhile, Apple has had a setback by an Australian Federal Judge's ruling that computer programs cannot be protected by copyright under Australian law as they are not literary works. However, an appeal is expected.

Late U.K. News

Some news received just on deadline:

Sir Clive Sinclair was to launch in late January his QL (for Quantum Leap) microcomputer: a 128K machine with typewriter keys and twin disk drives, and network facility, to compete with the BBC microcomputer.

The BBC is to broadcast computer programs on its Radio 4 network. The listings, taking 40 seconds each to broadcast, will be in Basicode, a system developed by the Dutch broadcasting organisation, NDS. All users need is a cassette recorder and a special manual, according to newspaper reports.

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TRS80/SYSTEM 80

Change in '80 world

By Gordon Findlay

I know it doesn't feel like New Year still, but this is the first issue of *Bits & Bytes* for 1984, so I will start with a New Year "roundup" of the '80 scene.

Rumours have been floating around about the fates of the various machines in the TRS/System 80 fold. The Tandy organisation has no direct dealings in New Zealand, working through an agent.

During 1983 two things happened: a new agent, Porterfield Computers, of Auckland, was appointed; and the earlier agent, David Reid's, of course, was taken over.

The upshot is that there are likely to be some bargains around in the short term, as things get sorted out and "no longer required" stock is moved around. An example: Triad Computing are (were?) doing some excellent prices on the Color Computer, and ROM packs for the CoCo, and also Model 1 and 3 software. I don't imagine that these good prices (for us!) will be around terribly long, as the amount of stock involved cannot be very large.

The Tandy machines at present available in New Zealand are the Model 3, the Model 4, the CoCo, and the portable, model 100. What's a Model 4? It's a Model 3 with 128K of RAM, and the ability to run CP/M software, as well as the usual TRS-80 stuff. As far as I am aware, the Model 2, 12, and 16 aren't to be had here, but if they are, somebody is sure to tell me!

I don't imagine that there can be many Model 3's left, as the machine has been supplanted in the States. I have heard in several quarters that second-hand machines, which you can get for the proverbial song in the United States are "going to be imported". I hope so: the more users the better.

Dick Smith is no longer selling the System 80. There may be a few still in stock around the country, but that's all.

What is clear is that the '80 scene is changing.

To me the most interesting of all the machines is the TRS Model 100 portable. It is a bit dear, and would be most useful if the communications facilities could be used to communicate with something else, such as a System 80/Model 3 or what have you. I haven't see one yet, just several write-ups and reviews. By all accounts, it took the computer shows in the U.S.A. by storm, upstaging the Model 4, and recent developments in some other brands. If anybody wants to get me a birthday present, go ahead!

To help with holiday-time production of the magazine, Gordon Findlay wrote this column in mid-December.

SPECTRUM

Some of the listings in the December/January edition of Bits & Bytes, were reduced too small to reproduce correctly. Here, at readers' request, are reprints of two program sections that were difficult to follow:

Cavern Mission

```
 214 IF INKEY$="7" THEN GO TO 54
0
 215 IF fu<50 THEN GO TO 220
 216 IF INKEY$="8" THEN GO TO 56
0
 218 IF INKEY$="5" THEN GO TO 50
0
 220 IF ATTR (y,x)<>51 OR ATTR (
y,x+1)<>51 THEN GO TO 1000
 225 IF INKEY$="a" THEN GO SUB 9
00
 230 PRINT AT y,x;b$
 240 GO TO 90
 500 IF x>1 THEN LET x=x-1: IF C
ODE SCREEN$ (y,x)<>32 THEN GO TO
 1000
 510 PRINT AT y,x+2;g$;AT y,x;b$
: GO TO 90
 520 LET y=y+1: IF NOT (CODE SCR
EEN$ (y,x)=32 AND CODE SCREEN$ (
y,x+1)=32) THEN PRINT AT y-1,x;g
$: GO TO 1000
 530 PRINT AT y-1,x;g$;AT y,x;b$
: GO TO 90
 540 LET y=y-1: IF NOT (CODE SCR
EEN$ (y,x)=32 AND CODE SCREEN$ (
y,x+1)=32) THEN PRINT AT y+1,x;g
$: GO TO 1000
 550 PRINT AT y+1,x;g$;AT y,x;b$
: GO TO 90
 560 IF x<30 THEN LET x=x+1: IF
CODE SCREEN$ (y,x+1)<>32 THEN PR
INT AT y,x-1;g$: GO TO 1000
 570 PRINT AT y,x-1;g$;AT y,x;b$
: GO TO 90
 700 BEEP .15,16: BEEP .1,20: PR
INT AT y,x;b$
 705 LET re=re+1: LET sc=sc+100
 710 PLOT 240,oh: DRAW 7,d: PLOT
 240,oh+66: DRAW 7,d
 715 IF fr<.985 THEN LET fr=fr+0
.001
```

```
2040 LET a$=CHR$ 16+CHR$ 3+CHR$
146+CHR$ 147: LET b$=CHR$ 16+CHR
$ 3+CHR$ 144+CHR$ 145
2041 REM Change fr to a slightly
 smaller decimal to make the fue
l depots more common.
2042 LET he=3: LET sc=0: LET fu=
100: LET re=0: LET fr=0.973
2045 REM c$, d$ & e$ hold the ex
plosion, the human, & the missil
e.
2050 LET c$=CHR$ 148+CHR$ 149: L
ET d$=CHR$ 16+CHR$ 4+CHR$ 150: L
ET e$=CHR$ 16+CHR$ 1+CHR$ 151+CH
R$ 152
2053 REM f$ is used in the sidew
ays scrolling.
2055 LET f$=CHR$ 16+CHR$ 2+CHR$
17+CHR$ 0
2057 REM g$ is used to erase the
 helicopter
2058 LET g$=CHR$ 32+CHR$ 32
2060 FOR k=0 TO 21: LET f$=f$+CH
R$ 22+CHR$ k+CHR$ 31+CHR$ 32: NE
XT k
2062 LET h$=CHR$ 16+CHR$ 7+CHR$
17+CHR$ 0+CHR$ 18+CHR$ 1+CHR$ 15
3
2065 GO SUB 2500
2070 PAPER 6: INK 2: BORDER 1: C
LS
2072 LET h=50: LET i=INT (RND*10
): LET bi=1: LET bx=31: LET by=1
3
2075 PLOT 0,13: DRAW 200,7: DRAW
 35,10: DRAW 20,h-30: PLOT 255,1
75: DRAW -5,-55: DRAW 5,-4
2077 GO SUB 1510
2079 LET y=8+RND*5: LET x=10+RND
*13
2085 PRINT AT y,x;b$
2087 LET fu=100
2090 PAUSE 50: PRINT INK 2;AT 2,
20;fu: RETURN
```

Duckshoot

```
 300 INK 0: PAPER 2: BORDER 5: C
LS
 310 LET a$=CHR$ 17+CHR$ 4
 320 FOR k=1 TO 32: LET a$=a$+CH
R$ 32: NEXT k
 330 PRINT a$;a$;a$
 340 FOR k=3 TO 18: PRINT AT k,0
;a$( TO 3);AT k,21;a$( TO 3): NE
XT k
 350 PRINT a$;a$;a$; INK 1; PAPE
R 7;AT 1,11;"DUCK SHOOT"; INK 1;
 PAPER 4;AT 20,1;"SCORE";AT 20,1
4;"TIME"
 360 PLOT INK 0,151,11: DRAW INK
 0,96,0
 390 PRINT INK 4;AT 4,9;"by Gary
 Parker"; INK 7;AT 12,1;"Shoot a
s many ducks as you can";AT 13,1
;"before your time runs out. Use
 ";AT 14,1;"1 and 2 to move left
 and right";AT 15,1;"and use 0 to
 fire."
 400 FOR k=USR "a" TO USR "h"+7:
 READ g: POKE k,g: NEXT k
 408 REM This is the graphics da
ta. If any of these numbers are
unclear, refer to line 999.
 410 DATA 8,8,8,8,12,14,62,255,3
,7,14,26,30,15,15,7,8,62,107,127
,127,127,62,28,152,224,112,56,12
0,240,240,224,24,44,252,63,31,31
,15,7,0,1,243,255,254,254,252,24
8,0,128,207,255,127,127,63,31,24
,62,63,252,240,240,240,224
 420 LET a$=CHR$ 16+CHR$ 6+CHR$
32++CHR$ 32++CHR$ 144+CHR$ 32+CH
R$ 32
 430 LET b$=CHR$ 16+CHR$ 6+CHR$
32++CHR$ 32+CHR$ 145+CHR$ 16+CHR
$ 5+CHR$ 17+CHR$ 6+CHR$ 146+CHR$
 16+CHR$ 6+CHR$ 17+CHR$ 2+CHR$ 1
47+CHR$ 32+CHR$ 32
```


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COMMODORE 64

Good year coming for the 64

By STEVEN DARNOLD

The future looks bright for the Commodore 64. In fact I am predicting that by the end of this year the 64 will be the biggest selling computer in the world. Certainly IBM and Sinclair will be in the race, but when it comes to the crunch the 64 should win. No other computer can match the 64's features at the 64's price, and Commodore is gearing up to sell massive quantities of the 64 as it winds down production of the VIC 20.

Unfortunately, Commodore has underestimated the demand for peripherals, and major shortages have occurred. Some customers have had to wait months for their printers, disk drives and monitors. If you are still waiting for a 1526 printer, you may want to consider an Epson RC-80 or a Gemini 10X.

I use an Epson printer with my 64 and I am very happy with it. It is faster and sturdier than the Commodore 1525, and it produces well-formed characters with real descenders. This is especially important to me because I use the computer for word processing and the printer must produce attractive output. The Epson also has several different character sets, including one that enables 132 columns to be printed.

The main problem in using a non-Commodore printer on the 64 is that it does not print Commodore graphics characters. This is particularly troublesome in program listings where colours and other control characters are represented by reverse field graphics. If I do a normal listing, my printer simply leaves out all the control characters. Instead, I use a special listing routine which spells out the special characters. Thus, instead of a reverse-field heart, my printer prints [clr].

An interface is made in New Zealand to link the Epson and other parallel printers to the user port of the 64. It costs about $70 and comes with a short driver routine. A simple SYS activates the driver, and from then on printer commands automatically go to the user port instead of the serial port. In some cases the driver is not required. "Easy Script", for example, is already configured for both Commodore and parallel printers.

More new games

Recently, Alpine sent me two new Comm*data games for review. They each cost $39.95 and come on cassette tape.

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Supercuda. A year ago Comm*data released an underwater version of Pacman called Pakacuda. It was written in machine language and has some good features, but over all Pakacuda left room for improvement. Now Comm*data has released an upgraded version called Supercuda. It is a much better game. First, Supercuda begins at a slower pace. This gives you more time to see where you are and plan ahead. Second, Supercuda incorporates two extra mazes, which are reached via doors at the top and bottom of the screen. This not only adds variety but also opens up the game to new strategies. Third, Supercuda has better sound and cleaner graphics. If you are thinking about buying Pakacuda, forget it. Supercuda sells for the same price, and it is better in every way.

Pegasus Odyssey. In this game you are in control of a flying horse and your object is to knock bats out of the sky and stomp on their eggs. This unusual theme is matched by an unusual method of locomotion: you flap your horse's wings by pressing and releasing the fire button on the joystick. When I first played the game, I did not like it very much. Even at the lowest level, the horse was difficult to control, and success depended more on luck that on skill. However, after I had played the game for a while, I developed a bit more control — although I am still a long way from making the horse go exactly where I want. As a one-player game, Pegasus Odyssey will probably not appeal to many people. However, there is a two-player option which is much, much better. Two horses have a much easier time subduing the bats and then it's a race to see which horse gets to the eggs first. My recommendation is that you should only buy this game if you have two joysticks and plan to use it primarily as a two-player game.

Line and column

Commodore computers use control characters in the PRINT statements to position the cursor. That is why it is so easy to spot VIC and 64 listings in magazines — you just look for the strings of reverse field characters. This method of positioning the cursor works very well for most applications. However, on some occasions you may wish to position the cursor directly, using line and column numbers.

The 64 has two special memory locations to register the cursor's position. Location 214 is the line number and 211 is the column number. The lines are numbered from 0 to 24, and the columns from 0 to 39. Thus, the top left-hand corner is line 0, column 0, and the bottom right-hand corner is line 24, column 39. To position the cursor directly, just POKE the desired line and column numbers into 214 and 211 and then SYS 58732. The next PRINT will then occur at the position you have specified.

Competition

Can you write a BASIC program for the 64 which changes the border colour every time the f1 key is pressed and changes the background colour every time the f3 key is pressed? If so, send it to me by February 20 and you might win a tape of "Supercuda" (donated by Alpine Computing). The address is:

Supercuda Contest,
P.O. Box 201,
Alexandra.

Only one entry per person. The first correct entry randomly drawn will win the tape.

VIC

Controls in strings

By Bruce Winslade

Peter Archer's article on using the Commodore internal clock (*Bits & Bytes*, October, 1983) begins with a defence of Commodore II BASIC; this would be more convincing if the program examples in the article did not highlight the lack of one very useful command, namely PRINT AT.

Positioning a printed string at the right spot on the Commodore screen can be tricky. It can be accomplished by converting the ASC values of the string characters into screen POKE values and then poking them to the screen, along with the appropriate colour values, as Peter Archer suggests, but this is slow (both to program and in execution) compared with printing to the screen.

One very useful feature of Commodore II BASIC is the ability to include control characters inside strings, such as cursor movements, colour control, clear screen and cursor home, delete and insert, and then print them on the screen.

