

PERSONAL COMPUTER MAGAZINE

BITS & BYTES

holiday

issue

December/January 1983-4 : \$1.25

Reviews of
Spectravideo
Oric 1
Comx 35
computers

Complete Catalogue for
Christchurch Computer Show
Printers for
home use

*Christmas
Buyers
Guide...
comprehensive survey of
computers under
\$5000 in NZ.*

*Program
Special!
-pages of programs to
type and try!!*



SORD

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Printer Interface: Centronics-type parallel
Joypad Interfaces: 2 Joypads available separately
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FEATURES

Which computer to buy?

A major round-up of microcomputers on sale in New Zealand under \$5000. A comprehensive survey and comparison by micro user, teacher, and writer Gordon Findlay

Which printer to buy?

A comparison of printers on sale in New Zealand up to \$2000 by Shayne Doyle

Program Special

Pages of programs in the first of a regular feature:

| | | | |
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| Spectrum | 68, 72 | TRS80/System 80 | 70 |
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Hardware reviews:

A compact colour micro, the Comx 35

A punchy machine with a powerful BASIC, the Spectravideo with what the reviewer calls one nifty feature after another

The Oric 1, the reviewer is pleasantly surprised

Crosswords: Try your hand at a special crossword for microcomputer buffs

Japan: American and British machines didn't get much of a look in at a big microcomputer show in Tokyo. Our man reports.

Education: Pat Churchill looks at computer age learning and likely teaching changes in a report from the Learning in the Computer Age Exhibition

COLUMNS

BBC: Pip Forer looks at the disk system

TRS80/System 80: Brian Sullivan concludes his series on tape-based word processors

Commodore 64: Steven Darnold looks at seven new games and a Pascal editor/compiler

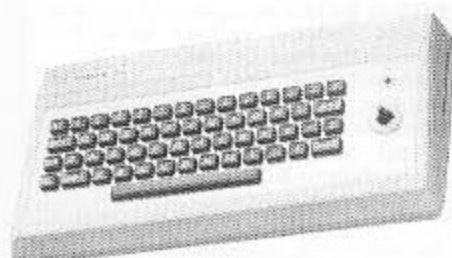
MicroBee: Shayne Doyle looks at linking micro's by radio

REGULARS

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BITS & BYTES COMPUTER SHOW

The full catalogue is printed in this issue for the show at the Christchurch Town Hall complex on Friday and Saturday, December 2 and 3.



Comx 35 26

The first round-up

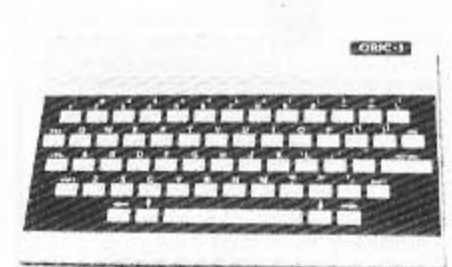
Computers under \$5000 . . 8



Spectravideo 31



Program Special . . . 64-77



39 Oric 1 29

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MICRO NEWS

Dick Smith 'IBM PC'?

Dick Smith Electronics, of Australia successfully rode on the tails of the Tandy Corporation with the System-80, which is of course, compatible with the TRS80.

Now reports from Australia suggest that Dick Smith will launch an IBM PC lookalike, made in Britain, and selling for about \$Aust 995 for a basic unit. With two disk drives, a monitor, and a letter quality printer, the package will cost about \$Aust 4000, say the sources. In the package will be MSDOS, a spreadsheet program, a word-processor, and a database program.

New Atari

A new Atari computer should be available in New Zealand early next year.

The Atari 600 XL with 16K of RAM and a true keyboard is expected to cost \$749 here according to the agent, David Reid Electronics (P.O. Box 2630, Auckland).

The 600XL is just one of a number of new computer models and peripherals announced recently by Atari in the United States.

Pencil II

Another new computer expected to be available in quantities early in the new year is the Pencil II — a \$669 computer that runs the CP/M operating system.

This means a large range of business software is already available for it (if you are prepared to pay another \$1200 for disk drives and controller) and so in spite of a rubber keyboard the Pencil II is also being promoted as a business computer.

To this end the 18K of standard RAM can be expanded to 80K with the addition of a plug-in 64K cartridge costing \$252 (a 16K memory cartridge is also available at \$126).

For the home user, the Pencil II also accepts cartridges and cassette tapes. It has a 24 by 32 character screen display in up to 16 colours and a sound generator.

Input/output interfaces built-in are cassette, printer (parallel), two joystick sockets, video (to television or monitor) and audio (to television or monitor).

The New Zealand agent is Fortuna Industries, P.O. Box 25014, Wellington. A full review will appear soon.

TI pulls out

The week of the IBM announcement in America, Texas Instruments announced that it was quitting its losses in home computers, and would withdraw from the field. The electronics firm's shares immediately rose speculatively on Wall Street.

The company has lost more than \$US220 million in the last nine months.

Production of the TI 99/4A models, the company's main range of home computers, will stop this month, but the company will continue to provide support.

Production and sales of the TI Professional Computer will continue. This machine is a product of the company's data products division, rather than the consumer products division, and is sold to business users.

Watch out for discount TI 99/4A's in New Zealand.

Peachtree software

The Peachtree Software range for microcomputers has been launched in New Zealand at promotions in Christchurch, Wellington, and Auckland.

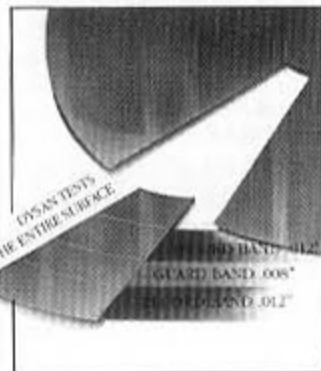
MDL is the New Zealand agent for Peachtree Software (Australia), an offshoot of the Peachtree parent, MSA, an American software corporation with annual growth of 41 per cent. This year MSA's turnover is expected to be \$US140 million, of which \$40 million will be from Peachtree.

Machines that Peachtree will run on include Panasonic, Casio, IBM, Epson, Televideo, Sirius, NEC, BMC, Sharp, Hewlett-Packard, and many others. A word processor, spelling dictionary, mailing list manager, spreadsheet, and telecommunications facility, plus the usual accounting software such as general ledger and accounts receivable are among the Peachtree products.

ZX interface

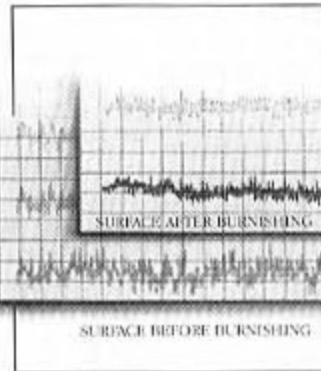
David Reid Electronics hopes to have on sale in New Zealand before Christmas the new Sinclair ZX Interface 2, which plugs into the rear expansion port of the Spectrum or into the ZX Interface 1. The top of the interface includes a porthole for ROM cartridges and two joystick ports accepting standard nine-way D plugs. All the ROM cartridges being made available will work with a 16K Spectrum. At least 14 programs, mainly games, are available on ROM cartridge.

Four Reasons Why The Dysan Difference is Worth Paying For



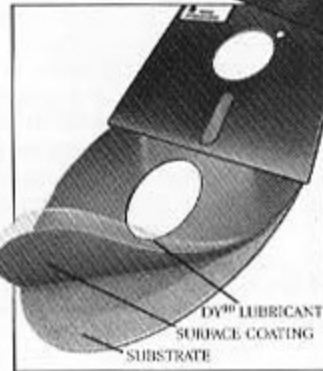
1. 100% Surface Tested

Only Dysan provides fully usable diskette surfaces that are truly 100% error-free across the entire face of the diskette. An exclusive on-and-between the track testing procedure guarantees error-free performance regardless of temperature and humidity distortions or slight head misalignments.



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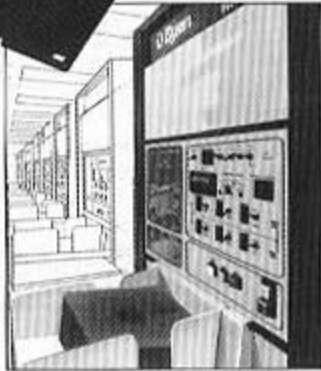
Dysan's advanced polishing methods create a smoother, more uniform diskette surface. This results in better signal quality on each track, less wear on drive heads and reliable access to data after millions of head passes.



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Dysan's proprietary DY¹⁰ lubricant complements the advanced burnishing process. Both maximize error-free performance while minimizing headwear. Optimal signal presence is maintained between the head and diskette surface during millions of write/read interfaces.

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IBM's new micro: the details

The IBM Peanut, as it was code named by rivals, has been announced. The PC Junior is a \$US669 system unit with a 64K of user memory, 16-bit microprocessor, and a 62-key keyboard, which is detachable and links with the computer by infrared, as remote TV controllers do.

The American price of \$US669 is for the basic model. A system with a 128K floppy disk drive will sell for \$US1269. This may mean a price for the basic 64K unit in New Zealand of about \$2750.

The microprocessor is an 8088, there is 64K of ROM memory, two slots for ROM cartridges, and the display is 40 columns.

Each key on the board can be programmed to begin several steps.

The keyboard is perhaps the biggest innovation. Battery operated, it can transmit signals to the processor up to six metres away.

TAB contract

STC Data Products has been awarded the TAB contract for supply of 400 printers. The unit supplied will be the Centronics model 122/2 graphics dot matrix printer, a full featured 120 cps unit with bit map graphics capability. These printers will be in use by April 1 next year, all around the country.

New handheld

Featuring CETL, a powerful but simple to use financial spreadsheet program the Casio FP-200, a new handheld, incorporates a 20 column by 8 line LCD display. With 8K of RAM expandable to 32K, and 32K ROM expandable to 40K, this small but powerful microcomputer has a full size QWERTY keyboard plus 13 extra function and utility keys. Other

The enhanced model can display up to 80 columns of information.

American users of either model may install an internal asynchronous modem, a connector for a television set, joystick controls, a parallel printer attachment, keyboard overlays, a power cord for the keyboard, and adaptor cables for a colour monitor, personal computer cassette recorder and a serial device for connecting a printer or modem. There are also connectors for audio output and a light pen, as well as a carrying case.

Also announced by IBM were two new personal computer printers. The IBM PC compact printer is a low-cost, table-top thermal printer for use with the PC JR. Suitable for most home uses, it prints up to 50 characters per second, and uses single sheet, fanfold or continuous roll thermal paper.

The personal computer colour printer, for use with the PC and the personal computer XT, can produce documents and graphics in as many as eight colours. It operates at 200 characters per second in draft mode, 110 cps for correspondence, and 35 cps for letter quality documents, and can accommodate single sheet, fanfold and continuous roll paper up to four pages.

features include: C85 BASIC, clock/calendar, battery or mains operation, memory safeguard battery, auto power off, plus centronics printer, standard cassette and RS232 interfaces. The price, \$795.

ICL Chief

ICL (New Zealand) Ltd, has recently announced the appointment of Mr T.J. Cullinane as managing director. Mr Cullinane, currently managing director of Sydney-based MDS Computer Systems (Aust), Pty, succeeds Mr N.A. Neville, who will return to a senior management position with ICL's UK parent. Prior to his Sydney position, Mr Cullinane was general manager of the equipment division of Computer Consultants, Ltd, and was also a director of that company.

Although IBM will ship demonstration models of the PC JR to its authorised dealers and IBM retail centres, customers will be unable to buy the machines until the first quarter of 1984.

This could be a short-term boon for other home-computer makers, such as Commodore International, Coleco Industries, Tandy and Atari, because the "Peanut" will not be available in America during the important Christmas selling season.

The PC JR includes several features specifically designed to help new and inexperienced users begin to operate the computer within a short time. "Keyboard Adventure," programmed into the system's ROM, introduces the keyboard. "Exploring the PC JR" and the "IBM PC JR Sampler" are two diskettes provided with the enhanced model. The first acquaints users with the system, and the second enables them to quickly learn how to structure budgets, write letters, organise files, compile directories and manage other everyday activities.

Bits & Bytes will review the machine as soon as it is available: full details then. The machine will not be available in New Zealand before mid-1984.

All micro enthusiasts will now watch closely to see whether IBM becomes the standard setter in the field, as veterans of the mainframe and mini computer worlds are predicting.

New PC versions

Just announced in the United States and due for release there in the second quarter of 1984 is the IBM Personal Computer XT/370 that will allow programmers to run most programs available for the IBM 370 mainframe computers at their own desktop. It will also be available as an upgrade to existing IBM PC XT users.

Also announced for release in the first quarter of 1984 is the IBM 3270 Personal Computer, which combines the host interactive functions of the 3270 Information Display System and the computing power and versatility of the IBM PC. It comes complete with a windowing package that divides the screen into as many as seven windows (four host interactive sessions, two local notepad sessions and one IBM PC session) which can be moved, grown or shrunk independently.

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Ever wanted to visit Las Vegas? This is the next best thing - OR a good way to practice if you're planning a trip there. Blackjack or '21' is the game and the screen shows all the cards.
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If you can't guess the mystery word (8 letters) the figure on the screen is hanged - you lose! Based on the popular children's game, this program helps kids with spelling and vocabulary.
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NOTE: Some programs may require 16K memory module.

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Want to get the most from your VZ-200? This technical manual explains all the ins and outs, ups and downs. For the real computer enthusiast or the beginner who wants to know more! Cat B-7204

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Are you a 'babe in the woods' when it comes to computing? Try this one out: written just for YOU! In a language you can understand, it will have you a VZ-200 expert in just a few days! Cat B-7200

\$12⁹⁵

First Book Of Programs

Tried, trusted and true programs for your VZ-200. There's something for everyone - and remember, they're all written in BASIC so you can save these on cassette so you only have to key them in once! Cat B-7202

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INVADERS Cat X-7239
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GHOST HUNT Cat X-7242
HOPPY Cat X-7243

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Cat X-7254

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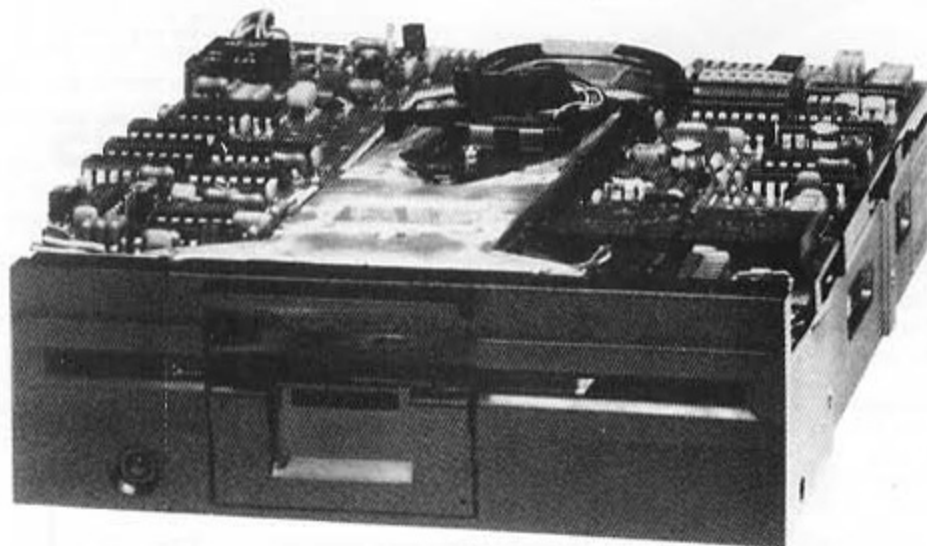
Corvus storage

Corvus, a pioneer in large data storage devices for micros, has announced a new, low-cost, 200 Megabyte product for use with its own machines and Omninet Local Area Network. 'The Bank' is an endless loop, removable tape system. Although tape-based the device is random access with a 60K byte transfer rate and a maximum access time of 10 seconds. Based on 100 track videotape technology the real surprise is the price: the equivalent of \$4200. Placed into Omninet, which is now offering enhanced server gateway and UNIX-compatible facilities, the package is attractive for many potential LAN

users of Omninet compatible machines (for instance, the Sirius, Apple II and III, and the IBM PC).

Mitsubishi drives

Mitsubishi Electric has released on the New Zealand market new 5¼ inch floppy-disk drives. A half-height cabinet gives room for two drives where one fitted before, the New Zealand distributor, Melco Sales (N.Z.) Ltd, says. Track capacity has doubled giving 1000K-1600K storage capacity on the M4853 and M4854 models respectively. Beltless direct drive, a brushless motor, an average access time of 91 milliseconds, and a patented circular gimbal support are some of the other advantages.



The new Mitsubishi floppy-disk drive
New software

New Zealand micro software recently on the market includes a new wordprocessor for the Apple II, called Fulltest-55, and produced by Specific Software, of Dunedin. It provides upper and lower-case letters, and 55 characters per line without any extra hardware. It includes a built-in mailer and assembler. The main interest is expected to be those buying Apples second hand. A new business package now being marketed in New Zealand for microcomputers is Cotour, a system for travel agents. Cotour is marketed by The Byte Company, and is available from ICL Traderpoint Dealers.

CED sold

The New Zealand Apple agent, CED Distributors, Ltd, has been bought by the listed public company, Consolidated Enterprises, Ltd (CEL). The new owner bought CED

Distributors for an undisclosed sum in cash and shares from Mr and Mrs Robert Koskella and Mr Brian Eardley-Wilmot. The firm had reached a stage in growth when a stronger capital base and wider business skills were necessary, Mr Eardley-Wilmot said. Also bought by CEL in the deal were other parts of the CED group: Computer Distributors, Ltd, the Computer Shop, Ltd, and CED's 75 per cent holding in an Australian joint venture, the New Zealand Beginning.

Satellite data

Micro users should take an interest in the satellite dishes coming on to the market for television use. At the moment they are very expensive (about \$11,000 with electronic accessories), but they will get cheaper. Already they can tap teletext data being piped across the sky, such as the Dow-Jones index of American stock prices. Apart from copyright, the problem is the need for a decoder. In the longer run satellites may provide a greater advantage for micro users. Dr N. Abramson, professor of electrical engineering and of information and computer sciences at the University of Hawaii, told a seminar in Christchurch recently that cheap means of transmitting micro-computer data via satellite, as well as receiving it, were rapidly becoming feasible. A spokesman for the New Zealand Post Office demurred, but Professor Abramson stuck to his guns in an interview after his lecture. Computer data needed a minute bandwidth compared with other telecommunications data, he emphasised, and affirmed that cheap transmitters would be developed in the not-so-distant future.

BBC 2nd processors

There seems to be a continuing gap between different sources on the likely availability of the BBC second processors. In spite of optimistic announcements in the computer press, British buyers who have actually ordered a processor were circulated in late September with the news that last-minute changes have put the production schedules back to November (6502), December (Z80) and first quarter of 1984 (16032), with a two-month backlog of orders. If the news on the 16032 is even approximately true that at least is good news. Meanwhile, the Torchpack continues to offer the impatient a Z80 and 68000 option.

PRESS RELEASE

MOLYMERX, the largest supplier of TRS-80 software in Australia and New Zealand, announces the availability of their new COLOUR CATALOGUE.

The catalogue caters for the BBC Micro, the COLOUR GENIE and the TRS-80 Colour Computer and again represents the largest independent software source in Australasia for these machines. There is a comprehensive range of Utility, Application and Games software.

As is our usual practice, the catalogue is updated regularly and these updates are supplied to registered owners at no cost after the initial catalogue supply price of \$3.00.

MOLYMERX software is despatched by mail order with orders processed within 24 hours of receipt.

DEALER Enquiries are welcomed.
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Advertisement.

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BBC MICRO COMPUTER Programme Preview

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Circus
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Sphinx Adventure
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Cube Master
Chess
Missile Base
Castle of Riddles
Countdown to Doom
Starship Command
Hopper
Snooker
Draughts & Reversi

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Tree of Knowledge
Algebraic Manipulation

Peeko Computer
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Chemical Simulations
Chemical Structures
Jars

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Graphs & Charts
Creative Graphics

LANGUAGES

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Forth
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BUSINESS

Desk Diary
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Jumbo
Shuttle
Disc Zap
Disc files

I.J.K.

GAMES

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Family Games
Mutant Invaders/
Breakout
Beep-Beep
(Super Simon)
Beepmunch
Super Hangman
Maze
Invaders
Wordpro
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Flags
Hyperdrive
Stratobomber
Leap Frog
Pontoon/Patience
5-a-side Soccer

MICRO POWER

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Beebman
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Disassembler
MicroBudget

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The labyrinths of
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Adventure
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Availability of machines

Most of the machines are widely available, but a few are specially imported by one particular retailer or group. Check the advertisements in *Bits & Bytes* and your local newspaper.

How to read this guide

There are really two types of information in the guide. The routine information is displayed in tabular form. This includes type of processor, keyboard, RAM and ROM size, and so on. In the tables, a blank space indicates "not known". Some, especially smaller, machines use

specialised processing chips rather than a general micro-processor.

Other information, specific to each machine, is presented in text form. Naturally, in a guide this big we cannot include everything about a computer.

Gordon Findlay

The compiler of this guide, Gordon Findlay, will be well known to regular readers of BITS & BYTES, for his beginner and TRS80/System 80 columns. He is a teacher at Riccarton High School, Christchurch.

Under \$1000

| NAME | Atari 400 | Color Genie | COMX | MicroBee | Panasonic JR 100 | Panasonic JR 200 |
|-----------------------------------|--------------------|---------------------|-----------------|---------------|-------------------|-------------------|
| RAM | 16K | 32K | 32K | 16-64K | 16K | 32K |
| ROM | 10K | 16K | 16K | | 8K | 8K |
| Keyboard | membrane | typewriter | calculator | typewriter | rubber | rubber |
| No. of keys | 57 | 58 | 55 | 60 | 45 | 63 |
| TV interface? | yes | yes | yes | yes | yes | yes |
| Monitor interface? | no | yes | yes | add on | yes | yes |
| Colours | 9 | 8 | 8 | 26 | no | 8 |
| Text display (lines & characters) | 24 x 40 | 24 x 40 | 24 x 40 | 16 x 64 | 24 x 32 | 24 x 32 |
| Maximum graphics resolution | 320 x 192 | 160 x 96 | 240 x 216 | 512 x 256 | 64 x 48 | 64 x 48 |
| Graphics Characters | 29 & 256 definable | 128 & 128 definable | 64, redefinable | 126 definable | 64 & 32 definable | 64 & 32 definable |
| Processor | 6502 | Z86 | 1802A | Z80 | MN 1800A | MN 1800A |
| Sound? | yes | yes | yes | yes | yes | yes |
| Lower case? | yes | yes | no | yes | | yes |

| NAME | Polybrain | Sinclair ZX Spectrum | Sinclair ZX-81 | SORD M5 | Spectra-video | Texas Instr. 99/4A |
|-----------------------------------|---------------|---------------------------|----------------|---------------|---------------|--------------------|
| RAM | 2-32K | 16-48K | 1-16K | 20K (4K user) | 32-256K | 16-48K |
| ROM | 8K | 16K | 8K | 8K | 32K | 26K |
| Keyboard | membrane | rubber | membrane | calculator | calculator | typewriter |
| No. of keys | 42 | 40 | 40 | 53 | 71 | 48 |
| TV interface? | yes | yes | yes | yes | yes | yes |
| Monitor interface? | yes | no | no | yes | | |
| Colours | no | 8 | no | 16 | 16 | 16 |
| Text display (lines & characters) | 24 x 32 | 24 x 32 | 24 x 32 | | | |
| Maximum graphics resolution | 64 x 44 | 256 x 192 | 64 x 44 | 256 x 191 | 256 x 192 | 192 x 256 |
| Graphics Characters | 22 & inverses | 16 & user def. & inverses | 20 & inverses | | 52 | |
| Processor | Z80A | Z80A | Z80 | Z80 | Z80 | TM9900 |
| Sound? | yes | yes | no | yes | yes | yes |
| Lower case? | no | yes | no | yes | yes | yes |

blank spaces indicate "not known"

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THE SPECTRUM POCKET BOOK PROGRAMS
(SPECTRUM)

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MAZEMAN (ZX81 + SPECTRUM)
ADVENTURE 1 (ZX81 + SPECTRUM)
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Xeno II
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Cavern Fighter
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Games Pack 1
Games Pack 2
Tiny Tots 7
Mini Korg

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TERMINAL INVADERS

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STRATEGIC COMMAND (DRAGON)
SUPER NINE (ZX81)
MARTIAN RAIDER (VIC)
SHARK ATTACK (VIC)

MAC GAMES (UK)

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GAMES PACK 1

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INHERITANCE (BBC)
G.B. LIMITED (BBC)

IJK (UK)

STAR TREK (BBC) MODEL A AND B
CANDY FLOSS (BBC) MODEL A AND B
HANGMAN, KRYPTOGRAM, DICE, BEETLE,
GRAND NATIONAL AND MUSIC — (BBC) MODEL A
AND B
MUTANT INVADERS, BREAKOUT (BBC) MODEL A
AND B
BEEP-BEEP (BBC) MODEL B (OR A + 32K)
BEEBMUNCH (BBC) MODEL B (OR A + 32K)
SUPER HANGMAN (BBC) MODEL B (OR A + 32K)
3D MAZE (BBC) MODEL B (OR A + 32K)
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STRATOBOMBER (BBC) MODEL B (OR A + 32K)
LEAP FROG (BBC) MODEL B (OR A + 32K)
PONTOON AND PATIENCE (BBC) MODEL B (OR A
+ 32K)
5 — A — SIDE SOCCA (BBC) MODEL B (OR A +
32K)

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BUYER'S GUIDE

| NAME | VIC 20 | VZ-200 | Pencil II |
|-----------------------------------|--------------------|----------|-----------|
| RAM | 5-29K | 8-24K | 18-80K |
| ROM | 8K | 16K | 8-20K |
| Keyboard | typewriter | rubber | rubber |
| No. of keys | 67 | 45 | 59 |
| TV interface? | yes | yes | yes |
| Monitor interface? | yes | yes | yes |
| Colours | 8 | 8 | 16 |
| Text display (lines & characters) | 23 x 22 | 24 x 32 | 24 x 32 |
| Maximum graphics resolution | 176 x 158 | 128 x 64 | 256 x 192 |
| Graphics Characters | 64 & 256 definable | 16 | 51 |
| Processor | 6502 | Z80A | Z80A |
| Sound? | yes | yes | yes |
| Lower case? | no | no | no |

These machines are obviously where to start looking if all you want is a home machine, for learning programming or playing games. But look beyond this range, too, especially if you are likely to want a disk drive some time, or need expansion capacity. Machines in this group range from programmable calculators with an ego problem to quite potent little devices. Be sure of what is included in a price — sometimes even a power supply isn't.

Hand-helds

A few years ago, programmable calculators were programmed in machine code, and had only a few program steps and memories. The hand-helds are the descendants of these; programmable in BASIC, with 2K and 16K of memory. Models tend to change frequently, and a complete listing here would soon be out of date. The chief use of the hand-helds is as a powerful calculator.

Among the Casio models:

FX-702P, with 55 scientific functions, room for 20 characters on a liquid crystal display. Up to 1680 program steps, which leaves room for 26 data memories. A program step appears to be a keystroke. The number of data memories can be increased, at the expense of program room, up to 226. Basic keywords are just one keystroke each. Results are displayed to 10 digits. The BASIC language is big on scientific functions, with no string handling or anything like that. Price: \$299.

Printer (paper tape) \$149, cassette adaptor \$50.

PB-100, 25 scientific functions, up to 544 program steps with 26 memories; increasing to 1568 steps/26 memories with an optional RAM pack (\$50). Price: \$159.

FX-700P, 25 functions, 1568 program steps and 26 memories, up to 222 memories after sacrificing program room. 12 Character display. Results displayed to 8 digits. Price: \$199. Cassette adaptor \$50, printer \$149.

FX-802P, this is basically the FX-700P, with a small printer built in. \$379.

FX-801P, a 20 character display, with 10 digit accuracy, built in printer and microcassette recorder. \$695.

Casio is regularly producing new models. At the time of writing, a new model, with a four-line screen, taking up to 4 RAM packs was about to be released.

Sharp hand-helds

The Sharp series are horizontal, calculator style, programmable in BASIC, with thermal printer and microcassette for program storage. Primarily intended as easy-to-use, programmable calculators, which, of course, can be programmed from tape.

PC-1245. A maximum of 1486 program steps (keystrokes). BASIC keywords are entered as single keystrokes, and up to 18 keys can be redefined to your requirements. The operating system is contained in 24K of ROM, and 2.2 K of RAM provides

for program and data storage. A 5 by 7, dot-matrix display can show up to 16 characters. Battery powered, of course, the memory is backed up by an auxiliary battery, so that programs and data may be kept even though the PC-1245 is turned off. Programs may be edited with insert and delete keys. The BASIC supplied has most common commands, but no string handling or graphics of course. Price: \$215.

PC-1401. A combination pocket computer and scientific calculator, with a capacity of 4.2K of RAM, and 59 pre-programmed functions. A recent release. Price \$295.

PC-1251. This is the first of the hand-helds to permit the use of character data, with a full complement of string handling commands, as well as the usual arithmetic and trigonometric. Keywords must be spelt out in full. Array processing is also catered for, with some limitations. The display accommodates 24 characters. Capacity: 3486 program steps, 26 memories. Price: \$305.56.

The above all use a common microcassette/thermal-printer attachment, price, \$388.13.

PC-1500. This is the most sophisticated of the range. A 26-character display with upper and lower case, a more powerful version of BASIC than the others, a clock and alarm function. User memory is 2.6K bytes, expandable with 4.8 and 16K RAM modules. The BASIC language supports strings and arrays (again with limitations), and a colour printer plotter. This accessory prints and plots on 58mm paper, in red, green, blue, and black. A "software board" is also available, giving 140 programmable keys! Price, \$561.70; printer/plotter, \$476.66, 16K RAM expansion, \$407; 8K, \$200; 4K, \$164.99.

Atari 400

Still available in New Zealand, but apparently updated in the United States. The 400 has 16K of RAM, and 10K of ROM. The 400 can be programmed with plug-in cartridges. Atari has provided a serial input/output port for major peripherals, and four jacks for joysticks and paddles. Both TV and monitor outputs are provided, too. Atari is a little unusual in that it has no language interpreter in main ROM, providing BASIC in a plug-in cartridge. Other cartridges allow for PILOT, and assembly language. Full screen editing, with cursor keys, and graphics characters accessible from the keyboard are other features. The

BUYER'S GUIDE

main claim to fame of the Atari family has always been graphics capability. The 400 provides 9 graphic modes, with varying resolutions, number of colours, and number of luminances (intensities of colour). These are not independent — increasing the resolution decreases the number of colours and intensities you have. Player-missile graphics is a concept rather similar to sprites, obviously intended for games, and indeed Atari is noted for its games cartridges. Four independent sound synthesisers, each covering four octaves, with variable volume and tone are also provided, to drive the internal speaker. Price (16K, no recorder), \$599.

EACA Colour Genie

Made by the people who brought the very successful System 80/Video Genie/C Micro, this is a desktop machine, with a full-size keyboard, high-resolution graphics, colour, sound, a good version of BASIC, and a lot of room for expansion. As well as pixel graphics (plotting points, lines, circles and so on), the Colour Genie has both pre-

defined and programmable graphics characters. The pre-defined characters are accessed by pressing combinations of keys. There are 8 function keys, which may be programmed as you wish. As well as the usual built-in interfaces, the Genie includes an audio output — to supplement the in-built speaker, parallel and serial ports, a light-pen port, and an expansion port for software cartridges or an "expander" for running disk drives. Joysticks are also available, and are built in to a numeric keypad. The version of BASIC in ROM is very complete, with a lot of commands, rather similar to the earlier model, but with the addition of sound, joystick, and graphics functions. The same powerful BASIC line editor as found in the earlier machine is also provided in ROM.

Reviewed in *Bits & Bytes*, Sept, 1983. Price, 32K, excluding monitor, \$795. First disk drive, around \$900. Subsequent drives, cheaper than this.

COMX 35

The COMX is a small computer, with a calculator-style keyboard,

supporting colour graphics, sound, and a built-in joystick. It plugs straight into a TV, but has no provision for using a monitor. The colour display has 128 different characters — upper case letters only, with lots of special graphics characters. All the characters can be re-defined, effectively allowing the user to re-define 64, without changing the letters. No pixel graphics are supported directly. The background, and two foreground colours can be set from BASIC. Why two foreground colours you ask? One for your typing, one for the machine's responses! They can be made the same, but initially at least the machine "talks" in cyan, you do in white, and the cursor is pink. That is a sensible use of colour for a change. Stick-in-the-mud users can make the whole lot white. The music synthesiser has one channel, and a noise generator. Cassette storage is on a normal cassette recorder, and apparently disk drives are a future possibility. Price (32K CPU with keyboard), \$499.

Reviewed in this issue of *Bits & Bytes*.

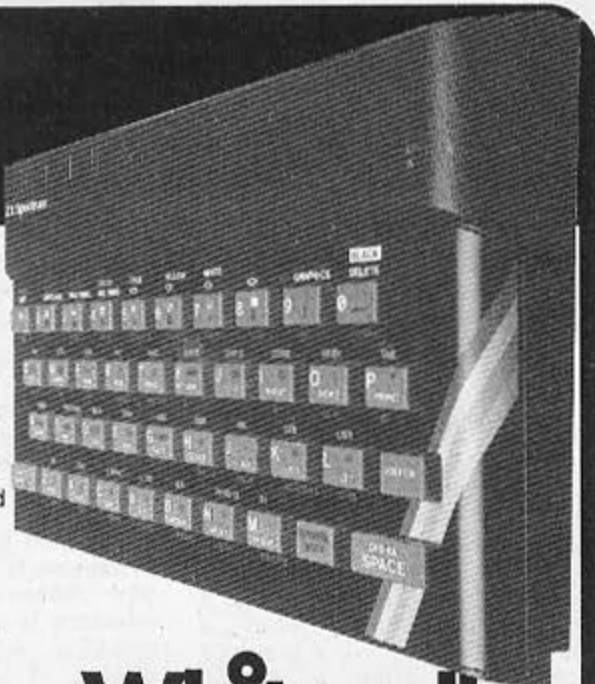
Sinclair ZX Spectrum

- Colour and sound
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- High resolution graphics

Your ZX Spectrum comes with a mains adaptor, all the necessary leads to connect to most cassette recorders and TVs (colour or black and white), and two manuals. If you're new to computing, you'll find both manuals of immense help.

Together, they represent a course in BASIC programming from first principles to advanced techniques. But if you already have experience of computers, you can skip much of the ground-work, and move straight into the colourful world of ZX Spectrum professional-level computing.