Take the example of displaying the time: for this example we'll choose the top left corner of the screen, and as in Peter Archer's article, call it in a subroutine. (The control characters appear as graphic symbols when listed. As these are sometimes difficult to decipher, I've changed them to text inside square brackets.)

```
5000 PRINT " [HOME] " + LEFT$ ( TI$,2 ) +
":" + MID$ ( TI$,3,2 ) + ":" + RIGHT$ (TI$,2)
5020 RETURN
```

There you are! Much less painful than 10 lines of mysterious POKEs and it works on all Commodore machines. Use either semicolons or the plus sign, it makes no difference. If you want to enhance it with colour changes then line 5000 becomes:

```
5000 PRINT " [HOME] [PURPLE] " + LEFT$ (
TI$,2 ) + " [BLACK] : [RED] " + MID$ (
TI$,3,2 ) + " [BLACK] : [GREEN] " + RIGHT$ (
TI$,2 )
```

One problem here is that the cursor is now sitting at the start of the second row; add the following line ('L' is the line number you wish the cursor to end on.) to place the cursor back where you want it.

```
5010 PRINT " [HOME] ";: IF L THEN FOR J =
0 TO L : PRINT " [CURSOR DOWN] ";: NEXT
J.
```

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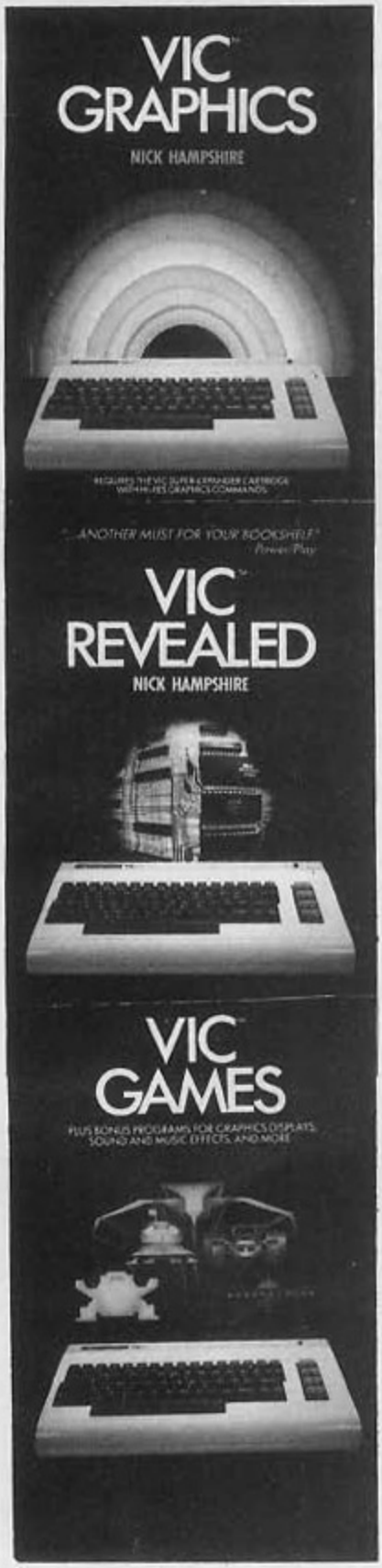

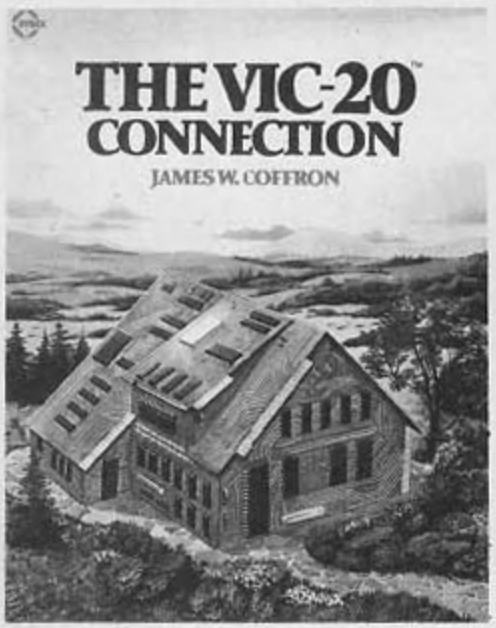

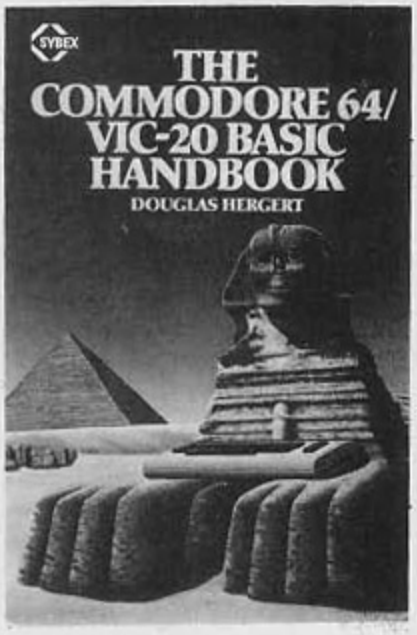

VIC-Users

Be in for your very own bonus points special

- Each of your current bonus points is worth $2.00 off the advertised price of any of these new VIC books.

OR

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The Commodore 64/VIC-20 BASIC Handbook **Douglas Hergert**

Alphabetical listing and explanation of BASIC commands and functions. Includes special tips and suggests for using BASIC vocabulary to make programming as simple and efficient as possible. Sample programs demonstrate how to use commands in their proper syntax, and sample output screens show exactly what the commands do. Provides knowhow to convert the 64 or VIC to do a multitude of home and office tasks.

Sybex **Our price $20.85. Save $1.10.**

The VIC-20 Connection **James W. Coffron**

Shows how easily you can use the VIC along with household devices. Outlined techniques for using the computer to control a home security system, a home temperature system, a voice synthesiser to make the computer talk. The VIC is well suited for connecting to non-computer devices and this book provides many ideas and with the knowhow on what to do.

Sybex **Our price $17.05. Save 90 cents.**

VIC Revealed **Nick Hampshire**

A comprehensive look at the VIC 20's hardware capabilities, uncovering features such as programming power given the limited memory, game and graphics technology in the video interface chip, and I/O capabilities. Detailed VIC memory map, explanations of BASIC ROM variables, user memory and data storage. Complete instruction set for 6502 CPU disclosed, along with options for using machine code subroutines in VIC BASIC programs. Sound-effects programming and graphics programming described and an outline provided on how to extend the VIC's home applications.

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VIC Graphics **Nick Hampshire**

Explains theory of high resolution graphics plotting and the VIC's multicolour code, with applications ranging from art and games to educational simulations in maths, science and business. All program listings tested and annotated. Programs cover colour plotting, drawing maps, rainbows, geometric figures, pie charts and line graphs, cursor control, character and shape design, and moving shapes on the screen. Requires use of VIC Super-Expander cartridge with high resolution commands.

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VIC Games **Nick Hampshire**

Collection of 36 programs covering arcade style, strategy and educational world games. These include driving a grand prix, fighting space pirates, manoeuvring through a maze of land mines, solving Rubik's cube, creating colourful images and accompanying music, finding your way out of a jungle, improving spelling and vocabulary skills.

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Introductory

Basic Computing
A Complete Course — **Tim Crawford**

Provides a broad-based introduction to computer science and data processing suitable for a variety of levels in high schools, universities or industry. Begins with questions such as What is a Computer? Where Did Computers Come From? Gives detailed coverage of computer languages, programming, program structure, logic, testing, documentation and program maintenance.

Osborne/McGraw-Hill — **Our price $26.10. Save $1.40 and earn 2 bonus points.**

Mastering Computers — **G.G.L. Wright**

A good introduction for the initiated, or for use as a text in a computer-appreciation course. Covers the field from the basis of mainframes, through such everyday applications as bar coding to the possibilities of videotex and an electronic money system. Well written, concise, and well illustrated.

MacMillian Master Series — **Our price $9.45. Save 50c and earn 1 bonus point.**

Microcomputers in Plain English for New Zealanders. — **Brian Strong**

The first computer book for New Zealanders, and the book for the first-time computer users. Clear, precise and often humorous introduction to the world of the microcomputer for business people, those at home, farmers and teachers, industrial technicians and sports administrators. Assuming no previous knowledge of computers, the author explains the different uses of microcomputer, the way it works, the jargon of the industry, and the various equipment and programs available.

Reeds — **Our price $7.50. Save 45c and earn 1 bonus point.**

Home Computers: 210 Questions and Answers — **Rich Didday**

Vol 1: Hardware, Vol 2: Software give you in question and answer form a real feeling for what's involved in personal computing. Well illustrated. Some of the section titles: Numbers, logic and building blocks; Getting into Hardware, What's it Like to Assemble a Computer Kit, Some Specific Microprocessors, What's It Really Like to Program in Machine and Assembly Language, What's it Like to Program in BASIC.

Dilithium Press — **Our price $18.95 for each volume. Save $1 on each and earn 2 bonus points.**

BBC

The BBC Micro: An Expert Guide — **Mike James**

Introduction to the BBC, covering both hardware and software aspects. Provides inside view of the machine, connoisseur's guide to BBC BASIC and an introduction to the machine operating system. Covers graphics, sound generation, interfacing and assembly language programming. Projects used to illustrate topics, short programs are part of narrative, and there are complete listings.

Granada — **Our price $23.70. Save $1.25 and earn 2 bonus points.**

Structured Programming With BBC BASIC — **Roy Atherton**

Some ideas on exploiting the advanced graphics and control structures of the BBC version of BASICS. Uses graphics as a major theme for its own sake and as an interesting, visually appealing vehicle for learning the principles of problem analysis and programming. Recognises increasing importance of logic and programming. Practical approach with more than 100 worked examples or solved problems. Structure diagrams and line drawings illustrate discussion.

Horwood — **Our price $31.30. Save $1.65 and earn 3 bonus points**

The BBC Microcomputer for Beginners — **Seamus Dunn & Valerie Morgan**

Complete introduction to the machine and programming in BASIC. No computer experience or mathematical skill needed. Each step illustrated with sample programs and screen responses. Detailed description of machine's special features.

Prentice-Hall — **Our price $25.55. Save $1.35 and earn 2 bonus points.**

Assembly Language Programming for the BBC Microcomputer — **Ian Birnbaum**

A guide on how to get the most from your BBC. Covers addition and subtraction, decision making and loop structure in assembly language, indexed addressing, multiplication and division, the stack, subroutines and interrupts. Offers some utility programs and provides answers to exercises.

MacMillan — **Our price $33.20. Save $1.75 and earn 3 bonus points.**

Discovering BBC Micro Machine Code: How to get more speed and power — **A. P. Stephenson**

Unlocks machine code which holds the key to the BBC's powers. Tells how to generate fast-moving graphics, make effective use of peripherals and ancillary equipment, save memory. Short programs and routines show the way.

Granada — **Our price $23.70. Save $1.25 and earn 2 bonus points.**

Basic Programming on the BBC — **Neil and Pat Cryer**

You've seen the machine on television, and this is the book prepared to go with programme. It's designed for the new BBC. Teaches how to write programs, draw and animate pictures and graphics in full colour, design sound effects and program games. Detailed glossary.

Prentice-Hall — **Our price $19.25. Save $1.05 and earn 2 bonus points.**

BBC Micro Graphics and Sound — **Steve Money**

Practical guide to the BBC's graphics and sound facilities, detailing techniques to make the most of the machine's capabilities. Learn how to produce graphs and charts, draw pictures and use colour. Explains animation, perspective, the world of 3D graphics and the operation of the sound generator. Many short, easily handles illustrative listings, plus complete listings to try yourself.

Granada — **Our price $23.70. SaVe $1.25 and earn 2 bonus points.**

100 Programs for the BBC Microcomputer (Models A & B) — **John Gordon**

Published in association with Acornsoft, this book sets out to answer the question: what do you use a microcomputer for? Routines cover home, business, school and recreational uses. Programs are clearly presented and the author provides a brief explanation with each.

Prentice-Hall — **Our price $25.55. Save $1.35 and earn 2 bonus points. Cassette available: Our price $47.45. Save $2.50 and earn 4 bonus points.**

VIC

Vic 20 User Guide — **John Heilborn & Ran Talbott**

Designed to help you enjoy your computer time whether for entertainment or practical applications. Shows how to operate the VIC 20 and all its peripherals, program in VIC BASIC, use the machine's full range of colour graphics and sound capabilities, build a custom character set, and learn advanced mathematical programming.

Osborne/McGraw Hill — **Our price $29.80. Save $1.60 and earn 2 bonus points.**

Get More From the VIC 20 — **Owen Bishop**

Tells you how to get the best from the VIC's graphics and sound capabilities, and explores some of the machine's more spectacular aspects. Detailed explanations and plenty of examples in using the main BASIC commands, and a host of routines for reliable short-cuts to competent programming.

Granada — **Our price $18.95. Save $1 and earn 1 bonus point.**

Start with BASIC on the Commodore VIC 20 — **Don Monro**

Don Monro is one of the snappiest, most humorous, and easiest to follow writers on beginning computing. This book with its illustrations by Bill Tidy, is an excellent guide for VIC 20 owners. The hepful exercises and line drawings make learning a snap.

Reston — **Our price $19.25. Save $1.05 and earn 2 bonus points.**

PET

The Alien, Numbereater and other Programs for Personal Computers With Notes on How They Were Written — **John Race**

Dr Race has devised some interesting and unusual programs for the Commodore PET 2001 8K. He has listed the programs, but, more important, has detailed the way the programs were developed, pointed out the techniques and pitfalls, and generaly provided a sound basis for the reader to design and write games and other programs for himself. A book for the enthusiast rather than the beginner. Programs suitable for Commodore 64.

Macmillian — **Our price $12.32. Save 65c and earn 1 bonus point.**

PET Fun and Games — **Jeffries and Fisher**

Selected Cursor Programs

More than 30 games and puzzles, selected from more than three years issues of "Cursor" magazine. Will run on any model Commodore PET or CBM. The games include Zap, Shark, Demon, Maze, Dungeon, Yahtzee, Mad. The puzzles include Hanoi, Box, and Mind.

Osborne/McGraw Hill — **Our price $23.85. Save $1.25 and earn 2 bonus points.**

Language/programming

Programming With Graphics — **Garry Marshall**

Up-to-date treatment covering the three major methods of computer graphics production. Backgrounds the subject and principles of production, then works through block, pixel and line graphics, colour, movement and three-dimensional drawing. Appendix summarises graphics facilities of various micros. Readily understandable by non-mathematical user and is machine dependent.

Granada — **Our price $18.95. Save $1 and earn 1 bonus point.**

Pascal for the Apple (book 9 disk) — **Iain MacCallum**

Provides an introduction to Pascal as a first computer language. Use your Apple to help you learn programming Pascal. Uses graphics extensively – to entertain, provide experiments and programs, and teach the serious principles of program construction. Written as a self-teaching guide for those working alone and for students. No previous experience assumed.

Prentice-Hall — **Our price $53.35. Save $2.80 and earn 5 bonus points**

Microsoft Basic (2nd edition) — **Ken Knecht**

Shows how easy it is to learn to program. A comprehensive tutorial on programming using Microsoft versions 5.0 with the TRS80/System 80 and other generalised CP/M based systems as examples. This edition has a new chapter on the Microsoft BASIC compiler.

dilithium Press — **Our price $33.70. Save $1.80 and earn 3 bonus points.**

Computer Languages and Their Uses — **Garry Marshall**

Questions BASIC's position as the major personal computer language by developing examples common in the home, education and small business, first using BASIC then a more suitable language. Surveys computer languages and considers databases, three-dimensional graphics, simulation and pixel graphics. Written for the personal computer user.

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How to Build a Program — **Jack Emmerichs**

Gives you the chance to look over an experienced programmer's shoulder and see how to develop an original idea into a set of instructions which can be translated into a specific language for a computer. Looks at likely errors and bugs, and valuable testing techniques.

dilithium Press — **Our price $41.75. Save $2.20 and earn 4 bonus points.**

Your First Basic Program — **Rodnay Zaks**

The author of more than 15 best-selling computer books teaches the basics of BASIC. It doesn't matter whether you're eight or 88, if you want to learn how to program a computer, this book is aimed at you. No computer experience is needed. Written in Zaks' entertaining style and attractively produced with lighthearted but telling graphics.

Sybex — **Our price $20.85 Save $1.10 and earn 2 bonus points.**

Discover FORTH: Learning and Programming the FORTH Language — **Thom Hogan**

Whether you are a beginner seeking information on this multifaceted programming language or a serious programmer already using FORTH this book is a reference that should not be overlooked. Describe FORTH syntax, specifically applicable to both FORTH 79 and FIGFORTH.

Osborne/McGraw-Hill — **Our price $29.90. Save $1.60 and earn 2 bonus points.**

Education

Computer Studies: A Practical Approach — **G.M. Croft**

For anyone meeting computers for the first time, it emphasises data processing and file handling. It also takes into account the rapid advance in computing and looks ahead to the way in which the subject will develop over the next few years.

Hodder & Stoughton — **Our price $16.10. Save 85c and earn 1 bonus point.**

Atari

Atari Pilot for Beginners — **Jim Conlan & Tracy Deliman**

Easy-to-follow guide to making your Atari 400 and 800 home computer play music, make moving pictures and do maths. Unveils secrets of new PILOT language designed for speed and ease. Beginner can learn through play and experimentation with programming. All programs tested by children and adult beginners.

Reston — **Our price $28.40. Save $1.50 and earn 2 bonus points.**

Atari Games and Recreations — **Herb Kohl, Ted Kahn, and Len Lindsay**

Provides hours of pre-programmed games to play. But it also gives instruction readers need to improve on these games and create more complex and challenging games of their own. How to tell fortunes, compose songs, guess riddles, do word puzzles, and animate cartoon characters on the Atari.

Reston — **Our price $27.00. Save $1.45 and earn 2 bonus points.**

Some Common BASIC Programs: Atari Edition — **Lon Poole et al**

Seventy-six short programs to key into your Atari 400 or 800, giving you a powerful collection of financial, statistical, and maths programs. Each program is complete with source lisng, documentation, and sample execution.

Osborne/McGraw-Hill — **Our price $29.90. Save $1.60 and earn 2 bonus points.**

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

The book is arranged in 33 lessons, with notes for the instructor, containing assignments and review questions. From a "bare bones" introduction to programming, the sequence quickly leads to the point where programs can be written. From there, it's on to more advanced and powerful commands, and finally, the broader aspects of programming such as editing and debugging, and user-friendly programming.

Reston — **Our price $39.80. Save $2.10 and earn 3 bonus points.**

Our new selection

TRS-80 Data File Programming: A Self-Teaching Guide — **Leroy Finkel & Jerald Brown**

Learn by working through the many examples of programming and maintaining data files in BASIC on your TRS-80, and use them to keep track of your information. After learning the principles of file organisation, you go on to more advanced programming techniques, writing your own data file programs, modifying programs, adapting other programs.

John Wiley & Sons — **Our price $35.60. Save $1.90 and earn 3 bonus points**

Using Programmable Calculators for Business — **C. Louis Hohenstein**

A non-technical guide stacked with illustrations and samples of program output. Assumes no prior calculator or computer knowledge and sets out to show how the programmable calculator can work for you every day.

John Wiley & Sons — **Our price $26.10. Save $1.40 and earn 2 bonus points.**

Using VisiCalc: Getting Down to Business — **Carol Klitzner & Matthew J. Plociak Jr.**

A guide to the exploitation of VisiCalc's time saving and business management features. Step-by-step instructions through all VisiCalc commands and 150 figures showing the VisiCalc screen at every step.

John Wiley & Sons — **Our price $37.95. Save $2.00 and earn 3 bonus points.**

The IBM PC-DOS Handbook — **Richard Allen King**

A complete guide intended to give you confidence to be creative with your computer's capabilities. Reveals features and functions inside PC-DOS, what you can do with them, and how they go together. Second half of book shows how to become adept at using PC-DOS's more advanced features.

Sybex — **Our price $20.85. Save $1.10 and earn 2 bonus points.**

Problem Solving on the TRS-80 Pocket Computer — **Don Inman & Jim Conlan**

Learn at your own speed, working through problem posing and solving exercises to teach you the "nuts and bolts", then progress to using the computer as a practical tool in areas ranging from logic functions to storing, sorting and searching for randomisation.

John Wiley & Sons — **Our price $21.40. Save $1.10 and earn 2 bonus points**

Clean Slate Word Processing for the TRS-80 — **Henry Melton**

For the user — full explanation of commands, examples, hints and shortcuts; manual of functions and applications. For the programmer — information from original design to finished commented source code; concepts, suggestions and necessary facts to implement a custom version of Clean Slate.

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101 Projects for the Z80 — **Frank P. Tedeschi & Robert Colon**

Jammed with hardware and software projects to stimulate imagination and expand skills. Collection of practical projects and a thorough grounding in creative programming. Instructions for building and programming a simple micro unit and guidance to expand it into full-blown computer system with a variety of peripherals.

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All About 1, 2, 3 — **Robert Schware & Alice Trembour**

Provides information for potential buyers of the 1, 2, 3 software package. Outlines its capabilities and a general guide to buying a managerial software package for a personal computer. Lots of examples of how it can be used.

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COBOL for Microcomputers: A Self-Teaching Guide — **Ruth Ashley & Judi N. Fernadez**

An outline on how to put COBOL's business computing power to work. Shows how to write and run practical programs, through numerous examples, exercises, self-tests, and correct answers. Advances to control structure, data file maintenance and instructions to printers, disk drives and other peripherals.

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The Handbook of Microcomputer Interfacing — **Steve Leibson**

Shows how to put your micro to work, how to attach peripherals from any manufacturer, how to use your computer to control almost any information. Wealth of practical, use-it-now information on all aspects of interfacing, hardware, software, and the history and theory of interfacing practice. Hints, tips, detailed information, practical advice.

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More Than 32 BASIC Programs for the Commodore 64 Computer — **Tom Rugg & Phil Feldman**

Chock full of programs covering games, applications, education, graphics, mathematics. Each program is fully documented with a complete source listing, the program's purpose and how to use it. Also information on how to adapt programs by making simple modifications.

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The BBC Micro Book: BASIC, Sound & Graphics — **Jim McGregor & Alan Watt**

Starts by describing BBC BASIC clearly and simply, then covers graphics animation and sound facilities. Designed to have you inventing and playing games, writing and listening to music, producing and watching animated graphics.

Addison-Wesley — **Our price $28.45. Save $1.50 and earn 2 bonus points.**

Introducing Logo for the Apple II, Texas Instruments 99/4A & Tandy Color Computer — **Peter Ross**

Thorough presentation of Logo's terms, commands, procedures and turtle graphics. Logo's education orientation used to show adults and children how to think with Logo and create projects and search for solutions. Packed with ideas and practical examples.

Addison-Wesley — **Our price $25.45. Save $1.35 and earn 2 bonus points**

Troubleshooting and Repairing Personal Computers — **Art Margolis**

Sets out to take the mystery out of those "little black boxes" which control your computer and demonstrate how anyone can diagnose and repair many problems which strike home computers. Covers most of the common machines in an easy-to-follow style.

TAB — **Our price $30.35. Save $1.60 and earn 3 bonus points**

A PET For Kids (also for Commodore 64 and VIC-20) — **Sharon Boren**

Written by a teacher wanting to teach enthusiastic youngsters computer operation and programming in BASIC, individualised, self-paced approach encourages creative programming as well as good programming techniques. Snappy illustrations and activity worksheets focussing on solving, higher order thinking skills and creativity.

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Micro Cookbook: Machine Language Programming — **Don Lancaster**

Starting with the concepts of addressing and address space, you work your way to microcomputer architecture addressing modes and the toolkit needed for machine language programming. Exercises of programming and a detailed look at input/output. Offers ideas from 63 microcomputer applications.

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Timex/Sinclair Color Graphics — **Nick Hampshire**

Forty-five complete programs of colour graphics for the TS2048 and 1068 computers. The theory of high resolution graphics plotting is explained through programming examples, with a wide range of applications. All program listings have been tested and annotated for easy reference and modification.

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Introduction to FORTH — **Ken Knecht**

Complete information of the MMSFORTH version of the language, describing the basic syntax. No previous FORTH knowledge needed, although some exposure to Microsoft Level II BASIC helpful. Many program examples and direct comparisions between MMSFORTH and Level II BASIC. Designed specifically for MMSFORTH version of Radio Shack TRS-80 models I and III but most examples can be adapted to other microcomputers using different versions of FORTH.

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Assembly Language Programming on the BBC Micro — **John Ferguson & Tony Shaw**

Gentle introduction to writing in assembly language and speeding up your program execution. New topics are tackled progressively in accordance with difficulty. Specially written for those with some knowledge of BASIC but starting from scratch on assembly language. Many practical examples and illustrations.

Addison-Wesley — **Our price $28.45. Save $1.50 and earn 2 bonus points.**

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 cassettes; tells how to type in, use and modify programs; presents other sources of information.

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Using COBOL in an MP/M System — **Neil C. Gelb**

Full explanation for programmers, analysts, or anyone wanting to learn how to write COBOL programs for an MP/M system. Examples and discussion of mailing label program, locking out records for updating file records, password protection, relative and indexed data files, status testing.

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Apple Fortran — **Brian D. & George H. Blackwood**

Detailed language manual specifically on Apple FORTRAN 77. Written for anyone who uses FORTRAN on the Apple, and also directed at business people and professional people wanting to use FORTRAN in writing business or scientific programs. Progressive format expands simple language concepts to advanced concepts. Brief history of computers, FORTRAN. Wide range of example programs.

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Pet Graphics — **Nick Hampshire**

Designed for PET users to program graphic displays, the book provides a collection of machine language sub-routines providing a range of normally unavailable graphic functions. Emphasis on working examples.

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General

Microcomputer Math — **William Barden Jnr**

Step by step introduction to arithmetic operations on all types of micros. Covers binary, octal and hexadecimal numbering systems. Gives many practical examples and self-testing exercises.

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Boolean Algebra for Computer Logic — **Harold E. Ennes**

Knowledge of Boolean algebra is a must for anyone wanting to understand the design of digital computer logic circuits. This book provides that understanding without the reader having to know higher mathematics or advanced electronics. Many line drawings and worked examples. Exercises and allow self-testing (answers included).

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Introduction to Electronic Speech Synthesis — **Neil Sclater**

Helps you understand how a human "voice" is electronically created by three current digital synthesis technologies. Explains what you can expect in speech quality as it relates to data rate and cost of memory devices. Technical introduction to the subject written in non-technical terms. Ideal if you know something about electronics but don't have a background in computers, programming or speech physiology.

Sams — **Our price $17.85. Save 95c and earn 1 bonus point.**

Crash Course in Microcomputers (2nd ed) — **Louis E. Frenzel, Jr.**

Cover basics, number systems, memories, architecture, input/output operation, peripherals, mass storage, software, machine language programming, basic language programming, 16-bit microcomputers and applications. Suitable for anyone interested in micros.