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MicroBee

The MicroBee is an Australian computer, adopted for educational use in many Australian schools, and attracting quite a following in New Zealand. There are three models, 16K, 32K and 64K of RAM, any of which can be expanded to colour graphics. Any size system can be expanded all the way to the top, 64K model. Disk drive support requires 64K. The MicroBee uses CMOS, non-volatile RAM, which in plain English means that you can turn the power off, and still keep your program or data, using a small battery to preserve memory. Standard interfaces for all models include serial and parallel input/output, video, and cassette. Expansion to 64K opens the possibilities up: up to 4 disk drives, with 380K bytes (formatted) capacity each, running the CP/M operating system. Under CP/M the normal 16 lines by 64 characters display can be switched to 24 lines of 80 characters. There is some software compatibility with the TRS 80 model 1. Low and high resolution graphics are both supported; and there is a programmable character generator, giving 128 user definable characters. Expansion to colour gives an RGB output for use with a monitor. Foreground and background colours can be set independently. Reviewed in *Bits & Bytes*, March, 1983. Prices: 16K, \$829; 32K, \$990; 64K, \$1390; Single disk drive, \$1509 (including controller and operating system).

Panasonic JR 100

The JR 100 is a black-and-white display only computer, with BASIC keywords being obtained from the keyboard using a control key. BASIC in ROM, 16K of RAM, 64 graphics symbols and 32 user defined characters, standard interfaces to cassette, TV and monitor. Each graphics character may be displayed in inverse video. The processor is equivalent to a 6802. Each key has a number of functions: a letter, a keyword (such as PRINT), a graphics character, and often a special symbol. Entry of programs is aided by the screen editor. There is a range of 10 games available on tape. Internationally there is quite a range of peripherals around, but these don't seem to have reached NZ yet. Reviewed in *Bits & Bytes*, October, 1983. Price (no monitor or cassette), \$299.

Panasonic JR 200U

This is a colour computer, designed to work with a TV set and cassette recorder. The keyboard is similar to the JR 100 listed above. Additional interfaces are provided, for parallel printer and joysticks. The complement of RAM is also larger. The JR 200 will work satisfactorily with an ordinary recorder; a special, high-speed type is available overseas at least. Also supported are microfloppy disk drives. An RS-232 card can be added, for serial input and output, for example from a modem. The unit contains three independent sound generators. Price (no monitor or cassette, with 32K RAM), \$750.

Polybrain P-118

Interfaces directly to a TV set or monitor, a cassette recorder, and a thermal printer. The keyboard has 42 keys, most of which have a variety

The first round-up

of functions. BASIC programming keywords are entered as one key-press. The display is organised as 24 lines of 32 characters. The top 22 lines are used in the usual way, with the bottom two lines for program input, error messages, and editing. The syntax of a program line is checked on entry, and if incorrect the line will not be accepted. There are 22 graphics characters, and their inverses. The display may also be divided into 64 x 44 pixels. The Polybrain permits the use of arrays (multidimensional) and string arrays. Software being produced includes games, educational programs, etc. For BASIC programs the machine is compatible with the Sinclair ZX-81. Expansion is permitted with a 16K or 32K RAM pack, and a joystick interface is included, as is a sound amplifier for music and sound effects. Price (incl. power supply), \$219.50.

Sinclair ZX Spectrum

The Spectrum is the colour version of the ZX-81, with other improvements. The Spectrum is a low-profile, plastic box, with a rubber keyboard. The keys have a positive "click" to help in data entry.

Each key has a multiplicity of functions associated with it: 192 functions for 40 keys. The computer will sometimes automatically select the appropriate meaning; other times control keys must be used in conjunction with letter keys. Sockets at the rear provide for power supply, cassette and TV connection, and for expansion peripherals, including the microdrives. The screen is divided into "paper" and "border" areas, which may have separate colours specified. Each character can be printed in any colour "ink", and its brightness can also be controlled, so quite a variety of display is possible. Sixteen graphics characters, and a further 21 user-defined characters are provided. As well, the display can be treated as a grid of 256 x 192 dots; BASIC contains commands for drawing lines, circles, and so on. In the high-resolution mode, 9K of RAM is left to the user in a 16K machine. Sound is also supported. The basic machine has 16K of RAM, another version has 48K. Other expansion options include a thermal printer, and the "microdrives", which are a high speed digital tape cartridge, acting like a normal disk drive (available "soon"). Software, both on tape and published, is common. Forth may be used as an alternative to BASIC, and assembly-language programming is supported. Price: 16K, \$499; 48K, \$699; power supply, \$24.95.

Sinclair ZX-81

It's probably the smallest, probably the cheapest, and almost certainly the largest selling computer in the world. Something like a million and a half have been sold in the United States (under the Timex/Sinclair label). But this doesn't mean that the ZX-81 is not a powerful computer. It has a BASIC which is as powerful as most; any limitations arise because of its size.

The ZX-81 is small, and there isn't room for a real keyboard. Instead, a membrane keyboard is provided, with each key having a number of functions. BASIC programs are entered as a series of keywords — there is a key labelled "PRINT" for example, and you cannot type the five letters individually. The computer itself keeps track of which function is meant when a key is pressed. The display is 24 rows by 32 columns, the bottom two lines being reserved for program input and error reports. The ZX-81 is a black-and-white machine only. It has a number of graphics characters

BUYER'S GUIDE

accessible from the keyboard, giving low resolution graphic facilities. An alternative language (Forth) is available. Storage of programs is cassette tape only, the original 1K of RAM can be expanded with a 16K package attached to the rear of the computer. A small thermal printer, using aluminised paper, can also be added. Software, mainly games, is common, and the ZX-81 gets good magazine coverage. Price: (1K RAM) nominally \$199, often available at \$149. Power supply, \$19.95. RAM pack (16K), \$99; printer, \$189.

Sord M5

The SORD M5 is a compact home computer, with colour graphics and sound, a rubber keyboard with keywords and graphics characters on the keys, and provision for the most important interfaces. RF, video and sound outputs, cassette and parallel printer, and an expansion bus are standard, the expansion bus being intended to service RS-232 output, and a 3.5 inch microfloppy drive, which is expected to be available soon. The basic machine has only 4K of RAM, and a simple, version of BASIC called BASIC-I (introductory). Two other versions, one for graphics support, the other with floating point (i.e., decimal) numbers, are obtainable in ROM cartridges. The M5 has sprite graphics, in up to 32 priority levels. Memory can be expanded to 32K with a plug-in packs. This machine was reviewed in *Bits & Bytes*, August, 1983. Price (4K), under \$1000.

Spectravideo SV-318

This is a relative newcomer, and very interesting, as it is the first result of an agreement between software and hardware manufacturers on the specifications for low-end, 8-bit computers. This specification, known as MSX, details the input, output and graphics conventions to be used, without binding the designer as to how they are to be met. The most noticeable feature of the machine is the built-in joystick, which is part of the cursor movement pad. A full range of inputs and outputs is provided: additional joysticks, software cartridges, video and TV signals, a cassette port, and access to an expansion bus for the addition of a very large number of peripherals which are listed overseas, and which will, it is to be hoped, be coming to New Zealand as fast as possible. These include a special recorder, floppy-disk drives,

modem, printers and so on. The BASIC supplied in ROM is an extended version of Microsoft BASIC, and has a very long list of commands, many to support the extensive graphics capabilities of the hardware. Sprite graphics are fully implemented, and it will be interesting to see what software becomes available utilising the hardware. The manufacturers are no newcomers — they have been producing games and other software for the Atari range of computers and games consoles for a long time. Sound is supported, too, and there are special-purpose keys on the

The first round-up

keyboard for many common operations. These function keys are re-definable at will. Price: with 32K RAM, power supply and modulator for connection to a TV, \$899.

Texas Instruments TI-99/4A

The TI 99/4A has been around for quite a while, and has a full range of hardware and software available. The basic computer has interfaces for TV and cassette, and allows for use of program cartridges. The processor is a 16-bit device, unusual in a machine of this price, and is able to support coloured, high-resolution graphics, including sprites, and sound generation. Expansion requires the addition of the 'Peripheral Expansion System', which is a box with the slots needed to accommodate such things as a disk drive, serial or parallel printer, memory expansion (to 48K), speech synthesiser, and many other peripherals. Price (16K), \$895.

Vic-20

The VIC-20, by Commodore, is one of the more widespread machines. Commodore was, of course, one of the very first companies in the 'personal computer' business. The VIC has a full-size keyboard, programmable keys, sound, music, colour graphics. Plenty of expansion is allowed for, including increasing the initially small amount of memory, the addition of disks, a modem, a printer and so on.

Colour programming cannot be readily summarised, but fundamentally there are 8 colours available for characters, 8 for borders, giving 16 for the screen, in various combinations. Colours are selected from the keyboard. PET-type graphics characters are provided, along with a programmable character generator. The VIC requires a modified tape recorder. VIC BASIC is broadly compatible with other Commodore machines, such as the PET. It includes a full complement of commands and functions. Sound is catered for with 3 independent generators, each covering three octaves. Beyond a certain stage it becomes necessary to add an expansion chassis to provide extra plug-in slots. Prices: \$495, datasette tape recorder, \$129; disk drives, from \$995; RAM expansion: 3K, \$79.50, 8K, \$109.50, 16K, \$159.50.

Dick Smith VZ200

The VZ200 is a colour computer, with many fairly standard features, and some novelties. It has a fairly usual rubber keyboard, with each key having many functions — alphanumeric character, graphics character, keyboard (for BASIC programming) and control functions. It comes almost ready to run, plug-in the power supply, connect to a cassette recorder and a television set or monitor. The only other interfaces provided in the basic unit are an expansion bus and an input-output expansion connector. A RAM expansion pack may be attached to the expansion bus, giving an additional 16K of memory; a printer interface is available for the input/output connector to enable use of a parallel printer. Other interfaces and expansion options appear to be under development.

The VZ200 has two graphics models: 64 x 32 in 8 colours or 128 x 64 with only 4. The video display requires 2K of the inbuilt RAM, leaving 6K for programs. Sound is catered for with a music 'channel'. Other features include on-screen editing and inverse video.

Prices: Keyboard \$299; 16K RAM pack \$149; printer interface \$99.

Pencil II

The Pencil II is a small, desktop unit, with a rubber keyboard and multifunction keys. Standard interfaces are for TV or monitor, cassette recorder, parallel printer, and joysticks. A slot allows for the

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use of cartridge programs, and is used for some expansion options.

Keywords are entered directly, each word being represented by a letter key. Each key also generates, in conjunction with a control key, one of the 51 graphics characters. The Pencil II also has cursor movement keys, and six programmable function keys.

BASIC is provided, not in ROM as such, but in a cartridge. The version supplied is known as SD-BASIC and has a fairly standard list of commands. The addition of the

The first round-up

BASIC cartridge increases the ROM size from 8K to 20K. RAM may be expanded from the basic 18K to 80K. This presumably involves some sort of bank selecting, as 64K is all that the processor can address.

Sockets are provided for two joysticks, which also contain a numeric keypad. Three music synthesiser channels, and a noise channel, provide for music and sound effects.

Expansion options include disk drives, modems, printers, etc. With a disk drive the Pencil II will run the CP/M operating system.

Price: Console \$699. Cassette recorder \$145. Disk drive (complete with controller and power supply) \$1200. RAM expansion, 16K \$126; 64K \$252.

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BUYER'S GUIDE

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| NAME | Apple IIe | Atari 800 | BBC | BMC Model 10 | Commodore C-64 | Cromemco C-10 |
|-----------------------------|----------------|-------------------|----------------------|--------------------|----------------|----------------|
| Type | Desktop | Desktop | Desktop | Desktop | Desktop | Desktop |
| Processor | 6502 | 6502 | 6502 | Z80A | 6510 | Z80A |
| RAM | 64K plus | 16-48K | 32K | 64-128K | 64K | 64K |
| ROM | 16K | 10K | 32K | 2K | 20K | 24K |
| Keyboard | typewriter | typewriter | typewriter | typewriter | typewriter | typewriter |
| No. of keys | 62 | 61 | 73 | | 66 | 59 |
| Text screen (lines x cols) | 24 x 40 | 24 x 40 | 25 x 40 | 25 x 80 | 25 x 40 | 25 x 80 |
| Colours | 16 | 16 | 16 | see text | 16 | no |
| Maximum graphics resolution | 280 x 192 | 320 x 192 | 640 x 256 | 640 x 200 | 320 x 200 | 160 x 72 |
| Upper & lower case? | yes | yes | yes | yes | yes | yes |
| Speaker incl? | yes | yes | yes | | yes | |
| NAME | Epson HX-20 | Franklin Ace 1000 | Hewlett-Packard HP75 | HITACHI MB-6809 | IMC-FOX | Kaypro II |
| Type | Briefcase | Desktop | Handheld | Desktop | Desktop | Portable |
| Processor | 2 x 6301 | 6502 | custom | 6809 | 6502 | Z80 |
| RAM | 16-32K | 64K | 16-24K | 32-64K | 64-256K | 64K |
| ROM | 32-72K | up to 12K | 48K | 24K | | |
| Keyboard | typewriter | typewriter | calculator | typewriter | typewriter | typewriter |
| No. of keys | 56 | 72 | 65 | 87 | 66 | 76 |
| Text screen (lines x cols) | 4 x 20 | 24 x 40 | see text | 25 x 80 or 25 x 40 | | 24 x 80 |
| Colours | see text | add on | | 7 | | no |
| Maximum graphics resolution | see text | 280 x 192 | | 640 x 200 | | |
| Upper & lower case? | yes | yes | yes | yes | | yes |
| Speaker incl? | yes | yes | yes | yes | yes | |
| NAME | Dulmont Magnum | Morrow MD2 | Osborne 1 | Panasonic JR-800V | Pied Piper | Sanyo MBC-1100 |
| Type | Briefcase | Desktop | Portable | Briefcase | Portable | Desktop |
| Processor | 80186 | Z80A | Z80A | 63A01 | Z80 | 2 x Z80A |
| RAM | 64-256K | 64K | 64K | 16-24K | 64K | 64K |
| ROM | 128K | | 4K | 20-32K | | 8K |
| Keyboard | typewriter | typewriter | typewriter | calculator | typewriter | typewriter |
| No. of keys | 74 | 92 | 69 | 74 | 62 | 90 |
| Text screen (lines x cols) | 8 x 80 | 24 x 80 | see text | 8 x 32 | 24 x 80 | 25 x 80 |
| Colours | no | no | no | no | no | no |
| Maximum graphics resolution | | | | 192 x 64 | | |
| Upper & lower case? | yes | yes | yes | | yes | yes |
| Speaker incl? | yes | | no | yes | | no |

blank spaces indicate "not known"

BUYER'S GUIDE

| NAME | TRS-80 Color Computer | Televideo Portable | Tandy Model 100 |
|--------------------------------|--------------------------|-----------------------|--------------------|
| Type | Desktop | Portable | Briefcase |
| Processor | 6809E | Z80A | — |
| RAM | 4-32K | 64-128K | 8-24K |
| ROM | 8-16K | 8K | 32K |
| Keyboard | calculator | typewriter | typewriter |
| No. of keys | 53 | 83 | 56 + 16 |
| Text screen (lines x cols) | 16 x 32 | 24 x 80 | 8 x 40 |
| Colours | 8 | | |
| Maximum graphics resolution | | 640 x 240 | 240 x 164 |
| Upper & lower case? | no | yes | yes |
| Speaker incl? | yes | yes | yes |

This range is impossible to categorise. Some machines are clearly intended for home use, others clearly for business purposes. Some, such as the briefcase models, seem to best fit the category, "for personal use in a business setting". Others could be used anywhere. As usual, it's the software that finally determines what a computer does.

Apple IIe

The Apple was, of course, one of the machines to start the whole thing. The first Apple to be produced in volume, the II, had integer BASIC only; the II+ followed with Applesoft extended BASIC, and the latest version, the IIe ("e" for "enhanced") continues the

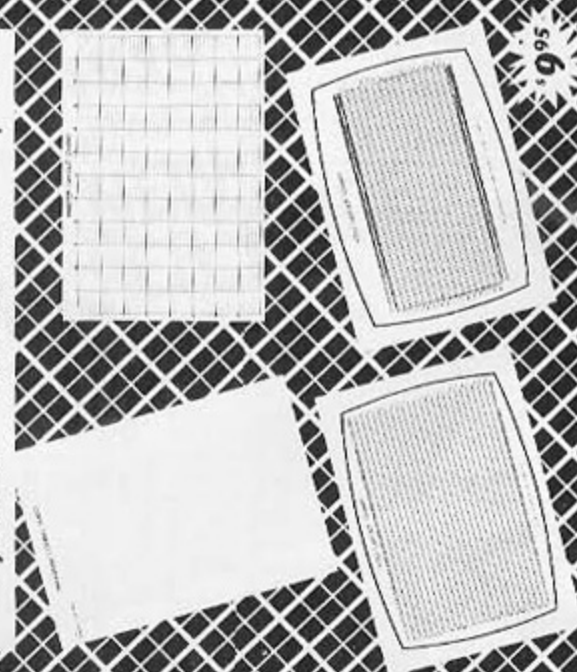
refinement process. Most notable for three things: the first with high-resolution colour graphics; easily expandable by using the eight plug-in slots provided; and the incredibly wide variety of software and hardware produced to enhance it. Whatever you want you can have: disk drives, additional processors (6809 or Z80), large capacity memory boards (up to 512K), for use as pseudo-disks, modems, printers, joysticks, plug-ins to control outside devices, and networking are just a start.

The latest version includes upper and lower case, four arrow keys, 64K RAM, auto-repeat keys, easy expansion to an 80 column wide display. The most important feature though is still the one which made the Apple such an overwhelming success: flexibility, in both using the hardware and in programming. Of course, all the games, utilities, business programs, word processors and so on must help! Price for 64K system, one disk drive, monitor, monitor stand, and 80-column card, \$3995; with high-resolution colour monitor instead \$4875.

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CARDHOLDER'S SIGNATURE

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BUYER'S GUIDE

Atari 800

Still available in New Zealand, but apparently updated in the United States. This is an expandable version of the 400, with a "real" keyboard, and lots of peripherals. The 800 starts with 16K of RAM, and can be expanded with plug-in cartridges to 48K. This expansion is necessary to use a disk drive, and many pieces of software. Atari has provided a serial input/output port for major peripherals, and four jacks for joysticks and paddles. Both TV and monitor outputs are provided, too. Atari is a little unusual in that it has no language interpreter in main ROM, providing rather a number of options in plug-in form. Atari BASIC is provided; Microsoft BASIC, Pilot, and assembly language also. The main claim to fame of the Atari family has always been graphics capability. The 800 provides 9 graphic modes, with varying resolutions, number of colours, and

version of BASIC, and other ROMs may be plugged in to give access to Pascal (soon) and other software. There are 8 different display modes, including one for teletext. The higher the resolution of graphics required, the more RAM must be devoted to it. This BASIC includes potent "structured" commands, and the ability to include assembly language. Interfaces include cassette, serial, parallel printer, TV, video monitor, analog channels, and an extension bus. Expansion options are wide ranging, including disk drives, networking, a second processor, printers, etc. A Z80 as second processor will give (soon?) operation under CP/M operating system. Reviewed in *Bits & Bytes*, November 1982. Price: cassette based — \$1995. Disk based — \$2255. Disk interface \$295, disk drives from \$905.

The first round-up

number of luminances (intensities of colour). These are not independent — increasing the resolution decreases the number of colours and intensities you have. Player-missile graphics is a concept rather similar to sprites, obviously intended for games, and indeed Atari is noted for its games cartridges. Four independent sound synthesizers, each covering four octaves, with variable volume and tone are also provided, to drive the internal speaker. Expansion options are many: up to four disk drives (88K formatted each), many different printers, a modem, joysticks and paddles. A programmable serial interface module is required for some, and also allows the use of many third-party devices. Price (16K, no recorder) \$1999.

BMC 800 Model 10

A relative newcomer, which came to notice when the BMC line was included in the Education Department list of recommendations to schools. The standard configuration for the model 10 includes a keyboard, processor, monitor, printer, and a single 5.25in drive. The BMC runs the CP/M operating system, which means that a large amount of software is available, and that there is no language as such in ROM. A lot of languages are available to run under CP/M: MBASIC and CBASIC, are versions of BASIC, each with special strengths; USCD Pascal, Pascal MT+, Fortran, etc. A version of BASIC is supplied which supports the graphics capabilities of the machine. It has eight colours, mixing to give 32 "hues". The graphics resolution is an impressive 640 x 200 pixels. The keyboard has a numeric pad, and a group of 10 programmable keys. A full screen editor, with cursor movement keys, insert, and delete keys and so on is also standard. Each floppy disk (one drive is standard) has a storage capacity of 384K bytes. Standard interfaces: RS232 serial, RGB video, light pen, extra floppy disks. Accessories include all manner of interfaces, analog-digital and digital-analog converters, a plotter, a digitiser, etc. The standard package includes an 80-character, dot-matrix printer, which probably does graphics, because there is a "screen dump" key. Price: \$4158 (64K RAM, green screen monitor); \$4950 with a colour monitor instead.

BBC Microcomputer

The BBC has attracted a lot of interest since its release. In outline its specification is common enough: high-resolution colour graphics, 6502 processor, 32K of RAM, and so on. The special features of the "Beeb" are a little different. The 32K of ROM includes a very powerful

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Commodore 64

Not just a big brother to the VIC 20, the C-64 is a home computer with some very interesting features, some of which don't seem to be available quite yet (at the time of writing). A very larger body of software is available for the 64, and the machine is expandable in hardware to handle single or dual disk drives, parallel printers, and a second processor, as well as the more usual tape recorder, TV or monitor, and so on. The second processor cartridge, containing a Z80, enables the 64 to run CP/M. The USCD p-system is also supposed to be coming. Compatibility with the VIC and earlier PET machines is not perfect, but is pretty close, at least in BASIC. The processor, a 6510, is, roughly, a version of the ubiquitous 6502, with extra I/O facilities.

Graphics facilities include sprite graphics, which open up a whole lot of possibilities. Most graphics programming needs to be POKEd and PEEKed from BASIC, but useful utilities, such as sprite editors and other packages are coming out in the magazines all the time. Music is well catered for as well. The machine includes 64K RAM, not all of which is available under BASIC (39K). Disk drives are "intelligent", that is, the drives have their own micros to control them, and the operating system is in ROM within the drive. The drives communicate in serial form, rather than the usual parallel transmission. Reviewed in *Bits & Bytes*, May 1983. Price for keyboard/processor, including modulator and power supply, and special tape recorder (Datasette): \$1124. Single disk drive: \$995.

Information on other Commodore (CBM) machines arrived too late for inclusion in this part. They will be included in part 2 of the guide.

Cromemco C-10

The Cromemco C-10 is a computer, built into a 12in green screen monitor. This contains a complement of RAM and ROM, and a number of communication channels, both serial and parallel. Clearly the first thing to add would be a keyboard. Cromemco has a detachable, low-profile keyboard, with cursor movement keys. The number keys are used, in conjunction with a control key and the shift to give 30 user-definable function keys. Most Cromemco software assigns

special meanings to these keys, for example, word processing functions. A disk drive is the next necessity. The mini-floppy drive has a 390K byte capacity; dual units are also available. The C-10 runs a CP/M compatible operating system, giving access to a lot of Cromemco software, such as word processing, investment analysis, spreadsheet, accounting etc., and a variety of languages: BASIC, COBOL, RATFOR and FORTRAN, as well as Cromemco's "Structured BASIC". The operating system is a menu-driven shell around CDOS, a Cromemco operating system which is used with other machines; direct access to CDOS commands is also permitted. Four character sets are provided including graphics characters. The C-10 can also function as a terminal to a mainframe computer, emulating any of a variety of standard terminals. Reviewed in *Bits & Bytes*, November 1983. Price: (64K RAM, 1 disk drive, green screen, bundled software) \$4855.

The first round-up

Epson HX-20

The Epson is a representative of the relatively new class of briefcase portables. It is a small package, battery powered, and just the size (in area) of a copy of *Bits & Bytes*. The display is a liquid crystal display, like most digital watches, which is a four-line window on a much larger, "virtual" screen. There is even a small printer built in! A "real" keyboard, typewriter style, with five programmable function keys. Graphics characters are there, too. Programmed in a very powerful dialect of BASIC, with more commands than many, much bigger, computers. Interfaces are provided for cassette, a serial interface for printer or modem, a bar-code reader, ROM cartridges, and the ability to connect to a standard TV set. Expansion options listed include a full-size printer and floppy disks, but it won't all fit in your briefcase then (not with room for your lunch anyway!). An acoustic coupler is intended to allow communication to others, and to bigger computers, when New Zealand gets into the communications act properly. Graphics capability: 4 lines of 32 characters in four colours on a TV or

32 by 120 dots on the liquid crystal display. The HX20 also includes a sound generator, and a clock for the time and date. Reviewed in *Bits & Bytes*, February 1983. Price: \$1671.74. Microcassette additional \$329.07. 16K RAM \$351.68. Dual floppy drives \$2907.64.

Franklin Ace 1000

The Franklin is the most famous, and probably the most successful, of the Apple workalikes, and as such has come in for a fair amount of legal argument, which continues. "Compatible with Apple hardware and software" is the claim. "Not a copy, a different instrument playing the same music." Designed as an Apple II+ workalike, the Franklin added lower case, a numeric keypad, extra arrow keys, and a fan. Removed were tape facilities (rarely used with Apple), and colour, which became an extra to "add on". The "language card" which provided the Apple with its final 16K of RAM got built in, too, giving immediate access to Pascal, and other, languages. A Z80 card makes CP/M a possibility. Sockets are provided for 12K of EPROM. Normally BASIC comes on a disk. Reviewed in *Bits & Bytes*, August 1983. Price: with single disk drive and green screen — \$3975.

Hewlett-Packard HP75

The HP75 looks like just another hand-held computer/calculator, but it certainly has more features than any other in its size range. The HP 75C is just 25 cm by 13 cm (10 in x 5 in), with a QWERTY keyboard, and a one-line LCD display 32 characters wide, scrolling to 96 characters. User RAM is 16K, expandable to 24K, with provision to plug-in ROM modules containing software. But the really impressive statistic is this: the ROM is a massive 48K! This gives the HP 75C an operating system with 167 commands. Remember that not that long ago, 48K was regarded as a very large amount for the total memory of a system. The unit has a built-in card reader (hand pulled), three sockets for ROM packages, one for RAM, and one for Hewlett-Packard's interface. This latter allows the use of a digital cassette drive, printer, instrument control, a video monitor, plotters, acoustic couplers, modems and a lot of other things of specialised, scientific interest. The unit is battery powered, of course,

BUYER'S GUIDE

and a recharger is built in. Time and calendar functions are supported, with an alarm.

This is not just for scientific use! The use of a video interface to a monitor allows you to use Visicalc, a text formatter, and communications software. The BASIC language provided in ROM has functions to control the clock functions, a colour plotter, the card reader and so on, and has a large number of programming and mathematical statements. The digital cassette drive maintains a directory (yes, on tape!) and can locate files by name. These are only the main options: the HP 75C can also be used in instrumentation and scientific measurements, and can be interfaced to other computers. Price: with 16K RAM \$2484; 8K RAM expansion \$487; digital cassette drive (128K bytes) \$1155.

Hitachi MB-6890

The Hitachi Peach, as it is known in Australia, is under \$5000 in basic configuration, but over this limit with disk drives. Few machines are being used without drives, but it's here in this article anyway! A middle-of-the-road machine in every way — probably aimed at the small-business

or professional market, but with other possible areas of application. The keyboard includes the CPU and interface for colour and black and white video, parallel printer, cassette, light-pen and serial (RS-232) interfaces. Notice — no TV; a modulator would need to be used. Most machines are sold with a green screen or colour monitor. Internally, the machine boasts six edge connectors for expansion, and 2 memory sockets, which may each have 16K of RAM fitted. There are a number of video modes, the highest resolution requiring 16K of user RAM for the screen. Extended BASIC is in ROM, to support the graphics.

The Hitachi is well supported with business software, utilities and games. The BASIC language is not particularly fast; machine code is accessible through an assembler. The keyboard has a numeric pad, and function keys, which are initially programmed with common BASIC instructions. These may be changed at will. A CP/M card will be available, and disk drive, both 8in and 5.25in are available. The dual mini-disk drive holds 640K (formatted) data; the 8in dual unit two megabytes in total. A light pen is also for sale (\$520 approximately). Reviewed in *Bits & Bytes*, March 1983. Prices: keyboard unit only \$1775; Green

monitor \$338-524; dual mini-floppy drives \$3031; 16K RAM card \$225 (required with disks); dual 8in disk drives \$5724.

IMC-Fox

The IMC-Fox is a multi-system computer from Taiwan. It has 64K of memory on board, which is expandable up to 256K, but with no ROM at all! It has no fixed language, so can use any by way of a plug-in card. It is supplied with a plug-in systems card containing FOX-DOS, which is an Apple workalike. The keyboard includes a numeric keypad with cursor control, and several functions (CATALOG, etc.) using control keys. The computer has 9 expansion slots (one is used for the systems card), and a very wide variety of hardware is listed to occupy them! FOX-DOS includes a number of useful utility functions, and a graphics/sorting package. Other than the usual systems card, IMC lists a CP/M softcard, a 6809 CPU card, an 8255 card, for controlling the outside world, a card to make the FORTH language available, and a host of others. Interfaces included in the basic unit are joystick, cassette, NTSC TV (a PAL system interface which would be needed in New Zealand for colour

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is an optional extra), graphics tablet and speaker (with volume control). Price for basic unit, 2 disk drives, green screen and disk controller card: \$3495.

Kaypro II

The Kaypro is a portable computer, with a keyboard, 9in screen, two disk drives and processor in a metal case. It is about the size of a sewing machine. The screen displays a full 24 lines by 80 characters, and has a green phosphor. The detachable keyboard includes a numeric keypad and cursor movement keys. The two drives each provide 200K bytes of storage on 5.25 inch disks. Standard memory is 64K of RAM, which is the usual amount to run the CP/M operating system, version 2.2. Standard interfaces provided are a serial port, modem connection, and a parallel printer interface. The Kaypro comes with a lot of standard software: a word-processing program (with spelling checker), a database system, a spreadsheet, two versions of BASIC, investment analysis, the operating system, of course, and even an unspecified number of games. There are quite a number of software packages listed, and of course CP/M makes a lot more available. There seems to be no graphics capability. Included in portables review, *Bits & Bytes*, November 1983. Price (including software): \$4377.

Dulmont Magnum

The Magnum is a very recent arrival, from Australia. It is a 16-bit portable, about the size of a telephone book, with a fold-up screen, and aimed at the professional who has to travel, visit clients, or work in the field. It is battery-powered, with a liquid-crystal display of eight lines. An external monitor may be used, giving 24 lines of 80 characters. The memory is surprising: 128K ROM, with 64K RAM, expandable to 256K! Of course the RAM is CMOS, which means that turning the machine off doesn't wipe out the memory contents — the internal batteries keep everything as it was. Application software may be made available in plug-in cartridges. The huge amount of ROM contains a word processor, a spreadsheet program, an electronic diary, and the BASIC programming language. Two serial and one parallel input/output

ports allow for expansion. Expansion options which are advertised include dual disk drives, monitors, printers, and even hard disks. However, rather than take this route, many will prefer to interface it to an IBM PC, with which the Magnum is compatible. Price (basic unit): \$4495.

Morrow Micro Decision MD2

Morrow produces a line of small business computers, running the CP/M operating system, and bundled with quite a bit of software. The smallest of these, the MD2, is a dual disk system, with a separate terminal and keyboard. The detachable keyboard sports a

The first round-up

numeric keypad, with function, editing, and word processing keys, attached to the screen unit by a "curly cord". All keys automatically repeat. The screen unit is designed to sit on top of the computer box itself, but may be placed elsewhere. The drives and mini-floppies, with 200K storage each (formatted). Up to four drives are supported. Text on the screen may be inverse, half-intensity, blinking or underlined. Interfaces include two serial (RS-232) ports, one of which will be used for the terminal and a parallel printer port. The MD2 comes with the following software included: CP/M operating system, Wordstar word processor, a spelling checker, an electronic spreadsheet, Microsoft BASIC, a data-base management system, and the BaZic language interpreter, to handle Northstar BASIC. The MD2 can read Osborne, IBM and Xerox format disks, allowing for data interchange. Price: \$4600.

Osborne 1

Rumours abound — the Osborne Corporation in the United States filed for reorganisation because of financial difficulties caused, paradoxically, by the overwhelming success of its products. Anyway, the Osborne is still being sold and supported in New Zealand at the time of writing. This was the first of the portable computers. It looks like a sewing machine, which opens up to reveal a keyboard, small screen,

two disk drives, and assorted connectors. Strictly a business machine (watch somebody prove me wrong!), the Osborne runs the CP/M operating system, which is more or less the standard for 8-bit business machines. The interfaces included are a serial (RS-232), a connector for an external display, an IEEE 488 interface, for connection to test instruments etc.

The small {5in} screen gives a 52-character window on a 128-character line, and this scrolls horizontally automatically. The screen is 24 lines deep. The Osborne can be run from a battery pack, can have hard disk drives fitted, up to 15 megabytes. In view of its price, perhaps the most startling thing about this machine is the amount of "free" software which is bundled with it. This comprises the CP/M operating system, CBASIC and MBASIC languages, Wordstar for wordprocessing, Mailmerge for mailing lists and form letters, and Supercalc, an electronic spreadsheet. There are a lot of programs available, mostly of course for business use. Reviewed in *Bits & Bytes*, November 1983. Price: (with double-density disks) \$3815; battery pack \$600.

The Osborne Executive will be included in the second part of the guide.

Panasonic JR-800U

A book-size, briefcase computer, the JR-800U has a built-in LCD display, 8 lines by 32 columns, which functions as a window on a larger "virtual" screen. The screen also functions as a graphics display, each dot being individually addressable. There are also 30 or so pre-defined graphics characters on the keyboard. The computer has one of the largest calculation capacities this writer has ever seen: exponents up to 153 are permitted. The ROM contains the usual BASIC language, cassette and printer interfaces are standard, along with built-in clock and calendar, and a music "synthesiser". Multiple (up to 8) program files may be worked on at once. The keyboard is multifunction — each key represents a letter, a graphics character, and a keyword. There are 10 programmable function keys, and a numeric keypad. The unit may be powered from battery or mains, via an adaptor. Battery life in standby mode, i.e. keeping the contents of memory, is 70 hours. A low-battery indication is given, and if left alone for more than six minutes,

BUYER'S GUIDE

the machine will power itself down. Memory is expandable, by plug-in cartridges, to 24K RAM and 32K ROM. Price: CPU with keyboard and built in screen: \$1195.

Pied Piper

The Pied Piper, also called the Communicator overseas, is a portable computer, comprising a keyboard and a single disk drive. The Pied Piper, with its cover in place and its carrying handle looks rather like a large portable radio. A large keyboard, built into the sloping front, with a disk drive at the right side. Interfaces and all connectors are round at the rear: TV and monitor output, connector for a second drive, and an expansion bus. Options include RS-232 interfaces and a hard drive. The name, Communicator, is explained by the built-in modem. There is no screen — add your own monitor or TV set. The in-built disk drive has 784K (formatted) capacity. The Pied Piper runs the CP/M operating system, and comes with included utilities and other software. Reviewed in *Bits & Bytes*, November 1983. Price: \$3750.