Sams — **Our price $43.80. Save $2.30 and earn 4 bonus points.**

Bits, Bytes and Buzzwords: Understanding Small Business Computers — **Mark Garetz**

Explains microcomputers, software and peripherals in a straightforward sensible way, especially for those considering using a computer in their business. Explanation and discussion of computer systems, followed by a comprehensive glossary of computer terms.

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IBM

Using Your IBM Personal Computer — **Lon Poole**

A practical thorough guide. Part One helps you get started with off-the-shelf programs, and shows you how to use the PC's system unit, keyboard, display screen, disk drives, and printer. Part Two teaches you to program in PC BASIC, with scores of examples to help you learn quickly. Full explanations on all commonly used PC BASIC commands, including those for graphics, music, sounds effects, and more.

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Useful BASIC Programs for the IBM PC — **Stanley R. Trost**

A selection of tested programs for more than 65 home and business tasks. Home finances, business calculations, real estate, data analysis, record keeping and education are some of the fields covered. No knowledge of BASIC programming is needed to use these programs.

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CP/M

CP/M Revealed — **Jack D. Dennon**

Explains technical aspects of CP/M, including console monitor (CCP), system manager (BDOS) and input/output driver package (CBIOS). The data structure of the CP/M disk is fully outlined to allow experienced users to realise the full potential of CP/M programming. Advanced users should appreciate discussion of booting up, logging in, changing memory size, mapping disk space, calling programs and interfacing techniques.

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CP/M Printer — **Stephen Murtha & Mitchell Waite**

Information on the latest CP/M 2.0 version, disk allocation and extents. Tear-out reference card and extensive list of CP/M software.

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Soul of CP/M — **Mitchell Waite & Robert Lafore**

Unlocks the secrets of how to use the hidden power of your CP/M system. Describes the workings of CP/M, and offers a DDT code-fragment approach for getting started quickly. Teaches 8080 assembly language programming, how to use CP/M system calls, how to access CP/M from BASIC, and how to modify BIOS.

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CP/M Bible — **Mitchell Waite & John Angermeyer**

Reference guide to CP/M, covering all built-in and transient commands. Compares CP/M versions and looks at optional utilities. Describes BASIC, PASCAL, MAC, CBASIC and CB-80. Includes detailed command summary card and extensive bibliography.

Sams — **Our price $39.80. Save $2.10 and earn 3 bonus points**

Osborne CP/M User Guide — **Thom Hogan**

Bridges the gap between echnique manuals and users' working knowledge of computers. Provides basic, practical information you need, then details all CP/M commands and describes compatible support programs. Many tables and lists as operating references. For more advanced users, the relationship between CP/M and other operating systems is examined, and modifications and use of CP/M for program development is discussed.

Osborne/McGraw Hill — **Our price $31.50 Save $1.65 and earn 3 bonus points.**

CP/M and the Personal Computer — **Thomas A. Dwyer & Margo Critchfield**

Two authors known for their down-to-earth explanations of computing intricacies have produced an up-to-date guide to the microcomputer disk operating system. They break CP/M into its components and combine their explanations with applications and self-study techniques. New users get a "quick tour" of CP/M and there is an insider's view of CP/M's four main applications.

Addison-Wesley — **Our price $39.20. Save $2 and earn 3 bonus points.**

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TRS-80

TRS-80 Models I, III, & Color Computer Interfacing Projects — **William Barden Jnr**

Contains practical and easy-to-build construction projects which demonstrate how to interface the three machines to "real world" devices with a minimum of time and expense.

Sams — **Our price $29.80. Save $1.60 and earn 2 bonus points**

Interface Projects for the IRS-80 (Mod III) — **Richard C. Hallgren**

For the user with some computer experience. A series of easily built interface projects allowing the discovery of the computer's capabilities. Many fully tested practice hardware projects including review of data transfer formats, analog-to-digital conversion biofeedback projects, and controlling a video playback device.

Spectrum — **Our price $23.25. Save $1.25 and earn 2 bonus points.**

TRS80 For Kids from 8 to 80 Vol 1 — **Michael Zabinski**

Enjoyable, easy to follow, and very effective. Suitable for beginning TRS80 programmers of any age, especially youngsters. No special background is needed. Same principles used at the American National Computer Camp help you quickly begin writing computer programs and encourage you to try many examples. For System 80, too, of course.

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Using the Z-80 in the TRS-80 — **Elmer Poe**

Explains programming the Z-80 in TRS-80 machine language, leading you step by step through Z-80 architecture and instruction set in the the TRS-80. Guides you in devising machine language techniques and developing them slowly and progressively. Suitable for self study or introductory course. Covers both TRS-80 Models 1 and III.

Sams — **Our price $27.90. Save $1.40 and earn 2 bonus points**

TRS-80 Interfacing: Book 1 — **Jonathon A. Titus, Christopher A. Titus, David G. Larsen.**

If you want to apply your TRS-80 to more than just standard peripherals, you need to know the internally generated signals and how each can be used under BASIC language program control. A book for the reader with a good understanding of commands in level II BASIC, and midway between the beginner and the advanced programmer/hardware designer.

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Top-Down BASIC for the TRS-80 Color Computer — **Ken Skier**

Learn how to design BASIC programs from the top down. Covers user interface for games, animations and educational programs; breaking down a large project into subroutines; making programs user-friendly; writing programs in a readable manner.

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How to Write a Computer Program: Vol 1. TRS-80 Ed — **Ed Faulk**

Sets out some simple techniques for program development. Faulk offers no guarantee he will turn you into a "super programmer" but does claim he will make you a better programmer if you apply his methods diligently. Discusses planning, preparation for coding, coding, testing, documentation.

Prentice-Hall — **Our price $26.30. Save $1.40 and earn 2 bonus points**

Making the Most of Your TRS-80 Color Computer — **Peter Vernon**

Will help you create eye-catching visual displays, informative graphs and exciting games. And you can enhance them with sound and music from the computer. You can also explore program packs and a variety of other programs which transform the TRS-80 into a word processor, financial planner, typing instructor, games machine.

Prentice-Hall — **Our price $22.30. Save $1.20 and earn 2 bonus points**

119 Practical Programs for the TRS-80 Pocket Computer — **John Craig**

Collection of software created for the pocket model. Programs range from statistics, numerical analysis and finance to electronics and engineering. Author is a professional programmer.

TAB — **Our price $18.95. Save $1.00 and earn 1 bonus point.**

Introduction to TRS-80 Graphics — **Don Inman**

One for all the 80 users! A complete introduction to the basics of graphics programming on the TRS-80, using dozens of examples. It begins with the most basic concepts of line drawing and leads to geometric shapes, moving figure animation, and other more advanced topics.

dilithium Press — **Our price $18.95. Save $1 and earn 1 bonus point.**

Word processing

Wordstar Made Easy — **Walter Ettlin**

In 14 easy lessons, this handbook demonstrates all the powerful features of the MicroPro Wordstar system. Lessons cover everything from loading, using the unique printing, text manipulation, and formatting functions. Spiral bound, it is ideal to use while working at the terminal.

Osborne/McGraw-Hill **Our price $23.85. Save $1.25 and earn 2 bonus points.**

Low-Cost Word Processing — **Laurence Press**

Tells you how to produce memos and reports, ready for mailing, quickly and efficiently — even if you know about computers. Brings together the necessary information, suggestions and tips; outlines the workings of a word processing system; considers options; and discusses the choice of software packages.

Addison-Wesley **Our price $22.40. Save $1.20 and earn 2 bonus points.**

The Foolproof Guide to Scripsit Word Processing — **Jeff Berner**

A quick and easy way for TRS80 Model 11, 12 and 16 users to learn the SCRIPSIT program. You can enjoy learning to create and delete files, handle documents, polish texts, prepare form letters and use your printer.

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Sinclair

Z80 Assembly Language Programming — **L.A. Leventhal**

Comprehensive coverage of the Z80 microprocessor assembly language. Examples illustrate software development concepts and actual assembly language usage. Assemblers and assembler directives are explained. Includes more than 80 sample programming problems. All problems solutions in source code and object code. Each Z80 instruction fully explained.

Osborne/McGray-Hill **Our price $33.95. Save $1.78 and earn 3 bonus points.**

Better Programming for Your Spectrum & ZX81 — **S. Robert Speel**

More than 40 programs are explained in detail to show how they work and how you can apply the techniques to your own programs. Emphasis on better programming techniques to help you get the best from your computer.

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Introducing Spectrum Machine Code: How to Get More Speed and Power — **Ian Sinclair**

Written specially for the beginner who, in easy stages is shown how to program the Spectrum directly in machine code — knowledge which greatly enhances the machine's uses. Working examples consolidate the lessons.

Granada **Our price $28.45. Save $1.50 and earn 2 bonus points.**

The Sinclair ZX80 Programming for Real Applications — **Randle Hurley**

Aims to develop in the reader an interest in pushing the ZX81 further that anyone expected it to go when it was first launched. The programs show how to store more numbers than there are memory bytes in the 16K ZX81 and then access this idea in many different ways afterwards. Large, "off the peg" programs, but you can also use these as working examples to illustrate the programming ideas at the beginning of the book. Financial, banking and educational programs, and a lot more.

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More Real Applications for the ZX81 and the ZX Spectrum — **Randle Hurley**

Provides ZX81 and ZX Spectrum owners with "of the peg" programs doing real computing work in a wide range of applications . . . file handling, batting and bowling statistics for cricket, the production of frames for animated sequence. Requires 16K for the ZX81.

Macmillan **Our price $27.50. Save $1.45 and earn 2 bonus points.**

Software tapes available

Advanced Programming for the 16K ZX81 — **Mike Costello**

Written for those who have had time to get used to their ZX81 and are now looking for more information in order to exploit it to the full. Investigation of the ZX81's operating system, discussion of BASIC subroutines and techniques used in a wide range of programs, including business applications and games. Also the use of assembly language programming techniques and mixing BASIC with machine code.

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The ZX Spectrum and How to Get the Most From It — **Ian Sinclair**

Takes a beginner's viewpoint to setting up and operating the machine, highlighting difficulties and showing responses to incorrect commands. Guides beginner through difficult early stages until confident enough to start designing and entering BASIC programs. Also a useful reference for more experienced users.

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The Timex/Sinclair 1000 Basic Handbook — **Douglas Hergert**

A computer-side reference to programming. Lists and explains alphabetically each of the Timex/Sinclair's BASIC keywords and function keys. Explanations include special tips and suggestions for using BASIC vocabularly to make programming as simple and efficient as possible.

Sybex **Our price $17.05. Save 90c and earn 1 bonus point.**

More Uses For Your Timex/Sinclair 1000: Astronomy on your Computer — **Eric & Howard J. Burgess**

Ready-to-run programs to help you explore the heavens and have fun while learning about the stars and the solar system. Programs will convert time from one system of measurement and teach you to recognise constellations.

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The Spectrum Book of Games — **Mike James, S. M. Gee & Kay Ewbank**

Twenty-one games specially written for the ZX Spectrum — both 16K and 48K. All fully tested and crashproof. Each program is accompanied by an explanation of how to play and how it works, including tips on modifying or personalising it for special use.

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Timex/Sinclair 1000 Basic Programs in Minutes — **Stanley R. Trost**

Ready-to-enter programs for more than 50 home and business tasks. Handy for home finances, business calculations, real estate, data analysis, education. Ready-to-run in less than 10 minutes and no knowledge of BASIC needed.

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First Steps With Your Spectrum — **Carolyn Hughes**

Takes you from the first tap of the keyboard to writing your own Spectrum programs. You learn to use colour and sound, make objects move around the screen, BASIC programming techniques and practise skills with specially written programs. Also six new progams for beginners.

Armada **Our price $3.30. Save 20c and earn 1 bonus point.**

The Spectrum Programmer — **S. M. Gee**

Provides brief history of ZX range, with advice on setting up the machine and using the keyboard. Describes first steps in BASIC, looping and choice, handling test and numbers, and functions and subroutines. Sections on graphics and sound, logic and other advanced topics. Many programming examples and at least one complete listing in most chapters.

Granada **Our price $18.95. Save $1 and earn 1 bonus point.**

Apple

Basic for the Apple II: A Self-Teaching Guide — **Jerald R. Brown, Leroy Finkel & Robert L. Albrecht**

Self-instructional guide to develop programming skills. Adopts successful interactive format, with clear, non-technical language taking you step-by-step through Applesoft BASIC to the advanced areas, with plenty of examples along the way.

Wiley **Our price $30.40. Save $1.55 and earn 3 bonus points.**

Pascal Programming for the Apple — **T.G. Lewis**

Step-by-step guide and examples for both the hobbyist and the professional. Covers fundamentals of Pascal and demonstrates techniques for programming, graphics modules in turtlegraphics, musical tone generators and structure operations. Also many ready-to-run programs for home mortgage repayments, stock market charting and cash flow analysis.

Reston **Our price $20.35. Save $1.05 and earn 2 bonus points.**

Graphics Cookbook for the Apple — **Nat Wordsworth**

A guide to "painting" shapes, objects and letters in low-resolution graphics on the Apple II. Explains method and techniques of drawing pictures using Applesoft BASIC, then providing a library of microcomputer graphics. Works from geometric shapes to multicoloured robots and flying saucers, trees, yachts and colourful backgrounds. Also discusses displaying "billboard" messages using giant letters and numbers.

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Apple II: Basic Programs in Minutes — **Stanley R. Trost**

Collection of versatile, ready-to-enter programs for more than 65 home and business tasks on the Apple II, II-plus or IIe. 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.