Sanyo MBC 1100/1150

A compact, small, business computer, in two versions. The 1100 version has one built in mini-disk drive, the 1150 version has two. The disk drives are vertical units, built in to the monitor stand, which tilts and rotates. The keyboard is detachable, with a numerical keypad, and 15 programmable function keys. The use of dual processors (both Z80A) at 4MHz and a separate processor for keyboard control should give a reasonable burst of speed. Each drive has a formatted capacity of 320K bytes. The built-in monitor is a 30cm, green type. Characters on the screen can be blinking or in reverse video. Other interfaces included are serial (RS-232) and a parallel printer port. The unit runs under the CP/M operating system, (version 2.2), which means that there are, potentially any way, lots of programs around! If you do need to write your own, BASIC, COBOL, Pascal and machine code are all supported. Price: \$4332 with one drive (1100); \$4798 with two (1150). Hard disks, 5 and 10 megabyte, also available.

Other, similar Sanyo computers will be included in Part two of the buyer's guide, in *Bits & Bytes*, early next year.

TRS80 Color Computer

The Color Computer (CoCo) is now Tandy's main entry in the home computer stakes. It followed the pioneering Model I, and the Model III, providing high-resolution colour, and expansion capability to match any. A wide variety of hardware and software is available from Tandy, and outside organisations. There are specialist magazines, and it gets good coverage in the general magazines. All sorts of software is available, from games to editors and assemblers. Initially intended for use with tape, and program cartridges, but disk drives are available, and connect via the cartridge port. CoCo is one of the very few micros which can run the Flex operating system (after simple modification), which gives access to a wide variety of software, including languages. Most users, however, will stick with the original Color BASIC, or Extended Color BASIC, which costs extra, but gives a lot more features. All manner of peripherals can be had. Reviewed in *Bits & Bytes*, December 1982. Price: (16K RAM) \$1195. Extended BASIC around \$200.

Televideo Portable

The Televideo Portable is a full featured computer, very similar to the Televideo 803, but in portable form. Judge portability for yourself: dimensions 46 x 38 x 20cm, weight 11.3kg. It is a business machine, running CP/M as operating system, with specialised software also available for business-type things. The standard package has a 9in green screen, and two mini-floppy drives, both double-sided, double density, with a capacity (formatted) of 368.6K bytes per drive. Addition of an RS-422 interface board allows communication to other computers. User RAM is 64K-128K, with 32K of screen RAM in addition. With this much screen RAM, it is obvious that graphics support is there, and indeed it is, with a GSX-80 extension to CP/M, to allow the use of "business graphics". Text characters may be half or full intensity, reverse video, blinking, underlined, or any combination. The keyboard is detachable, with 10 dual-purpose programmable function keys, a numeric keypad, cursor movement keys, etc. A serial modem port, a

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PHILIPS



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parallel printer port and a port for a "mouse" controller complete the picture. Price: with one disk drive \$3444, with two drives \$4300.

Note: The Televideo TS800 and TS1600 work stations, also under \$5000, will be included in part 2 of this Guide.

Tandy Model 100

A briefcase machine, with built-in software, 8-line display, with graphics capability. A good-looking keyboard, with a group of keys acting as a numeric keypad, and special function keys, most linked with the built-in software. Clock and calendar support is there, too, and hardware for a direct-connection modem. Other interfaces include printer, RS-232 and cassette. The software in ROM comprises a text editor, telecommunications program, an appointments diary, and BASIC. Once entered, programs and data stay put, even when the computer is turned off, until deliberately deleted. When the unit is turned on, a selection is offered of all that is in ROM or RAM. The version of BASIC provided is extended Microsoft, with lots of facilities for using the hardware. As one example, a BASIC program can contain an instruction to perform a certain group of actions at a particular time, or at regular intervals. The text processor is also used for editing BASIC programs. The 100 was released in the United States only about July 1983, so lots of add-on bits and pieces can be expected to start appearing. Price (expected) \$2495.

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PRINTER ROUNDUP

PRINTERS IN N.Z.: PART ONE

What you get under \$2000

By SHAYNE DOYLE

One of the most useful peripherals the home-computer enthusiast can add to his or her computer system is a printer. It is possible to achieve quite a lot without one, but sooner or later the need for printed output becomes paramount. Unfortunately, the computer hobbyist in New Zealand is not well supplied in this area, particularly if the budget for add-ons is rather restricted.

As I see it, the printer market in New Zealand falls into clearly identifiable bands:

1. Low-end personal computing use — up to \$800.
2. Top-end, home-computing and low-end, small-business use — \$800 to \$1500.
3. Top-end, small-business use — \$1500 to \$3000.
4. High-performance, heavy-duty commercial use — \$3000 and up.

Within band 1 are the cheaper 20/40-column, dot-matrix and thermal printers with very limited uses, a couple of very slow 80-column impact printers, and one quite fast new 80-column thermal

unit — Star STX80. This is a disappointing situation for the home hobbyist as these machines run fairly short on facilities.

Stretching one's resources to band 2 gives a much wider choice these days. Recent months have seen a number of new printers becoming available in this price range. Some of these are obviously identical mechanisms in different cases. All offer similar facilities, which for want of better words could be termed "Epson emulators", as that stalwart of printer technology has been around for a number of years with these features.

Typical of the options one expects from these units are speeds of about 80 to 150 characters per second, expanded and compressed characters giving up to about 132 characters per line, vertical and horizontal tabbing, selection of character fonts, block and bit-map graphics capabilities, friction and pin or tractor paper feed. Some, not all, have print buffers of various capacities, and most have bidirectional print-head action. The only drawback with them is the noise level, which varies according to case and acoustic damping design.

The accompanying chart presents in condensed form the important parameters of printer choice such as: price; type of mechanism; maximum characters per line; maximum print speed on normal font; standard fitted interfaces (adding a serial interface to a parallel printer can cost considerably extra); bit map graphics capability; standard paper feed options; bidirectional logic-seeking print head; and buffer size if any. The only sure way of choosing a printer is to try it out and make sure it suits your requirements and machine.

Printers up to \$2000 retail price in N.Z.

| Model Name | \$NZ | Type ¹ | Max. cols. | Speed (cps) | Standard ² Interface | Bitmap Grafix | Paper ³ Feed | Bidir. Print | Buffer Size |
|---------------|------|-------------------|------------|-------------|---------------------------------|---------------|-------------------------|--------------|-------------|
| 3M Whisper | | | | | | | | | |
| Writer 1482 | 1522 | T | 80 | 35 | S | N | F | Y | |
| Alphacom | | | | | | | | | |
| Sprinter 40 | 425 | T | 40 | 160 | P/S | Y | F | N | 1 line |
| Amber 2400 | 395 | I | 24 | 17 | P/S | Y | F | N | |
| Amust 80DT | 850 | I | 131 | 80 | P | Y | F/T | Y | |
| Brother EP-22 | | | | | | | | | |
| (Aust)329* | | I | 80 | 17 | S | | F | | 2K |
| Brother HR-15 | 1495 | D | 165 | 13 | P | N | F/T | Y | 3K |

PRINTER ROUNDUP

| | | | | | | | | | |
|------------------------------|-------------|---|-----|-----|-----|---|-----|---|------------|
| C.Itoh 1550B | 1995 | I | 136 | 120 | P | Y | F/T | | |
| C.Itoh 8510B | 1570 | I | 136 | 120 | P | Y | F/T | | |
| C.Itoh Prowriter II | 1895 | I | | 120 | P | Y | F/T | Y | 1K |
| Canon A-1200 | 1794 | I | 136 | 120 | P | Y | F/T | Y | 1 line |
| Centronics 122 | | I | 132 | 120 | P | Y | F/T | Y | 2K |
| Commodore 1525 | 795 | I | 80 | 30 | S | Y | T | | |
| Commodore 1526 | 995 | I | 80 | 80 | S | Y | F/T | | |
| Compute Mate | | | | | | | | | |
| CP-80 | 990 | I | 142 | 80 | P | Y | F/T | | |
| Digital LA50 | 1613 | I | 132 | 100 | S | | F | | |
| Digitec 6430 | 1157 | E | 32 | 40 | P/S | N | F | | |
| Epson MX80 | 995 | I | 132 | 80 | P | Y | F/T | Y | |
| Epson FX80 | 1600 | I | 132 | 160 | P | Y | F/T | Y | 3K |
| Epson RX80 | 1158 | I | 137 | 100 | P | Y | F | Y | |
| Epson RX80 F/T | 1344 | I | 137 | 160 | P | Y | F/T | Y | |
| Facit 4510 | 1715 | I | 80 | 120 | P/S | Y | F/T | | |
| Gemini 10X | 885 | I | 132 | 120 | P | Y | F/T | Y | 2.3K |
| Gemini 15X | 1257 | I | 136 | 120 | P | Y | F/T | Y | 2.3K |
| IDS Micro Prism | 1670 | I | 132 | 110 | P/S | Y | F/T | Y | 1.4K |
| Mannesmann Tally | | | | | | | | | |
| Spirit | 954 | I | 142 | 80 | P | Y | F/T | Y | |
| Mannesmann Tally | | | | | | | | | |
| MT160L | 1977 | I | 160 | 160 | P | Y | F/T | Y | 80 chars. |
| Microline 80 | 972 | I | 132 | 80 | P | N | F/T | Y | |
| Microline 82 | 1413 | I | 132 | 120 | P/S | N | F/T | Y | 1 line |
| Microline 83 | 1997 | I | 136 | 120 | P | N | F/T | Y | |
| Microline 92 | 1606 | I | 80 | 160 | P | N | F/T | Y | |
| NEC Pinwriter | | | | | | | | | |
| | approx.1800 | I | 136 | 180 | P | Y | F/T | Y | 2K |
| Pacesetter | 989 | I | 132 | 80 | P | Y | F/T | Y | |
| Seikosha GP100 | 555 | I | 80 | 30 | P | Y | P | | |
| Seikosha GP250X | 684 | I | 80 | 50 | P | Y | P | | |
| Sekonic S-201GP ^s | 1500 | I | 80 | 76 | P | N | T | Y | |
| Star DP-8480 | 1199 | I | 132 | 80 | P | Y | F/T | Y | |
| Star STX-80 | 462 | T | 80 | 60 | P | Y | F | Y | |
| Texas Omni 850 | 1799 | I | 164 | 150 | P/S | Y | F/T | Y | 4K |
| Zenith Z25 | 1400 | I | 217 | 150 | S | N | T | Y | 256 chars. |

Notes: this is by no means a complete list of all available printers in this category. Importers are invited to send details of any not included to: Shayne Doyle, 18 Holdsworth Ave, Upper Hutt.

1. Printer Type : T = Thermal I = Impact dot matrix D = Daisywheel E = Electrosensitive
 2. Std Interface : S = Serial P = Parallel
 3. Paper Feed : F = Friction T = Tractor P = Pinfeed
 4. No N.Z. price available yet for the Brother EP-22
 5. The Sekonic Z-201GP is a printer/plotter
- CPS in the speed column stands for characters per second.

Comx 35:

A fine colour machine

By Brian Conquer

The Comx 35 is very compact, measuring only 29 by 16 by 4.5 cm. It has a nice feel to the keys, which are not of the membrane type. The machine is well presented and very sturdy, giving a clean uncluttered look.

The hardware contains 16K ROM, a built-in speaker driven by an LM386 with a nominal audio output of 250 mW, providing ample volume in the home (in fact, an audio on/off would have been welcome at times for volume is software controlled in four steps but there is no "off").

Programs are loaded by the built-in cassette interface at about 300 bps (slow, but common to many micro's) by the BASIC command, PLOAD, or are saved by PSAVE. You hear the pages of data, via the built-in speaker with tone between blocks, but it would be nice to see block numbers or even a flashing spot as it loads.

The machine has a Gaussian, white-noise function for explosions, phasers, etc, with eight selections of frequency range and 15 amplitude settings including (0).

MUSIC command gives a range of

handy facility. All keys are software decoded except the RESET, which returns you to start-up and wipes out any program in memory (however, to do this you must also operate the space bar at the same time — a nice safeguard).

The screen is 40 x 24, with a nice look to it. The characters are well defined and look good. There is a wide selection of graphic characters and a SHAPE command, which makes the mind boggle. You can replace the output from the keyboard with any shape on a 6 x 9 matrix. This means that any shape you wish to produce and define with a series of hex numbers will be produced. An example given is a Chinese character. In addition, you can set it to one of the eight colours.

For screen colours there are three BASIC commands: COLOUR, SCREEN, CTONE. These set the background full screen and you can get keyboard response or computer response in any one or more of the other eight colours. You can get your screen flashing on and off with the different colours and your characters or graphics in other colours.



The name Comx 35 indicates 35K RAM.

The first thought is: it cannot have all that memory in this size.

When you see the wall-plug pack power supply you may wonder, too, but the system is based on a CMOS central processing unit. The 1802A and most chips are CMOS, the others are 74LS types, therefore power drain is low.

The documentation is in the form of an open, flat, spiral-bound book. In some cases it is very good. In other cases the examples assume you know a lot. There is no real technical or hardware data in the manual. I was told that it was only an interim manual and that a new one was to be produced containing the technical details. This will be a must, as many users will want to extend the system using the extension socket on the side.

eight notes and eight octaves. TONE gives 128 notes and a range of eight octaves. The notes can be long or short, loud or soft. The graphics set contains two music notes and music can be played while the program runs with these built-in functions.

I liked the built-in stick controller, which is not really a joy stick with full quadrant control, but a four-position switch. You do not hold it over or the keyboard auto repeat function comes into use.

Auto repeat on all keys is a very

Real-time applications are made simple with TIME, TIMEOUT, and WAIT. Time starts an internal timer, which, when it reaches zero, jumps to a BASIC GOSUB routine specified by the TIMEOUT line number. Wait allows you to insert in a program intervals, in increments, of approximately 8 ms.

RENUMBER is great if you have a

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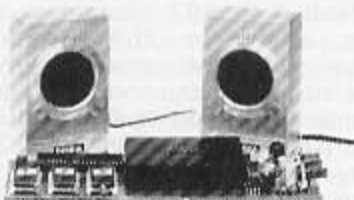
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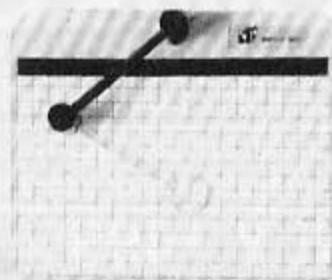
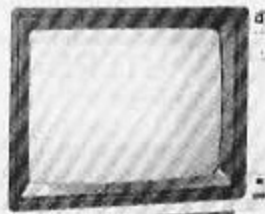
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HARDWARE REVIEW

tidy mind and like even numbers. TRACE is excellent for debugging. RUN + can speed up the running at a program by changing "interpretive branches" with "absolute address branches".

The machine has a Gaussian, white-noise function for explosions, phasers, etc, with eight selections of frequency range and 15 amplitude settings including (0).

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I liked the built-in stick controller, which is not really a joy stick with full quadrant control, but a four-position switch. You do not hold it over or the keyboard auto repeat function comes into use.

Auto repeat on all keys is a very handy facility. All keys are software decoded except the RESET, which returns you to start-up and wipes out any program in memory (however, to do this you must also operate the space bar at the same time — a nice safeguard).

The screen is 40 x 24, with a nice look to it. The characters are well

Microcomputer summary

| | |
|--|---|
| Name: | Comx 35 |
| Clock speed: | 4 MHz |
| RAM: | 35K, 32K user available |
| ROM: | 16K |
| I/O: | 44-way expansion port. PAL compatible colour TV signal. Standard cassette input. |
| Keyboard: | QWERTY layout. Little smaller than normal, with 54 keys, space bar, and built-in joystick. |
| Language: | Logo enhanced BASIC. Forth optional. |
| Display: | 40 x 24 characters or 40 x 24 graphics characters. 51,840 pixels set up as 6 x 9 plus 2 for colour. Approximately 100 characters in ROM and infinitely variable with "basic shape" command. |
| Sound: | 250-300 milliwatts with built-in speaker. |
| Cost: | \$595 |
| Reviewer's ratings (out of 5): | Documentation 3, ease of use 4, language 5, expansion 3, support 5, graphics 5, value for money 4. |
| Reviewer's system from Micromart Computers, Ltd, 415 Dominion Road, Mt Eden, Auckland. | |

defined and look good. There is a wide selection of graphic characters and a SHAPE command, which makes the mind boggle. You can replace the output from the keyboard with any shape on a 6 x 9 matrix. This means that any shape you wish to produce and define with a series of hex numbers will be produced. An example given is a Chinese character. In addition, you can set it to one of the eight colours.

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by the TIMEOUT line number. Wait allows you to insert in a program intervals, in increments, of approximately 8 ms.

RENUMBER is great if you have a tidy mind and like even numbers. TRACE is excellent for debugging. RUN + can speed up the running at a program by changing "interpretive branches" with "absolute address branches".

Over all, the BASIC has many good points and some not so good. Strings are limited to 127 characters and string arrays to 255 elements. Arrays may be one or two-dimensional and can consist of up to 26 arrays [A (expr) to Z (expr)] and 26 strings, with a maximum of 255 in any dimension.

The mathematical commands are very extensive. They include natural logarithms, but not logarithms to the base 10. The Comx 35 has several trig functions as well, plus a random-number generator.

For error messages I found that I was turning the relevant page in the manual quite a bit at first as I experimented with the commands, etc. There are no error messages. There are, however, 73 "error codes" which you turn to and find the error of your ways. You should read the list to see what the system tests for, what it is capable of, and what is to come.

I was supplied with the demonstration tape which comes with the machine and with 12 others. There is a good range of software on tape: educational, games and personal.

The Comx 35 is designed and manufactured by Comx World Operations, Ltd, in Hong Kong.

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ORIC 1

Impressive small machine

By Nick Alexander

Being asked to do a review of a new home computer inspired feelings of "I've seen all that before", however I have been pleasantly surprised in giving the Oric-1 a work-over. I received the machine with about 10 games, software tapes, a monitor program for machine language, the manual, and leads.

The Oric is attractively designed. The keyboard sits up on an angle; the push-button type keys sit beneath your fingers ready for typing. The small button-type keys are relatively easy to use, being adequately spaced for adults' hands, but needing slightly too much pressure. The keyboard layout is much the same as a business computer's keyboard: the space bar is across the bottom, with cursor control keys around it. The keyboard "plinks" when keys are depressed, and "plonks" when return is pressed. This can be toggled on and off with Control-F.

The Oric has eight colours (including black), used for both "paper" and "ink" (foreground and background colour). Using Control-T a typewriter mode is activated — giving you lower case letters and capitals when shift is pressed. An excellent feature also is a parallel printer port. The dot-matrix printer will connect to this directly. The Oric thus seems suited to simple word processing applications.

There is also a 34-way edge connector — for expansion to micro-floppy drives. These are not yet available. Other connections are cassette and RGB video plugs and a UHF modulated TV connection, which I had no difficulty in tuning to a clear image on a TX9 colour TV set once I had tuned a channel to it.

Inside, a 14-way connector is waiting for something not mentioned

in the documentation. It looks like an extension of the sound and music functions.

The Oric is driven by a 6502 microprocessor with a dedicated sound chip. There is a space for ROM expansion (on board word-processing maybe?).

A magazine is published in Britain for Oric owners. Called *Oric Owner* it contains a number of useful programs and games. Issue 3 (which was given to me also for review) included a Blackjack game, an adventure game, a ski-ing game and a re-number utility.

The Oric uses Oric Extended BASIC Version 1.1, which is explained reasonably well in the manual for the beginner, along with some good coverage of computer fundamentals. The BASIC supports a wide range of functions including sound creation, six octaves of pre-programmed notes, sound envelopes, three sound and music channels, plus four pre-programmed video game sounds: PING, ZAP, SHOOT, and EXPLODE — all realistic.

Oric BASIC supports two significant letters for variable names, which can be of any length. So you can use variables such as "DOLLARS" or "PROFIT", but the latter would mean the same as "PRICE". It has floating-point decimals up to nine significant figures and two graphics screens.

High-resolution graphics are supported and individual characters may be re-defined. Double-height characters, flashing characters, circles (which came out on my TV as

ovals), and a range of logical, non-clumsy graphic BASIC commands make a graphics package which starts to measure up to the claims touted so often of "anyone can program in this simple BASIC language..." It is getting well within reach here, without too much complex machine code to write and play a decent game written in BASIC! Machine code and assembler is also available in the catalogue of Oric products.

The cassette operates at a fast and slow rate, 2400 and 300 baud. It is pure relief to see a cassette load in less than a minute or so, and have reliable copies also. Micro disk drives should be available in the future, making data storage faster. With disk drives and a printer, this could be the basis of a small-business



The Oric 1

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HARDWARE REVIEW

Microcomputer summary:

| | |
|--------------------------------|--|
| Name: | Oric 1. |
| Microprocessor: | 6502 8-bit. |
| RAM: | 48K (47870 useable). |
| ROM: | 16K. |
| Input/output: | Cassette, parallel port, VHF & RGB video outputs, 34 pin expansion connector. |
| Keyboard: | 57 hard plastic moving keys; key press response beep. |
| Display: | Text 40 x 28 lines, (3 lines used for control and system information). |
| Languages: | BASIC, 6502 machine language. |
| Graphics: | 200 x 240 pixels, Teletext/Viewdata compatible, 96+ definable characters. |
| Sound: | 3 channels of six octave music or noise from dedicated sound IC, pre-programmed ZAP, SHOOT, PING and EXPLODE sounds, envelope generator, internal 2.5in speaker. |
| Cost: | \$695. |
| Peripherals: | Cassette, parallel port. |
| Options: | Forth, printer. Yet to be supplied: 3in micro floppy-disk drives, serial interface, modem. |
| Software: | Imported and locally written, <i>Oric Owner</i> magazine. In addition, many Apple, Commodore 64 and Sinclair programs would be convertible. |
| Reviewer's Ratings (out of 5): | Documentation 4, ease of use 3, value for money 3, language 5, expansion 4. |

Machine supplied by Barr Bros Computers Ltd, Papakura.

system, provided that volumes were small to very small, as it would take some time to enter up batches of invoices, etc, through the keyboard.

Looking at the debit side

Having been impressed by this "little" computer what criticisms could I have?

My pet hate of non-typewriter keyboards seems to have been made clear. The small hard keys, though better than a "membrane" type, take a slightly heavier touch than a touch typist would want to use but for the purposes of home computing they serve.

Oric extended BASIC supports a wide range of commands, but an obvious omission was the AUTO command (for automatic line-numbering when entering programs), and a key or control character for freezing the display. But Oric compensates for the inconvenience with REPEAT/UNTIL conditional looping for structured programming; a screen type editor which is similar to (but easier and better than) Applesoft cursor editing; a screen display of 38 by 26 characters in text mode or 39 by 26 in LO-RESOLUTION modes; HI-RESOLUTION screen of 200 by 240 pixels plus three lines of text.

When you blunder it gives descriptive error messages. It says syntax error rather than error code 13.

Upper and lower case are available, but there is no caps lock, although Control-T toggles the typewriter mode and suffices.

When disk drives are added, a further extended BASIC would be needed with a disk operating system.

In the ever-more-confusing home-computer market, it is the outstanding user-oriented features that make (or break) a computer, as well as the company backing it.

In a market including the Sinclair Spectrum, Commodore 64, Spectra-video, SORD-M5 and Comx-35 — the Oric 1 should survive provided a sufficient user base for it is established and software is available for it.

So far there is a list of about 30 available educational (simulation type) games; "Space Invader" type games (including an excellent rendition of the arcade "Centipede" game in machine code); a few business programs — data base, word-processing, etc; graphics and sound.

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Do you use a microcomputer?

Yes/No

If yes, which brand?

Main area of interest?

Spectravideo
SV-318One nifty
feature
after
another

By Martin Downey

When I went to collect the Spectravideo computer for review I had preconceptions. There are so many home computers around already that my first impression when I saw the glossy cardboard box was, "Not another one!" But once out of the box the computer started to take on a new appearance as I discovered one nifty feature after another.

The computer case is white plastic with keys of grey with white markings. Although the keys are rubber they are in the full size QWERTY layout. There is a long space-bar, two shift keys and a caps-lock key with LED. There are two graphic symbols above most keys and these are accessed using the LEFT-GRAPH and RIGHT-GRAPH keys.

There are 10 programmable functions keys (five physical keys used with SHIFT). On the right of the keyboard is the first "nifty-feature", an eight-way cursor pad which doubles as a joystick by inserting a red knob (a spare knob is also supplied). This cursor pad is used in association with these other keys (called "Wordprocessing keys") to give very powerful, easy-to-use full-screen editing of BASIC programs. This is a considerable improvement on the standard Microsoft EDIT command. The three editing keys are CLS/HOME (home cursor and/or clear screen), INS/PASTE (insert mode on/off) and DEL/CUT (delete character). A fourth key SELECT is not mentioned in the documentation, but its close proximity to the cursor pad suggests a "mouse-like" use given appropriate software (shades of the Apple LISA).

Both the power supply and VHF modulator are external to the computer and there is also a

*The Spectravideo SV-318*

TV/Computer switch box. All this makes for quite a jumble and makes the system much less portable than the glossies imply.

The back of the computer reveals an expansion socket and the cassette socket. The Spectravideo cannot use a standard recorder so this means an additional cost of \$129. However, the special recorder will load and save programs at 1800 baud, which is quite a bit faster than can be achieved with the average home cassette recorder. I did not get a chance to review the recorder, so I cannot comment on reliability.

On the right of the computer is the power socket and on/off switch as well as two joystick ports. These are standard sockets so most brands of joysticks should be compatible. The sockets are also used for an optional graphics tablet, which at \$199 looks worth-while. However, details of the tablet were scarce and its usefulness would depend on appropriate software being available.

At the top right of the computer is

the games cartridge socket, which is nicely concealed under a hinged door. Prices for cartridges range from \$18 to \$40, which is quite good value when you consider that cassette-based software from some other computers costs just as much. The advantages of ROM cartridges cannot be overstated. Instant loading, no degradation (unless you violently misuse them), and virtually no home pirating. I had the opportunity to try out two such game cartridges: Frantic Freddy and Super Cross-Force. Frantic Freddy is a brilliantly addictive game with great graphics. The scenario is an old-apartment block (complete with graffiti!) with you as the fireman trying to extinguish the flames and rescue cats. Great fun and ideal for "kids" of all ages. Super Cross-Force is less spectacular, but is still a challenging Invaders-style game for those not spoilt on more elaborate computer games.

If you have a cartridge in place when the computer is switched on

HARDWARE REVIEW

then that program will automatically be run otherwise the computer will come up in Microsoft BASIC. It is this BASIC that really sets the Spectravideo apart from its competitors.

The first noticeable feature of the BASIC Operating System is the automatic self-test at power-up. This takes just a fraction of a second and then the company logo appears. After this you are into extended Microsoft BASIC. This is the version of BASIC found on most CP/M and MP/M machines with additional commands for sound and graphics.

POWERFUL FUNCTION-KEY SYSTEM

The computer powers up in screen mode 0 which is 40 x 23 text. The default colours are white-on-blue, which gives a surprisingly readable display even on a poorly adjusted TV. I cannot understand why some other home computers still make do with just 21 or 32 column text. The colour scheme can be changed to any combination of the 16 available colours.

There is also a twenty-fourth line in this screen mode which shows the function-key definitions.

This line is automatically changed to show the shifted definitions every time SHIFT is pressed. The keys are loaded with default definitions such as RUN and LIST when the computer is turned on, but are easily changed to any 15-character ASCII string using the KEY commands.

Altogether this is a very powerful system usually found only in up-market business machines and it certainly outshines the use of function keys on other home computers. Another BASIC command, ON KEY GOSUB, which works under interrupt, adds still more to the computer's power.

Other commands of note are:

- ON STRIG GOSUB, which branches whenever the joystick fire button or space-bar is pressed.
- ON SPRITE GOSUB, which branches whenever two sprites (defined pictures) collide.
- PLAY, which plays a tune using a Music Macro Language giving notes A-G sharps, flats, change octaves, tempo, volume...
- DRAW, which draws pictures using a Graphic Macro Language with commands for up, down, left, right, angle, diagonal, colour, scaling...
- SOUND, which controls the four

Microcomputer summary

| | |
|----------------------------|---|
| Name: | Spectravideo SV-318 |
| Manufacturer: | Spectravideo, U.S.A. (Hardware from Hong Kong, Software from Tokyo division of Microsoft). |
| Microprocessor: | Z80A |
| Clock Speed: | 3.6 MHz |
| RAM: | 16K video + 16K user built in. Expandable to 144K externally (bank switched) |
| ROM: | 32K Microsoft BASIC built in. Expandable to 96K externally. |
| Input-Output: | Expansion slot. Cassette port (non-standard). 2 x joystick ports (also used by Graphics Tablet). Game cartridge socket. |
| Keyboard: | 54-key standard QWERTY, 10 programmable (5 physical keys), 2 graphic function, 4 editing, 8 way joystick/cursor-keypad, STOP key. Rubberised keys. |
| Display: | Composite video output through VHF modulator to standard TV (Channel 2). Includes sound. |
| Languages: | Microsoft Extended BASIC built in. Disk BASIC and CP/M options available. |
| Graphics: | SCREEN 0 — 40 x 23 (plus function-key line) text & graphic characters only, 2 colour. SCREEN 1 — 256 x 192 graphics, 16 colours, 40 x 24 text. SCREEN 2 — 64 x 48 graphics, 16 colours, 11 x 6 text. |
| Sound: | 3 channels of music (7 octaves) plus 1 channel noise. |
| Price: | \$899. |
| Options: | SV-328 Business version (\$1475 total). |
| Peripherals: | Super expander (\$359), mini expander (\$41) Games adapter — runs COLECO games (\$216) Dot-matrix printer with interface card (\$1245) Floppy-disk drive — 173K (\$995) Cassette drive (\$129), graphics tablet (\$199) External joysticks (\$27.50 each) Interface cartridge for expander units: Disk drive cartridge, CP/M + Disk BASIC (\$331) Centronics interface (\$193) RS232 interface (\$193) 80 column card (\$345), modem card (\$322) 16K RAM card (\$106), 64K RAM card (\$350) Games cartridges \$18-\$40 each. |
| Other features: | Out of 5. Documentation 3, ease of use 5, language 5, expansion 4, value for money 4. |
| Reviewer's ratings: | |

Review Unit From: Computer South, 78 Oxford Terrace, Christchurch

sound channels including envelope information.

- CIRCLE, LINE, PAINT, POINT, GET, PSET, PRESET.

The list goes on, but one command I must give special mention to, because I have not seen it in any other version of BASIC, is ON INTERVAL =n GOSUB. This command lets you specify a routine that is executed every n/60 seconds. Such programmable interrupts are usually available only through machine code. By making them available from BASIC the door is opened to all sorts of industrial and home-control applications. Brilliant!

Another command of awesome power for a machine its price is SWITCH. This lets you switch

between banks of memory if you have the optional extra RAM installed. Used in conjunction with the interrupts "multi-tasking" is possible (running two or more programs concurrently). "Are you sure this is just a home computer?"

I have already mentioned screen mode 0 which is just text and graphics characters (similar to PET graphics). SCREEN 1 is true high-resolution graphics with 16 colours. SCREEN 2 is low-resolution graphics with 16 colours. The low-resolution mode of 64 x 48 has very limited applications, but would probably be useful for those just learning about computer graphics. A medium resolution of 128 x 96 would have been more useful.

HARDWARE REVIEW

Screen mode 2 with 256 x 192 pixels is the optimum resolution from a programmer's point of view. Higher resolutions are nice to have, but seldom get used because of the extra programming involved.

On the surface the documentation appears very good. It comes in a glossy ring-binder and includes lots of pictures. The sections on setting up the computer and the introduction to BASIC are very good, but there is not enough explanation of the more advanced commands. I had to find out about a number of the commands through trial and error. A removable booklet in the back of the ring-binder acts as a quick-reference guide to BASIC, but some of the commands are never explained in detail at all. There is certainly room for follow-up material. The English used is good (certainly not Asian-English), but there are too many frustrating typographical errors.

The SV-318 can certainly be expanded well beyond most other home computers and since all additions are just "plug in" they are ideal for the novice. However, such expansion is generally more expensive than buying all-in-one so if you want many of the options, one

of the higher-priced computers may be cheaper in the long run.

A Business version (SV-328) is also available although one was not yet available here for review. This has a proper 87-key typewriter keyboard including cursor keys and a numeric keypad. It also has 48K ROM and 80K RAM built in and at \$1475 with the option of running CP/M it is a very competitive business machine (plus it will run the SV-318 games!).

Conclusions

- Good colour and sound.
- An excellent version of BASIC.
- Ample expansion options.
- Lots of nice little features that make the computer fun to use.

Sample listings of Spectravideo BASIC.

LISTING 1: Use of interrupts

```
10 INTERVAL ON
20 ON INTERVAL=10 GOSUB 100
30 FOR I=1 TO 3000
40 PRINT I;
50 NEXT I
60 END
100 PRINT "****";
110 RETURN
```

LISTING 2: Use of sprites and sprite collisions

```
110 SCREEN 1: 'High resolution
120 ON SPRITE GOSUB 240: 'For collision
130 SPRITE ON
132 '
135 'Read in picture of ball for sprite
140 FOR T=1 TO 8
150 READ A$
160 S$=S$+CHR$(VAL("&B"+A$))
170 NEXT T
180 SPRITE $(1)=S$
182 '
185 'Move 2 sprites till they collide
190 FOR I=1 TO 256
200 PUT SPRITE 0, (256-I, 96), 8, 1
210 PUT SPRITE 1, (I, 96), 7, 1
220 NEXT I
230 PRINT "MISS": GOTO 230
235 '
240 PRINT "HIT": GOTO 240
245 '
250 DATA 00011000
260 DATA 00111100
270 DATA 01111110
280 DATA 01111110
290 DATA 01111110
300 DATA 01111110
310 DATA 00111100
320 DATA 00011000
```

LISTING 3: Use of DRAW and PLAY

```
10 SCREEN 1
20 BOX$="C8U50R50C7D50L50"
30 DRAW BOX$
40 '
50 HAPPY$="S5LBC64R64C64DCEF"
60 PLAY HAPPY$
```

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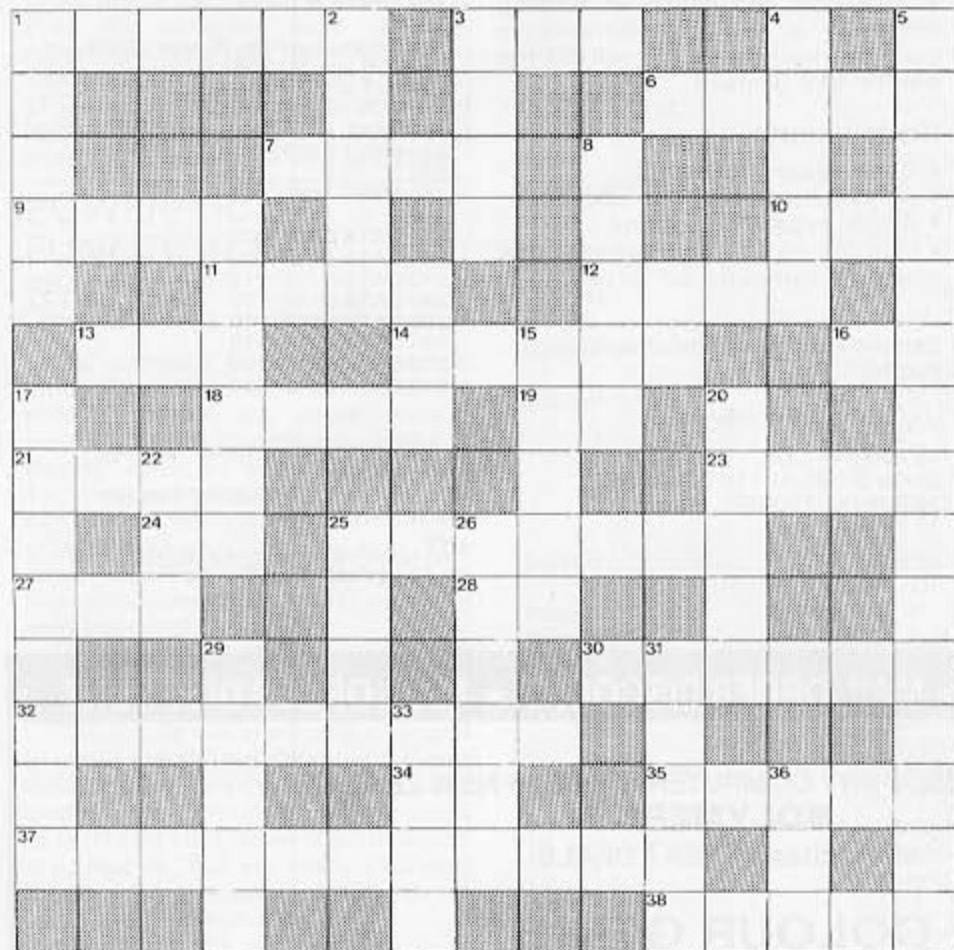
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Silicon Crossword



By Elfelfa

In the crossword normal conventions are followed except a # in the answer length indicates one or more numbers rather than letters.

Across

- 1: This one from Intel really has hexadecimal parts (2,4#).
 3: To destroy one's disk in a manner reminiscent of flavoured milk (3).
 6: Unlike the farmer's wife, Lisa has only one (5).
 7: Seems two more than 1 Across but actually eight fewer on the bus (4#).
 9: Sounds like the moaner that put an enigmatic smile on Steve Jobs' face (4).
 10: Cecil's lusty silicon, or just the Lincoln capping magazine? (3).
 11: Does this computer go red when you boil it for that special meal? (4)

- 12: Long John's shoulder burden is a true Kiwi (4).
 13: Initially a battered bride's computer (1,1,1).
 14: A headless terror in everyone's programming efforts (5).
 16: The only way an off bit can go? (2).
 18: A parity that is not weird (4).
 19: The initial start of the Bible could be rather warm for a Cockney (1,1).
 21: Stamps without their holy men could burn your circuits with excess (4).
 23: A cricketing haven reminiscent of a circle on some computers (4).
 24: Home of the micro could be read to be you and me (1,1).
 25: Fiddled by a famous office automator? (7).
 27: Something to catch the school buyer in? (3).
 28: Could be a question but sounds like ASCII 65 (2).
 30: A computing star of the first magnitude too? (6).
 32: Do I hear a peculiar levy on misdeeds? We all have it at times (3,6).
 34: Adam Osborne's position regards the creek? (2).
 35: A cragless mediator may yield the very material of magnetic storage (5).
 37: A grudge for Sandy to carry on his shoulder? (7,4).
 38: Memory that should be hidden treasure (5).

Down

- 1: The fruit of the tree of knowledge just for teacher? (5).
 2: One of the few things Apple, Atari, and Acorn agreed on (4#).
 3: Sinclair's Salvation at the alphabet's end times hexadecimal 51 (1,1,2#).
 4: A question for the database rhyming with eerie (5).
 5: The final stages of mainframe computer addiction? (8,7).
 8: An adolescent pixel? (1,4).
 15: I hear a dog, but perhaps just a fair comment on many rushed releases (5).
 17: Many coloured micros from Digital Equipment (8).
 20: A translator, or a machine-language freak (5).
 22: Playing a stroke on the green without a tee provides a very genteel Poke (3).
 25: Sounds like the disk is old, but it could alert someone (4).
 26: Australian computer of the year ... and acronym, too (1,1,1,1,1,1).
 29: Could be read to be like a chip connector ... but in fact is just what a disk needs (1,4).
 31: Big Blue's blues for every other manufacturer? (1,1,1,1,1).
 33: Get the most from a chip ... or the product of the SOUND commands (4).
 36: Initially the company sounds to be what sailors hit ... and Wall Street hit them in October (1,1,1).

• Answers: p91

Otago program

The University of Otago is running an introductory course on Pascal programming using micro's these summer holidays. The university is also holding a week-long introductory (or refresher) course in BASIC programming in January. Details on the courses from the Continuing Education Unit, Otago University Extension, Box 56, Dunedin.

Dynamism at the Tokyo Data Show

From Peter Hyde



in Tokyo

Take the average New Zealand A & P show. Multiply it in size by three and quadruple again the number of people visiting it. Make the subject of the show entirely computers and related products, and you have something close to the Tokyo Data Show. Held from October 18 to 21, this annual show occupies three huge exhibition halls at the World Trade Centre in Harumi.

From this show, I have gleaned enough material for five articles, but what with the speed at which this information becomes dated, I will try to stick to the main points in one long summary.

All major Japanese computer companies attended, and a lot of minor ones, many unknown outside Japan. Several of the smaller efforts belonged to the computer divisions of large companies better known for other products and services (e.g., Mitsubishi). It seems every sizeable Japanese corporation has a stake in this business nowadays.

There was a notable absence of the traditional overseas micro manufacturers at the show. If there was an Apple, Spectrum, Commodore, Dick Smith, Sirius or Osborne at the show, it was not easy to find. However, the "giants" of the international computer industry were well represented, with entries from IBM, Burroughs, DEC, and Nippon Data General among others. Undoubtedly the biggest crowd-pullers, however, were the "local boys": NEC, SORD and Fujitsu (PANAFACOM). This was closely related to their present standing in

the Japanese market.

For a first-time visitor to this event, the methods of showmanship employed were almost as fascinating as the equipment on display. The standard method of promoting a stand was to hand out carry-bags (for the mountains of brochures) in exchange for a business card or contact address.

Some methods were more original. National Panasonic used an "office computer" skit and a voice-recognition demonstration (alas, unconvincing) to attract attention. SORD "spaced the word" with a multitude of stick-on "animals" which were seen bobbing on shoulders over the show. It also had a three-dimensional holofilm which certainly fascinated the onlookers.

Many stands had huge video screens showing computer output or films. However, most noticeable was the incessant noise from hundreds of loudspeaker systems — so much so that the show resembled a New Zealander's conception of an Arabian bazaar, with the notable addition of 1000 watts/channell.

For foreign visitors, English-speaking helpers with English-language brochures made some stands (in particular Panasonic, Sharp and SORD) more informative. Surprisingly, IBM seemed unable to

help in either regard.

The competition for the biggest stand at the show was a close fight between NEC and IBM (luckily, in separate pavilions). NEC had a frontage running the full width of one building, whilst IBM stuck to a more compact (but just as expensive) modular design.

NETWORKS IN VOGUE

Before launching into an analysis of the most notable exhibitors, it's worth summarising what trends were visible among most of the offerings...

On the hardware scene, networks were very much in vogue — from the simple LAN (local area network) to major globespanning designs (such as DECNET). The Apple Lisa (in absentia) has had a great effect on hardware design, with bit-mapping and the ubiquitous "mouse" appearing all over the show. Paradoxically, IBM PC software compatibility and appearance was the other dominant effect from overseas.

Colour and high-resolution graphics are here to stay judging by their proliferation at this show. The time seems to be near when the

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JAPAN REPORT

green CRT will be as dated as the black and white television set.

In the area of innovations, a 9.6 Mb floppy disk from Hitachi should wake a few people up. So should the appearance of a 32-bit desktop minicomputer. Finally, voice recognition is making hesitant steps out of the laboratory.

The software scene was even more interesting. While IBM compatibility is desirable, it seems that the inherent limitations of MSDOS (single user, only 8 Mb of disk support) are driving manufacturers towards a better operating system as the low-powered 8088 CPU is superseded. The absolute winner here is UNIX, together with its family of "lookalikes" such as UNOS, SPHINX and XENIX. The growing popularity of the 68000 CPU over the 8088/8086 probably has a lot to do with this.

Finally, the proliferation of CAD (computer-aided design) machines indicates that this market is set to boom overseas as it is now doing in Japan. The announcement by one manufacturer of intentions to

develop a \$US10,000 PCAD (Personalised CAD) system in the coming year should accelerate this growth substantially when you consider that most current systems, running on mini's sell for between \$US100,000 and \$US200,000!

IBM surprised nearly everybody by seemingly ignoring the PC in its stand this year. Instead, it concentrated on the new 5550, an unattractive machine designed to fill the gap between the PC and IBM's smallest minicomputers. One theory circulating at the show was that since the PC was manufactured by Matsushita, IBM was too embarrassed to show it in its native country! However, its stand exuded a feeling of quiet confidence.

NEC's stand was most impressive. Its biggest crowd-pullers were the newly announced PC-9801 and PC-100, both a long way ahead of the baby PC-8000 on sale in New Zealand this year. Both machines featured a mouse, and Lisa-style graphics. The PC-100 was powered by twin 8086 processors thus giving it the best of both (IBM and Apple) worlds as it was able to run MSDOS. It even offered a mouse-oriented Multiplan!

Most significant about the new NEC machines (apart from excellent software) was their price, which should cause Apple some discomfort when they are exported. However, their display setting (cramped as it was by onlookers) gave a lesson in the disadvantages of a mouse: the requirement for desk space, and the need for the operator to move hands away from the keyboard to use the mouse. Perhaps some bright New

Zealand engineer can come up with a keyboard based device that beats the mouse.

SORD displayed several new products, as well as the popular M5 home computer. (The latter was on display elsewhere in the show under the OEM brand, Takara.) New products included the Z80B-based (6MHz) multi-terminal M243EX, the dual Z80A/68000 M68, and a star of the show, the 32-bit desktop M685 (more about that later). SORD also had a sample setup of its low-cost local area network called SNET, which transmits information between up to 128 computers at 1 Mbit/second.

HAND-HELDS THAT 'HEAR'

National Panasonic had good attention-getters in its hand-held computers, one of which (the JR600) featured voice-recognition capabilities. However, the operator was in an enclosed booth, spoke very slowly (one word every two seconds) and often had to repeat a word. From this, it is clear that this technology has not quite reached its prime (although it is obviously close). Other points of interest on this stand were specialist Chinese character input devices (a big market in Asia) and laser storage devices (alas, not erasable yet).

Sharp had an interesting model in its PC 5000 portable computer. This machine featured a 16-bit processor, 80 x 8 LCD, optional 80-column attachable printer, and optional bubble-memory cartridge. Unfortun-

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JAPAN REPORT

ately, the latter was only 128K, which rather limits the program/data storage of the machine in "portable" mode. However, it can attach twin minifloppies with MSDOS to become a desktop computer — but then the LCD becomes annoying. . . . It does seem that portables still await the software in particular to make them a truly powerful tool for the travelling computer user. Maybe the Gavilan (a recently announced United States entry) will provide the goods, but they have yet to commence manufacture of their product.

Fuji Xerox looked good until information from an insider revealed that, first, the communications "discoveries" on display are now two years old (ex-England); and, second, one of its microcomputer offerings was really a SORD M243EX with a Fuji label. However, the firm gave a very interesting demonstration of Smalltalk (a computer language invented by Xerox in the United States about the time it developed the mouse). Lisa's origins showed clearly in this display!

Fujitsu (No. 1 over IBM in the Japanese mainframe market) was pushing microcomputers under the PANAFACOM brand. It was even running UNIX on its larger systems. The best feature was the EPOC range of software modelled on SORD PIPS, and now No. 2 in the applications language market after PIPS. Multiplan, Visicalc, DBASE-II, and Supercalc are nowhere near as popular in Japan as PIPS and EPOC.

NEC'S PC-100 THE HIGHLIGHT

Undoubtedly, the biggest crowd-puller at the show was the NEC PC-100. This machine is significant in many ways — for example, the integration of Lisa-style features with MSDOS compatibility. The unique screen (which can be turned on its side and used length-wise), and the system price will also cause a stir in the computer market (rumours have it that NEC's next model will make the coffee).

The SORD M685 is a 32-bit 68010/68020 based minicomputer (they call it a "micro mainframe"). It will support four to twelve terminals for less than \$US40,000. A processing speed of 1.25 32-bit MIPS (million instructions per second) makes a humble Z80A-based machine (0.3 8-bit MIPS) look rather sad. Published user-benchmarks for this system have put it faster than the VAX 11/730 and in

the same league as the VAX 11/750 (both DEC minicomputers). Best of all, a joint venture between SORD and Charles River Data Systems of Massachusetts, has given the M685 full software support in the form of UNOS — a UNIX compatible operating system.

Hitachi's 9.6 Mb floppy disk seems set to eliminate the low-capacity Winchester market. As yet, however, price and supply details are not available. You can expect to wait at least another year before you see one on your desk. Even so, it will cause some engineers (who said the technology was still a year or three away) to think again!

As for the future, it seems that Japan is leading the United States in the areas of voice recognition and erasable laser-disk — two technologies which individually could transform this dynamic industry yet again!

There is tremendous power and innovation present in Japan, combined with sound management. The net result is a range of computer products eclipsing American counterparts in price and performance. Most important, this power is combined with a tremendous range of impressive software.

New Zealand distributors of United States and British equipment who still believe and propagate the myth that "Japanese computers have no software" are going to be in for an uncomfortable time in the next year or two!

Sinclair cartridges

Just four months after it announced its intentions, Sinclair has marketed its ROM cartridge expansion add-on (surely a record for Sinclair?). Called the Interface 2, it allows the owner to attach joysticks and a single ROM cartridge at any time. The first ROM offerings are games software of a fairly well-worn kind at roughly 15 pounds. The interface itself, which plugs into the edge connector, has a slot included for the printer and costs five pence under 20 pounds in Britain.

IBM/Hitachi accord

IBM and Hitachi have jointly announced a settlement of existing litigation between the companies. Both companies said that this settlement is an important step to enable their organisations to restore the excellent relations which have traditionally existed between them.

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This is the new Commodore 64 Personal Computer. It costs \$995. Not bad for a brilliant piece of technology with a 64K memory. But then, it's a Commodore.

And as one of the world's leading high-performance micro-computer companies, we're not exactly unknown when it comes to outstanding achievements.

LOOK AT THESE FEATURES FOR EXAMPLE

1. A total memory capacity of 64K, 38K directly available to BASIC. When not using BASIC a full 54K is available for machine code programs.
2. Interface adaptors will allow the use of a complete range of hardware peripherals including disk units, plotter, dot matrix and daisy wheel printers, networking and much, much more.
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 5 1/4" 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 |
| T.V. Output | YES |
| INPUT/OUTPUT FEATURES | |
| Cassette Port | YES |
| Intelligent Peripherals | YES |
| Serial Peripheral Bus | YES |
| ADDITIONAL SOFTWARE FEATURES | |
| CP/M* Option (over 1000 packages) | YES |
| External ROM cartridge slot | YES |

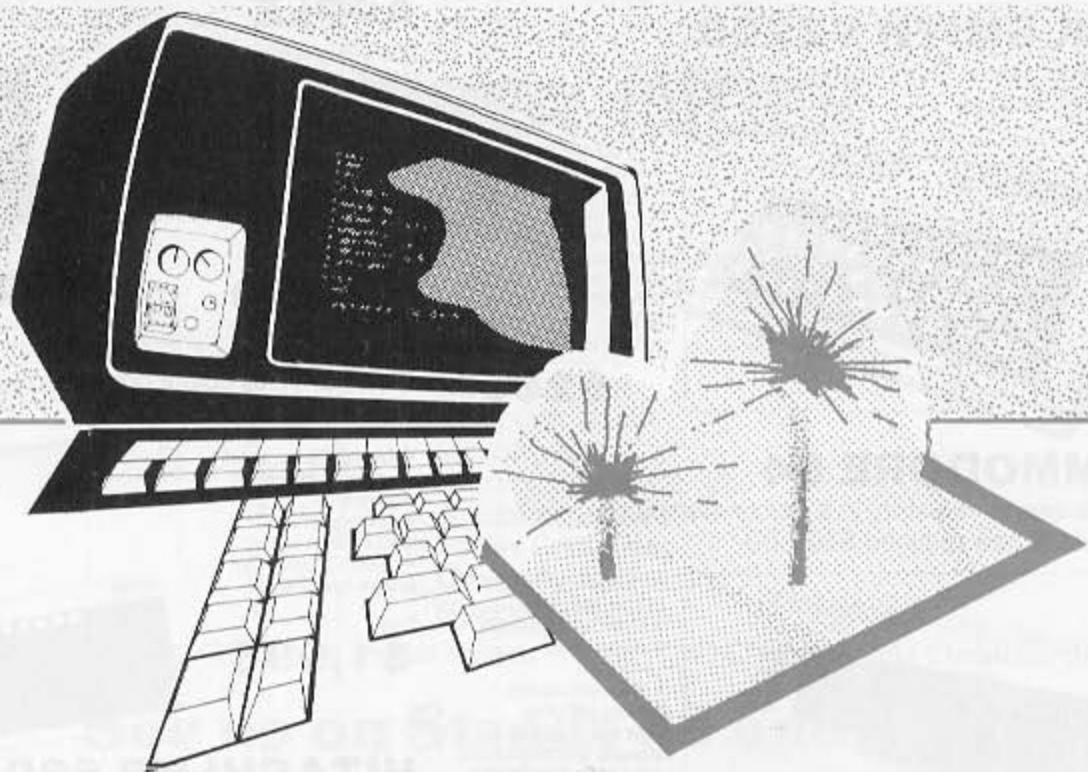


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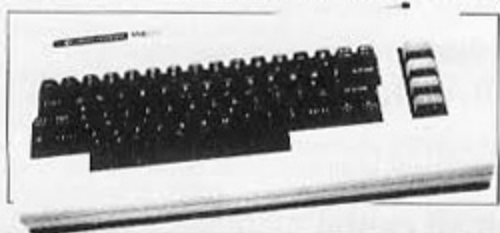


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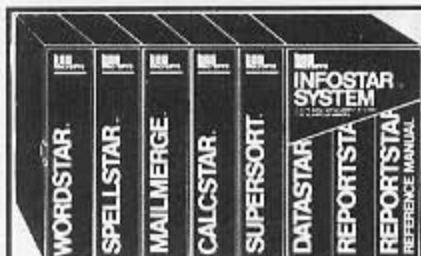
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Systems Ltd.

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Unisoft Developments Ltd,
Microprocessor
Developments Ltd, MEC,
Malcolm Lerner and
Associates, Financial
Systems, and N.Z.
Typewriters.

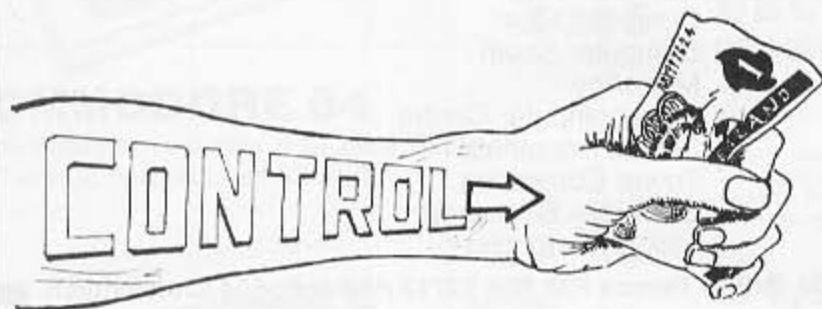
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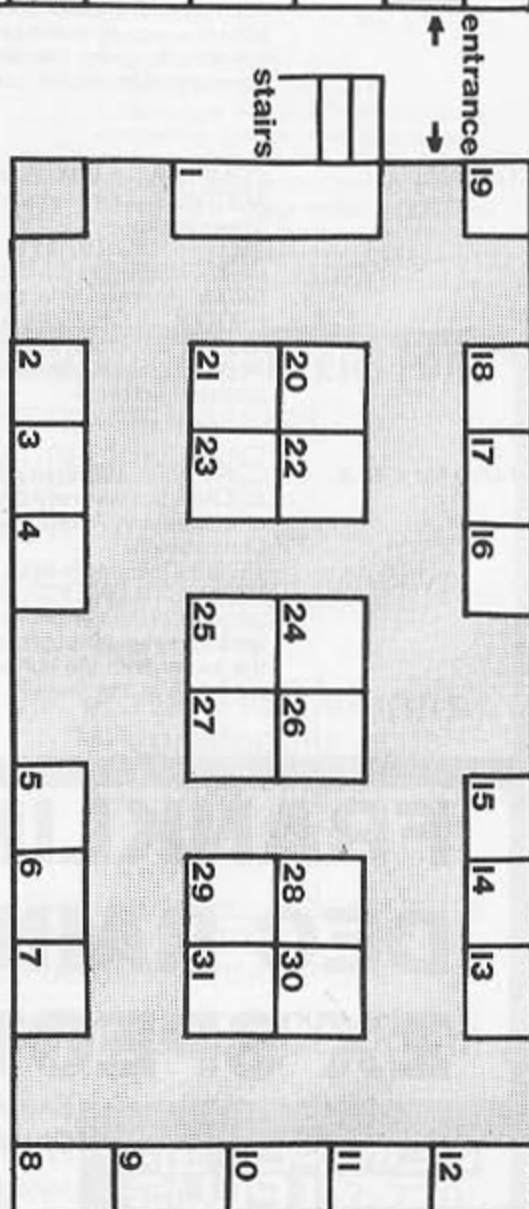
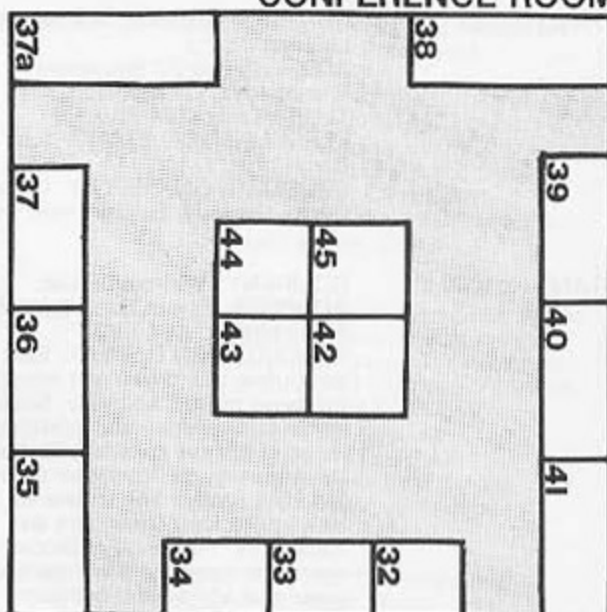
STAND

NO

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- 44 Farm Plan
- 45 Hitec Micro

STAND LAY OUT

CONFERENCE ROOM



LIMES ROOM

EXHIBITOR DETAILS

STAND No: 1

COMPANY: **Abacus, The MicroShop Limited.**
ADDRESS: 26-27 Mezzanine,
The Shades, Christchurch.
TELEPHONE: 794-339.
PERSONNEL ON STAND: Tony
Quinn.
PRODUCTS ON DISPLAY: Colour
Genie, Genie III, Sinclair, Atari, Hitachi.

STAND No: 7

COMPANY: **Christchurch Polytechnic.**
ADDRESS: P.O. Box 22-095,
Christchurch.
TELEPHONE: 798-150.
PERSONNEL ON STAND: Mike
Spiers.
PRODUCTS ON DISPLAY: Teletext
802, BMC 800, students
demonstrating training programs used
in courses for microcomputer users.

STAND No's: 2, 3

COMPANY: **Whitcoulls Ltd.**
ADDRESS: Private Bag, Christchurch.
TELEPHONE: 794-580.
PRODUCTS ON DISPLAY: BBC
computers disk drives and monitors,
full range of BBC software. Sinclair
computers, printers and monitors, full
range of Sinclair software. Verbatim
DataLife products, computer printers
including Brother HR 15 and 25.
Hewlett-Packard computers and
calculators. Full range of Brother
electronic typewriters with facility for
peripheral add on and computer
interfaces. Computer books. Casio
pocket computers and programmable
calculators. Sharp calculators and
programmable pocket computers.

STAND No: 8

COMPANY: **MicroAge Computer Camps Ltd.**
ADDRESS: 357 Hereford Street, P.O.
Box 13-054, Christchurch.
TELEPHONE: 891-109 (8 lines).
PERSONNEL ON STAND: Glynn
Hurley, Shelly Henderson, Lesley
Holibar.
PRODUCTS ON DISPLAY: The
MicroAge Computer Camps will be
displaying information on the 3
computer camps that will be taking
place over the Christmas holidays. The
camps are to be held at the University
of Canterbury student halls. Each
camp will have room for 120 children
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Each child will be able to have at least
25 hours computer time.

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STAND No: 4

COMPANY: **A.V.M. Electronics.**
ADDRESS: 149 Hereford Street,
Christchurch.
TELEPHONE: 797-279.
PERSONNEL ON STAND: Warwick
Brown, Andrew Jefferson.
PRODUCTS ON DISPLAY: Polybrain,
VIC 20, Commodore 64, Spectrum,
Atari 400, Sega, Aquarius and
assorted software.

STAND No's:
9, 10, 11, 12

COMPANY: **MicroAge NZ Limited.**
ADDRESS: 357 Hereford Street, P.O.
Box 13-054, Christchurch.
TELEPHONE: 891-109 (8 lines).
PERSONNEL ON STAND: Up to 10.
PRODUCTS ON DISPLAY: MicroAge
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computers and VDU's. Epson printers.
System Group computers. MicroPro
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STAND No's: 5, 6

COMPANY: **University Bookshop.**
ADDRESS: University Drive, University
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TELEPHONE: 488-579.
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range of computer books from all the
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EXHIBITOR DETAILS

STAND No's:
13, 14, 15

COMPANY: Noel Leeming Limited.
ADDRESS: 575 Colombo Street,
Christchurch.
TELEPHONE: 799-622.
PRODUCTS ON DISPLAY: VZ200,
Commodore VIC, Sinclair Spectrum,
2X81, Commodore 64, Aquarius and
Sega computers.

STAND No: 17

COMPANY: Timber Tru Industries.
ADDRESS: 374 Ferry Road,
Christchurch.
TELEPHONE: 892-986.
PERSONNEL ON STAND: John
Sparrow and Ronnie Harris.
PRODUCTS ON DISPLAY: Opello
computer desks, Commodore
computers, Gemini computer module,
Commodore User Group.

STAND No: 16

COMPANY: Television New Zealand.
ADDRESS: P.O. Box 1945,
Christchurch.
TELEPHONE: 792-680
PERSONNEL ON STAND: Up to 8
rostered.
PRODUCTS ON DISPLAY: Computer
Graphics using Apple II and Apple III.
TVNZ built character generator.
Teletext demonstration. Captioning for
News Review. Lighting effects as on
'That's Country' using Pegasus
computer. Video replay of computer
graphics as used in various TVNZ
programmes. Diode (LED) MATRIX and
sound fix driven by home brew 6809
computer.

STAND No: 18

COMPANY: Sicom Computer World.
ADDRESS: National Mutual Arcade
and 66 Oxford Terrace, Christchurch.
TELEPHONE: 61-399 and 796-259.
PERSONNEL ON STAND: Ronnie
Harris and John Sparrow.
PRODUCTS ON DISPLAY:
Commodore computers, Sinclair
computers, Sanyo computers.

STAND No: 19

COMPANY: G. T. Computing.
ADDRESS: Wave House, 194
Gloucester Street, P.O. Box 21-018,
Christchurch.
TELEPHONE: 797-811.
PRODUCTS ON DISPLAY:
Commodore VIC-20, Commodore 64
computers, Commodore disk drives,
printers, printer/plotter, CP/M 2.2
operating system for Commodore 64,
Commodore colour monitor, LOGO for
Commodore 64, business,
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STAND No's: 20, 21

COMPANY: **Computercorp.**
ADDRESS: 78 Riccarton Road,
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TELEPHONE: 488-300 and 486-780.
PERSONNEL ON STAND: Keith
Needham, Andre Van Duiven, Paul
Molloy.
PRODUCTS ON DISPLAY: Dick Smith
VZ200, Commodore VIC 20,
Commodore 64, Hitachi, BBC, Apple,
Apple Lisa.

STAND No: 22

COMPANY: **Michael Cambridge.**
ADDRESS: Sweetstream, Private Bag,
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PERSONNEL ON STAND: Michael
Cambridge.

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STAND No: 23

COMPANY: **Computer Centre Limited.**

ADDRESS: 149 Manchester Street,
P.O. Box 5270, Christchurch.
TELEPHONE: 793-428.
PERSONNEL ON STAND: Alex
Davidson, Rachel Gant.
PRODUCTS ON DISPLAY: Hopefully
Atari 600 XL and other Atari products.
Possibly VZ200 and associated
products.

STAND No: 27

COMPANY: **Bits & Bytes.**

ADDRESS: P.O. Box 827,
Christchurch.
TELEPHONE: 66-566.
PERSONNEL ON STAND: N. Birss,
P. Crooks, D. Crooks, M. Blyth, M.
Shirtcliffe.
PRODUCTS ON DISPLAY: The latest
issue of *BITS & BYTES* and all
available back issues. Subscriptions at
only \$10 a year for adults and \$8 per
year for school students can be taken
out at the show.

STAND No's: 24, 25

COMPANY: **Check-Point Computers.**

ADDRESS: 368 Main Road, Private
Bag, Tawa, Wellington.
TELEPHONE: 326-999, 326-988.
PERSONNEL ON STAND: Tony
Pointon, John Davis.
PRODUCTS ON DISPLAY: Solution 1,
Microbee, Comx 35 and Amust
Executive 816 computers, 5K floppy
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STAND No: 28

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STAND No: 26

COMPANY: **Custom Computers Limited.**

ADDRESS: 247 Sawyers Arms Road,
Christchurch 5.
TELEPHONE: 596-074.
PERSONNEL ON STAND: Alan
Mulholland, Martin Cahill.
PRODUCTS ON DISPLAY: We will be
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We'll have the "Colour Genie" with its
range of excellent graphics software
and flexible hardware add-ons — from
joysticks to the recently released disk
drives. We'll also be releasing the
"Ducom" computer. This brand new
import has 64K RAM, built-in BASIC,
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including CPM and accepts all Apple
cards. Pricing, including 12 month
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Apples.

STAND No: 29

COMPANY: **Software Supplies.**

ADDRESS: P.O. Box 865,
Christchurch.
TELEPHONE: 890-550 (H).
PERSONNEL ON STAND:
I. Goodwin.
PRODUCTS ON DISPLAY: Range of
Sinclair software for Spectrum and
ZX81 computers. Special discount at
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STAND No(s): 30, 31

Christchurch Computer User Groups.

Several user groups will display the
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EXHIBITOR DETAILS

STAND No: 32

COMPANY: **Solstat Industries Limited.**

ADDRESS: 32 Sheffield Crescent,
Box 13-183, Christchurch.
TELEPHONE: 588-202.
PERSONNEL ON STAND: John
Campbell, Ron Blakemore, Nigel Lloyd.
PRODUCTS ON DISPLAY: Intertec
Compustar, Dysan disks and alignment
media, IMS Ascent accounting
software, Microsoft languages and
MicroPro software, printers, speech
synthesizer.

STAND No: 36

PRODUCTS ON DISPLAY: MX(6)
microcomputer (multiuser); BMC800
model 20 colour graphics
microcomputer; Epson QX-10
microcomputer, HX-20 portable
computer, FX-100/80, RX80 Epson
printers. PEACHTREE software (POPS
— office products), (PCAS —
accounting).

STAND No: 33

COMPANY: **Antipodes Software Systems.**

ADDRESS: Box 1331, Dunedin.
TELEPHONE: 30-733 (Dunedin).
PERSONNEL ON STAND: Larry R.
Nelson.
PRODUCTS ON DISPLAY: Lertap 3;
a test, survey, and general data
analysis system for small computers.
Possibly other data analysis
software.

STAND No: 37

COMPANY: **Sanyo Business Systems.**

ADDRESS: 528 Moorhouse Avenue,
Christchurch.
TELEPHONE: 790-460.
PERSONNEL ON STAND: Ken Davis,
Bill Thew.
PRODUCTS ON DISPLAY: Sanyo
systems solution, business computers,
Sanyo retail system.

University of Canterbury.

STAND No: 34

COMPANY: **Computersouth.**

ADDRESS: P.O. Box 22-713,
Christchurch.
TELEPHONE: 60-504.
PERSONNEL ON STAND: John
Bowman, John Garratt, Alistair
Burbery.
PRODUCTS ON DISPLAY: Apple,
Epson computers, printers,
typewriters, software, e.g.
PEACHTREE, Farmplan, Visiseries,
Apple software.

STAND No: 37A

COMPANY: **Hallmark Computer Services.**

ADDRESS: 315 Madras Street,
Christchurch 1.
TELEPHONE: 797-269.
PERSONNEL ON STAND: Graeme
Hall, Vernon Small, Denyse Watson.
PRODUCTS ON DISPLAY: Morrow
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STAND No: 35

COMPANY: **MDL (Microprocessors Developments Limited).**

ADDRESS: 24 Manukau Road,
Epsom, Auckland 3.
TELEPHONE: 540-128.
PERSONNEL ON STAND: Malcolm
Fry (South Island Sales Manager).

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EXHIBITOR DETAILS

STAND No's: 38, 39

COMPANY: Tower Computing (NZ) Limited.

ADDRESS: The Tower Building, Cnr Montreal and Salisbury Streets, Christchurch.

TELEPHONE: 61-275.

PERSONNEL ON STAND: Campbell Egan, Graham Thompson.

PRODUCTS ON DISPLAY: Home computers: the SEGA SC3000 (games and basic), the BBC micro (home, games, educational, business), (Torch add-on processor Z80).

Education: E-Net with 10 megabyte Winchester, U-Net, Apple to BBC.