Sybex **Our price $20.85. Save $1.10 and earn 2 bonus points.**

Keyboarding

Quick Keyboarding — **Vonnie Alexander**

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

Methuen **Our price $6.50. Save 45c. and earn 1 bonus point.**

Keyboarding for Information Processing — **Robert Hanson**

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 seperate 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 $8.95. Save 57c and earn 1 bonus point.**

Business

Executive VisiCalc for the Apple Computer — **Roger E. Clark**

Shows how to forecast sales, model budgets, perform financial analysis, and how to use VisiCalc for your specific needs. Guides you through the less widely known aspects of VisiCalc and offers tips on getting started, command statements, logic, sample business models, and hardware options.

Addison-Wesley **Our price $30.60. Save $1.60 and earn 3 bonus points.**

Basic for Business — **Douglas Hergert**

Teaches you to read, write and "debug" BASIC programs for business applications. All BASIC vocabulary listed and important programming techniques and concepts discussed. Realistic sample programs illustrate each element and exercises guide you to further exploration. Also an introduction to COBOL, FORTRAN and Pascal, comparing each with BASIC.

Sybex **Our price $28.45. Save $1.50 and earn 2 bonus points**

Doing Business with VisiCalc — **Stanley R. Trost**

Assumes an introductery-level understanding of VisiCalc. Beyond that it is a quick and easy guide. It has more than 50 planning and forecasting applications ranging from financial statements to master budgets, and pricing models to investment strategies. Each application is described in detail and a complete program for setting up the application in VisiCalc is noted.

Sybex **Our price $25.65. Save $1.30 and earn 2 bonus points.**

Executive Planning with BASIC — **X.T. Burt**

A collection of interactive, oriented business programs. They can be used in their existing form or as tools for management and planning decisions. Finding breakeven point, linear programming, inventory management, critical path analysis, moving averages, linear regression, financial ratio analysis, portfolio managment . . . these are some of the topics covered.

Sybex **Our price $29.90. Save $1.60 and earn 2 bonus points.**

Software

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.

Granada **Our price $18.95. Save $1 and earn 1 bonus point.**

Data Base Management Systems: A Guide to Microcomputer Software — **David Kruglinski**

Helps set benchmarks among the variety of data base packages – defines the capabilities of file, relational and network/hierarchical categories of data base management systems; provides criteria for evaluating data base software; examines several packages, some of which run under the CP/M system; discusses future products and trends.

Osborne/McGraw Hill **Our price $33.80. Save $1.80 and earn 3 bonus points.**

Commodore

Commodore 64 Computing — **Ian Sinclair**

Introductory guide and reference book covering setting up and operation of the computer and its facilities. Explains main features and summarises BASIC syntax with examples as a reference for the experienced user and a guide for the less experienced user.

Granada **Our price $18.95. Save $1 and earn 1 bonus point.**

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 $30.35. Save $1.60 and earn 3 bonus points.**

Two games to key in

The following programs are reprinted with the permission of Dick Smith Electronics from *Getting Started* (on the VZ200), by Tim Hartnell and Neville Preteborn.

Getting Started and another four books written especially for the VZ200 are now available in New Zealand from Dick Smith Electronics and its dealers.

Out on the Fairway

A golf game called Caddy. You have nine holes to negotiate, as you'll see when you play the game, the computer obligingly keeps the score card for you. After each hole, it will tell you how you are doing to date, and will work out your average score per hole. All you have to do is hit the ball! If you overshoot, the computer will automatically make sure the next shot is back towards the hole. You'll find it pretty tricky going, especially on holes with a high difficulty factor.

Here's the listing, golf pro:

```
10 REM CADDY
20 DIM X(9):CO=0:H$=CHR$(216)
30 U=224:L$="
40 FOR Z=1 TO 9
50 SC=0
60 J=RND(12)
70 Q=RND(3)+2
80 IF Q=5 THEN Q$="FIVE"
90 IF Q=4 THEN Q$="FOUR"
100 IF Q=3 THEN Q$="THREE"
110 CLS:PRINT:PRINT
120 IF Z=2 THEN PRINT "SCORE UP TO THIS
                       HOLE IS"X(1)
130 IF Z>2 THEN PRINT "SCORE UP TO THIS
                       HOLE IS"K
140 PRINT "<<< HOLE NUMBER"Z">>>"
150 PRINT:PRINT "DIFFICULTY FACTOR IS "Q$
160 GOSUB 430
170 PRINT:INPUT "ENTER STROKE STRENGTH"
                    ;A:SOUND 31,2
180 PRINT@U,L$:IF J>24 THEN A=-A
190 J=J+INT(A/RND(Q))
200 IF J=24 THEN GOSUB 490
205 IF J>30 THEN J=30:GOTO 205
207 IF J<1 THEN J=1
210 IF J<>24 THEN PRINT@U+J-1,H$
215 IF J<>24 THEN PRINT@352,L$:PRINT L$
220 SC=SC+1
230 PRINT@448,"AFTER THAT STROKE YOUR
                    SCORE IS"SC
240 FOR P=1 TO 2500:NEXT P
250 IF J<>24 THEN 110
260 C=C+SC
270 X(Z)=SC
280 IF Z=1 THEN 390
290 K=0
300 PRINT "THE GAME SO FAR:"
310 FOR J=1 TO Z
320 K=K+X(J)
330 PRINT "HOLE"J"TOOK JUST"X(J)"STROKES"
340 FOR M=1 TO 300:NEXT M
350 NEXT J
360 IF Z<9 THEN PRINT:PRINT "THE AVERAGE SO
          FAR IS"INT((K+.5)/Z)
370 FOR P=1 TO 1000:NEXT P
380 IF Z>1 THEN PRINT:PRINT "THE SCORE FOR"
          Z"HOLES IS"C
390 IF Z=1 THEN PRINT:PRINT "THE SCORE FOR
          THE FIRST HOLE IS"C
400 FOR M=1 TO 2500:NEXT M
410 NEXT Z
420 GOTO 560
```


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The incredible new Dick Smith VZ 200 Computer looks like becoming the personal computer success story of the 80's

With many thousands of these $300 units already in Australian and New Zealand homes, demand for additional software programs is growing at an alarming rate. Here is an outstanding opportunity for enterprising computer buffs to earn extra money in your spare time and gain recognition by writing programs for the VZ-200.

Contact:
Peter Traill
Dick Smith Electronics
Private Bag
Newmarket
Phone (09) 504-409

```
430 IF J>30 THEN J=30
435 PRINT@196,""
440 PRINT TAB(J-1);H$
450 PRINT "########################\ /######"
460 PRINT "########################## #######"
470 PRINT "^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^"
480 RETURN
490 PRINT@416,"YOU DID IT!!"
500 PRINT@311,H$
510 FOR P=1 TO 300:NEXT P
520 SOUND 21,4:SOUND 16,2:SOUND 16,1:
        SOUND 18,4:SOUND 16,4
530 SOUND 0,1:SOUND 20,4:SOUND 21,4
540 FOR P=1 TO 2000:NEXT P
550 RETURN
560 PRINT:PRINT "END OF THAT ROUND, GOLFER!"
570 PRINT:PRINT "YOU SCORED"C
580 PRINT "AND YOUR AVERAGE WAS"INT((C+.5)/9)
590 PRINT:PRINT
600 PRINT "ENTER 'Y' FOR ANOTHER ROUND, OR
                'N' TO QUIT"
610 A$=INKEY$
620 IF A$<> "Y" AND A$<> "N" THEN 610
630 IF A$="Y" THEN RUN
640 PRINT:PRINT "OK, THANKS FOR
                PLAYING, CHAMP"
```

Testing your Speed

Reaction Test, is great fun to play. You enter the program, type in RUN, and the message STAND BY appears. After an agonising wait, STAND BY will vanish, to be replaced with the words, "OKAY, HIT THE 'Z' KEY!". As fast as you can, you leap for the Z key and press it, knowing that the computer is counting all the time.

The computer tells you how quickly you reacted, and compares this with your previous best time. "THE BEST SO FAR IS . . ." appears on the screen, and the computer than waits for you to take your hands off the keyboard before the whole thing begins again.

The game continues until you manage to get your reaction time to below 10, which is not an easy task.

Line 20 sets the variable HS to 1000. The variable C is set to zero in Line 50 and incremented by one every time this line is revisited, which occurs when you have not managed to get to the 'Z' key. Lines 55 and 60 check to see if you have touched the Z key, and if not, send the program back to 50 where C is incremented.

Once you've managed to get to Z, the program 'falls through' to line 65 where you are told your score. This is compared with the best score (variable name HS) in the following line, and HS is adjusted to C if C is the lower of the two.

The next line (80) puts in a short pause, and then checks to make sure you have taken your hands off the keyboard. It stays cycling through 80 and 85 until you take your hands off the keys. The NEXT W then sends the program back to the line after the FOR (line 15) and the next round of the game begins.

The FOR/NEXT continues only so long as HS stays greater than 10 (as you can see in line 15). Once you get a high score below 11, the program continues through the NEXT to line 15 where the words "YOU'RE THE CHAMP!" appear on the screen, and SOUND 31, 1 is activated.

```
  5 REM - REACTION TEST -
  7 CLS
 10 LET HS=1000
 15 FOR W=0 TO 999: IF HS<10 THEN 90
 20 PRINT@236,"STAND BY"
 25 GOSUB 105
 30 GOSUB 100
 35 IF A$<>"" THEN 25
 40 LET C=0
 45 PRINT@134,"OKAY - HIT THE 'Z' KEY!"
 50 LET C=C+1
 55 GOSUB 100: IF C>=200 THEN GOTO 90
 60 IF A$<>"Z" THEN 50
 65 PRINT: PRINT "YOUR SCORE IS";C
 70 IF C<HS THEN LET HS=C: SOUND 30,2
 75 PRINT: PRINT "THE BEST SO FAR IS";HS
 80 GOSUB 105: GOSUB 100
 85 IF A$<>"" THEN 80
 90 NEXT W
 95 PRINT: PRINT "YOU'RE THE CHAMP!":
          SOUND 31,5: END
100 LET A$=INKEY$: RETURN
105 FOR P=0 TO 499+RND(999): NEXT P:
          CLS: RETURN
```

New competitor

The deregulation of the American phone companies and the breaking up of the old system is one of the biggest events in world business at present.

One of the side effects is that at least one of the phone companies, ITT, is entering the personal-computer field.

ITT is bringing out a machine being matched against the IBM PC, but selling for 5 per cent less.

Called the Xtra, the machine will dovetail with ITT services such as electronic mail. It has 128K RAM, a disk drive and some enhanced features such as a swivelling screen.

Micro micro

Seiko, the Japanese watch maker, in January marketed what it claimed is the world's first wristwatch computer system capable of accepting input of personal data. The system comprises a wristwatch, keyboard, and controller. The wristwatch displays memorised personal data such as addresses and telephone numbers as well as having the usual time and alarm functions. Equipped with five LSI chips, the watch can also show graphics on its LCD panel, which is 22mm by 17mm. The watch will sell in Japan for 54,800 yen (about $NZ365).

Quick look at Econet

By Pip Forer

The deadline for this issue having been and gone and the hard disk still being airborne between here and the United Kingdom, the promised review of the hard-disk options will have to wait. Instead we can briefly look at Econet, which is, after all, the environment the hard disk is scheduled to start work in. It is also the selling point that Acorn has chosen to push in the United States as the main benefit of its system. The ads in the October issue of *Bits & Byte* showed a set of BBC's in use from the air with the caption, "The One Computer to have when you are having More Than One". Apart from the trace of Clayton's there (which is hardly likely to confuse the U.S. audience) the ad was well chosen. Econet is one of the BBC's currently most attractive features.

Here is a quick run-down on Econet to date, both the good and the bad features. A network is usually required to offer three things: user communications, resource sharing, and system administration. The concept of Econet is an advanced one in a machine this cost since the network is quite sophisticated at its fullest implementation. To run the basic Econet currently requires two things.

First, each machine on the network needs an Econet interface. This is the usual Acorn blend of firmware and hardware in the form of chips and ROM's. Each machine has an internal eight-bit switch that can be set to determine the station's number on the network plus various resident software routines and an extra sideways ROM. In operation, Econet costs you the use of one ROM socket plus 400 bytes from your user RAM for working space.

Second, you need to link several (or at least two) machines on to a physical network of cable through the DIN plug at the back of the machine. This network cable also needs to have a clock on it to generate a timing signal.

With all this in place it is possible to use the network and transfer information around between computers at speeds of 300–400,000 baud on a small network, quite fast enough given the handling speeds of the machines at each end. This is the blunt end of its communication facilities. The individual machines can use their cassettes or their own disk systems for storage and talk to each other through certain machine calls. These involve using operations known as the network primitives, which basically establish dispatch and reception buffers in different machines and allow transfer of the memory contents from one machine to another. Personally, I can see a lot an inventive mind could do with this on its own. However, most users want a network that offers simpler, higher level commands and will allow resources to be shared (disks or printers) and things such as access to the network to be effectively administered.

All of this inevitably involves software and a file server. This latter is currently a dedicated machine which administers the network and makes small networks (say under six machines) economically marginal. On Econet the file server can be of three sorts, of which two function very similarly. These two are the System 4 and second-processor Econets which drive higher versions of Econet software. The odd one out is the Level 1 File server. This last named runs with just a BBC model B and offers restricted facilities. The other two require extra processing power and do a great deal more.

All of the options allow the network to share one or two disk drives (or a hard disk theoretically) between all the users. On the level one system each user (identified by his station number) gets to have a similar number of files available under his own unique directory name (single letter) plus access to the main library directory. Level 1 supports only BASIC files (not data files) and is

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essentially a reconfiguration of the normal DOS and formats disks identically. However, it also supports some of the more exciting Econet features, such as the *VIEW command to see other users' screens and the ability to send other stations' messages. Level 1 Econet is a cheap entry but really only suitable for limited programming classes on a small network. The programming environment is limited and the administrative and file-handling functions are small.