Business: Z80 packages on BBC micro.

Sirius, Torch, Televideo, Shugart, Sony.

STAND No: 40

COMPANY: Vision Computing.

ADDRESS: P.O. Box 13-455, 51

Cathedral Square, Christchurch.

TELEPHONE: 67-565, AH 524-854.

PERSONNEL ON STAND: John

Anstice.

PRODUCTS ON DISPLAY: U-NET:

The professional standard micro network system. Supports Apples and BBC micros in network, other low cost micros will be included soon.

U-TALK: Low cost Apple speech synthesis card.

ZX-Spectrum Expansion System:

Start with 1 card and extend up to 7 cards in this expansion system for the ZX Spectrum. Available now are RS232 dual channel cards, parallel I/O interface, centronics printer interface all with software. More coming.

STAND No: 41

COMPANY: Armstrong and Springhall Limited.

ADDRESS: 72 Oxford Terrace, Christchurch.

TELEPHONE: 796-080.

PERSONNEL ON STAND: Martin Russell, Brad Smith, Paul Morrison.

PRODUCTS ON DISPLAY: Sharp microcomputer, Olivetti microcomputer, Olivetti word processing, microcomputer, electronic typewriter interface, Juki word processing printer.

STAND No's: 42, 43

COMPANY: Computer Plus.

ADDRESS: 103B Riccarton Road, P.O. Box 8100, Riccarton, Christchurch.

TELEPHONE: 488-519.

PRODUCTS ON DISPLAY: The Digital "Rainbow 100" personal business computer running 8 and 16 bit software under CP/M and MS DOS.

The Sinclair "Spectrum" home computer and the latest software from England.

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STAND No: 44

COMPANY: FARM PLAN NZ Limited.

ADDRESS: 374 Montreal Street, The Tower Building, Christchurch.

TELEPHONE: 795-024.

PERSONNEL ON STAND: Tony Lissaman.

PRODUCTS ON DISPLAY: Farm software, farm management software for accountants, management system for small businesses.

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EXHIBITOR DETAILS

STAND No: 45

COMPANY: **Hitec Micro Limited.**

ADDRESS: 10 York Street, Parnell, Auckland 1.

TELEPHONE: 399-183.

PERSONNEL ON STAND: Brian Clark, Tony Whitehouse.

PRODUCTS ON DISPLAY: Kaypro computers — No. 1 in portable computers, Kaypro 2 — 64K twin disk drive, 9 inch screen. Kaypro 4 — 64K twin disk drive, 9 inch screen. Kaypro 10 — 10 megabyte hard disk drive, 9 inch screen, New Zealand sole distributors "Hitec Micro Limited".

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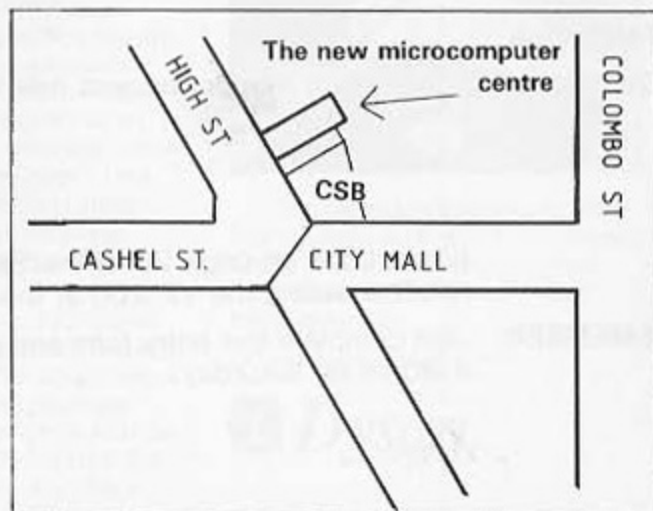
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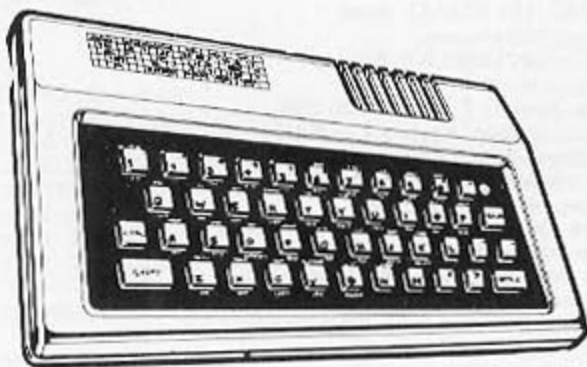


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Address

Telephone

Question: How much random access memory (RAM) does the VZ 200 have as standard?

(Clue: Look on page 20 of the September issue of Bits & Bytes or ask any of the retailers selling the VZ 200 at the show.)

REMEMBER: Just complete this entry form and place it in the box on the BITS & BYTES stand by 4.30pm on Saturday.

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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.

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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.

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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

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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.

Fornara

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The BBC Micro: An Expert Guide Mike James

Introduction to the BBC, covering both hardware and software aspects. Provides inside view of the machine, computer'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.

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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.

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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.

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Bits, Bytes and Buzzwords: Understanding Small Business Computers

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Explains microcomputers, software and peripherals in a straightforward, readable 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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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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Introduction to Electronic Speech Synthesis

Neil Sclater

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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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Excuse Me... What was That?

Anton Braun Quist

A very funny book full of anecdotes about things that should've worked but didn't and the things that did work but for all the wrong reasons. Only the person who's never sworn at his micro will fail to get a grin out of this book.

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Security Dictionary

Richard A. Hofmeister & David J. Prince

Brings together video equipment, computer hardware and software, ultrasonics, fiber optics, biometric ID, infrared sensors and microwaves as they apply to security. Includes tables of security, fire protection, electronic schematic symbols, and switch configurations.

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User's Guide to Microcomputer Buzzwords

David Dasebrock

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The Microprocessor Handbook

Elmer Poe

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IBM

Useful BASIC Programs for the IBM PC

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Using Your IBM Personal Computer

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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 of all commonly used PC BASIC commands, including those for graphics, music, sounds effects, and more.

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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 generally 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.

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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 Hanaf, Box, and Mind.

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Language/programming

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.

Forth Programming

Leo J. Scanlon

Written for anyone who wants to learn how to write computer software using FORTH. Shows how to add new operations (words) to the language and how to manipulate the stack. Describes both FORTH-79 and fig-FORTH, identifying programming differences. Includes more than 50 programs which will execute with little or no modification on any FORTH system.

Sams Our price \$33.80. Save \$1.80 and earn 3 bonus points.

The 68000: Principles and Programming

Leo J. Scanlon

An introduction and full description of the highly complex and powerful 68000, 16-bit microprocessor, and how to program it. Starts with fundamental material and gradually introduces more involved topics in an orderly manner.

Sams Our price \$22.75. Save \$1.20 and earn 2 bonus points.

Program Your Microcomputer in BASIC

Peter Gosling

No previous knowledge of computing is assumed. The author says this book is designed to put in just where the manuals have allowed you to get your new micro up and running. Instructions or groups of instructions are dealt with in activities, giving a complete course in the elements of BASIC.

Macmillan Our price \$13.25. Save 70c and earn 1 bonus point.

Parlez-vous BASIC

R.J. Campbell and M.R. Ellis

A textbook for teaching programming on the Commodore PET. A useful source for the teacher. Written by two teachers at Palmerston North Boys' High. Indexed, and with cartoons, diagrams, and charts.

Phase 3 Electronics Our price \$8.50. Save 50c and earn 1 bonus point.

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/Systems 80 and other generalised CP/M based systems as examples. This edition has a new chapter on the Microsoft BASIC compiler.

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Basic BASIC - English Dictionary

Larry Noonan

Specifically for users of the Apple, PET, and TRS-80 who have found programs in magazines or books that were exactly what they wanted, but were written for some other computer.

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P.E. Gosling

An introduction to the language for first-time users. Also has lots of interesting digressions about such devices as tape readers.

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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 fig-FORTH.

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

Mastering Computer Programming

P.E. Gosling

A complete, self-contained course from Britain for self study at home, or for use in the classroom. In one book, the essential information to learn programming. The language taught is BASIC. The author, a former lecturer in computing, runs a computer services company.

MacMillan Master Series Our price \$9.45. Save 50c and earn 1 bonus point.

Inside Basic Games

Richard Mateosian

A fun introduction for anyone beginning programming. The author has chosen the medium of games to teach readers how to design error-free, interactive BASIC programs. Computer games are described in detail, then explained and analysed to illustrate how the games were developed. Rules, algorithms, and coding differences from the TRS-80, Apple II, and PET are also included.

Sybox Our price \$25.15. Save \$1.35 and earn 2 bonus points.

Buy now

Our new selection

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.
Sybex

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and earn 1 bonus point.

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.
Granada

Our price \$18.95. Save \$1
and earn 1 bonus point.

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.

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.

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 programs for beginners.
Arnada

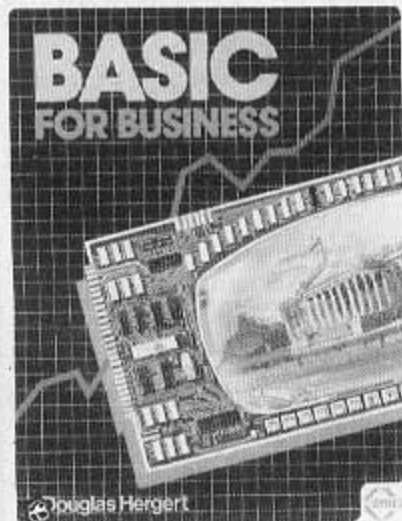
Our price \$3.30. Save 20c
and earn 1 bonus point.

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



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 text 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.



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.

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.



The Spectrum Book of Games

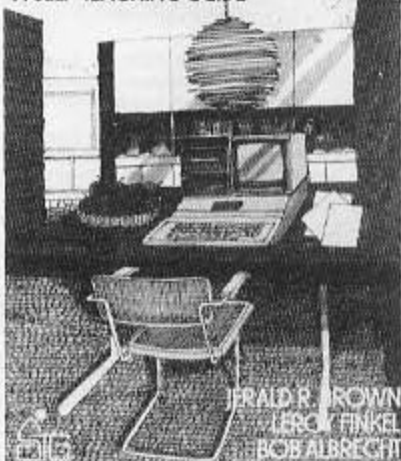
Mike James,

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.
Granada

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and earn 1 bonus point.

BASIC FOR THE APPLE II® A SELF-TEACHING GUIDE



Basic for the Apple II: A Self-Teaching Guide

Jerald R. Brown, Leroy Finkel &
Robert L. Albrecht

Self-instructional guide to develop programming skills. Adapts 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.

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 handled illustrative listings, plus complete listings to try yourself.
Granada

Our price \$23.70. Save \$1.25
and earn 2 bonus points.

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.

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 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.
Granada

Our price \$18.95. Save \$1
and earn 1 bonus point.

Buy now!

Language/programming**Your First Basic Program**

Rodney Zaks

The author of more than 16 best-selling computer books teaches the basics of BASIC. It doesn't matter whether you're right or left-handed. 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 highlighted and listing graphics.

Sybex

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

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 key errors and bugs, and valuable testing techniques.

Dilithium Press

**Our price \$41.75. Save \$2.20
and earn 4 bonus points.**

Word processing**The Tenderfoot's Guide to Word Processing**

Barbara Chrlain

Can I use a word processor in my profession or small business? What do I need in the way of equipment? Will a word processor be of use to me? These are just a few of the questions this book will answer.

Dilithium Press

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

Introduction to Word Processing

Hal Glatzer

What a word processor is, what it does, how to use one. How to choose one. A Word Processor is not so likely to generate cash flow, as it is to save time, trim labour, improve efficiency, and productivity, says the author. The "Bits & Bytes" reviewer described it thus: "An ideal introduction to word processing for the home computer initiate".

Sybex

**Our price \$27.05. Save \$1.45.
and earn 2 bonus points.**

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. It reveals 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 IBM PC Model 1, 2, and 16 users to learn the Scripsit program. You can enjoy clicking to create and delete files, modify documents, polish texts, prepare form letters and save your printer.

Sybex

**Our price \$25.60. Save \$1.35
and earn 2 bonus points.**

Practical Wordstar Uses

Julie Anne Arca

Easy-to-follow, step-by-step instructions for typical Wordstar processing tasks backed by realistic examples. Experienced users can pick up new ways of using Wordstar's special features. Colorful poster has graphic display of each Wordstar command.

Sybex

**Our price \$28.45. Save \$1.50
and earn 2 bonus points.**

Hardware**Don't, or How to Care for your Computer**

Rodney Zaks

An easy, entertaining guide to computer and peripheral preservation. Specific advice for the computer, floppy disks, hard discs, the CRT terminal, the printer, tape units, the computer room, software, and documentation. In the words of "Popular Computing" this book is "cheap insurance".

Sybex

**Our price \$25.65. Save \$1.30
and earn 2 bonus points.**

From Chips to Systems: An Introduction to Microcomputers

Rodney Zaks

A superb, fast-paced journey through the history of microprocessors, the microprocessor chip itself, its support

components, and the design of an actual microcomputer system. You'll find out that microprocessors were developed by accident rather than design, that early structural errors have become today's features and, most importantly, how easy it is to understand microcomputers.

Sybex

**Our price \$37.95. Save \$2
and earn 3 bonus points.**

Microcomputer Design and Troubleshooting

Eugene M. Zumchak

Considers every aspect of microcomputer design from the idea to the working system. Controller functions, the development system, read/write timing, good hardware design, the computer system, hardware testing and troubleshooting and the three basics of software design: documentation, philosophy, and technique.

Sams

**Our price \$30.75. Save \$3.35
and earn 3 bonus points.**

Computers: Information and Data

Barbara & John Jaworski

Describes the principles behind the use of computers rather than details of how they work. Concentrates on what they do, why they are required to do these things and how they fit into the world. Explains why computers are what they are.

Nelson

**Our price \$19.70. Save \$1.05
and earn 1 bonus point.**

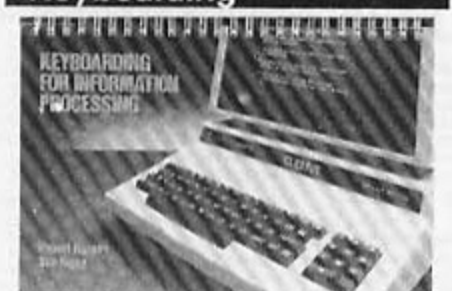
Computer Peripherals

Bary Wilkinson & David Horrocks

Emphasises the underlying principles of operation of the main types of peripheral. Also to be encouraged are some likely to be marketed in the future. Should be valuable for engineering and computer technology students.

Hodder & Stoughton

**Our price \$28.25. Save \$1.50
and earn 2 bonus points.**

Keyboarding**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 separate 10-key pad; keyboard information quickly and accurately; understand some of the basic vocabulary used in keyboarding. Can be used for classroom or individual, self-instruction.

Osborne/McGraw-Hill

**Our price \$8.95. Save 57c
and earn 1 bonus point.**

Quick Keyboarding

Vonnice Alexander

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

Mathuen

**Our price \$6.50. Save 45c.
and earn 1 bonus point.**

CP/M**CP/M Revealed**

Jack D. Dennon

Explains technical aspects of CP/M, including console monitor (CPR), system manager (SMB), and input/output error package (IOBOS). 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, editing programs and interfacing techniques.

Hayden

**Our price \$28.45. Save \$1.40
and earn 2 bonus points.**

CP/M Printer

Stephen Murtha & Mitchell Waite

Information on the latest CP/M 2.0 version, disk allocation and external. Includes reference card and extensive list of CP/M software.

Sams

**Our price \$33.80. Save \$1.80
and earn 3 bonus points.**

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 and logic programming, how to use CP/M system calls, how to write CP/M from BASIC, and how to modify BIOS.

Sams

**Our price \$37.85. Save \$2
and earn 3 bonus points.**

CP/M Bible

Mitchell Waite & John Angermeyer

Reference guide to CP/M, covering all built-in and printer commands. Compares CP/M versions and looks at optional utilities. Describes BASIC, PASCAL, MAC, CRASIC and C80. 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 technique 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 techniques 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 technical applications.

Addison-Wesley

**Our price \$39.20. Save \$2
and earn 3 bonus points.**

Software**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.**

Atari**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 math programs. Each program is complete with source listing, documentation, and sample execution.

Osborne/McGraw-Hill

**Our price \$29.90. Save \$1.60
and earn 2 bonus points.**

BASIC Exercises for the Atari

J.P. Lamoitier

A practical and entertaining way to learn programming with Atari BASIC. Through step-by-step examples you learn the five points of the language and how to write your own programs. This is what "Interface Age" said: "This excellent book... teaches BASIC without taking down to the reader." The exercises run on the Atari 400, Atari 800, and the new 1200XL.

Sybex

**Our price \$29.90. Save \$1.60
and earn 2 bonus points.**

Kids and the Atari

Edward H. Carlson

The book is arranged in 53 lessons, with notes for the instructor containing assignments and review questions. From a "bar bones" introduction to programming, the abundance of examples 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, debugging, and test-friendly programming.

Reston

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

Buy now

Education

Computer Studies: A Practical Approach

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.

VisiCalc for Science and Engineering

Stanley R. Trost & Charles Pomernacki

A technical problem-solving aid which offers more than 80 ways of using an "electronic spreadsheet". Solutions to common engineering, scientific and design problems in such areas as statics, statistics and analysis, electrical and electronic engineering, solar engineering, heating, ventilating and air conditioning, control systems, mechanical engineering.

Sydex

Our price \$28.45. Save \$1.50 and earn 2 bonus points.

Introducing Computers

Peter Bishop

A first introduction to computers intended for lower secondary school pupils. Assumes no previous computer knowledge and looks at wide-ranging topics to give an overview of the role of information and the structure of computers, jobs done by computers in industry, the development of computers, and their effect on society.

Nelson

Our price \$17.60. Save 90c and earn 2 bonus points

Sinclair

Your Timex Sinclair 1000 and ZX81

Douglas Hergert

For Sinclair users. Takes you from the very beginning and explains in simple, everyday language how to use your ZX81 to its fullest capabilities. A good book for the new user.

Sydex

Our price \$15.15. Save 80c and earn 1 bonus point

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/McGraw-Hill

Our price \$33.95. Save \$1.78 and earn 3 bonus points.

The Sinclair ZX80 Programming for Real Applications

Randle Hurley

Aims to develop in the reader an interest in pushing the ZX81 further than 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 data 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.

Macmillan

Our price \$27.50. Save \$1.45 and earn 2 bonus points.

More Real Applications for the ZX81 and the ZX Spectrum

Randle Hurley

Provides ZX81 and ZX Spectrum owners with "off 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 put 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.

Macmillan

Our price \$25.60. Save \$1.35 and earn 2 bonus points.

How to Use the Timex-Sinclair Computer

Jerry & Deborah Willis

Emphasis is on practical information with introduction to computer and expansion of its basic components, step-by-step instructions on getting it up and running; shows how to load and save programs on standard audio cassettes, tells how to type, use and modify programs from books and magazines.

Collins Press

Our price \$8.95. Save 55c and earn 1 bonus point.

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 several tips and suggestions for using BASIC vocabulary to make programming as simple and efficient as possible.

Sydex

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.

Sydex

Our price \$18.95. Save \$1 and earn 1 bonus point.

Z80 Applications

James W. Coffron

Numerous diagrams and examples help you develop applications using the Z80 microprocessor. Easy reading and clear illustrations provide instructions for controlling peripheral I/O devices, information on use of ROM and static RAM, input and output devices, dynamic RAM, interrupts, peripheral devices including the Z80-SIO, PIO and CTC.

Sydex

Our price \$31.30. Save \$1.65 and earn 3 bonus points.

Two Dozen Exciting Programs for your 1K ZX81

B.W. Hempstead & G.R. Parker

The authors, both members of the Christchurch Sinclair User Group, show what can be done with a 1K machine and offer plenty of hints and tips. Includes logic games, moving graphics, fan programs, and some more serious and useful programs. Listing can be studied to see how programs achieve their objective and the techniques applied to your own programs.

B.W. Hempstead

Our price \$9.45. Save 50c and earn 1 bonus point.

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.

Start with BASIC on the Commodore VIC 20

Don Monro

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

Reston

Our price \$19.25. Save \$1.05 and earn 2 bonus points.

Apple

Learning LOGO in the Apple II

McDougall, et al

LOGO's a Piaget-based way into computing. A multi-purpose language. Non technical, learning by doing.

Prentice-Hall

Our price \$18.05. Save \$1 and earn 1 bonus points.

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, formatted statements, "peg" sample business models, and hardware options.

Addison-Wesley

Our price \$30.60. Save \$1.60 and earn 3 bonus points.

The Easy Guide to Your Apple II

Joseph Kascmer

Learn to use your Apple II and it plus in a matter of hours. Become familiar with keyboard, video screen and disk drives, and how how easily you can write your own BASIC programs. Or skip programming and get on with using commercially available software. Covers creation of video graphics, use of disk drives, forecasts and simulations, customising pre-written programs, expanding your system with peripherals.

Sydex

Our price \$20.85. Save \$1.10 and earn 2 bonus points.

Apple II: Basic Programs in Minutes

Stanley R. Trost

Collection of versatile, ready-to-enter programs for more than 60 home and business tasks on the Apple II. Plus on file. 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.

Sydex

Our price \$20.85. Save \$1.10 and earn 2 bonus points.

Graphics Cookbook for the Apple

Nat Worthworth

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, with providing a library of microcomputer graphics. Works from geometric shapes to multicoloured robots and flying saucers, trees, yachts and colourful backgrounds. Also discusses displaying "balloon" messages using gosh letters and numbers.

Hayden

Our price \$23.25. Save \$1.25 and earn 2 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 built-in graphics, musical tone generators and structures applications. Also many ready-to-run programs for more: mortgage calculators, stock market charting and cash flow analysis.

Reston

Our price \$20.35. Save \$1.05 and earn 2 bonus points.

Business

How to Use SuperCalc

Deborah and Jerry Willis and Merl Miller

A guide to the applications and implementation of spreadsheet programs in general, and to SuperCalc specifically. Simple language, down-to-earth directions. Tells you how to organise, arrange, and manipulate your data, and is also a reference manual.

Collins Press

Our price \$37.95. Save \$2 and earn 3 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 management. These are some of the topics covered.

Sydex

Our price \$29.90. Save \$1.60 and earn 2 bonus points.

Doing Business with VisiCalc

Stanley R. Trost

Assumes an introductory-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.

Sydex

Our price \$25.65. Save \$1.30 and earn 2 bonus points.

Mastering VisiCalc

Douglas Hergert

Written both for newcomers to the spreadsheet program and for those who are already using it. Shows how to set up VisiCalc spreadsheets for finance, business and numerical applications; how to change the parameters; how to create the formulas. How to use the DIF-like function. A complete guide.

Sydex

Our price \$25.65. Save \$1.30 and earn 2 bonus points.

The Business Guide to Small Computers

Lawrence Calmus

A step-by-step guide to the small computer for business. Covers costs, maintenance, implementation, systems design and even environmental impact — all both hardware and software. It starts with an analysis of your organisation's needs and then sets out ready-to-use information clearly and concisely.

Osborne/McGraw-Hill

Our price \$38.50. Save \$2.00 and earn 3 bonus points.

BBC

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 discussions.

Foreword

Our price \$31.30. Save \$1.65 and earn 3 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.

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 programs. 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.

EXHIBITION

Goodies at Trillos

By Cathy Arrow

This year's Consumer Electronics show at Auckland's Trillos and Travelodge enabled those interested in stereo and hi-fi to listen undisturbed at the Travelodge, whilst computers and other electronic retailers were at Trillos.

Atari and Fountain Video Games were present. However, I noticed several people comparing price and capabilities against the computers running similar games, then investigating computers. It was good to note the large number of women present trying out and investigating computers.

Computerworld launched the Spectravideo SV 318 Personal Computer with built-in joy stick, and special word processing keys. Priced at \$899, it has built-in Microsoft BASIC.

Eye-catching was the colourful Koala Pad — a touch tablet which one draws on with fingers or special pen

and allows you to change the drawing pixel by pixel. An interesting addition to the VIC 20, it retails for about \$300 and would be invaluable in assisting the very young and handicapped. It is stocked by Pat Dunphy, of Supatech, together with the Flexi Key system, a programmable numeric keyboard for VIC 20 and Commodore 64. Pat had obtained these and lots of other new ideas overseas. He had been to the Berlin Trade Fair, the Birmingham Cable and Satellite Television Exhibition, the London Olympia — Home Entertainment Spectacular and the First London Personal Computer World Show.

Grandstand Leisure was offering the Sega SC 3000 at \$399. This features 32 independent sprites (video "objects" that can each be

given shape, colour and position on the screen), 16 colours, 38 x 24 text screen, and is expandable to 48K of useable RAM.

The firm also exhibited the Texas Instruments TI 99/4A, which has just been released in New Zealand although it has been available overseas for several years. The TI99/4A is a 16-bit micro with 256 x 192 pixel graphics, 16 colours, 32 independent sprites, a text screen of 32 x 24 and comes with 16K RAM, expandable up to 72K. A very wide range of languages, expansion modules and software is available.

David Reid Electronics displayed the Sinclair ZX Spectrum and the Atari 600XL, while the sounds of gentle music one could enjoy using the BBC or Spectrum in the suite occupied by John Gilbert, Ltd.

Dial a dragon

The Association of London Computer Clubs has a new experience for home users: multi-player adventure games. Using spare capacity in the University of Essex mainframe, home users can phone-in to an interactive game of Dungeons and Dragons ... where an oncoming light may be demons of

the deep or just your neighbour also out for some subterranean fun.

Lisa Price

The Apple Lisa's New Zealand price has been reduced \$6500 to \$19,950. This is for the Lisa package: hardware, 5 Megabyte disk drive, six software applications, and a printer.

Holiday Software

Typing

Practice your touch typing and evaluate your performance. A sentence or phrase is selected at random (the computer has 100 to choose from) and printed. You copy it as quickly and accurately as possible. After 10 such phrases, you are told how long you took, the numbers of words and sentences typed, and words per minute. And how many times you used the DELETE key. A graph is printed showing each key and the number of times you pressed the wrong key, showing where you go wrong. Available for BBC model A and B micros, and expected to be available for the Commodore range — PET, VIC and 64 — soon.

Our price \$15.00

Microbee

MBCALC
A low cost spreadsheet program allowing creation and manipulation of financial models. These may be saved and relocated to tape, or printed out. Full documentation plus customising instructions.

Our price \$22.50

CHEQUE

Bank account database — cassette data files, print summary by error code within major code, update, maintain, sort, interrogate data.

Our price \$22.50

MBFOX

A quick PCG graphics version of the old Fox and Hounds game.

Our price \$14.00

PCGDEF

Defines PCG characters on a screen matrix — 3 characters wide. Three functions: operating keys allow toggling a pixel, automatic toggling of pixels, automatic toggle to end of line. Cursor walks around successive lines.

Our price \$7.00

PDGREE

Enables the pedigree animal breeder to maintain a database of blood relationships within a particular breed. The database, held on cassette, may be interrogated or used to print out a 5 generation pedigree chart etc. Originally written for dogs but may be used for any animal.

Our price \$14.00

MAZE

Generates and prints out mazes of varying sizes, each one different.

PORT 2

Plot your landing capsule over the mountain and down into the landing pad. Adapted from the early Port 2 program.

Our price \$14.00

COLDITZ

Adventure game — you have to break out of Colditz castle.

Our price \$14.00

FARMS

Farm management simulation.

Our price \$14.00

Some tapes contain two programs. All programs are written in BASIC, may be altered by the buyer, and are duplicated on both sides of a cassette. We recommend you make a backup copy of the original if you wish to modify it.

GRAFIC

A graphics utility enabling you to draw pictures in either HIRIS or LORES. Once drawn, the picture may be saved to tape, incorporated into other programs, edited, etc. The picture is reduced to a simple plotting routine for subsequent reproduction.

Our price \$14.00

MAZE3D

Generates a random maze to user specified dimensions, places you randomly in it, and leaves you to find your way out. Uses Microbee's HIRIS graphics and plotting commands to draw the 3 dimensional perspective views from within the maze. The final maze reviewer can revert to a location on display plan view to assist him.

Our price \$14.00

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VIC

Southdown

You've always said you could run a freezing works. Well, here's your chance. Because that's what Southdown, an economy game requiring at least 8K memory expansion, is all about. A cracker of a game! In the words of 'Bits and Bytes' special reviewer:

Our price \$12.00

Gambling omnibus

Too, High Finance, Soly Power, Acey Deucey. An omnibus games tape covering horse racing, the stockmarket, poker and cards. Rated good value by 'Bits and Bytes' reviewer.

Our price \$20.00

Multiploy

Apple Arithmetic Problems

By transforming arithmetic problems into an on-screen game, Multiploy has made arithmetic drills irresistible fun. Set the difficulty level, select an Apple II, select an operator and difficulty level, and you're under attack.

Our price \$44.90. Save 10%

Cross Reference utility (CRF)

Provides a complete listing of variables within a BASIC program, enabling you to review, analyse, and modify a program. Achieves maximum capability from the computer system. Where utility programs force you to locate and copy, CRF automatically identifies frequently used variables, quickly change variable names.

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"Paint" — art software for the Atari

Designed for the Atari 800, "Paint" is an easy to use drawing and basic allowing users to create dazzling, intricate pictures on a screen. Features include one letter menu commands like B for brush, E for erase, Z for zoom) which easily learned at the first sitting. You can create hundreds of different colour/pattern combinations. Needs 48K Atari 800 disk space, colour TV or monitor, and joystick.

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ZEUS

PYRAMID (by Rodger Olsen)
This is our most challenging ADVENTURE.
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QUEST — A NEW IDEA IN ADVENTURE GAMES! Different from all the others. Quest is played on a computer generated map of Alesia. Your job is to gather men and supplies by combat, bargaining, exploration of ruins and temples and outright banditry. When your force is strong enough, you attack the Citadel of Moorlock in a life or death battle to the finish. Playable in 2 to 5 hours, this one is different every time. TRS-80 Color, and Sinclair, 13K VIC-20. Extended BASIC required for TRS-80 Color and TI99/A.

32K TRS 80 COLOR Version
Adds a second level with dungeons and more Questing.



WIZARDS TOWER — This is very similar to Quest (see above). We added wizards, magic, dragons, and dungeons to come up with a Quest with a D&D flavor. It requires 16k extended color BASIC. 13k VIC, Commodore 64, TRS-80 16k Extended BASIC, TI99/A extended BASIC.

ZEUS — It's fast and furious as you become the WIZARD fighting off the Thunderbolts of an angry ZEUS. Your Cone of Cold will destroy a thunderbolt and your shield will protect you — for a while. This is the best and highest speed arcade action we have ever done. Difficulty increases in wave after wave, providing hours of challenging fun and a game that you may never completely master. Commodore 64, Vic20 (16k expander), and 16k TRS-80 Color Computer. (ALL MACHINE CODE!)



ADVENTURES III

The Adventures below are written in BASIC, are full featured, fast action, full plotted adventures that take 30-50 hours to play. (Adventures are interactive fantasies. It's like reading a book except that you are the main character as you give the computer, commands like "Look in the Coffin" and "Light the torch.")

Adventuring requires 16k on Sinclair, and TRS-80 Color. They require 8k on OSI and 13k on VIC-20. Now available for TI99. Any Commodore 64.

ESCAPE FROM MARS

(by Rodger Olsen)

This ADVENTURE takes place on the RED PLANET. You'll have to explore a Martian city and deal with possibly hostile aliens to survive this one. A good first adventure.

SEAWOLFE

SEAWOLFE — ALL MACHINE CODE In this high speed arcade game, you lay out patterns of torpedoes ahead of the attacking PT boats. Requires Joysticks, at least 13k RAM, and fast reflexes. Lots of Color and Sound. A fun game. Tape or Disk for Vic20, Commodore 64, and TRS-80 Color. NOTE: tape will not transfer to disk!



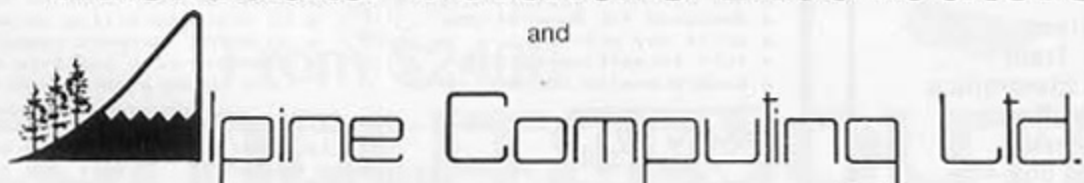
Dungeons of Death — This is the first D&D type game good enough to qualify at Aardvark. This is serious D&D that allows 1 to 6 players to go on a Dragon Hunting, Monster Killing, Dungeon Exploring Quest. Played on an on-screen map, you get a choice of race and character (Human, Dwarf, Soldier, Wizard, etc.), a chance to grow from game to game, and a 15 page manual. 16k Extended TRS-80 Color, 13k VIC, Commodore 64. At the normal price for an Adventure.

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Computer Age Learning

By Pat Churchill

There is no disputing the magnetic
attraction of the computer.
Wherever a computer is on public
display going through its paces you
can almost guarantee the
surrounding few metres will soon be
packed with people wanting a look,
or better still a go at the keyboard.

The Learning in the Computer Age
Exhibition at Wellington's Michael
Fowler Centre in October was no
exception.

Organised by the Wellington
branch of the New Zealand
Educational Administration Society
(NZEAS) the exhibition featured the
latest in computer software and
audio-visual educational materials,
plus a comprehensive range of
computer literature. It was very
much a "show and tell" affair with
an opportunity in the afternoon for
teachers, students, and parents to
look over the displays.

Exhibitors showed educational
software for a variety of computers
including the Poly 1, Atari,
Commodore, BBC, Apple, ZX81,
BMC, and Pencil II. There were also
packages for teachers and school
administrators covering such topics
as time-tabling and course options.

The Wellington Polytechnic's Poly
1 display attracted considerable
interest, and an adjacent display
showed how physically handicapped
children at Kimi Ora School in
Wellington are able to use a Poly 1.
The bright yellow machine featured
three large keys to enable users to
tap out letters in Morse code — a
dots key, a dashes key and an
"enter" key. This was just one way
a disabled child could operate a
computer.

One interesting feature was the
number of youngsters introducing
their parents to computers. The

exhibition will no doubt generate
another round of cake stalls.

As Dr Colin Boswell, president of
the New Zealand Computer Society,
told a local newspaper covering the
exhibition, "cake stall money" has
provided more than \$1,500,000
towards computers for New Zealand
schools — more than the Education
Department has allocated for the
same purpose.

Dr Boswell, director of the
computer services centre at Victoria
University, said the Education
Department had established a two-
person curriculum unit to make
programs available to schools, and
had identified five preferred
computers for secondary schools,
but it needed to do much more or
New Zealand would slip behind the
rest of the world.