Level 2 or 3 Econet is far more sophisticated. The various inter-user commands which distinguish Econet from most of its rivals are still there and enhanced. However, the file system is totally altered. Unlike the Level 1 file server disks the disk on the other levels are laid out completely differently from standard DOS and users get access to long file names with a complete directory structure. Furthermore, users become identified with a password which can be used to control access to some or all files. This enhances the administration capabilities considerably and ensures sharing the disk resource. The requirement for these networks is that the file server has enhanced hardware.

Generally, the file server is often confused with the network and this should not be so. In practice, a network system is a blend of a communications highway with various protocols for sharing equipment and gaining access. A standard Econet nterface basically lets you on to the highway. The file server to a large degree controls what you can do and how you do it once you are there. In terms of the three functions of a network that we started with, the 1983 version of Econet provides a good data highway (and I suspect that this communications role may prove the most important in the long run), partly because it can link in to the BBC's quite sophisticated MOS calls. It is a good administrative system in its Level 2 and 3 releases but is least developed in its resource sharing (no printer spooling and limited disk space). The hard-disk system promises to enhance this significantly. Which brings us back to where we started . . . and, it is to be hoped, to a hard-disk review next month, ELSE an introduction to windows on BBC graphics.

More on DOS

The Watford DOS is now also in New Zealand and is available through Tower Computing, of Christchurch. Although I have yet to assess it in a machine, the manual is certainly good and it offers some useful extensions, although less radical than any of its rivals. I did get a chance to benchmark the PACE system since the last issue of *Bits & Bytes*. The results are interesting. The ROM I had, running with a Shugart drive, performed more slowly than the Acorn system. However, it performed a great deal better than the same published benchmarks run in the August "Micro User" on the PACE system. Equally a lot of the odd behaviour noted in that review was no longer occurring (although a few odd events did crop up during my sessions with it). The next batch of ROM's received by the distributor apparently performed even faster. It would seem that the system is undergoing continuing enhancement as new approaches and old problems come to light. Clearly alternative DOS ROM's are going to offer more and more power as their design gets optimised.

VIEW blues

If you are a VIEW user using the word processor with disks the SAVE and LOAD documentation may cause some confusion (if you are using tape . . . my sympathies). Although the general VIEW Reference Guide states that SAVE can be used to save part of a file to disk by denoting the markers set around the piece to be saved (e.g. SAVE MYFILE 1 2) this is in error. The example as given insists on saving the entire document. After the fifth time this happened I read the other manual, — the "how-to-do-it-simply" one. It tells me that only the WRITE command will save parts of files, just as READ will only insert a file into an existing document. The latter guide is the right one, so correct your reference manual accordingly.

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Print @ routine

By Tony Graham

While for most purposes Commodore's system of cursor controls within a program is satisfactory, there are times when a PRINT @ routine would be useful. The program listing given here will provide a pseudo PRINT @ allowing positioning of the cursor just prior to a PRINT statement.

The routine uses the variable A the value of which determines the position on the screen. For standard screen format the value of A would be between 0 and 505. There is no protection against higher values of A than 505, which makes it useful for those who push the VIC out to 26 characters across the screen. (The VIC still thinks it's printing 22 characters even though 26 characters are obtainable). If the value of A is higher than the last screen byte, the print position is unpredictable.

The variable A (it can be changed to any variable name you like), ***must*** be the first variable in your program as the machine code subroutine goes looking for the "start of variables", and takes the value of the first one it finds. This value is then tranferred via a couple of ROM routines to the PLOT routine in the KERNAL ROM.

The machine code is relocatable, so those with sufficient programmng experience can use the data statements in the listing and write their own loader. The less experienced can use the full listing, which hides the machine code behind a REM statement. This system has both advantages and disadvantages. The main advantage is the machine code is saved during a BASIC SAVE and reLOADed along with the BASIC program. The disadvantages are that the line containing the REM must be the first line typed in after the VIC is turned on or after a NEW command. The line will list as garbage, cannot be edited, and variable A must be the first variable defined.

Type in line 1 as shown, with any 54 characters follcwing the REM. This simply reserves the space required for the machine code. When the loader program is run, the data is POKEd back into the space. After RUNning the loader delete all lines above line 10.

```
10 A=0:P=4104
15 FOR X=P TO P+49
20 READ B:POKE X,B
25 NEXT:END
35 DATA 24,164,46,165
40 DATA 45,105,2,144
45 DATA 1,200,32,162
50 DATA 219,32,170,209
55 DATA 165,101,133,1
60 DATA 165,100,133,2
65 DATA 162,8,6,1
70 DATA 42,201,22,144
75 DATA 4,233,22,230
80 DATA 1,202,208,242
85 DATA 133,2,24,168
90 DATA 166,1,32, 240
95 DATA 255,96
```

Plot routine

This is a follow-on from the Print @ routine already described. The routine uses 2 variables X and Y followed by a system call. X determines the cursor line and Y the position on that line. For details of how to run the loader program listed, and changes for memory expansion refer to the Print @ explanation.

To test the program try this line:—
20 A=250:SYSP:PRINT"TEST"

If all is well TEST should have been printed in the centre of the screen. Note that once set A retains its value and should you add the following line:—
30 SYSP:PRINT"SAME"
SAME will overwrite TEST. A can be revalued by any valid BASIC expression. i.e. A=A+22, A=INT(A/3), A=X−2, are all valid providing A is always in the range 0-505.

In the program listing P=4014, this is for a VIC without any expansion memory. With 3K expansion P=1032,

Turn to page 60

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School courses in 1984

Teaching about computers needs little justification for its inclusion within an education programme and it is here that we are probably doing our most worthwhile job. The future of administration in general and educational administration in particular will be enhanced by the ground-work that computer teachers are doing in their awareness courses. Indeed, if the computer teachers do a good job for the next 10 years there should be a phasing out of computer-awareness courses in schools. My observation is that it is teachers who need the awareness courses.

Secondary schools are moving quite quickly into computer awareness and the best courses I have seen have used the language, LOGO. In 1984 a large number of schools are anticipating a start in this field. Some will include it within traditional subjects like social studies and mathematics, others will install it as a short course (12–25 hours). Some will make it compulsory for all fourth-formers (the most popular level), while others will include awareness within their sixth form computer studies course. As a piece of terminology, computer studies, is the commonly accepted name for sixth-form courses which involve large chunks of programming and which have a hint of vocational instruction.

Several principals have asked me about the best place for a computer awareness course and the best people to teach it. My answer is always the same: computer awareness should be taught by those teachers enthusiastic about computer awareness. There is no right place but most schools are looking at the fourth form.

Teachers who are "into" computers are arrayed in two groups. Firstly, there are the *BOFFINS*, who are born with chips on their shoulders and usually have a short span of concentration when dealing with the uninitiated. They are valuable people and in your school they should be fed with programs that need altering and occasional new pieces of machine hardware. On no account let them near a computer awareness course. They will fill it with more bytes than a piranha-infested river.

Then there are the enthusiastic users. These are the people who should be running the computer awareness courses. They should teach it to fourth-formers and use LOGO as the language for the computer.

Having mentioned languages, I feel that it is best to reserve BASIC as a computer-club language and to encourage Pascal in the senior school. LOGO is ideally suited for use at any primary level although it can extend the very best of our senior secondary and tertiary students.

The courses on awareness vary in content but they aim to break down two myths. First, they try to reduce the adulation that some students want to give to computers. Second, they reduce the fear that some other students may have for computers. In the awareness courses you are increasing their awareness and their effectiveness as citizens in a computerised future.

Teaching senior computing is probably the easiest and most commonly found of our four categories. The mathematician brings a special expertise to this field because the course is concerned largely with programming. Ninety of the 106 pages in the sixth-form guidelines booklet are devoted to programming techniques, the remainder are about the impact of computers.

In most schools it is called computer studies and the course is designed for students who want to use computers later in their own studies. They, therefore, must understand some programming. They must be aware of the limitations and strengths of computers; and they ought to be shown some of the application packages (commercial programs) which they might face as users. They should be aware of the strengths of VisiCalc-type programs, word processing packages, databases and statistical tools. Computer studies should develop them as users with an academic and a commercial component included in their studies.

It is very important to place programming in perspective. If you are in some North Island schools I understand that you can see computers being used exclusively for programming. Why anybody would want to follow that blind alley I cannot fathom. The best that can be said for it, is that it is somewhat easier on teachers to teach programming and it does keep students quieter for longer. I suppose it is also an excuse for not searching for appropriate software. It certainly makes the costly multi-machines busy and justifies their purchase.

I consider that in these early and muddled days some schools and teachers see in programming a panacea and a "busy-ness" which is reinforced every time somebody cries out that there is no educational software. Don't be fooled by these Doomsday Soothsayers. Often they are fuelled by people who are selling the hardware and who have inadequate software.

Teachers must be careful that they are not feeding the false employment hopes of school and tertiary students by promoting the vocational interests which are the foundation of many programming courses. Programming is of paramount importance within a balanced course because of its contribution to problem-solving techniques. A student who learns some programming will be better equipped to attack some other problem in a "programming" way. It provides a method of attack. Even the intermediate school pupils who learn LOGO will have some concepts reinforced which are improving their general education and are not specific to computers, or the language, or the turtle!

Conclusion

In the schools and in the teacher in-service courses, I have been heartened by the imaginative use of existing software, by the innovative ideas for new software and by the competence of our own teacher programmers. They are in "frontier territory". We make no apology for the topsy growth that we are experiencing with the new technology. It is normal and really quite healthy for this stage of a revolution.

This is part of an address delivered at a recent teacher's refresher course by Neil Fleming, the inspector in charge of computing for most of the South Island.

Mr Fleming has been the main driving force behind computing in the region and is responsible for producing the much-used "Templeton Disks" of educational software.

Fund raising

A popular course with at least one polytechnic has been how to use spreadsheet programs. This would be a good fundraiser for schools, if they have or can get a suitable teacher for the course. Busy folk from the world of business seem ready to pay big money for instruction rather than persevere with manuals and texts.

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One for the 'advanced beginner'

Better Programming for your Spectrum and ZX-81
by S. Robert Speel with foreword by Tim Hartnell.
Fontana Books, 248pp, $9.95.
Reviewed by Euan J. Davidson.

At only 20 years of age, Robert Speel has a wealth of experience with Sinclair computers. He started with one of the first ZX-80 machines and worked his way through the ZX-81 to the Spectrum as they became available.

He has produced this book for Spectrums and ZX-81 owners who have become as familiar with their machines as the supplied user manual allows but would like to know more detail of operation and programming capabilities.

Although not a Spectrum owner, I still found the first 120 or so pages, devoted entirely to the Spectrum, very interesting. Sound, user-defined characters, extended user-defined graphics and high resolution graphics capabilities are covered very well with a chapter on each subject.

After an easily understood description of each mode's "on-board" facilities, he presents program listings with detailed descriptions of how they work and a print copy of the display.

It would be very simple to modify any of them for your own use — which is what this book is really all about.

A chapter on "Avoiding Program Problems" could be useful to even the more advanced user.

A chapter, entitled "Converting ZX-81 Programs for use on the Spectrum", covers the differences of such keys as "pause, scroll, fast and slow," to name a few. Speel has not done the same for Spectrum to ZX-81 conversion but some information can be gleaned by applying the information in reverse.

The remainder of the book deals mainly with ZX-81 programs (several of which will run in 1K of RAM). While well presented, there is no detailed description of graphics or moving objects on-screen, two aspects of the Spectrum covered well earlier.

Two very useful chapters are "How to make your Cassette collection" and "Hardware Problems". The later discusses problems which most ZX-81 owners will meet sooner or later, such as RAM-pack wobbles, LOAD and SAVE problems and TV synch difficulties.

Speel has been successful in achieving his aim of providing better programming for your Spectrum but falls a bit short when it comes to the ZX-81.

Perhaps, he has progressed from the simpler ZX-81 to the more complex Spectrum and now finds the ZX-81 "a piece of cake". Hence the lack of any detailed descriptions of ZX-81 facilities, many of which the user manual covers pitifully — from a beginner's point of view.

However, a very reasonable price and despite these criticisms, this book would be very useful to the "advanced beginner" with a Spectrum but should not be ignored by ZX-81 owners to whom it would be worth-while for the programs alone.

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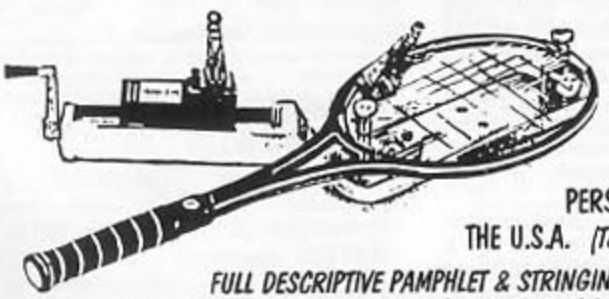
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SHARP PC1500 USER GROUP – Contact: Allan Thomas, P.O. Box 155, Napier. Newsletter.

SERADO & HART APPLE COMPUTER CLUB, Kerikeri High School, Kerikeri. Lessons, 12:15 to 1:15 weekly. Contact: S. Shearman 79-882 (Kerikeri) or Fairway Drive, Kerikeri.

WHANGAREI COMPUTER GROUP: Tom Allan, 3 Maunu Rd, Whangarei. Phone 83-063 (w). Meets every second Wednesday of the month at Northland Community College.

N.Z. MICROCOMPUTER CLUB, PO Box 6210, Auckland. A meeting is held on the first Wednesday of each month at the OSNZ Hall, 107 Hillsborough Rd, Mt Roskill, from 7.30 pm. Visitors are also welcome at Micro Workshop 10am – 5pm, at the same hall on the Saturday following the above meeting.

The following user groups are part of, or affiliated with, the N.Z. Micro Club. Meetings start at 7.30pm at the OSNZ Hall. Those shown '*' are held at the VHF Clubrooms, Hazel Ave, Mt Roskill.

APPLE USER GROUP: Ross Bryon, ph 761-670 (h). Meetings: 3rd Tuesday.

BBC USER GROUP: Dave Fielder, ph 770-630, Ext 518 (w). Meetings: 2nd Wednesday *.

BUSINESS USER GROUP: Cathy Arrow, phone 491-012. Meetings: 4th Tuesday * even months, visits on odd months.

CP/M USER GROUP: Kerry Koppert, 2/870 Dominion Rd, Balmoral. Phone 695-355 (h). Meetings: 1st Wednesday 9pm.

IBM PC USER GROUP: Terry Bowden, ph 452-639 (h) 778-910 (w). Meetings: 3rd Thursday.

NZ COMMODORE USER GROUP (AK) INC: John Walker, ph 8339-589 (h). PO Box 5223, Auckland. Meetings: 3rd Wednesday, Remuera Primary School Hall, Dromorne Rd, Remuera.

NZ OSBORNE USER GROUP (NZOG): Brian Jones, ph 659-738 (h). Meetings: 1st Thursday, 20 Kingley St, Grey Lynn.

POCKET COMPUTER USER GROUP: Peter Taylor, 14 Gollan Rd, Mt Wellington 6, phone 576-618 (h).

SINCLAIR USERS GROUP: Doug Farmer, phone 567-589 (h). Meetings: 4th Wednesday *.

SORCERER USER GROUP (NZ): Selwyn Arrow, ph 491-012 (h). Meets at Micro Workshop.

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2650 USER GROUP: Trevor Sheffield, phone 676-591 (h).

68XX (X) USER GROUP: John Kucernak, ph 606-935 (h).

The above contacts can usually be found at N.Z. Microcomputer Club meetings and micro workshops; or via P.O. Box 6210, Auckland.

Other Auckland-based groups:

ACES (Auckland Computer Education Society): C/- Director, Computer Centre, Secondary Teachers' College, Private Bag, Symonds Street, Auckland. Meetings, third Wednesday of month, at the College.

ATARI MICROCOMPUTER USER GROUP: Ian Mason, 24 Sequoia Pl, Glenfield 10, ph 4789-556 (h). Meets 2nd Tuesday, Western Suburbs Radio Club, Gt North Rd, New Lynn.

BBC Club: See entry at head of this list.

CMUG (Combined Microcomputer Users' Group): This is an association of Microcomputer Clubs, Groups, etc formed to co-ordinate activities and to give a combined voice on topics concerning all micro users. Representation from all Clubs and Groups is welcomed to: CMUG C/- P.O. Box 6210, Auckland.

EPSON HX20 USERS' GROUP. Contact: C.W. Nighy, 231 Khyber Pass Road, Auckland, (Ansaphone, 774-268).

HP41C USERS' GROUP (Auckland): C/- Calculator Centre, P.O. Box 6044, Auckland. Grant Buchanan, 790-328 (w). Meets third Wednesday, 7pm, at Centre computers, Great South Rd., Epsom.

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CENTRAL DISTRICTS COMPUTERS IN EDUCATION SOCIETY: Rory Buter, 4 John Street, Levin (069) 84-466 or Margaret Morgan, 18 Standen Street, Karori, Wellington. (04) 767-167.

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BBC USER GROUP: Users of other machines welcome too. See entry head of list.

MICROBEE USERS' CLUB: P.O. Box 871, Wellington, 2nd Sunday of month.

NEC COMPUTER USERS' GROUP: C/- P.O. Box 3820, Wellington.

N.Z. SINCLAIR USERS' GROUP: P.E. McCarroll, 11 Miro Street, Lower Hutt.

NZ SUPER 80 USERS' GROUP: C/- Peanut Computers, 5 Dundee Pl., Chartwell, Wellington 4. Phone 791-172.

OHIO USERS' GROUP: Wellington. Secretary/Treasurer: R.N. Hislop, 65B Awatea Street, Porirua.

ATARI USERS' GROUP, Wellington: Eddie Nickless. Phone 731-024 (w), P.O. Box 16011. Meetings: first Wednesday of month.

WELLINGTON MICROCOMPUTING SOCIETY INC.: P.O. Box 1581, Wellington, or Bill Parkin (h) 725-086. Meetings are held in Wang's Building, 203-209 Willis Street, on the 2nd Tuesday each month at 7.30pm.

WELLINGTON SYSTEM 80 USERS' GROUP: Contact: M. Trickett. Phone: 724-351 (w), 662-747 (h).

NELSON MICROCOMPUTER CLUB: Dr Chris Feltham, Marsden Valley Rd, Nelson. Phone (054) 73-300 (h).

NELSON VIC USERS' GROUP: Peter Archer, P.O. Box 860, Nelson. Phone (054) 79-362 (h).

BLENHEIM COMPUTER CLUB: Club night second Wednesday of month. Ivan Meynell, Secretary, P.O. Box 668. Phone (h) 85-207 or (w) 87-834.

CANTERBURY COMPUTER EDUCATION SOCIETY: Secretary, Neil Fleming, 798-800, Box 2612, Christchurch.

CHRISTCHURCH ATARI USERS GROUP: Contact Edwin Brandt. Phone 228-222 (h); 793-428 (w).

CHRISTCHURCH '80 USERS' GROUP: David Smith, P.O. Box 4118, Christchurch. Phone 63-111 (h).

CHRISTCHURCH PEGASUS USERS' GROUP: Don Smith, 53 Farquhars Rd, Redwood, Christchurch. Phone (03) 526-994 (h), 64-544 (w), ZL3AFP.

OSI USERS' GROUP (CH): Barry Long, 377 Barrington St., Spreydon, Christchurch. Phone 384-560 (h).

CHRISTCHURCH SINCLAIR USERS' GROUP: Mr J. Mitchell, Phone 385-141, P.O. Box 33-098.

CHRISTCHURCH COMMODORE USERS GROUP: John Kramer, 885-533 and John Sparrow. Phone 896-099.

CHRISTCHURCH BBC USERS' GROUP: Contact: Michael Hopkins (h) 582-267 or Rodney Derham (h) 893-215.

PANASONIC (JB-3000) USERS' GROUP: Contact: Prof B.J. Clarke, Dept of Accountancy, University of Canterbury, Private Bag, Christchurch, 1.

ASHBURTON COMPUTER SOCIETY: Mr. J. Clark, 52 Bruce field Avenue.

SOUTH CANTERBURY COMPUTER GROUP: Caters for all machines from ZX81 to IBM34. Geoff McCaughan. Phone Timaru 84-200 or P.O. Box 73.

NORTH OTAGO COMPUTER CLUB: Contact: Peter George, P.O. Box 281, Oamaru. Phone 29-106 (b) 70-646 (h).

LEADING EDGE HOME COMPUTER CLUB: Elaine Orr, Leading Edge Computers, P.O. Box 2260, Dunedin. Phone 55-268 (w).

DUNEDIN COMMODORE USER GROUP. Contact: Mrs S.I. Downes, C/- The Micro Shop, P.O. Box 5518, Dunedin: (w) 740-469. Meetings: second Monday of month, 7pm-9pm.

DUNEDIN SORD USERS' GROUP: Terry Shand. Phone (024) 771-295 (w), 881-432 (h).

CENTRAL CITY COMPUTER INTEREST GROUP: Contact: Terry Stevens, Box 5260, Dunedin. Phone 882-603. Meetings every second Tuesday.

OTAGO COMPUTER EDUCATION SOCIETY: C/- Peter Brook Otago Girls' High School, Dunedin.

SOUTHLAND COMMODORE USER GROUP: (VIC 20 and 64s). Address: C/- Office Equipment Southland, Box 1079, Invercargill.

N.Z. SOFTWARE EXCHANGE ASSOCIATION: Non-profit group for exchange of software written by programmer members. Contact: Ian Thain, Box 333, Tokoroa.

Note: Clubs would appreciate a stamped self-addressed envelope with any written inquiry to them.

If your club or group is not listed, drop a line with the details to: Club Contacts, *BITS & BYTES*, Box 827, Christchurch. The deadline for additions and alterations is the first weekend of the month before the next issue.

SOFTWARE

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These tools include: Application Master, an application generator; Reportmaster, a report generator; Querymaster, an online query generator; TPMS, an online networks system manager; the IDMS database management system.

All of the Quickbuild tools are integrated with the Data Dictionary System, ensuring complete consistency across all computer applications. This means that new systems can be added — and existing systems modified, as the needs of the business develop. This is achieved easily and naturally without disrupting any other systems.

Another new product, Sourcewriter 20, is an application generator for ICL's DRS20 range. Extremely easy to use and learn, it is designed to produce complete information systems to the end user's requirements, to professional standards and at a fraction of the usual time and cost.

Launched in New Zealand at the fair was a product which won Britain's "Computing Product of the Decade" award — CAFS-ISP (Content Addressable File Store). This is a "supercharger" product that can be fitted to any current ICL 2900 computer. CAFS enables simple or complex information search functions to be carried out 50 times faster than conventional techniques.

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GLOSSARY

Algorithm: A list of instructions for carrying out some process step by step.

Applications program: A program written to carry out a specific job, for example an accounting or word processing program.

Array: A data type found in high level languages, which is stored in a contiguous block of memory. Accessed by the array name and an index making it easier to process groups of data in many situations.

ASCII: American Standard Code for Information Intercharge. An 8-bit code.

BASIC: Beginners' All-purpose Symbolic Instruction Code. The most widely used, and easiest to learn, high level programming language for microcomputers.

Baud: Speed of transferring data, measured in bits per second.

Beeb: The BBC microcomputer.

Binary: The system of counting in 1's and 0's used by all digital computers. The 1's and 0's are represented in the computer by electrical pulses, either on or off.

Bit: Binary digit. Each bit represents a character in a binary number, that is either a 1 or 0. The number 2 equals 10 in binary and is two bits.

Boot: To load the operating system into the computer from a disk or tape. Usually one of the first steps in preparing the computer for use.

Bubble memory: A non-volatile memory (i.e., it is not erased when the power is turned off). The information is stored as microscopic pieces of magnetic polarisation.

Buffer: An area of memory used for temporary storage while transferring data to or from a peripheral such as a printer or a disk drive.

Bug: An error in a program.

Byte: Eight bits. A letter or number is usually represented in a computer by a series of eight bits called a byte and the computer handles these as one unit or "word".

CAD/CAM: Computer-aided design and Computer-aided manufacture. A burgeoning field of computing, based on mini's, that allows design on-line, and the use of co-ordinates, etc, from designers to be used in manufacturing.

CAL: Computer Aided Learning CAL programs are written to take different actions on different student answers.

CMOS: Chip technology in which a pair of transistors of opposite type are used together.

Computer language: Any group of letters, numbers, symbols and punctuation marks that enable a user to instruct or communicate with a computer. See also Programming languages and Machine language.

Courseware: Name for computer programs used in teaching applications.

Cpi: Means character per inch. A common way of describing character density, i.e., how close together characters are in printers.

CP/M: An operating system for Z80 based machines. It is by far the most widely used DOS for Z80 based machines and there is an extremely large software base for it. See also disk operating systems.

cps: Characters per second. A common way of describing speed in printers.

Cursor: A mark on a video that indicates where the next character will be shown, or where a change can next be made.

Data: Any information used by the computer either I/O or internal information. All internal information is represented in binary.

Descenders: The "tails" of printed letters, e.g., of "p", "g" and "y".

Disk: A flat, circular magnetic surface on which the computer can store and retrieve data and programs. A flexible or floppy disk is a single 8 inch or 5¼ inch disk of flexible plastic enclosed in an envelope. A hard disk is an assembly of several disks of hard plastic material, mounted one above another on the same spindle. The hard disk holds up to hundreds of millions of bytes – while floppy disks typically hold between 140,000 and three million bytes.

Disk drive: The mechanical device which rotates the disk and positions the read/write head so information can be retrieved or sent to the disk by the computer.

Diskette: Another name for a 5¼ inch floppy disk.

Disk operating system: A set of programs that operate and control one or more disk drives. See CP/M for one example. Other examples are TRSDOS (on TRS 80) and DOS 3.3 (for Apples).

DOS: See disk operating system.

Dot matrix: A type of print head, made up of a matrix of pins, e.g. 8x8. When a character is to be printed the appropriate pins push out and strike the ribbon to paper forming the character.

Dot graphics: These graphics are individual screen pixels. Used by either turning on or off one pixel.

Double-density: Floppy drives that store twice the standard amount of data in the same space.

Dump: Popular term for sending data from a computer to a mass storage device such as disks or tape.

EPROM: Erasable, user-programmable, read-only memory.

Execute: A command that tells a computer to carry out a user's instructions or program.

Fanfold: A type of paper that although a continuous sheet folds into set length sheets. This is achieved by way of a perforated line at set intervals. It also makes it easy to tear off a length of paper.

File: A continuous collection of characters (or bytes) that the user considers a unit (for example on accounts receivable file), stored on a tape or disk for later use.

Firmware: Programs fixed in a computer's ROM (Read Only Memory); as compared to software, programs held outside the computer.

Floppies: Thin plastic disks with a magnetic coating used for storing information. Called floppies because they are flexible.

Friction feed: A type of paper-feeding system for printers: normal paper in a continuous sheet is gripped between two friction rollers as on a typewriter.

Hardware: The computer itself and peripheral machines for storing, reading in and printing out information.

Hex: Abbreviation for hexadecimal notation, a base-16 numbering system convenient to use with computers.