Parents viewing the exhibits were
certainly enthusiastic and keen for
their children to have access to
computers at school. Some were
clearly interested in the display with
a view to purchasing home
computers.

Dr Lynette Hardie Wills, of NZEAS,
said the society was delighted with
the response to the exhibition. A
series of musical activities was
organised in conjunction with the
exhibition and participating
youngsters were encouraged to
bring their parents to view the
displays as well as to hear the music.

"In addition to having parents and
teachers present, we also wanted
members of the education
community who are making
decisions about buying materials to
come along. And we invited school
councils and representatives from
the Education and Labour
Departments.

The Department of Education had
been very supportive, she said, and
had mounted a striking display.

Dr Wills said the exhibitors, too,
were delighted with the amount of
interest shown.

"There was a lot of informing
going on."

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Coming up: more home learning

By Pat Churchill

With the cost of computers falling dramatically in the past dozen years and computers moving from the work place to the home, computers will have a dramatic impact on education in the not-too-distant future, according to Dr Colin Boswell.

Dr Boswell, who is head of the computing services department of Victoria University of Wellington, was a major speaker at the "Learning in the Computer Age" exhibition organised recently by the New Zealand Educational Administration Society's Wellington branch.

He said the educational use of computers had been made in the past, but normally at universities and wealthy schools, using large computers and for relatively boring teaching programmes.

"Until recently there has been little impact on the secondary or primary parts of the education industry. For these reasons, much of what has been done up until now in education using computers has not been successful.

"This will change. It is changing. It is changing now."

Dr Boswell said computer education would take place in two places — the school and the home.

While at the moment most high schools had only one or two computers, in a few years this number would increase to tens, and there would be two or three

computers in each primary school, too.

There would also be a dramatic rise in the number of homes with computers.

"Some experts argue that education in the home using computers will increase until eventually all formal education is done in the home and children will go to school to play, for physical activities, and to earn to socialise."

The same people argued the drive for this would come not from the wealthy middle class, but from people lower down the scale.

"Wanting their children to do as well as possible, they perceive that education is what they need. They will bypass the schools, buying teaching software to run on their home computers."

Dr Boswell said it was interesting to note in the Wellington region it was the schools catering to the lower socio-economic status children that had made the most progress in purchasing and introducing computers into the curriculum.

Looking ahead, Dr Boswell said computer-assisted education would be used in two areas: the education of the general pupil; and in the development of the physically handicapped or educationally subnormal child.

Of developing educational software, Dr Boswell said one of the problems was good programmers were rarely good teachers. Similarly, good teachers were seldom good programmers, even if they had the time. Really good computer-based lessons would be developed by teams including:

- Teachers with subject mastery.
- Graphics designers.
- Programmers to implement the programs, preferably on a variety of computers.
- Technical-educational writers.

- Other teachers as referees.
- Students to monitor the product.

Dr Boswell observed with interest that this was the approach adopted by the Poly organisation and the Department of Education in designing much of the early software on the Poly system. "They should be congratulated for this."

In the United States and Britain firms were just beginning to produce good cheap teaching material for home computers, but unfortunately developers saw lots of money in such activities and Dr Boswell foresaw a snowball effect.

The problem would then be like that in the textbook area — which one to choose.

Parental pressure would keep the topic of computer education a live issue. The parental pressure which had funded computers for secondary schools, was starting to appear in primary schools.

"The Department of Education should be seriously considering the possibility of computers in primary schools right now."

Dr Boswell said while in terms of computers in schools New Zealand was "not too bad, even if they are being purchased with cake stall money," in terms of Government involvement in computer assisted education "we run the risk of falling behind."

"It will be sad if, while the rest of the world is learning to swim, we are still dipping our toes in the water."

School purchase

Kuranui College in the Wairarapa, is buying five Colour Genie microcomputers. This purchase extends the college's computing tutorial base from its present TRS-80 machines.

There is a strong probability of Kuranui College's buying a further five Genies in January.

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110 REM EXCHANGE
120 REM NETHERLANDS
130 POKE36879,26
140 POKE36869,242
150 PRINT"*** SOUND EFFECTS ***"
160 PRINT
170 PRINT"0 MYSTERY NOISE"
180 PRINT"1 COMPUTER MANIA"
190 PRINT"2 EXPLOSION"
200 PRINT"3 BOMBARDMENT"
210 PRINT"4 ALARM"
220 PRINT"5 LASER FIRE"
230 PRINT"6 FIRE"
240 PRINT"7 SILLY TUNE"
250 PRINT"8 TELEPHONE"
260 PRINT"9 RANDOM NOISES"
270 PRINT"0-9 WHICH ONE ? (0=1)
280 GET#1:IF#1<0 THEN#30
290 FORI=1TO500:NEXT
300 Q=Q+1:IFQ=8THENQ=2
310 POKE36879,Q+24
320 GOTO280
330 A=1+VAL(A#)
340 IF#1=" " THEN#50
350 ONAGOSUB380,400,410,420,440,460,480,500,510,530
360 FORQ=0TO4:POKE36874+Q,0:NEXT
370 GOTO280
380 POKE36878,15:FORL=250TO200STEP-2:POKE36876,L:FORM=1TO100:NEXT:NEXT
390 FORL=205TO250STEP2:POKE36876,L:FORM=1TO100:NEXT:NEXT:RETURN
400 POKE36878,15:FORL=1TO100:POKE36876,INT(RND(1)*128)+128:FORM=1TO10:NEXT:NEXT:RETURN
410 POKE36877,220:FORL=15TO0STEP-1:POKE36876,L:FORM=1TO300:NEXT:NEXT:RETURN
420 POKE36878,10:FORL=230TO120STEP-1:POKE36876,L:FORM=1TO20:NEXT:NEXT:POKE36876,0
430 POKE36878,200:FORL=15TO0STEP-1:POKE36876,L:NEXT:RETURN
440 POKE36878,15:FORL=1TO10:FORM=180TO235STEP2:POKE36876,M:FORM=1TO10:NEXT:NEXT
450 POKE36876,0:FORM=1TO100:NEXT:NEXT:RETURN
460 POKE36878,15:FORL=1TO30:FORM=250TO240STEP-1:POKE36876,M:NEXT:FORM=240TO250
470 POKE36876,M:NEXT:POKE36876,0:NEXT:RETURN
480 POKE36878,15:FORL=1TO10:POKE36875,200:FORM=1TO500:NEXT:POKE36875,0:POKE36876,200
490 FORM=1TO500:NEXT:POKE36876,0:NEXT:RETURN
500 POKE36878,15:FORL=1TO15:POKE36876,160:FORM=1TO400:NEXT:NEXT:RETURN
510 POKE36878,15:FORL=1TO5:FORL=1TO50:POKE36876,220:FORM=1TO5:NEXT:POKE36876,0:NEXT
520 FORM=1TO3000:NEXT:NEXT:RETURN
530 POKE36878,25:FORL=1TO20:FORM=254TO240+INT(RND(1)*10)STEP-1:POKE36876,M:NEXT
540 POKE36876,0:FORM=0TOINT(RND(1)*100)+120:NEXT:NEXT:RETURN
550 PRINT"*** POKE36879,27 POKE36869,240
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PROGRAMS

MicroBee Othello By Shayne Doyle

```
00010 REM * MICROBEE OTHELLO
00020 REM
00030 GOSUB32000:GOTO100
00040 PCG:IF B&K THEN PRINT"ABC": ELSE PRINT"DEF":
00050 NORMAL:RETURN
00060 PCG:IF C&K THEN PRINT"ABC": ELSE PRINT"DEF":
00070 NORMAL:RETURN
00080 PCG:IF A&K THEN PRINT"DEF": ELSE PRINT"ABC":
00090 NORMAL:RETURN
00100 DIM B(8):S(8)
00105 POKE220,255:RESTORE 110
00110 DATA -64,-61,3,67,64,61,-3,-67
00120 FORZ=1TO8:READO(Z):NEXTZ
00130 B=194:C=197:E=207:F=1:F1=1:G=61440:H=32
00135 I=296:J=305:K=194
00140 L=46:M=0:M1=0:N=64:T=0:U=0
00150 GOSUB1000
00160 GOSUB2000
00170 IFX=99THEN900
00180 S2=M1
00200 FORV=1TO8:S(V)=M
00210 IFPEEK(P+Q(V))=BTHENLET(S(V)=F:S2=F1
00220 NEXTV
00230 IF S2=F1THEN810
00240 PCG:CURS(P-Q-1):PRINT"MMM":NORMAL:GOTO160
00250 CURS(P-Q-1):GOSUB60
00260 S3=M1
00270 FORV=1TO8
00280 IFS(V)=MTHEN700
00290 S1=M1:R=P
00300 FORL=1TO8:R=R+Q(V)
00310 IFPEEK(R)=BTHENNEXT*W 470
00320 IFPEEK(R)=CTHENLET(S1=F1
00330 NEXTW
00340 IFS1=M1THEN700
00350 R=P
00360 FORL=1TO8:R=R+Q(V)
00370 IFPEEK(R)=BTHENNEXT*W 700
00380 IFPEEK(R)=CTHENLET(S1=F1
00390 CURS(R-Q-1):GOSUB60:S3=F1
00400 NEXTW
00410 NEXTV
00420 IFS3=M1THEN310
00430 T=M1:U=M
00440 FORV=61573 TO 62021 STEP N
00450 FORL=0TO21STEP3
00460 IFPEEK(V+L)=BTHENLET(T=T+1
00470 IFPEEK(V+L)=CTHENLET(U=U+1
00480 NEXTW:NEXTV
00490 V=I:W=J
00500 IFS=HTHENLET(V=J:W=I
00510 CURS(V):GOSUB40:PRINT" "
00520 CURS(W):GOSUB60:PRINT" "
00530 IF T=U THEN15000
00540 IF T=0ANDU=0ANDT=0 THEN15000
00550 A=R:0=C:A
00560 GOTO 160
01000 REM ** DRAW SCREEN SUB
01010 CLS:XS=37654921
01020 CURS(15):PRINT"A B C D E F G H"
01030 CURS(29):PRINT"A B C D E F G H"
01040 FORX=1TO8:CURS(X*64+65):PRINTA5(X,X)
01050 CURS(X*64+66):PRINTA5(X,X):NEXTX
01060 CURS(168):PRINT"MICROBEE OTHELLO"
01070 CURS(224):PRINT"PLAYER 1"
01080 REM CURS(171):PRINT"1 2 3 4 5 6 7 8"
01090 FORI=1TO8:CURS(X*64+67):PRINT"J":
01100 CURS(X*64+92):PRINT"J":NEXTX
01110 CURS(643):PRINT"LHHHHHHHHHHHHHHHHHHHHH"
01120 FORX=138TO581STEP64:FORY=0TO21STEP3:POKE(61440+X+Y),207
01130 NEXTY:NEXTX
01140 CURS(333):PRINT"ABC":DEF"
01150 CURS(397):PRINT"DEF":ABC"
01160 CURS(296):GOSUB40:CURS(305):GOSUB60
01170 NORMAL
01180 RETURN
02000 REM
02005 FORZ=1TO50:NEXTZ:CURS(424):PRINTA20 321:
02010 CURS(552):PRINTA20 321:
```

PROGRAMS

```

02010 CURS(424):PRINT"PLAYER 1:00SUB80:PRINT" ? " :
02020 X7$=""
02030 X6$=KEY$:IFX6$=""THEN2030
02040 IFX6$="0"THEN15050
02050 IFX6$="P"THENLETX=99:RETURN
02060 X7$=X7$+X6$:CURS(437):PRINTX7$:
02070 IFLEN(X7$)>2THEN2030
02080 X=ASC(X7$(1,1))-64
02090 Y=9-INT(VAL(X7$(1,2)))
02100 IFX<10RX<80RY<10RY<8THEN2005
02110 X=X*3+2:Y=Y+1:P=G+(Y*64)+X
02120 IFPEEK(P)=ETHEN2140
02130 CURS(552):PRINT"INVALID MOVE":GOTO2005
02140 CURS(552):PRINT[A20 32]:
02150 CURS(424):PRINT[A20 32]:
02160 RETURN
10000 CURS(960):PRINT"?":
10010 IFKEY$=""THEN10010
10020 RETURN
15000 REM ** END OF GAME
15010 IFU>TTHENLETA=0
15020 IFT>UTHENLETA=C
15030 CURS(552):
15035 IFI=UTHENPRINT"IT'S A DRAW !!":GOTO15050
15040 PRINT"PLAYER 1:00SUB80:PRINT" WINS !!":
15050 CURS(680):
15060 PRINT"ANOTHER GAME ? " :
15065 X1$=KEY$:IFX1$=""THEN15065
15070 IFX1$="Y"THEN130
15080 CLS:END
20000 REM ** DEFINE PCG CHARACTERS
20005 RESTORE 20050
20010 #=63480+65*16
20020 FORA=PTOP+16*15-1
20030 READB:PCKEA+B
20040 NEXTA
20050 DATA 0,63,48,48,48,48,48,48,48,48,48,63,0
20060 DATA 0,255,0,0,0,0,0,0,0,0,0,0,255,0
20070 DATA 0,252,12,12,12,12,12,12,12,12,12,12,252,0
20080 DATA 0,63,63,63,63,63,63,63,63,63,63,63,63,0
20090 DATA 0,255,255,255,255,255,255,255,255,255,255,255,255,0
20100 DATA 0,252,252,252,252,252,252,252,252,252,252,252,252,0
20110 DATA 0,0,0,0,0,0,0,31,24,24,24,24,24,24,24
20120 DATA 0,0,0,0,0,0,0,255,0,0,0,0,0,0,0
20130 DATA 0,0,0,0,0,0,0,248,24,24,24,24,24,24,24
20140 DATA 24,24,24,24,24,24,24,24,24,24,24,24,24,24
20150 DATA 24,24,24,24,24,24,24,248,0,0,0,0,0,0,0
20160 DATA 24,24,24,24,24,24,24,31,0,0,0,0,0,0,0
20170 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
20180 DATA 255,255,255,255,255,255,255,255,255,255,255,255,255
20190 DATA 255,255,255
20195 DATA 0,0,0,0,0,0,0,50,50,0,0,0,0,0,0,0
21900 RETURN

```

Blues and Greens

The struggle between Apple and IBM continues apace, the 16-bit IBM PC creaming the top off the business market while Apple continues to dominate educational markets. The software advantage is still with Apple: marginally with business (the II has 1187 available software packages, just ahead of the 975 for Big Blue) and overwhelmingly with education (1805 to 48). The sales of the II, at 70,000 a month (IBM PC rumoured at 45,000), have flattened slightly but new pricing on the Lisa actually drops it below the US cost of an IBM PC-XT with near-comparable software. Plans are afoot, too, to revamp the II and offer the new PRO-DOS along with a version of Lotus 1-2-3.

The real fur will now fly with the new Peanut (set to undermine the IIe cheaper market) while Apple holds for a January rumoured launch of the Macintosh, aimed more at just moving everybody up-market on the coat-tails of Lisa's image.

U.K. Atari launch

Selling at 160 pounds, the Atari 600, successor to the 400, 800, and 1200, has received solid reviews. Very much an update of the earlier models, the system offers access to all Atari software, the same strong graphics and improved keyboard and interfacing. Atari plans an expansion box for CP/M and an up-market 1450XL machine with greater RAM and built-in disk drives in the near future.

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Cavern Mission

By Gary Parker

This game will work with a 16K or 48K Spectrum. You fly a helicopter through a sideways-scrolling cave. Your mission is to rescue bouncing and hovering men who are at the mercy of rampant jet packs. There are monstrous bats to avoid, and fuel depots to capture. The game has a helicopter with rotating blades and a tortuous, high-res cave.

Instructions are given at the start of the game. You use the four cursor keys, 5, 6, 7, 8 to move your helicopter, and must try to pass over men to rescue them, and over fuel depots to gain fuel. To catch a man, your cockpit must pass over him, not your tail. Bats must be avoided. You lose a unit of fuel with each move, and when the fuel drops below 50 units you lose the ability to move backwards and forwards. You cannot move at all when the fuel reaches zero.

I suggest you do not type in REM statements: use them simply to clarify points while keyboarding. Some strange programming techniques have been used, so don't change lines just because they look odd.

When you have finished typing SAVE it before you RUN it with SAVE "Cavern" LINE 1

```

10 GO SUB 2000
90 LET SC=SC+1. LET FU=FU-1: IF
FU=50 OR FU=0 THEN GO SUB 1515
92 LET AX=AX-1: IF AX=0 THEN
LET BX=31. LET MY=(150-H)/8: PRIN
T AT 21,AX: INK 6:
93 BEEP .002,0: LET OMY=MY: LE
T OMX=MX: LET MY=MY+MY: IF CODE
SCREENS (MY,MY) (>32 THEN LET MI
=MI: LET MY=OMY+MI
95 PRINT AT OMY,OMX:CHR$ 32:AT
MY,OMX:
100 IF INKEY$="1" THEN GO SUB 9
00
105 LET OH=H: LET D=RDND*20-10+I
: IF RDND>.9 THEN LET I=-1
110 LET H=h+d: IF H<5 OR H>80 T
HEN LET D=-d: LET H=OH+d: LET I=
-1
115 BEEP .002,0
120 PRINT AT Y,X:G$ LET I=USR
2000: IF CODE SCREENS (Y,X+1) (>
32 THEN GO TO 1000
122 PRINT AT Y,X:G$ AT 0,31: I$
130 PLOT 248,OH: DRAW 7,d: PLOT
248,OH+66: DRAW 7,d
142 IF AND>F THEN PRINT AT (13
0-H)/8,31:H$
145 IF AND>.97 THEN PRINT AT (1
40-H)/8,30:0$
146 IF AND>.95 THEN PRINT AT (1
50-H)/8,31:d$
147 BEEP .002,0
210 IF FU=1 THEN GO TO 220
212 IF INKEY$="6" THEN GO TO 52
3

```

The deadline for classified advertisements is the seventh of the month prior to the month of publication.

```

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$="5" THEN GO TO 50
0
220 IF ATTR (Y,X) (>51 OR ATTR (
Y,X+1) (>51 THEN GO TO 1000
225 IF INKEY$="3" THEN GO SUB 9
00
230 PRINT AT Y,X:G$
240 GO TO 90
250 IF X=1 THEN LET A=-1: IF 0
CODE SCREENS (Y,X)/32 THEN GO TO
1000
2510 PRINT AT Y,X+2:G$ AT Y,X:G$
GO TO 90
260 LET Y=Y+1: IF NOT (CODE SCR
EENS (Y,X)=32 AND CODE SCREENS (
Y,X+1)=32) THEN PRINT AT Y-1,X:G
$ GO TO 1000
260 PRINT AT Y-1,X:G$ AT Y,X:G$
GO TO 90
270 LET Y=Y-1: IF NOT (CODE SCR
EENS (Y,X)=32 AND CODE SCREENS (
Y,X+1)=32) THEN PRINT AT Y+1,X:G
$ GO TO 1000
280 PRINT AT Y+1,X:G$ AT Y,X:G$
GO TO 90
290 IF X=30 THEN LET X=X+1: IF
CODE SCREENS (Y,X+1)=32 THEN PR
INT AT Y,X-1:G$ GO TO 1000
300 PRINT AT Y,X-1:G$ AT Y,X:G$
GO TO 90
310 BEEP .15,16 BEEP .1,20: PR
INT AT Y,X:G$
320 LET A=A+1: LET SC=SC+100
330 PLOT 248,OH: DRAW 7,d: PLOT
248,OH+66: DRAW 7,d
340 GO TO 90
350 REM The Pause Routine.
360 FOR K=1 TO 50: NEXT K
370 IF INKEY$="" THEN GO TO 910
380 RETURN
1000 IF ATTR (Y,X)=52 OR ATTR (Y
,X+1)=52 THEN GO TO 700
1005 IF ATTR (Y,X)=135 OR ATTR (
Y,X+1)=135 THEN GO TO 600
1008 PRINT INK 0:AT Y,X:G$
1010 BORDER 0
1015 FOR K=1 TO 50
1020 BORDER INT (RDND*7+1)
1025 NEXT K
1030 BEEP .2,-10: BEEP .2,-14: B
EEP .4,-15
1050 LET HESHE=1
1060 IF HESHE=1 THEN GO SUB 1510
1100 GO SUB 2070
1105 LET FU=100
1110 GO TO 90
1500 LET HESHE=1
1510 REM The Crash Routine.
1512 REM Each word in line 1515
is preceded by 11 spaces.
1515 PRINT INK 1:AT 0,0:
Choppers: AT 1,0:
Score: AT 2,0:
Fuel: AT 3,0:
Re
scued: AT 4,0:
1517 IF FU=0 THEN LET FU=0
1520 PRINT INK 2:AT 0,20:HE:AT 1
,20:SC:AT 2,20:FU:AT 3,20:RE
1530 IF HE=0 THEN RETURN
1540 PRINT PAPER 0: INK 7: FLASH
1: BRIGHT 1:AT 11,11: Game Ove
r
1542 PRINT INK 2:AT 20,10: "Press
Any Key"
1550 IF INKEY$="" THEN GO TO 155
0
1550 RUN
1995 REM start the game
2000 GO SUB 3000
2002 RESTORE 1: FOR K=23300 TO 23
341: READ A: POKE K,M: NEXT K
2005 REM machine code data, take
care not to make any mistakes!
If any of these numbers are uncl
ear, refer to line 2010.
2010 DATA 33,0,64,85,62,192,6,3
,35,94,43,115,35,16,249,114,35,0
,132,242,53,0,58,62,50,14,22,6,3
,135,94,43,115,35,16,249,119,35,
13,32,242,201
2015 FOR K=USR "A" TO USR "J"+7:
READ U: POKE K,U: NEXT K
2017 REM user-defined graphics d
ata. If a character looks odd it
will be due to a mistake in thi
s data. If any of the numbers ar
e unclear, refer to line 2020.
2020 DATA 135,192,224,63,7,3,0,3
,255,32,252,242,249,255,136,254
,128,192,224,63,15,3,0,3,112,32,2
52,242,249,255,136,254,4,32,4,14
52,4,81,0,3,136,0,82,0,73,0,68,16
,34,24,60,90,153,60,36,102,2,33,
115,255,255,159,13,1,64,132,208,
255,255,249,176,128,255,129,189,
161,189,161,129,255
2035 REM as as & b4 hold the helico
pter.

```

```

2040 LET A$=CHR$ 16+CHR$ 3+CHR$
146+CHR$ 147: LET B$=CHR$ 16+CHR
$ 3+CHR$ 144+CHR$ 145
2041 REM Change ff to a slightly
smaller decimal to make the fue
l depots common.
2042 LET H=3: LET SC=0: LET FU=
100: LET RE=0: LET F=0.973
2045 REM C$, A$ & B$ hold the ex
plosion, the human, & the missil
e.
2050 LET C$=CHR$ 146+CHR$ 149: L
ET D$=CHR$ 16+CHR$ 4+CHR$ 150: L
ET E$=CHR$ 16+CHR$ 1+CHR$ 151+CH
R$ 152
2055 REM F$ is used in the sides
e scrolling.
2056 LET F$=CHR$ 16+CHR$ 2+CHR$
17+CHR$ 5
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$ 1+CHR$ 31+CHR$ 32: NE
XT K
2062 LET H$=CHR$ 16+CHR$ 7+CHR$
17+CHR$ 0+CHR$ 15+CHR$ 1+CHR$ 15
3
2065 GO SUB 2500
2070 PAPER 5: INK 2: BORDER 1: 0
LS
2072 LET H=50: LET I=INT (RDND*10
): LET MI=1: LET M2=0: LET MY=1
3
2075 PLOT 0,13: DRAW 200,7: DR
AW 35,10: DRAW 20,h-30: PLOT 255,7
75: DRAW -5,-55: DRAW 5,-4
2077 GO SUB 1510
2079 LET Y=0+RDND*5: LET X=10+RDND
*10
2085 PRINT AT Y,X:G$
2087 LET FU=100
2090 PAUSE 50: PRINT INK 2:AT 2
0,14: RETURN
2500 LET W=1: LET M1=0: LET M2=
2502 FOR K=M1 TO M2 STEP W
2505 PRINT PAPER 6: INK 1:AT 1,1
: "C A V E R N M I S S I O N"
PAPER 3:AT 19,9:"Press Any Key"
2507 PAUSE 5
2510 IF INKEY$="" THEN RETURN
2520 NEXT K
2530 LET W=-W: LET M1=M1: LET M
2=M2: LET M1=0: GO TO 2502
2595 REM Print the instructions.
3000 PAPER 3: INK 6: BORDER 1: 0
LS
3010 PRINT INK 2: PAPER 6:AT 1,1
: "C A V E R N M I S S I O N"
INK 5: PAPER 3:AT 3,9:"by Gary
Parker"
3020 PRINT INK 7:AT 5,0:"Secret
jet pack tests deep in a subte
rranean cavern system have giv
ne away: your mission is to res
ue the helpless test pilots
as they bounce and hover at the
mercy of their campai
jet pac
ks. Beware of monstrous bats, a
nd take care not to run out of
fuel."
3030 PRINT INK 6:AT 15,0:"Use th
e cursor keys to manoeuvre":AT 1
7,8:"Press 1 to pause"
3050 RETURN
9000 REM

```

end of program

9002 REM Here are lines 2005 to 2020 again. DO NOT TYPE IN THE FOLLOWING LINES. Just use them to compare with lines 2005 and 2020 if any of the numbers in the e lines have not printed clearly.

```

2005 REM This is a copy of line 2010
2010 DATA 33,0,64,85,62,192,6,3
,35,94,43,115,35,16,249,114,35,0
,132,242,53,0,58,62,50,14,22,6,3
,135,94,43,115,35,16,249,119,35,
13,32,242,201
2015 REM This is a copy of line 2020.
2020 DATA 135,192,224,63,7,3,0,3
,255,32,252,242,249,255,136,254
,128,192,224,63,15,3,0,3,112,32,2
52,242,249,255,136,254,4,32,4,14
52,4,81,0,3,136,0,82,0,73,0,68,16
,34,24,60,90,153,60,36,102,2,33,
115,255,255,159,13,1,64,132,208,
255,255,249,176,128,255,129,189,
161,189,161,129,255

```



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PROGRAMS

TRS80/System 80

Think Big Fun with letters

By Martin Downey

10 "THINK BIG" IS A BASIC SUB-ROUTINE ENABLING EASY PRINTING OF LARGE BANNER MESSAGES. THE LARGE LETTERS ARE THREE TIMES NORMAL LETTER SIZE AND ARE CREATED USING GRAPHICS.

20 THE ACTUAL SUB IS CONTAINED IN LINES 60000-60200, BUT DON'T FORGET LINE 100 WHICH SHOULD BE PLACED AT THE START OF YOUR PROGRAM WITH YOUR OTHER DIMENSION-ING ETC...

30 ON THE FIRST CALL OF THE SUB Z2 WILL BE ZERO SO THE DATA STATEMENTS WILL BE READ INTO THE STRING ARRAYS Z1 & Z2. THUS THE FIRST CALL WILL TAKE A BIT LONGER THAN SUBSEQUENT CALLS.

40 THE SUB CAN EASILY BE MODIFIED TO GIVE "PRINT" OR YOU CAN EXECUTE A "PRINT" BEFORE CALLING THE SUB (THIS WILL PLACE THE CURSOR WHERE YOU WANT THE MESSAGE TO START). A SAMPLE PROGRAM IS SHOWN IN LINES 500-590. IT PRINTS A TITLE AND THE ASCII CHARACTER SET THEN LETS YOU ENTER A MESSAGE TO BE DISPLAYED IN BIG LETTERS.

```
100 CLEAR8000:DIMZ1$(63),Z2$(63):
    DEFINTZ

500 CLS:Z$=" THINK BIG":
    GOSUB60100
505 X1$=Z1$:X2$=Z2$
510 PRINT@216:"BY MARTIN DOWNEY":
    PRINT:PRINT
520 Z$=" 1#%&*'()*+,-./01234":
    GOSUB60100
530 Z$="56789:;<=>?@ABCDEFGHI":
    GOSUB60100
540 Z$="JKLMNOPQRSTUVWXYZ[^\]^_":
    GOSUB60100
545 S$=STRING$(63,32)
546 FOR I=1 TO 20
550 PRINT@0:X1$=PRINTX2$:
    FORI=1TO30:NEXTI:
    PRINT@0,S$:PRINTS$:
    FORI=1TO15:NEXTI
560 NEXT I:CLS
570 INPUT "ENTER YOUR MESSAGE ":Z$
580 GOSUB 60100:PRINT
590 GOTO 570
```

```
59000 DATA FOR LARGE CHARACTERS

60000 DATA0,0,0,0,0,0,0,42,0,0,34,
0,0,5,5,0,0,0,0,8,29,29,2,7,7,
8,59,19,8,46,6,2,33,6,8,1,12
:CHARACTERS 6 TO Z

60005 DATA0,54,4,8,51,37,0,27,0,0,
0,0,0,24,3,0,9,48,2,9,16,32,
24,1,34,62,54,8,11,9,32,56,
48,0,2,0 :&+-
```

```
60010 DATA0,0,0,0,27,0,32,48,48,0,
0,0,0,0,0,0,48,0,0,32,6,8,1,
0,40,35,45,10,54,26,0,46,0,
0,58,16 :&-1

60015 DATA2,51,25,42,48,48,2,35,25,
32,48,26,32,6,21,2,3,23,42,
51,51,8,48,26,32,6,1,10,51,
25,2,3,27,0,22,0 :&2-7

60020 DATA8,51,25,10,48,26,8,51,
57,0,48,6,0,12,0,0,3,0,0,12,
0,0,27,0,0,48,4,2,12,16,8,12,
12,2,3,3 :&8-=-

60025 DATA0,36,16,0,24,6,8,35,25,0,
34,0,2,51,41,10,58,26,32,6,
36,42,3,43,42,51,25,42,48,26,
40,3,9,10,48,24 :&-C

60030 DATA42,3,36,42,48,6,42,51,3,
42,48,48,42,51,3,42,0,0,40,3,
3,10,48,59,42,48,58,42,0,42,
2,43,3,32,58,48 :&D-I

60035 DATA2,43,3,8,26,0,42,48,6,42,
0,41,42,0,0,42,48,48,42,36,
46,42,0,42,42,36,42,42,0,43,
40,3,41,10,48,26 :&J-D

60040 DATA42,51,25,42,0,0,40,3,41,
10,50,38,42,51,25,42,2,36,8,
51,19,32,48,26,2,43,3,0,42,0,
42,0,42,10,48,26 :&P-U

60045 DATA42,0,42,2,36,6,42,0,42,
42,6,46,2,36,6,40,1,41,2,
36,6,0,42,0,2,35,27,40,51,48
:CHARACTERS V TO Z

60050 DATA32,46,36,0,42,0,0,42,0,2,
46,6,32,54,48,0,9,0,32,50,52,
0,8,1,0,0,0,32,48,48 :&[-_

60090 END

60095 ***** THINK BIG SUBROUTINE *****
60097 PRINTS MESSAGE IN Z$.
(MAXIMUM 21 CHARACTERS)
60100 IFZ2=1THEN60140ELSEZZ=1
60105 FORZ0=0TO63
60110 FORZ1=1TO3:READZ2:
Z1$(Z0)=Z1$(Z0)+CHR$(Z2+126):
NEXTZ1
60120 FORZ1=1TO3:READZ2:
Z2$(Z0)=Z2$(Z0)+CHR$(Z2+128):
NEXTZ1
60130 NEXTZ0
60140 Z1$="":Z2$=""
60150 FORZ0=1TOLEN(Z1$):
Z1=ASC(MID$(Z1,Z0,1))-32
60160 Z1$=Z1$+Z1$(Z1):
Z2$=Z2$+Z2$(Z1):NEXTZ0
60170 PRINTZ1$:PRINTZ2$:PRINT
60200 RETURN
```

Commodore 64 (or PET) Satellite shoot

By Steven Darnold

```
10 REM
20 REM
30 REM
40 REM
50 REM
60 REM
70 REM
80 REM
90 REM
100 REM
110 REM
120 REM
130 DEF FNA(X)=P+79-INT(F/2)+X+W*40
140 PRINT"<clr><gr3>"
150 IF PEEK(55271)=208 THEN T=64
160 H=55296:P=32768:IF T=0 GOTO 190
170 P=1024
180 POKE 53280,12:POKE 53281,12
190 PRINT"DO YOU WANT INSTRUCTIONS";
```

```
200 INPUT A$
210 IF LEFT$(A$,1)="Y" THEN 1920
220 PRINT"<clr>"
230 FOR I=0 TO 39
240 POKE P+960+I,100
250 POKE H+960+I,0
260 NEXT
270 I=RND(-TI)
280 FOR I=1 TO 9
290 READ X
300 POKE P+962+I,X
310 POKE H+962+I,11
320 NEXT
330 DATA 254,160,160,160,160
340 DATA 160,254,160,160
350 FOR I=1 TO 7
360 READ X
370 POKE P+924+I,X
380 POKE H+924+I,11
390 NEXT
400 FOR I=1 TO 6
410 READ X
420 POKE P+884+I,X
430 POKE H+884+I,11:NEXT
440 DATA 254,160,252,225,32,252,252
450 DATA 225,225,97,32,97
460 POKE P+846,225
470 POKE H+846,11
480 POKE P+999,252
490 POKE H+999,15
500 POKE P+998,160
510 POKE H+998,15
520 POKE P+997,254
530 POKE H+997,15
540 POKE P+957,95
550 POKE H+957,15
560 POKE P+958,223
570 POKE H+958,15
580 GOSUB 890
590 GOSUB 1750
600 GET Q$:IF Q$="" GOTO 660
610 IF M>0 THEN POKE P+958-M*41,32
620 IF P+917-M*41=FNA(0) GOTO 770
630 M=M+1
640 POKE P+958-M*41,46
650 POKE H+958-M*41,15
660 POKE FNA(1),32
670 IF T THEN POKE FNA(0)+54272,2
680 POKE FNA(0),81
690 F=F+1
700 IF F=80 THEN F=0:GOSUB 880
710 IF F=0 THEN GOSUB 1750
720 IF INT(F/2)=V THEN GOSUB 900
730 IF INT(F/2)>V THEN GOSUB 930
740 IF M=25 THEN M=0:GOSUB 2030
750 IF M<25 AND M>0 THEN 610
760 GOTO 600
770 POKE P+917-M*41,42
780 POKE H+917-M*41,7
790 POKE P+918-M*41,42
800 POKE H+918-M*41,7
810 POKE P+916-M*41,42
820 POKE H+916-M*41,7
830 POKE P+877-M*41,42
840 POKE H+877-M*41,7
850 POKE P+957-M*41,42
860 POKE H+957-M*41,7
870 GOSUB 2030:GOTO 1760
```

Oak on way?