High-level language: Any English-like language, such as BASIC, that provides easier use for untrained programmers. There are now many such languages and dialects of the same language (for example MicroBASIC, PolyBASIC etc).

HIMEM: Denotes the highest address that is available in a memory map.

Input: Any kind of information that one enters into a computer.

Interactive: Refers to the "conversation" or communication between a computer and the operator.

Interface: Any hardware/software system that links a microcomputer and any other device.

I/O "Input/output".

Inverse video: When the background is coloured; e.g. on a black and white screen white becomes background and characters are written in black.

K: The number 1024. Commonly refers to 1024 bytes. Main exception is capacity of individual chips, where K means 1024 bits.

Kilobyte (or K): Represents 1024 bytes. For example 5K is 5120 bytes (5 x 1024).

LCD: Liquid-crystal display.

Line feed: A control code character found in the ASCII character set. Its normal purpose is to move the cursor down one line (on screen) or move paper up one line (on printer). Does not return the cursor to the left-hand margin.

Luminance: Intensity of colour.

Machine language: The binary code language that a computer can directly "understand".

Mainframe: The very large computers that banks and other large businesses use are called mainframes. Also in microcomputers the term is sometimes used to describe the core of the machine, i.e. the CPU plus memory.

Mass storage: A place in which large amounts of information are stored, such as a cassette tape or floppy disk.

Megabyte (or Mb): Represents a million bytes.

Memory: The part of the microcomputer that stores information and instructions. Each piece of information or instruction has a unique location assigned to it within a memory. There is internal memory inside the microcomputer itself, and external memory stored on a peripheral device such as disks or tape.

Memory capacity: Amount of available storage space, in Kbytes.

Menu: List of options within a program that allows the operator to choose which part to interact with (see Interactive). The options are displayed on a screen and the operator chooses one. Menus allow user to easily and quickly set into programs without knowing any technical methods.

Microcomputer: A small computer based on a microprocessor.

Microprocessor: The central processing unit or "intelligent" part of a microcomputer. It is contained on a single chip of silicon and controls all the functions and calculations.

Modem: Modulator-demodulator. An instrument that connects a microcomputer to a telephone and allows it to communicate with another computer over the telephone lines.

Network: An interconnected group of computers or terminals linked together for specific communications.

Output: The information a computer displays, prints or transmits after it has processed the input. See input and I/O.

Parallel interface: A type of communications interface used mostly for printers. It sends a whole character of data down eight (commonly) lines, one bit down each line. The most common type of parallel interface for printers is the centronics interface.

Pascal: A high-level language that may eventually rival BASIC in popularity.

PEEK: A command that examines a specific memory location and gives the operator the value there.

Peripherals: All external input or output devices: printer, terminal, drives etc.

Pixel: Picture element. The point on a screen in graphics.

POKE: A command that inserts a value into a specific memory location.

Program: A set or collection of instructions written in a particular programming language that causes a computer to carry out or execute a given operation.

RAM: Random access memory is the very fast memory inside your computer. The access time for any piece is the same. Your program and run-time data are usually stored in RAM.

REM statement: A remark statement in BASIC. It serves as a memo to programmers, and plays no part in the running program.

Resolution: A measure of the number of points (pixels) on a computer screen.

ROM: Read only memory. Any memory in which information or instructions have been permanently fixed.

Serial interface: A type of communications interface used for a wide variety of purposes (printers, terminals, telephone correction etc.). It uses a minimum of two wires, and sends the data one bit at a time down one wire. The most common type of serial interface is RS232C.

Sheet feed: A type of paper feeding system normally used for high-quality document printers. A special device picks up a sheet of paper and feeds it into friction rollers.

Simulation: Creation of a mathematical model on computers that reflects a realistic system.

Software: Any programs used to operate a computer.

System: A collection of hardware and software where the whole is greater that the sum of the parts.

Tractor feed: A type of paper feeding system for printers. Special computer paper with holes along both sides is fed by the tractors gripping these holes.

VDU: Visual display unit. A device that shows computer output on a television screen.

Word: A group of bits that are processed together by the computer. Most microcomputers use eight or 16 bit words.

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Programmer: German, with 1½ year experience with DEC PDP MM123 and CP/M (DEC, NCR, Wang etc) in scientific and business applications is searching for a permanent position. Reply to Programmer, Bits & Bytes, Box 827. ChCh.

Wanted: Back copies of 'Your Computer' (English) magazine to buy or borrow. Espec. August '83. Contact Andrew Cullen, RD2, Ohaupo. Ph 292-809 HN.

Wanted to Buy: Printer for Apple II. Any type. Please send information and possible price to Conan Gorbey, C/- National Art Gallery, Buchille St, Private Bag, Wellington.

Wanted: Byte magazines in reasonable conditon pre May 1982. Contact Alan Maxwell, 31 Barrowclough St, Chch 2. Phone 388-930.

Wanted to Buy: VT52, VT100 or Fully VT52 compatible Terminal. Please contact Professional Information Products, P.O. Box 687, Timaru or Phone 83-941 Timaru.

Commodore 64 software. Job register, a general purpose data storage and retrieval program, $21.50. Music teacher, learn to read music on your 64, $14.95. Prices include postage. Please send payment to freepost 690 Compusoft, Box 290, Manurewa.

Urgent Sale: Casio FX-801P — Brand new. $595.00 ono. Contact Darren Calkin, 5 Grey St, Kawakawa (Urgently).

Wanted: Back Issues 1 and 2 of Bits & Bytes. Phone David at Wellsford 5122.

Pocket Computer: Sharp PC1211 with printer. New price $704. Virtually unused with programming books, $395 ono. Phone 502-659 Auckland.

For Sale: CBM 4040 Dual disk drive with cable, manual and box of disks, exc. cond. $2000. Pet IEEE 488 to parallel printer interface, converts graphics to printable characters, addressable, new $150. Lots of software and books for Pet/6502. G.J. Walker, C/- P.O. Box 5104, Port Nelson.

For Sale: The Tempe of Apshai and Hellfire Warrior adventure games on cassette for TRS-80/System 80 or Pet. Cost $120 pair, sell $40 pr. 28 pin Zero insertion force IC sockets, $3 each new. 2 Atari joysticks. $20 each or $30 pr. G.J. Walker, C/- P.O. Box 5104, Port Nelson.

Wanted: Suggestions on modifying Apple PASCAL System, allowing programs to run on 48K. Contact Sean, 15 Buckley Rd, Epsom, Auckland.

For Sale: Ohio Scientific 32K CIP with disk drive and software. Great machine. Contact Rod McPherson, 639 Worcester St, Christchurch.

For Sale: 10 double sided-double density Verbatim discs (excess to requirements). Ph Rod ChCh 895-431.

VIC 20: Owner would like to swap programs and swap Super Expander for 8K RAM. Phone 266-9548 Auckland, 50 Fergusson Street, Manurewa.

Oscilloscope: UC3 model, excellent condition, recently checked out, $200 ono. Enquiries to Science Dept, Hornby High (phone 495-396 school hours) or Colin Price (ph 499-774 after hours).

For Sale: Teletype Model 15 teleprinter, excellent condition complete with power supply, workshop manuals, interface for Dick Smith System-80 computer and driver program. $30. Eddie Reddish, phone 569-147 (Auckland).

Wanted to Buy: Tape drive for System 80 memory expansion. Also swap software. Write G. Rose, RD2 Wellsford.

For Sale: Super 80, 48K RAM, ROM BASIC, B/W monitor, graphics, manuals, programs. Ph 5337 Rangiora.

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VIC

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and for 8K or more expansion P=4616. Save lines 1 and 10 as a BASIC program; this is now your PRINT @ routine.

```
10 X=0:Y=0:P=4104
15 FOR A=P TO P+48
20 READ B:POKE A,B
25 NEXT:END
35 DATA 24,164,46,165
40 DATA 45,105,2,144
45 DATA 1,200,32,162
50 DATA 219,32,170,209
55 DATA 165,101,133,1
60 DATA 24,164,46,165
65 DATA 45,105,9,144
70 DATA 1,200,32,162
75 DATA 219,32,170,209
80 DATA 165,101,133,2
85 DATA 24,166,1,164
90 DATA 2,32,240,255
95 DATA 96
```

From page 35

I/O (input/output) delays in all three systems can be reduced by a factor of about 10 with the addition of hard disk, plus increasing the capacity by a factor of 100 or so. RAM disks are also supported to give a reduction in I/O delay. All three software packages are written mainly in Pascal. This is compiled p code for the Apple and IBM and native code for the HP. About 10 per cent is written in assembly language, mainly for I/O functions where speed is of importance.

A new version for the Apple, version 3.0, was field tested at the seminar and is due for release about now. It allows hatching any area, repeating copies in several directions, up to 250 independent levels and 4000 objects in each drawing, etc. Networking (sharing of hard disk and plotter) is also available for each of the systems making this package very worth while for larger draughting offices.

These CAD packages are suitable for many draughting environments including mechanical, architectural, electrical, civil and graphic arts where a lot of repetitive work in the small to medium scale is required. They are especially suitable for use in schools and universities as an educational tool because of their interactive nature and ease of use.

The manuals supplied with each system are hands-on training oriented as well. Also provided are a set of application notes and helpful hints. These are updated from time to time.

Powertech Engineering, Ltd, P.O. Box 1417, Auckland, phone (09) 795-371 can also provide a 12 hour training seminar, or in-house training is available to quickly provide the necessary familiarisation and skill.

No computer experience or knowledge of special languages is required to put any of these packages to productive use.

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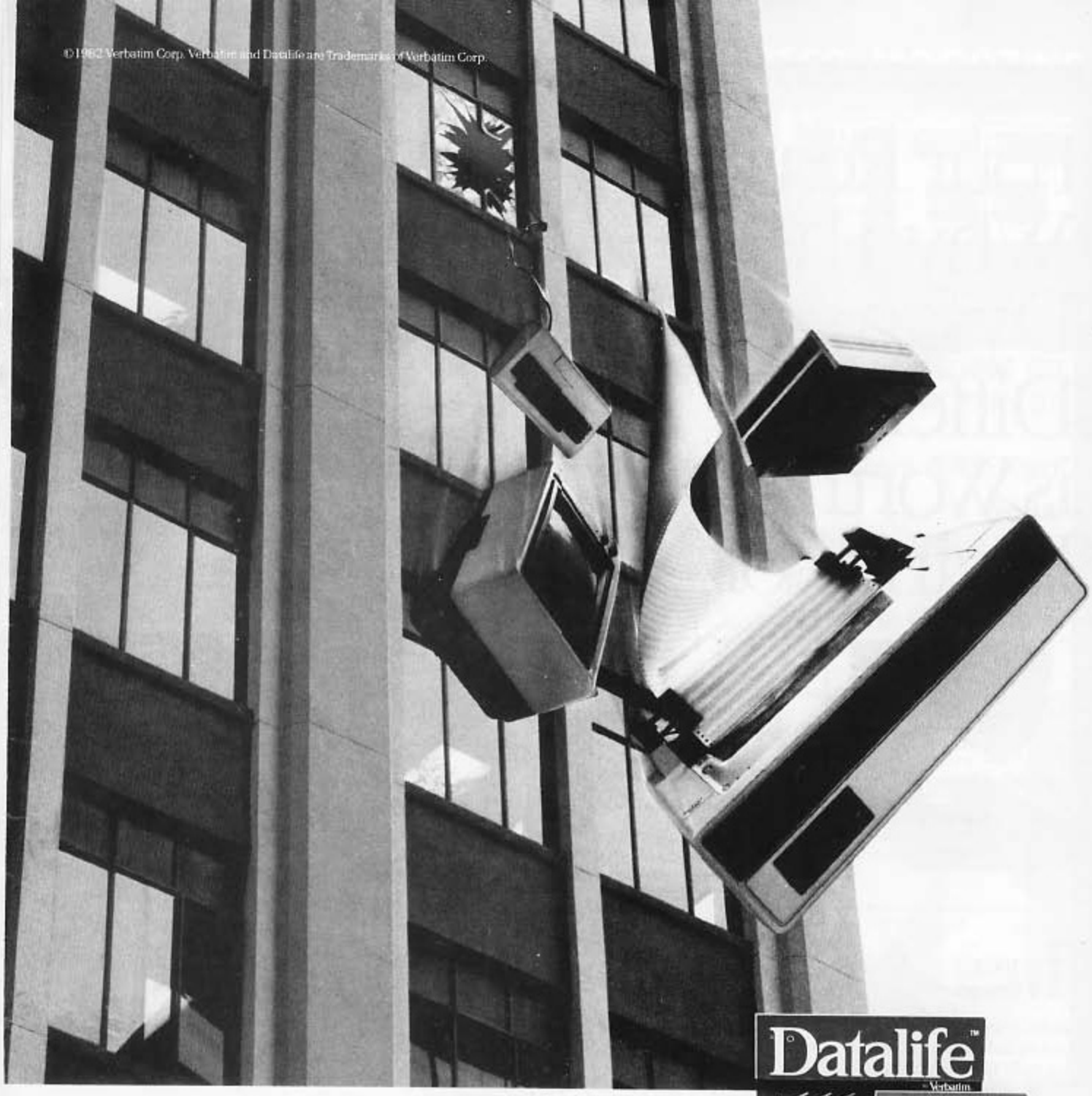

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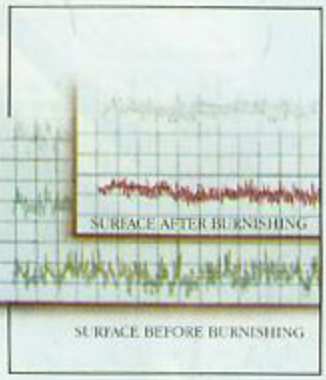

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