Following the example of such pioneers as Jobs and Wozniak, of Apple, the co-founders of Acorn have now themselves gone public (at least 10 per cent public). Shares floated on the London Stock Exchange value Acorn at roughly \$300 million. Floated as a \$500 company five years ago Acorn now boasts a \$250-million-a-year turnover. Of the total shares in the company, Herman Hauser owns 40 per cent and Chris Curry 38 per cent.

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today

```

080 POKE P+40*W#40,32
090 V=INT(RND(1)*7)*4+5:RETURN
900 V=FNA(-1)
910 S=1
920 RETURN
930 IF S>1 THEN POKE Y+40*(S-1),32
940 IF T THEN POKE 54272+Y+40*S,2
950 POKE Y+40*S,46
960 S=S+1
970 IF S=21-W AND V=29 GOTO 1010
980 IF S<>24-W GOTO 1000
990 V=50:POKE Y+920-W#40,32
1000 RETURN
1010 TI$="000000"
1020 POKE P+889,42
1030 POKE H+889,7
1040 POKE P+890,42
1050 POKE H+890,7
1060 POKE P+888,42
1070 POKE H+888,7
1080 POKE P+849,42
1090 POKE H+849,7
1100 POKE P+929,42
1110 POKE H+929,7
1120 IF TI<5 GOTO 1120
1130 POKE P+886,32
1140 POKE P+887,32
1150 POKE P+928,32
1160 POKE P+930,32
1170 POKE P+969,100
1180 POKE P+968,100
1190 POKE P+970,100
1200 POKE P+927,32
1210 POKE P+931,32
1220 IF TI<10 GOTO 1220
1230 POKE P+971,233
1240 POKE P+967,223
1250 POKE P+926,223
1260 POKE P+846,32
1270 POKE P+845,225
1280 POKE P+885,97
1290 IF TI<15 GOTO 1290
1300 POKE P+889,32
1310 POKE P+890,32
1320 POKE P+888,32
1330 POKE P+849,32
1340 POKE P+929,32
1350 POKE P+845,32
1360 POKE P+926,32
1370 POKE P+971,100
1380 POKE P+885,32
1390 POKE P+925,123
1400 POKE P+966,98
1410 POKE P+967,100
1420 IF TI<20 GOTO 1420

```

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[illegible]

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ZX81

Over 750,000 sold so far, touch-sensitive keyboard...black and white display...animated graphics...expandable 1K RAM (memory)...the ZX81 is the ideal introduction to the fascinating world of personal computing.

\$199.00

Power Supply **\$19.95**



ZX 16K RAM PACK

Massive add-on memory pack simply plugs into the back of a ZX81. Multiply your data and program storage by 16. With it, you can run sophisticated software like Flight Simulation or VU-CALC.

\$99.00



ZX PRINTER

Designed exclusively for use with the Sinclair ZX range of personal computers. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch. Plugs into the rear of a ZX81 or a ZX Spectrum.

\$189.00

ZX81 Printer
Power Supply **\$24.95**



ZX SPECTRUM 16K RAM

8 vivid colours...130 sounds...high-resolution animated graphics...moving-key keyboard...ASCII character set with upper- and lower-case characters — all for under \$500.00. You can even update to 48K RAM at a later date.

\$499.00

ZX Power Supply **\$24.95**



ZX SPECTRUM 48K RAM

All the features of the 16K Spectrum — but with three times the memory capacity. The Hobbit, VU-3D, and Small Business Accounts are just three of the programs you can run on the top-of-the-range Sinclair ZX Spectrum.

\$699.00



SINCLAIR ZX SOFTWARE

There are over 50 titles for the ZX81 and over 40 titles for the Spectrum in the Sinclair Software Library. And it's growing all the time. Latest releases include Sabotage and City Patrol for the ZX81, plus Cyrus-S-Chess and Computer Scrabble for the Spectrum.

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PROGRAMS

ZX81

Helicopter

By John Kamp

This is a game in which you fly an imaginary helicopter.

CONTROLS

1 TO INCREASE BLADE SPEED
2 TO DECREASE BLADE SPEED
3 TO INCREASE THRUST
4 TO DECREASE THRUST
5 TO TURN LEFT
6 TO TURN RIGHT

100 REM ***BY JOHN KAMP 27/8/83
101 REM WCH/MS

102 CLS
103 LET X=0
104 LET A=250
105 LET C=0
106 LET S=0
107 LET T=0
108 LET H=0
109 PRINT "WOULD YOU LIKE TO BE
110 IN THE AIR OR ON THE GROUND?"

111 IF A=0 THEN GOTO 190
112 INPUT I\$
113 CLS
114 IF I\$="A" THEN GOTO 90
115 IF I\$="G" THEN GOTO 95
116 LET B=50
117 LET H=200
118 GOTO 100
119 LET B=0
120 REM PRINTS WORDS
121 PRINT AT 10,0:"TIME" AT 0,0
122 "BLADE SPEED" AT 2,0:"ALTITUDE"
123 AT 4,0:"CLIMB RATE" AT 6,0:"SP
124 ED" AT 8,0:"DISTANCE TRAVELLED"
125 AT 10,0:"THRUST" AT 12,0:"BEARI
126 NG"

127 REM VARIABLES
128 LET F=H
129 LET K=0
130 REM CHECKS IF TAKEN OFF
131 IF H=0 AND T=0 THEN GOTO 90

132 REM PRINTS NUMBERS
133 PRINT AT 14,21,X:AT 0,21,B;
134 "AT 2,21,H:" AT 6,21;
135 "AT 8,21,D:" AT 10,21,T;
136 "AT 12,21,R;

137 REM KEYS
138 IF INKEY\$="1" THEN LET B=B+
139 10
140 IF INKEY\$="2" THEN LET B=B-
141 10
142 IF INKEY\$="3" THEN LET A=A+
143 10
144 IF INKEY\$="4" THEN LET A=A-
145 10
146 IF INKEY\$="5" THEN LET T=T+
147 10
148 IF INKEY\$="6" THEN LET T=T-
149 10
150 REM CLIMBING INKEYS
151 IF B<0 THEN LET B=0
152 IF A<-1 THEN LET A=359
153 IF A=360 THEN LET A=0
154 IF T<0 THEN LET T=0
155 IF S<0 THEN LET S=0
156 REM EQUATIONS
157 LET X=X+1

2050 LET H=H+(B-S)/31-T
2051 REM ***CHECKING EQUATION***
2052 IF H<0 THEN LET H=0
2053 IF X=180 AND S<0 THEN GOTO
4010
2054 IF B>0 AND X<240 THEN GOTO
4000
2055 IF C>0 AND X<360 AND X<301
2056 THEN GOTO 9000
2057 IF H=0 AND X<360 THEN GOTO
2050
2058 REM *****
2059 LET C=H-F
2060 LET S=(T**2)/20
2061 IF INKEY\$="4" THEN GOTO 300
2062 IF INKEY\$="" THEN GOTO 3000
2063 LET D=(X**2)/50
2064 REM *****
2065 GOTO 400
2066 PRINT AT 19,0:"YOU HAVE BEE
2067 N FLYING FOR THREE HOURS, AND YO
2068 UR FUEL IS LOW, GO AT A BEARING
2069 OF 270 FOR 60 MINS"
2070 GOTO 400
2071 PRINT AT 19,0:"

4210 IF A=270 THEN PRINT AT 21,1
4211 "LAND"
4212 IF A<270 THEN GOTO 6004
4213 GOTO 400
4214 PRINT AT 19,0:"

6001 PRINT AT 21,0:"YOU CRASHED"
6002 GOTO 6005
6003 PRINT AT 21,6:"YOU CRASHED"
6004 FOR Z=0 TO 120
6005 NEXT Z
6006 PRINT AT 10,0:"PRESS ANY KE
6007 Y TO PLAY AGAIN"
6008 IF INKEY\$="0" THEN RUN
6009 GOTO 3000
6010 PRINT AT 21,0:"YOUR TANKS H
6011 AVENOW FULL."
6012 GOTO 400
6013 CLS
6014 PRINT "YOU RAN OUT OF FUEL"
6015 GOTO 6005

ZX81

Cat-venture

By Sean Clancy

This adventure game runs on the 16K Sinclair ZX81. You use (A), (B), or (C) to play. (Our ZX81 editor has slightly altered this listing by Sean, who is 12, so that the words fit on the screen without splitting. He suggests that readers might like to vary the program with more use of random selection).

1 REM CAT-VENTURE
2 REM BY SEAN CLANCY
10 PRINT "YOUR NAME PLEASE?...
20 INPUT A\$
30 IF A\$="" THEN GO TO 10
40 PRINT "PRESS (P) IF YOU WAN
50 T TO PLAY CATVENTURE"
60 INPUT B\$
70 IF B\$="P" THEN PRINT "CHIC
80 KEN."
90 IF B\$="P" THEN STOP
100 IF B\$="P" THEN PRINT "GET R
110 EADY...."
120 PAUSE 100
130 CLS
140 PRINT "YOU ARE A PET CAT CA
150 LLED "
160 PRINT A\$
170 PRINT "AND YOU ARE TAKING Y
180 OUR USUAL AROUND WHEN SUDDENLY
190 THREE BIG DOGS START CHASING Y
200 OU...."
210 PRINT
220 PRINT "WHAT DO YOU DO?
(A) CLIMB A TREE
(B) SPEED ROUND A CO
(C) JUMP OVER A NEAR

BY FENCE"
125 PRINT
130 PRINT "PRESS EITHER (A), (B)
140 OR (C)."
150 INPUT C\$
160 CLS
170 IF C\$="A" THEN PRINT "YOU A
180 RE SAFE AND YOUR HOUSE
190 IS RIGHT NEXT TO YOU"
200 IF C\$="B" THEN STOP
210 IF C\$="C" THEN PRINT "YOU A
220 RE SAFE FROM THE DOGS, YOU H
230 AVE LANDED IN THE MIDDLE OF A
240 GROUP OF STRAY CATS AND THEY
250 WANT YOU TO BECOME ONE OF THEM.

185 PRINT "(A) YOU JOIN THEM
(B) YOU TRY TO FIGHT
(C) YOU JUMP BACK OU
THEN
ER THE FENCE
190 INPUT D\$
195 CLS
200 IF D\$="C" THEN GO TO 1000
210 IF D\$="B" THEN PRINT "TOO B
220 AD-YOU WOULD HAVE BEEN SAFER
230 WITH THE DOGS"
240 SCROLL
250 SCROLL
260 SCROLL
270 SCROLL
280 SCROLL
290 SCROLL
300 SCROLL
310 IF D\$="A" THEN PRINT "YOU A
320 RE LUCKY FOR THE MOMENT -BUT
330 SUDDENLY YOU SEE THE CAT -CATC
340 HER (A) YOU
350 U TRY AND GO THROUGH HIS LEGS
(B) YOU
(C) YOU
U JUMP THE FENCE
U FIND A SMALL ALLEYWAY AND GO T
THROUGH IT"
360 INPUT E\$
365 CLS
370 IF E\$="A" THEN PRINT "HE HA
380 S CAUGHT YOU"
390 IF E\$="A" THEN PAUSE 100
400 IF E\$="A" THEN GO TO 1000
410 IF E\$="B" THEN PRINT "THE D
420 OGS HAVE GOT YOU"
430 IF E\$="B" THEN PAUSE 100
440 IF E\$="B" THEN GO TO 1000
450 IF E\$="C" THEN PRINT "SUDD
460 ELY SOME MORE DOGS ARE AFTER
470 YOU"
480 SCROLL
490 SCROLL
500 SCROLL
510 SCROLL
520 SCROLL
530 SCROLL
540 SCROLL
550 GO TO 120
1000 CLS
1005 PRINT "CONSIDER YOURSELF NO
1010 N-EXISTANT"
1015 STOP

ZX81

Catchball II

By Jeremy Hollobon

This is a modification of Catchball, where you control the cup at the bottom of the screen. Here the computer controls the cup and the player must manoeuvre the falling balls. Use cursor keys 5 and 8 to move the ball left and right as it falls. After 10 balls have dropped, the Computer will display your score.

1 LET Z=NOT B\$
2 LET C=NOT C\$
3 LET D=NOT D\$
4 LET E=NOT E\$
5 LET F=NOT F\$
6 LET G=NOT G\$
7 LET H=NOT H\$
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ZX81

Number Challenge

By Malcolm J. Young

The computer generates a number between zero and 100 which you have to guess. It gives you clues such as "too high" or "too low". It keeps count of the number of guesses you make. After you guess the number, you make up a number for the computer to guess. After 10 rounds the winner is the person with the fewest guesses. The program is approximately 2K.

The ZX81 editor suggests that readers add the following two lines.
315 FOR X = 1 TO 200
316 NEXT X

```
10 PRINT TAB 7; "NUMBER CHALLENGE"
20 LET U=0
30 LET P=0
40 REM INSTRUCTIONS
50 PRINT "IN THIS GAME YOU MUST TRY TO BEAT THE COMPUTER IN GUESSING A NUMBER BETWEEN 0 AND 100"
60 PRINT "THE WINNER IS THE ONE TO HAVE LEAST AMOUNT OF GUESSES AFTER TEN ROUNDS."
70 PRINT "PRESS ANY KEY TO START"
75 REM WAIT
80 IF INKEY$="" THEN GOTO 80
90 CLS
95 REM MAIN DRIVER PROGRAM
100 FOR R=1 TO 10
105 REM COMPUTERS TURN
110 GOSUB 210
115 REM PLAYERS TURN
120 GOSUB 500
130 PRINT "SCORE:ZX81=";C; "YOU=";P
140 PRINT "ZX81=";C;TAB 10;"YOU=";P
150 PRINT "I AM WINNING" AND C<P
155 REM "AND" IN A PRINT STATEMENT ONLY PRINTS THE PRECEDING LINE WHEN THE CONDITION IS FULFILLED
160 PRINT "PRESS ANY KEY TO CONTINUE"
170 IF INKEY$="" THEN GOTO 170
180 CLS
190 NEXT R
200 PRINT "SCORE:ZX81=";C; "YOU=";P
210 STOP
220 REM RANDOM NUMBER 0-100
230 LET N=INT (RND*100)+1
240 PRINT "MY TURN.GUESS MY NUMBER"
250 INPUT G
260 REM CHECK IF INPUT IS IN RANGE
270 IF G<0 OR G>100 THEN GOTO 2
280 SCROLL
290 IF G=N THEN GOTO 310
300 REM GIVE CLUE
310 IF G<N THEN PRINT G;" IS TOO LOW,TRY AGAIN"
320 IF G>N THEN PRINT G;" IS TOO HIGH,TRY AGAIN"
330 REM INCREASE GUESS NUMBER
340 LET P=P+1
350 GOTO 230
360 PRINT "YOU'RE RIGHT IT WAS ";G
370 RETURN
400 REM OPERATING INSTRUCTIONS
500 PRINT "YOUR TURN.THINK OF A NUMBER BETWEEN 0 AND 100"
510 PRINT "PRESS ANY KEY WHEN YOU ARE READY"
520 PRINT "WHEN I GUESS PRESS EITHER:"
```

```
520 PRINT "H" FOR HIGH;"L" FOR LOW OR "C" FOR CORRECT"
530 IF INKEY$="" THEN GOTO 530
535 REM L=LOWEST POSSIBLE NUMBER
540 LET L=0
550 LET H=101
560 IF INKEY$="" THEN GOTO 560
565 REM GENERATE RANDOM NUMBER BETWEEN "L" AND "H"
570 LET G=INT (RND*(H-L))+L
580 SCROLL
590 PRINT "IS YOUR NUMBER ";G;"?"
600 REM WAIT UNTIL EITHER "L","H" OR "C" IS DEPRESSSED
610 IF INKEY$="" OR INKEY$<>"L" AND INKEY$<>"H" AND INKEY$<>"C" THEN GOTO 500
610 IF INKEY$="L" THEN LET L=G+
```

```
620 IF INKEY$="H" THEN LET H=G-1
630 IF INKEY$="C" THEN GOTO 570
635 REM CHECK IF FALSE CLUE IS GIVEN
640 IF H<L THEN GOTO 700
645 REM INCREASE GUESS NUMBER
650 LET L=L+1
660 GOTO 570
670 CLS
680 PRINT "I THOUGHT IT WAS ";G
690 RETURN
700 CLS
710 PRINT "CHEAT IF YOU DO THAT"
720 PRINT "I'LL START AGAIN"
730 REM FALSE CLUE HANDICAP
740 LET C=INT (C/2)+1
740 GOTO 500
```

Sord M5

Antarctica Wildlife

A white penguin attacks an invader with blue ice cubes (he moves the ice cubes by blocking them with his body). The invader is always waiting for a chance to attack the penguin. The game is over when either one defeats the other. This game is reproduced from *Creative Games and Programs for the Sord M5*, by Arai and Takahashi.

Directions:

RUN the program, and 25 blue ice cubes in a frame of 12 cubes in width and 11 cubes in length appear. An invader sneaks around the ice cubes. Command keys are as follows.

| | |
|------------|----------------|
| ↑ Upward | → To the right |
| ↓ Downward | ← To the left |

Pressing any of these directional keys produces a white penguin on the screen which moves in the direction indicated by the depressed key. Move the penguin into an ice cube so that the ice cube is projected toward the invader in the direction of the penguin's movement. A propelled ice cube continues movement until it contacts another ice cube or any side of the frame. The game is over either when the invader is killed with the ice cube attack, or when the penguin is attacked by the invader. The score in the upper right of the screen is calculated by subtracting the total seconds spent on the fight from 100. After the game ends, depress the CTRL+Z keys, then the CTRL+T keys. RUN again to play another game.

Program:

Since it is possible to simultaneously assign 32 sprites, theoretically, sprites can be used for all 25 ice cubes. In practice, however, a maximum of only four sprites can be on the same line. Another consideration is that if a penguin or an invader passes near four sprites in a row, it will be invisible. To avoid this inconvenience, all the ice cubes are set characters written with the PRINT command, and a sprite is used only for their movement.

LIST OF VARIABLES

| | |
|------------|--|
| XX, YY: | penguin's position |
| D: | code to fix the penguin's direction |
| P5, P6: | data of an input key |
| BX, BY: | invader's position |
| XO, YO: | range of each sprite's shift |
| SI, S: | check if the penguin or an ice cube is along the edge of the frame |
| X8, Y8: | position of sprite |
| XA, YA: | penguin & ice when moving |
| R, XC, YC: | invader's direction |
| TT: | score |

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PROGRAMS

PROGRAM MAP

- 10-50: screen production
- 60-110: key input
- 120-150: penguin's movement
- 160-220: ice cube's movement
- 230: start and stop music
- 240-270: subroutine to set up the screen
- 280-310: subroutine to shift the sprites of the penguin and ice cubes
- 320-360: subroutine to shift the sprite of the invader

PROGRAM LIST

```
20 Print "PENGUIN":for I=0 to 132:uPoke I,0:next I:let T=time
30 stchr "18343e3c7c3c382c" to 160:stchr "182c7c3c3e3c1c34"
to 161:scol 0.15:stchr "ifab5abd5abd5f" to 162:scol 1.5
40 stchr "24183c5aff182442" to 163:scod 2.163:scol 2.6:view
1.0,30,23:out 32.880
50 map 1:let XX=96:let VV=80:let D=160:scod 0.0:scod 1.162:9
osub 240
60 let P5=inp(835):let P6=inp(836):if P5=2 or abs(XX-BX)<12
and abs(VV-BY)<12 then goto 230
70 gosub 340:if P5<>32 and P6<>4 and P6<>32 and P6<>64 then
goto 60
80 if P6=64 then let X8=2:let Y8=0:if E=161 then loc 0 to 30
0,300:let D=160
90 if P5=32 then let Y8=2:let X8=0
100 if P6=32 then let X8=-2:let Y8=0:if D=160 then loc 0 to
300,300:let D=160
110 if P6=4 then let Y8=-2:let X8=0
120 let S=0:let XA=XX:let YA=VV:gosub 280:let XX=XA:let VV=YA
130 scod 0.D:loc 0 to XX,VV:if abs(XX-BX)<12 and abs(VV-BY)<
12 then goto 230 else let X8=XX+8+8*X8/2
140 let Y8=VV+8+8*Y8/2:if XX=176 and P6=64 or VV=158 and P5=
32 then goto 60
150 if upeek(Y8/16+12+X8/16)=0 then goto 60 else uPoke Y8/16
+12+X8/16,0
160 loc 1 to X8/16+16,Y8/16+16:Print cursor(X8/16+2,Y8/16+2)
: " <+ "
170 let S=0:let XA=X8:let YA=Y8:let X8=X8+4:let Y8=Y8+4:gosu
b 280:let X8=XA:let Y8=YA
180 let X8=X8/4:let Y8=Y8/4
190 if S=1 and S1=0 or P6=32 and XA=0 or P5=32 and YA=160 or
P6=64 and XA=176 or P6=4 and YA=0 then goto 220
200 if upeek((Y8+4+Y8)/16+12+(X8+4+X8)/16)<>0 then goto 220
210 if S=1 then loc 1 to X8,Y8:goto 170 else loc 1 to X8-8,Y
8-8:goto 170
220 loc 1 to X8,Y8:uPoke Y8/16+12+X8/16,1:Print cursor(X8/16
+2,Y8/16+2): " <+ " :loc 1 to 300,300:goto 60
230 for I=1 to 9:for M=40 to 90:out 32.880+I:out 32.M:next I
ext:out 32.88F:Print "game over" end
240 stchr "ifcccccf3f3cccc" to 152:1:stchr "ifffcf3333cf3c
f" to 153:1:stchr "f3f3ccccf3f3ffff" to 154:1
250 stchr "3333cf3f3333ffff" to 155:1:uPoke 83896,550:for I=
1 to 25
260 let X=rnd(11):let Y=rnd(10):if upeek(X+12+Y) then goto 26
0
270 uPoke X+12+Y,1:Print cursor(X+2,Y+2): " <+ " :next I:retu
rn
280 gosub 340:if abs(XA-BX)>12 or abs(YA-BY)>12 then goto 30
0 else if abs(X8+Y8)<>2 then Print cursor(24,0):TT=C+C/2
290 goto 230
300 let C=C+1:let XA=XA+X8:let YA=YA+Y8:if P6=4 or P5=32 the
n goto 320
310 if XA<0 then let S=1:let XA=0:goto 330 else if XA>175 th
en let S=1:let XA=176:goto 330
320 if YA<0 then let S=A:let YA=0 else if YA>159 then let S=
1:let YA=160
330 return
340 let R=rnd(3):if R=0 then let XC=0:let XC=1 else if R=1 t
hen let VC=1:let XC=0
350 if R=2 then let VC=0:let XC=-1 else if R=3 then let VC=-
1:let XC=0
360 let BX=BX+8*XC:let BY=BY+8*VC:if BX<1 then let BX=0 else
if BX>175 then let BX=176
370 if BY<1 then let BY=0 else if BY>159 then let BY=160
380 loc 2 to BX,BY:let TT=time-T:Print cursor(24,0):TT+C:out
32.880+rnd(9):out 32.rnd(8):return
```

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A look at the disk system

By Pip Forer

It has to be a sign of the times when bookshops start to hold LARGE stocks of disk drives on the shelf. That is precisely what W.H. Smith's in Britain has announced it will do in 1984. With the BBC disk-chip famine receding the British micro market is getting firmly into disks on its Beebs, and Cumana alone plans to sell 10,000 units a month in 1984. In New Zealand, supplies of drives and disk operating system (DOS) chips are also getting easier, but at the same time criticism of some of the BBC disk operating system's features have led to a spate of new chips with claimed advantages over the Acorn original. This seems an opportune time to review the Beeb's disk system, both for potential buyers and for disk users curious as to what else is on offer.

For a start it may be an error to speak of THE disk operating system when in fact the BBC has at least three ways of accessing disks amongst its many filing systems. Apart from the stand-alone DOS discussed here there is also the Econet system, which itself comes in

two versions. These two versions allow far greater power to the user, but, of course, you currently need a network of machines to operate the system.

The disk operating system on the BBC comes as a combination of internal hardware, external hardware, software and documentation. This needs specifying into these components since the variants of the system that are available usually only modify certain of these parts. It is also worth specifying because some parts are available independently and some only together. The most controversial combination here was Acorn's decision to market the DOS manual and software solely with disk drives, thus disadvantaging competitive, non-licensed drive manufacturers (and enraging a lot of consumers who rightly felt that the DOS chips they had just had installed should have their documentation with them).

It may help in understanding the capabilities of BBC DOS to look at just what the various components involve and then see how new offerings seek to augment the standard Acorn system. In doing this it may also be useful to compare the Acorn DOS with another popular system, the standard DOS on the Apple II.

The Acorn disk operating system is essentially composed of a set of

instructions to manage the input and output of information to a disk drive, plus buffer space for handling and re-directing that information as it is read to or from the disk. To the user, this system comes down to a set of available commands and a system with certain parameters such as speed and capacity. As in any design there are trade-offs between desirable features (speed, high capacity, efficient use of disk, convenience, power) and negative factors (cost, slow speed, memory usage, user unfriendliness). The BBC chooses a slightly different path from the Apple in deciding these trade-offs in most cases.

First, consider size of storage. Here Acorn offers four options on small floppies to standard Apple's one. The most obvious facts to the user in any comparison is that the BBC's smallest capacity drive hold less information than an Apple drive (100K to 180K+) but that the other BBC options hold more. The BBC offers drive choices in which:

- (a) each side can hold 40 or 80 tracks of information, and
- (b) a physical drive can access one or two sides of a disk.

The word, physical, is used here to emphasise that a two-sided single drive appears to the BBC as two logical drives, not a single, enlarged storage space. The 80-track, two sided drives on the BBC allow 400K of information to be stored.

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FASTER THAN APPLE DRIVES

BBC drives in general have a greater capacity than the Apple. They are also faster in use. The reason for this is that they also use the disk less efficiently and require greater user care to make best use of their space. These two factors are linked in a typical good/bad trade-off. The Apple is slower quite simply because it searches out empty spaces on a disk for new files. Imagine what happens on a disk when you add new files and then delete some. Most disk systems with a new disk will save data of programs in an efficient manner, maybe on consecutive sectors of disk. However, when some of these are deleted odd spaces appear. Further new files can either be tagged on the end of the used space or fitted into the now deserted areas left by deleted files.

If it happens that the file cannot fit into any single vacant space the Apple DOS partitions files into segments. When it reads in a file it automatically jumps around to the next part of the file. Although this takes time it is easy on the user and has the advantage that files can easily be lengthened. The BBC chooses simply to append one file after another, storing them head-to-tail. This means that you need to reserve a maximum space for any file before you start as it will not easily extend, and a used disk gets full of waste space. Hence the BBC has a *COMPACT command that shuffles all the files up together and eliminates waste space. This is the user's responsibility. The benefit to the user of this system is its simplicity and hence speed. The Beeb can load a 20K screen image far faster than the Apple can an 8K one.

The other aspect that immediately strikes the user is that the file names on the BBC are handled differently from the Apple. The Apple allows file names of up to 30 characters length and over 200 per disk. The BBC allows only eight characters per name. However, it also allows a simple (1 character) directory incorporated in the program name. More to the point it permits only 31 files per disk. The unfriendliness of the former

and the problems raised by the latter together have attracted quite a lot of criticism and inspired several solutions. These are discussed in the next section.

The BBC scores in its range of user commands and low use of memory. While the Apple uses roughly 10K of RAM to hold its disk system the BBC uses ROM space on-board and needs only 2.5K additional file-handling space from RAM. Its general file-handling and file capabilities are similar to those of Apples, but it offers easier user access to files without recourse to programming. *BUILD, *DUMP, *TYPE, *LIST and *SPOOL allow a variety of exchanges between the user and the disk. The first and last command create text files to disk (the latter simply dumping all screen output to a file) while the other three display files from disk. In addition *LIB and *DIR allow control over preferred access to files. Finally copying and back-up are also on-board commands, not on a utility disk as with the Apple. The one exception to this easier use is that the disk initialising procedure is on a separate disk, in contrast to the INIT of the Apple.

In general, honours end up reasonably even. The Acorn disk system is faster and larger, but less friendly. Users of CP/M would find a lot in common with certain features. Inevitably, bright minds have sought ways to break the deadlock. The simplest and cheapest to date, an idea to increase the number of files per disk, is outlined in an article and listing by Nigel Pendleton in October's *Acorn User*. His solution is essentially to persuade the BBC it has two catalogues by storing a second one on disk and loading the required one under a short assembler program control. By dexterous selection of file information (essentially placing a large dummy file on the second directory to protect space used by the first) the available file names are doubled. This is not quite as good as an original system that already had a 61-file directory, but it is a cheap solution using only a few bytes and a couple of extra sectors on disk. However, it still leaves you with 8-character file names, and there is a school that might suggest 61 of those is simply worse than 31.

THREE OF THE NEW SYSTEMS

This is where the heavies enter the fray with alternative hardware solutions. I had hoped to review these first hand this month, but the air-freight has gone astray again. So what I will do is briefly outline three of the new systems available and report on a review of them in the September *Micro User*. I hope to report back at first hand early next year, and possibly then also review a hard-disk offering from one of the suppliers, Pace.

The three earliest alternatives on current offer come from Pace, Watford Electronics, and Leasalink/Viewdata. These have been joined by offerings from Microware and Kenda. Apart from the Kenda system (which breaks from Acorn and goes for a stronger CP/M flavour) all appear to address themselves to two issues: enhancing the directory capabilities and improving the utilities support within a standard Acorn frame of reference. Indeed, most seem to offer total Acorn compatibility, either by providing a system that works with Acorn conventions but extends the options, or by having a system that either defaults to Acorn limits or works in an enhanced mode (in which standard BBC disks will not run).

The biggest innovator, but as yet little reviewed, is the offering from Leasalink Viewdata (LVL). This is a small printed circuit board that plugs into the 8271 slot in the BBC (i.e., is easy to fix) it allows double density on disk drives. At one move this takes a single drive to a potential 1.4 Megabytes. Users can reportedly define the disk density of the drives and the catalogue will support up to 248 file names. The Microware offering is also rumoured to improve disk capacity. The LVL option defaults to BBC standard density on power up until it senses a double density disk.

The Pace and Watford offerings are less radical and are reviewed in the September *Micro User*. Both offer BBC enhancements, including, for example, the inclusion of the disk formatter within the DFS ROM, and larger catalogue options (twice the number of files) with longer names (up to 15 letters). From

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these reviews it is clear that the new systems offer some useful additions. However, the early releases sent to reviewers also appear to have had a few bugs and the systems themselves have made their own trade-offs. There is some evidence that speed may have been compromised, although there have also been some improvements in memory needs. The Pace (AMCOM) system for instance uses roughly 1K less of RAM than the Acorn system. The reviewers appear to rate both systems well.

What is the future of new disk systems? Looking at a system that has already been there we might return to the comparison with Apple. Numerous faster, "better" DOSs have been produced for the Apple, but few have a wide following. The main problem has been that few users wished to isolate themselves from the main body of suppliers and customers by using a non-standard system. The BBC systems offer something different which suggests they may do better. All offer an enhanced local environment for disk users which are compatible with (and will convert to) the Acorn standard. The individual user may well value this local improvement at little cost in general compatibility.

One problem, however, is the interaction between the new DOS chips and other components of the system. One reviewer reported a problem with Pace and Wordwise together. What happens with other ROMs, or where a system is attached to a network?

Intangibles like this deserve attention. Over the Christmas break that attention will be given. While writing this, Tower Computing informed me that the Pace system had arrived. In addition both Acorn and Pace have introduced hard-disk options for the Beeb, Pace with its own networking system paralleling Econet with some sophisticated functions advertised. The Pace version should be operating in Christchurch by the time this goes to press and the Acorn hard-disk server has reached Barons in Melbourne. Maybe by February it, too, will be in New Zealand. Issues of disks and networks will be explored in the February column.

BBC plans for U.S.

While little is known of the moves to launch the BBC computer in the United States at the time of writing, the specs of the machine have been leaked, and Acorn claims 15,000 advance orders. The American BBC will come with some slight modifications to its operating system and with the standard inclusion of disk operating system, Econet interface and the VIEW word processor chip. To comply with Federal standards the power supply will be enhanced and the case will be foil-lined to reduce radio interference. The price will be under \$1000.

Cassette word handlers (2)

This is the second article in a two-part series by BRIAN SULLIVAN on cassette-based TRS80/System80 word processors.

I guess the last statement in the November article leads me very nicely into this next wordprocessor package. In an early edition of *Bits & Bytes* I noticed a small advertisement for a wordprocessor for the System-80 offered by Peanut Computers.

I had to find something better than WOP-1. Well, "Peanut Wordprocessor" combines with the ROM edit mode of the BASIC interpreter and uses a program which has read machine-language data to disable the LIST command and to print your text either to the screen or to the printer.

When initially loaded into the computer this software program leaves over 14000K of memory for text insertion. That has got to be about the most byte-miserly programming that 16K owners could wish for. That 14000K of memory translates into about five pages of text on a 16K micro or 15 pages on a 48K system. The easiest way to confirm this is to "MEM" and see the amount of memory left.

Frankly, this is a "BARE BONES" program with very little of the sophistication of a commercial standard wordprocessor. But it doesn't claim to be. This program is a wordprocessor designed for the hobbyist who doesn't want or need a full-blown powerful wordprocessor package.

One complaint is that when I print in lower case I have to put a single quotation mark (') at the start of each new program line. The program works by using the lines normally available for programming to insert the text. This means on the System-80 that the user can insert 240 characters and then must open up an aptly named NEWLINE by hitting that key.

Bruce Stevenson, of Peanut Computers, told me that this program was born of much the same frustrations that I have talked about with WOP-1. Bruce also says that the original version was designed specifically for use with Seikosha printers that didn't have true descenders. To get around this, graphic mode commands were used to plot and print these descenders. For anybody who owns one of these printers it would be a real windfall to get into wordprocessing without having to trade up.

That version wouldn't run on standard printers or rather other printers, so a standard version was written that will run most printers.

Congratulations to Peanut Computers, for here is a home-grown product which at \$30 for the standard version and \$40 for the Seikosha version has got to be good value to turn your underworked System-80 into a truly utilitarian machine. It is obviously aimed at the knowledgeable computer hobbyist who knows all the Microsoft BASIC commands that are available.

The third wordprocessing package for TRS80/System80 is the Radio Shack (Tandy Corporation, U.S.A.) Scripsit program. This should not be confused with Super Scripsit, or the disk version of Scripsit. This is a cassette version, I guess ostensibly for 16K machines or where the memory has been expanded but no disk drive added. I see no reason though why this program would not work well if at a later stage an owner did upgrade his system. It would simply be dumped to disk with suitable address changes.

I came to be the owner of this program because my son visited Fort Worth, which is Tandy Territory. My dissatisfaction with the WOP-1 software led me to purchase this alternative software. And here WOP-1 was kissed goodbye.

The Scripsit program is the most thoroughly professional presentation of software for a micro that I have seen. The program comes in a gold-embossed, simulated-leather (plastic), ring-binder folder with all sorts of embellishments, including a 57-page manual. Also provided are summary card with all commands, six audio-training cassettes, which last approximately an hour for each session — a total of six hours tuition in which you are taken step-by-step through all the commands in the program. With the training sessions comes an existing text which you load in either upper/lower case versions rather than typing a whole lot of text.

The program is in machine language and is much more sophisticated than I expected. With Scripsit it is possible with a 16K machine to record a document about 4100 characters long (that is two to three pages, A4 size).

There are many powerful commands and it is this straightforward practicality that has really sold me on this package. Most computer hobbyists could afford this software and then really enter the world of and experience the power of wordprocessing.

A sample of the commands will give some indication of this program's worth.

SAVE: To save text to tape no longer than normal CSAVE.

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TRS80/SYSTEM 80

LOAD: Reload from tape.
CURSOR CONTROL: The cursor is in active edit mode at all times and cursor is controlled by up arrow (ESC on SYSTEM 80), down arrow (CTRL), and left arrow (BACK SPACE) and right arrow (TAB).
TAB: Any tab position from 1-132 can be formatted.
OVERTYPE: Position cursor and overtype.
SPECIAL COMMANDS: A series of special commands are invoked by the @ key being re-named CONTROL and used as a shift on certain keys. In other words when the @ key and these other reserved keys are hit together they have certain commands such as DELETE, INSERT, EXCHANGE, PARAGRAPH, WORD, LINE, and so on. The software package comes complete with stick-on labels. These labels are put on the front of the keys and are readily visible without stopping the keys from being used for other purposes.
UPPER CASE/lower case: This is combined with a SHIFT LOCK position (this works well with U/L case modification).
EXCHANGE: This command will exchange text, words, sentences, paragraphs.
PARAGRAPH: Will move from end of current sentence any indentation that you require.
FORMAT LINES: Any width from 1-132. Completely flexible left

margin and right margin. Top of page margin and bottom of page margin. Format lines are visible on the screen and can be printed to or left off the hard copy.
COMMENT: The same applies to comment lines. They can be seen, printed or left on the screen.
PAGE NUMBERS: Top or bottom of page optional choice of every odd or even pages.
HYPHENATION: Text is able to be justified and along with this you need to have this option so that there are no big gaps between words.
GLOBAL SEARCH: Of more use probably when you have more memory than 16K, but nevertheless already in place for when you expand. Will search for a given string and delete or replace.

I have waxed eloquently for this program, and I really do think that it is well worth the money. Of course it is going to cost at least I am told three times the price I paid (\$US41) for it in Texas.

If you try to use the Scripsit program on Dick Smith hardware you will experience a glitch when trying to save text or load from tape. The whole system will go into a dead loop. The same happens when trying to print. The changes I list in table 1 have worked for me and have patched the software to System-80.

You will need to use a machine language monitor such as ZMON or possibly ZBUG it will of course not need to reside in the same memory location. Edit the tape and dump to a tape using the START ENTRY and END addresses listed in Table 1.

| Address | Contents | Change to | START | END | ENTRY |
|------------------|----------|-----------|-------|------|-------|
| 4306 | 3E 0A | 3E 00 | 42E9 | 6088 | 4303 |
| 4308 | 32 E8 37 | 00 D3 FD | | | |
| 4E0A | 3A E8 37 | 00 DB FD | | | |
| 4EF3 | 32 E8 37 | 00 D3 FD | | | |
| 4EF9 | 32 E8 37 | 00 D3 FD | | | |
| 55EB | 3A E8 37 | 00 DB FD | | | |
| 55FC | 3A E8 37 | 00 DB FD | | | |
| 560A | 32 E8 37 | 00 D3 FD | | | |
| 56CC | 32 E8 37 | 00 D3 FD | | | |
| CASSETTE CHANGES | | | | | |
| 5315 | 06 42 | 06 08 | | | |
| 5325 | 06 80 | 06 41 | | | |
| 532C | 06 22 | 06 76 | | | |

TABLE 1

This last piece of information minus inevitable typographical errors comes to us courtesy of John Ross, of the Adelaide Micro Users' Group.

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COMMODORE 64

Seven new games

By STEVEN DARNOLD

A good selection of software for the Commodore 64 is now available in New Zealand. Viscount's latest price list includes 66 programs on tape and 31 programs on disk. Similarly, Alpine Computing has recently obtained some of the best C-64 games from overseas. Add to this Commodore's own range of software and there is plenty to keep your C-64 busy.

My C-64 has been very busy the last few days trying out seven new games. I have blasted aliens, dodged bombs and gobbled fish until my joystick cracked with the strain. I suppose there is only so much excitement a poor Commodore joystick can take. At any rate, the games are of good quality: machine language is used throughout, and each game has some attractive features. They range in price from \$30 to \$45.

Annihilator.— This game is vaguely similar to the Defender arcade machine. Using the joystick, you manoeuvre your ship around the screen blasting the aliens. Unfortunately, the aliens do not shoot back, and they track you in a very simple-minded way. Players soon discover that by jiggling the joystick back and forth the aliens will bunch together. This makes them very easy to destroy. The only real challenge in the game is the meteors which appear at the higher levels. Over all, the game makes reasonably good use of graphics and sound.

Ape Craze.— This is the joystick-killer. The object of the game is to jump up a series of platforms while bombs rain down from the top. When one ramp is directly over another, the only way to ascend is to jump up and jerk the joystick quickly to the left and then quickly to the right. The better you get at this technique, the more crackling sounds your joystick makes. The game itself is interesting, but poorly implemented. The graphics are relatively primitive, there are only two different game sets, and a player has only one life.

Centropods.— The object of this game is to shoot a variety of beasts that move across the screen. The most interesting is a snake which breaks into bits when you shoot it. You then have to shoot all the bits as well. The game is smoothly executed, and the graphics and sound are pleasant. However, I didn't find the game very exciting.

Cyclons 64.— This is the best of the seven games. It is the first C-64 game I have played that has the "feel" of an arcade machine. As in Annihilator, you move around the screen shooting aliens, but these aliens shoot back and they are difficult to track. The graphics and sound are excellent — particularly the explosions. It is obvious that a lot of thought went into the design of this game. There is a nice title section with theme music. There are options for terrain, ricochet, and skill level. There is a place to display the top players' initials. If you want a shoot-the-aliens game for Christmas, tell Santa Claus about this one. Oddly, it is the cheapest of the seven games.

Escape MCP.— I liked this game, but it will not appeal to everyone. In fact, two out of three American reviewers have harshly criticised it. The object of the game is to negotiate a set of passageways while being pursued by a monster. Each set leads to a new, more difficult set. The main problem with the game is that most people cannot get past

the first set. They try to beat the monster with speed, and that simply doesn't work. The only way to win is to lure the monster into a bad position. This requires planning and a certain amount of experience. It also helps to have a good joystick.

Motor Mania.— The object of this game is to drive your car along three different types of roads, avoiding logs, potholes, nails, oil slicks, boulders, other cars and emergency vehicles. Your instrument panel shows your speed, fuel and generator. There are petrol stations along the way for fuel and repairs. If you like this sort of game, then you will probably enjoy this version. The sound and graphics are good, and you can set the skill level. I enjoyed the game at first, but after I had been over all the roads a few times, it became repetitive.

Pakacuda.— This is an underwater version of Pacman where you gobble little fish and are chased by four octopuses. If you eat an electrical eel, it gives you a charge and you can eat the octopuses for a while. Unlike the ghosts in Pacman, the octopuses are stupid and continue to chase you when you are charged. It is easy to catch all four every time. On the other hand, some aspects of the game are more difficult than Pacman. The maze has some nasty corners where it is awkward to turn, and the pace is so fast that it is difficult to plan ahead. Over all, I prefer Pacman.

Pascal editor and compiler

On a more serious note, Commodore has just sent me a copy of an important new product. It is G-Pascal, a Pascal

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COMMODORE 64

editor/compiler with an extensive set of special commands for the Commodore 64's graphics, sound, clock, and joystick.

When I reviewed the Commodore 64 earlier this year, I said one of its advantages was the ability to turn off the resident BASIC and replace it with another language. This is exactly what G-Pascal does. Load the program from disk or tape and your 8K BASIC interpreter is replaced by a 16K Pascal compiler.

G-Pascal has several advantages over BASIC. It is faster, it makes the use of graphics and sound much easier, and it is highly structured. G-Pascal will be of particular interest to people writing games programs and to teachers and students of structured programming.

My first attempt to write a Pascal program resulted in a flurry of syntax errors. Pascal expects things to be done in a certain way, and experienced BASIC programmers in particular will find it a bit uncomfortable. For example, you cannot just drop an X into your program when you need it. First, at the top of the program, you have to declare X as a variable. Such idiosyncrasies gave rise to many errors in my programs and I had to do a lot of corrections.

Unfortunately, the G-Pascal editor is not quite as good as the usual Commodore editor. You have to get into a special edit mode before you can alter a line. This is a nuisance at first, but it is still relatively easy to edit programs.

Once a G-Pascal program is completed, it needs to be compiled into P-code. For short programs this is practically instantaneous — you can press C (for compile) and R (for run) in one motion. For longer programs the compiler takes about one second for every 100 lines. Normally, G-Pascal has enough room to keep both the source program and its P-code in memory at the same time. Thus, if there is a run-time error, you can quickly call up the source program, correct the mistake and re-compile. For extra long programs, G-Pascal can save the source program to tape or disk and use all of its memory for the P-code.

G-Pascal's commands make it relatively easy to create spectacular

graphics. Special commands are used to select various modes and colours, and particular attention is given to designing and moving sprites. For example, the MOVESPRITE command makes a sprite move at a specified speed for a specified distance. Once the command is given the sprite moves automatically from then on. The sprite can also be animated by instructing it to sequence through a series of sprite definitions. Up to 16 different definitions can be used and the sequencing is automatic.

G-Pascal's sprite capabilities are by far the best I have encountered. The other types of graphics, however, are not so well catered for. The bit-map has only a simple PLOT command, and no special support is given for programmable characters. Nevertheless, the use of logical commands instead of obscure PEEKs and POKEs facilitates the use of all types of graphics.

G-Pascal also takes the PEEKs and POKEs out of music making. There are sound commands for all SID registers and there is a delay function calibrated in 1/100ths of a second.

The special features go on and on. Clearly, G-Pascal is much more than just an ordinary Pascal compiler. However, in some respects it is also much less. G-Pascal does not implement all the specifications of standard Pascal.

G-Pascal faithfully uses the structure of standard Pascal, but it is limited in the types of data it can handle. Standard Pascal uses five data types: integer, character, Boolean, real, and user-defined. G-Pascal uses only the first two.

The Boolean type is no problem. G-Pascal includes all the Boolean operators, and a Boolean datum will work as normal if it is converted to a character datum.

The real data type is more of a problem. G-Pascal uses (3-byte) integer arithmetic only. This limits values to the whole number between -8388608 and +8388607. Numbers outside this range and fractions will require special procedures. Moreover, none of the standard functions for reals are available in G-Pascal. This includes such things as sine and square root.

The user-defined data type is also a problem. This is a popular feature of

standard Pascal, and many programs use it. Anyone trying to type in standard Pascal programs under G-Pascal will have some converting to do. The G-Pascal manual gives instructions for such conversions.

In total, G-Pascal is an attractive product. It combines most of the features of Pascal with a powerful graphics/sound package. If you want something faster than BASIC without the heartache of machine language, have a look at G-Pascal. If you want a language that fully supports the graphics and sound capabilities of your C-64, have a look at G-Pascal. If you want to write structured programs that are well organised and easy to read, have a look at G-Pascal.

Before you buy G-Pascal, however, keep in mind that other new languages for the Commodore 64 are coming. Logo and Simon's BASIC will be here soon, and a full UCSD Pascal is not far away. G-Pascal is good, but one of the other languages, may suit you better.

Spectrum sound

Fuller Micro Systems, of Liverpool, has announced sound and speech-enhancement boxes for a variety of small machines ... most significantly for New Zealand, the Spectrum. The sound offers a three-channel synthesiser. The speech box uses an allophone chip accessible from BASIC. The whole machine can be housed inside the FDS, a full-sized typewriter keyboard for the more serious user. Prices in the UK are 30, 40 and 40 pounds respectively.

H-P interactive

A new Hewlett Packard micro, the HP-150, offers an 8088 based system with micro-floppies and, as an innovation, a touch-sensitive screen interaction based on infra-red sensors. Combined with the correct driving software icon-based interaction is possible without any detached peripheral. Not, however, for the shaky handed.

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Linking via amateur radio

By SHAYNE DOYLE

As mentioned in my first column, Jim Wilkinson, of Waikanae, contributes the following on linking up MicroBees by amateur radio.

The technique involved in VHF radio link up is similar to that used when directly connecting two MicroBees by their cassette input/output cables, the difference being that the cable link is replaced by a simplex radio link using amateur radio transceivers operating on 146.525 MHz in the 2 metre band (simplex = single frequency operation both ways rather than duplex or split frequency through a repeater). A simple interface between the MicroBee and transceiver at each end allows easy switching between voice and data communication.

Denis Young (ZL2BFI), of Raumati South, and Jim Wilkinson (ZL2WI), of Waikanae, were able to transfer programs reliably at both 300 and 1200 baud, in spite of some initial difficulty with the signal from the MicroBees being distorted by the ICOM 22S transceiver microphone amplifier. Fortunately, a spare pin on the microphone socket enabled the signal to bypass the initial amplifier stages.

Les McMillan (ZL2BBE), of Raumati Beach, provided valuable audio reports on the signal levels, although his System 80 objected to the baud rates and ignored the signals. Some experiments were also carried out via a Te Horo repeater, to Jim Bicknell (ZL2CE), near Greytown, in the Wairarapa. Most of a short program was successfully picked up by Jim's computer.

The statements needed for the transmitting MicroBee are: OUT #2; LIST n; PRINT CHR(26); OUT #0; END in is the start line number of the program being sent).

The Target MicroBee needs only IN#2 to receive the program. Change the #2 to #3 for 1200 baud.

Jim Wilkinson hopes that these experiments may lead to VHF radio linking of school MicroBees between areas such as Horowhenua and Porirua. It would certainly be an interesting way to exchange software around the schools. Of course, for such a network to be

possible (and legal), a licensed radio amateur is needed to operate the radio at each end of the link.

Any schools or individual MicroBee owners interested in pursuing this further should contact Jim at Paraparaumu College, Box 126, Paraparaumu.

These experiments bring to mind the system operating in Holland, where at a set time each week, one of the FM stations transmits public domain software for anyone who cares to pluck it out of the ether.

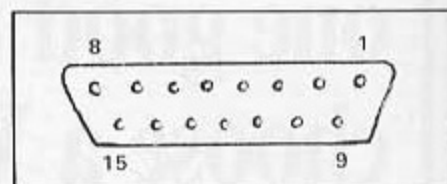
Pin details

I had an inquiry the other day from a new Bee owner who could not find out the pin details of his parallel interface. For those who may not have that data:

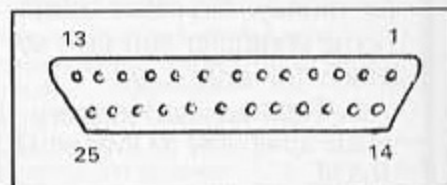
| Parallel socket DB15S | Pin | Name | Description |
|-----------------------|-----|-------|--|
| | 1 | +5V | regulated supply (100mA with S100 power) |
| | 2 | DA7 | most significant data bit of P10 port A |
| | 3 | DA5 | |
| | 4 | DA3 | |
| | 5 | DA1 | |
| | 6 | | |
| | 7 | AFDY | output, active high |
| | 8 | GND | system ground |
| | 9 | | |
| | 10 | DA6 | |
| | 11 | DA4 | |
| | 12 | DA2 | |
| | 13 | DA0 | least significant bit |
| | 14 | | |
| | 15 | ASTB* | input, active low |

| Serial RS232 socket DB25S | Pin | Name | Description |
|---------------------------|-----|-------|--|
| | 2 | Txd | Output: Transmit data, +12V = space, 0V = mark |
| | 3 | Rxd | Input: Receive data, 3V = space, .5V = mark |
| | 5 | CTS | Input: Clear to Send, uB will transmit if 3V |
| | 7 | SG | Signal ground |
| | 9 | +12V | |
| | 24 | (clk) | Output non-standard synchronous signal for Basic 5.1 |

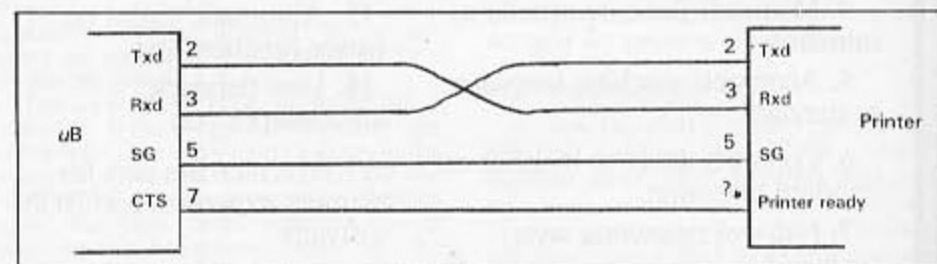
DB15S socket viewed from rear of MicroBee:



DB25S socket from same view:



To make up a simple serial printer cable, connect up as follows:



Note that pin 7 (CTS) is usually required only for printers needing "hand-shaking" signals to prevent the computer's over-running the

printer's buffer. The pin used at the printer end can vary, and should be identified from the printer manual.

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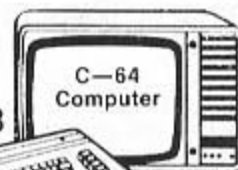
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BOOKS

PET programs from "Cursor"

"PET Fun and Games" by
Ron Jefferies and Glen
Fisher, Osborne/McGraw
Hill, 1981. 173 pages.
\$25.10. Reviewed by
Steven Darnold.

From July, 1978, to May, 1982, Ron Jefferies published a monthly magazine for the PET microcomputer. The magazine was called "Cursor" and it comprised a newsletter and a cassette tape of programs. From the beginning "Cursor" was extremely popular. For less than \$3 per issue, you received five programs and an animated "cover". Not only did the programs work, they were polished, and the whole magazine was put together with flair. "Cursor" rapidly established a reputation for its clever use of PET graphics, and it was one of the first promoters of CB2 sound.



Now, 31 of the early "Cursor" programs have been gathered into a book. The full listings are there, in nice big type, ready for you to type in. Every program is preceded by several paragraphs of introduction, and most of the listings are accompanied by a picture of the screen to show you what the end result should look like. And if you want to see what the programs' authors look like, there are pictures of them, too.

It's no fun typing in long program listings, but most of the programs in this book are well worth the effort. The graphics are good and many of the programs use sound. However, it should be

noted that these are the early "Cursor" programs. Most of them were written in 1978-79, and some are noticeably less sophisticated than the more recent "Cursor" programs.

Entering the programs should not be too difficult. To avoid confusion, special characters are used in the listings for graphics and cursor controls. Moreover, all of the program listings follow the same format. Most of them have an identical set of lines between 60000 and 60500, and these can be carried over from one program to the next.

As the title suggests, this book is for PET computers. The programs use several unique attributes of the PET, and it would be extremely difficult to get the programs to work on other types of computers. Even on a Commodore 64 with a PET emulator, there is a problem: many of the programs use the PET's number pad for indicating directions. Unfortunately, the 64's numbers are arranged in a straight line and are unsuitable for indicating directions.

If you have a PET, and you like games, and you don't mind typing in listings, and you don't already have the "Cursor" programs, then this book is for you.

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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 Interchange. 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.

Beob: 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", "q" 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 5 1/4 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 5 1/4 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 or 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 "fused" 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 than 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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Crossword answers

Across — 1: An 8086. 3: Zap. 6: Mouse. 7: 8088. 9: Lisa. 10: RAM. 11: Cray. 12: Poly. 13: BBC. 14: Error. 16: On. 18: Even. 19: O.T. 21: Amps. 23: Oval. 24: U.S. 25: Wangled. 27: Net. 28: Eh. 30: Sirius. 32: Odd Syntax. 34: Up. 35: Media. 37: Silicon Chip. 38: Cache.

Down — 1: Apple. 2: 6502. 3: ZX81. 4: Query. 5: Terminal disease. 8: A spot. 15: Rough. 17: Rainbows. 20: Coder. 22: Put. 25: Warn. 26: NECAPC. 29: A spin. 31: IMBPC. 33: Tune. 36 DEC.

CLUB CONTACTS

BBC MICROCOMPUTER USERS' GROUP OF NZ. Local meetings - Auckland: 2nd Wednesday of month at VHF Clubrooms, Hazel Ave., Mt Roskill. Fr. Dave Fielder, 770-630, ext 518 (w). Wellington - meets last Thursday of each month in staffroom, first floor, Correspondence School, Portland Cres. Thorndon. Local contact, Anton, 286-280. Hamilton - Waikato Tech B-block staffroom; last Wednesday of the month 5 pm. Local contacts Peter (Ham) 393-990 or Alison (Morrisville) 6695. Hawke's Bay - Hastings and Napier alternate months. Local contacts: Kendall (Napier) 435-624. Bob (Taradale) 446-955. Mitch (Hastings) 778-235. Christchurch - fortnightly, Tuesdays, 7 pm, Hagley High School. Local contact Michael, 582-267.

SERADO & HART APPLE COMPUTER CLUB. Kenken High School, Kenken. Lessons, 12.15 to 1.15 weekly. Contact: S. Shearman 79-882 (Kenken) or Fairway Drive, Kenken.

WHANGAREI COMPUTER GROUP. Tam Allan, 3 Mauna Rd, Whangarei. Phone 83-063 (w). Meets every second Wednesday of the month at Northland Community College.

NZ MICROCOMPUTER CLUB INC. P.O. Box 6210, Auckland. The monthly meeting is held on the first Wednesday of each month at the OSNZ Hall, 107 Hillsborough Rd, Mt Roskill, from 7.30pm. Visitors are also welcome to the computer workshop in the hall, 10am-5pm, on the Saturday following the above meeting.

The following user groups are part of the club. All meetings shown start 7.30pm at the VHF Clubroom, Hazel Ave., Mt Roskill. They can all be contacted at club meetings or via NZ microcomputer Club, P.O. Box 6210, Auckland.

APPLE USERS' GROUP. Don Hagen, 70 Hapua Street, Remuera, 546-748 (w) 547-180 (w). Meetings: first Tuesday each month.

BBC USERS' GROUP. Dave Fielder, Phone 770-630 ext 518 (w). Meetings: second Wednesday of month.

BIG BOARD USER GROUP. Steve Van Veen, Flat 5, 111 Miroser Rd, Mt Roskill. Auckland 4. Phone 209-659-881 (w).

BUSINESS USERS' GROUP. John Hawthorn, 11 Seaview Rd, Remuera, Phone 542-714 (w), 876-189 (w). Meetings: monthly.

COMMODORE USERS' GROUP. John Walker, 833-9589 (w), Box 5233 Auckland. Meetings: 3rd Wednesday. Remuera Primary School Hall, Dromone Road.

CP/M USERS' GROUP. Kerry Koppert, 2-870 Dominion Rd, Balmoral. Phone 69-5355 (w). Meetings: Micro workshop.

SINCLAIR USERS' GROUP. Doug Farmer, Phone 567-589 (w). Meetings: Fourth Wednesday.

SORICERER USERS' GROUP (NZ). Selwyn Anon, Phone 491-012 (w). Meetings: Micro workshop.

SORO USERS' GROUP. Goema Hall, 5 Broad Road, Manurewa 1266-8123 (w).

TI 99-4A USERS' GROUP. Ray Tucker, 568-195 CW, 63 Mariot Rd, Pakuranga.

WIZZARD USERS' GROUP. Richard McFadden, TGN8219 (w), 784580 (w), 11 Hilling St, Tauranga.

2650 USERS' GROUP. Trevor Sheffield 676-591 (w).

1802 USERS' GROUP. Brian Conner, Phone 655-984 (w).

The above contacts can usually be found at NZ Microcomputer Club Meetings, 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 USERS' GROUP. Brian or Dean Yakas, Phone 8363-060 (w). Meetings: Second Tuesday.

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. Ngley, 231 Khyber Pass Road, Auckland. (Ainslie), 774-2681.

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.

NZ TRS-80 MICROCOMPUTER CLUB. Clive Skarsholt, 203A Gendry Rd., Tauranga. Phone 817-8096 (w). Meets first Tuesday OSNZ Hall, 107 Hillsborough Rd, Mt Roskill.

OSI-BBC USERS' GROUP (Auckland). Secretary: Ken Harley, 77 Broomfield Road, Auckland. Meets third Tuesday, VHF Clubrooms, Hazel Ave., Mt Roskill.

SYMPOH NZ SYM USER GROUP. Mark Bennett, P.O. Box 651, Manurewa. Ph 541-043 (w).

A.Z.T.E.C. Brian Mayo, Church Street, Katikati. Phone 490-326. Members use all micros.

BAY MICROCOMPUTER CLUB (Tauranga). G. L. McKinnon, Secretary, Snodgrass Road, Tauranga. Phone 25-569.

BAY OF PLENTY COMMODORE COMPUTER CLUB. D.J. McVay, of 40 Esk Street, Tauranga.

BEACH COMPUTING CLUB (Waikato). Jamie Clarke Box 132, Waikato. Ph 45-384 Waikato Beach.

ATARI 400/600 USER CLUB. Dave Brown, P.O. Box 6063, Hamilton. Phone 10711 54-692 (w).

HAMILTON SUPER 80 USERS' Group. Bruce White, (w) 436-878.

WAIKATO COMMODORE USERS' GROUP. Secretary, Mrs Eileen Woodhouse, 32 Kenney Crescent, Hamilton.

MORRISVILLE COMPUTER SOCIETY. Contact: Alison Stoney, 49 Coronat on Road, Morrinsville. Phone 6695 (w). Meets 1st and 3rd Wednesdays.

WAIHI COMPUTER ENTHUSIASTS. Contact: G.C. Jenkins, 10 Smith St, Waihi (w) WAIHI 8478.

Workshops every Tuesday. Meetings last Tuesday of month.

GISBORNE MICROPROCESSOR USERS' GROUP. Stuart Mullett-Merrick, P.O. Box 486, Gisborne, Phone 88-828.

ROTORUA COMPUTER CLUB. Contact: Ken Blackman, 6 Urahaut Place, Rotorua. Third Tuesday of each month at 7pm, Waiariki Community College, Rotorua.

ELECTRIC APPLE USERS' GROUP. Noel Bridgeman, P.O. Box 3105, Fitzroy, New Plymouth, Phone 80-216.

TARANAKI MICRO COMPUTER SOCIETY. P.O. Box 7003, Bell Block, New Plymouth. Mr K. Smith, Phone 8558, Waitara.

HAWKE'S BAY MICROCOMPUTER USERS' GROUP. Bob Brady, Pinnal Pharmacy, Pinnal Plaza, Napier. Phone 429-016.

MOTOROLA USER GROUP. Harry Wiggins, (w) 206RL, P.O. Box 1718, Palmerston North. Phone 2063.

HOWWENUA MICROCOMPUTER CLUB. Meets on second and fourth Tuesday of month. President, Wally Weibel, P.O. Box 405, Levin. Secretary, Dennis Cole, 28 Edinburgh Street, Levin. Ph 10691 83-904.

WAIKARAPPA MICROCOMPUTER USERS' GROUP. David Carmine, 64 Heibart St., Masterton. Phone 86-175.

CENTRAL DISTRICTS COMPUTERS IN EDUCATION SOCIETY. Rory Butler, 4 John Street, Levin. (089) 84-466 or Margaret Morgan, 18 Standen Street, Kerori, Wellington (04) 767-167.

UPPER HUTT COMPUTER CLUB. Shane Boyle, 18 Holdworth Avenue, Upper Hutt. Phone 278-545. An all machine club.

BBC USER GROUP. Users of other machines welcome too. See entry head of list.

BBC CLUB. See entry at head of this 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., Chertwell, Wellington 4. Phone 791-122.

OHIO USERS' GROUP. Wellington. Secretary/Treasurer, R.N. Halop, 658 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 (w) 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 (w).

NELSON MICROCOMPUTER CLUB. Dr Chris Fenham, Marsden Valley Rd, Nelson. Phone (054) 73-300 (w).

NELSON VIC USERS' GROUP. Peter Archer, P.O. Box 850, Nelson. Phone (054) 79-352 (w).

ELLENHIM COMPUTER CLUB. Club night second Wednesday of month. Ivan Mayneil, Secretary, P.O. Box 668. Phone (05) 25-207 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 (w), 793-428 (w).

CHRISTCHURCH '80 USERS' GROUP. David Smith, P.O. Box 4118, Christchurch. Phone 63-111 (w).

CHRISTCHURCH PEGASUS USERS' GROUP. Don Smith, 53 Farquhar Rd, Redwood, Christchurch. Phone (03) 526-994 (w), 64-544 (w), 2L3APP.

CHRISTCHURCH APPLE USERS' GROUP. Paul Niederer, C/- P.O. Box 1472, Christchurch. Phone 796-100 (w).

OSI USERS' GROUP (CHI). Barry Long, 377 Barrington St., Spreydon, Christchurch. Phone 384-550 (w).

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 (w) 582-267 or Rodney Derham (w) 893-215.

PANASONIC (JR-3000) USERS' GROUP. Contact: Prof B.J. Clarke, Dept of Accountancy, University of Canterbury, Private Bag, Christchurch, 1.

ASHBURN COMPUTER SOCIETY. Mr J. Clark, 52 Brucefield Avenue.

SOUTH CANTERBURY COMPUTERS GROUP. Caters for all machines for 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 (w) 70-646 (w).

LEADING EDGE HOME COMPUTER CLUB. Elaine Orr, Leading Edge Computers, P.O. Box 2260, Danedun. Phone 55-268 (w).

DUNEDIN SORDI USERS' GROUP. Terry Shand, Phone (024) 771-295 (w), 881-422 (w).

CENTRAL CITY COMPUTER INTEREST GROUP. Contact: Terry Stevens, Box 5270, 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 64). 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 Thom, Box 333 Tokoroa.

NOTE: Clubs would appreciate a stamped self-addressed envelope with any written inquiry to them.

NOTE: 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.

MICRO NEWS

Letter quality printers

The Brother HR 15 daisy wheel printer mentioned in the October issue of *Bits & Bytes* is now difficult to obtain and new stocks are not expected until January.

However, the faster HR 25 which prints at 25 characters per second has been imported to fill the gap and instead of the \$2500 price tag expected earlier, national chain Whitcoulls is retailing the HR 25 for \$1950.

Again parallel and serial interfaces are included allowing the printer to be connected to a wide range of microcomputers.

CP/M for 64

The CP/M operating system is now available for the Commodore 64 giving users access to a wide range of business software.

The CP/M enhancement consists

of a Z80A microprocessor in a cartridge which plugs into the back of the 64 and a floppy disk containing a version of CP/M 2.2. The price is \$199 plus the cost of a disk drive if you don't already own one.

Available soon for the 64 will be Simon's BASIC, a set of 114 extra commands written by a 16 year old English schoolboy.

Portable 64

Launch of the portable version of the Commodore 64 in New Zealand has been delayed until next year.

Microsoft asset

The microcomputer programming company, Interactive Applications Ltd, will expand its product range in New Zealand through an arrangement with Microsoft, of America.

TAL expects the agreement to produce sales of \$250,000 in the first year.

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 Interchange. 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 8080 based machines. It is by far the most widely used DOS for 8080 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 5 1/4 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 5 1/4 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 for 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 typed 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 Ki): 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 connection 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 than 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.

If its micro news in Auckland
— telephone AK 491 012

Crossword answers

Across — 1: An 8086. 3: Zap. 6: Mouse. 7: 8088. 9: Lisa. 10: RAM. 11: Cray. 12: Poly. 13: BBC. 14: Error. 16: On. 18: Even. 19: O.T. 21: Amps. 23: Oval. 24: U.S. 25: Wangled. 27: Net. 28: Eh. 30: Sirius. 32: Odd Syntax. 34: Up. 35: Media. 37: Silicon Chip. 38: Cache.

Down — 1: Apple. 2: 6502. 3: ZX81. 4: Query. 5: Terminal disease. 8: A spot. 15: Rough. 17: Rainbows. 20: Coder. 22: Put. 25: Warn. 26: NECAPC. 29: A spin. 31: IMBPC. 33: Tune. 36 DEC.

CLASSIFIEDS

Hand-held Computer/Programmable Calc owners — contact J.W. Gifford, 17 Gosset Street, Christchurch 1. For all your software needs if you can specify it, I can write it.

ZX81 & 16K Ram & Printer & T.V. & Software & Magazines. Present cost over \$500. Will accept \$300 o.n.o. Ph. 853-017 Christchurch.

System 80/TRS-80 'Drakula' M/C Game. 16K or 32K Tape Version \$26, Disc \$35. Reon Burn, 141 Winchester St, Levin, N.Z.

For Sale Commodore 64 complete with Cassette, Joystick, Reference Manual and Software. \$950 — or o.n.o. Phone 6081 Gore or write to W.J. Nutsford, 20 North Terrace, Gore.

For Sale Dick Smith Super 80 Computer, Manuals and Programs. Ph: Wellsford 5122.

For Sale ZX81, 16K Ram, power supply & manual and games cassettes. Sell all \$300 o.n.o. Write John Mellish, 66 Rudds Road, ChCh, Phone 899-706.

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Interact Owners for correspondence with another owner write to: Denis Clark, 43 Charles Street, Westshore, Napier, Phone 59-517.

ZX81 16K RAM-pack, overlay keyboard, ZX Printer, 3 Program books. Worth \$550, sell \$375. Write Chris Smith, Papairi Rd, Wanganui.

Wanted to swap: arcade games and other useful utilities for the Apple II Computer. Contact G. Malcolm, 35 Singers Rd, Korokoro, Petone.

Are there any Wellington Commodore Pet and 64 owners who would be interested in forming a users' group? If so, Tel Wellington 795-776 (June Joyce) or 797-193 (Pat Churchill) or write to 5 Lucknow Terrace, Wellington 4.

Commodore users — holidaying in sunny Nelson?? Call in on the Commodore specialists, and have a chat to a dealer who does know what you are talking about. **PERSONAL COMPUTER SYSTEMS 186** Trafalgar St (upstairs), P.O. Box 860, NELSON.

Commodore-64 and VIC users. Join N.Z.'s leading Commodore users group. Hundreds of programs in our software library. Write to "Nelson Commodore Users Group", Box 860, NELSON.

MUST SELL: TRS-80-48K Expansion Interface, VDU, Disk Drive, in good working order. Any offer considered. Phone Martin, CHCH 888-032.

WANTED: Manufacturers data sheets for Z80CPU and Z80FIO. Write Bruce Deans, 132 Luxmoore Rd, Timaru.

SYM-1 computer board with RAE and BAS, KTM-2/80 terminal, 32K Beta dynamic memory board model 650CDM, FDC-1 floppy disk controller, Model 52 disk drive DS 40 track plus power supply, GP-80 Graphic printer, Parallel ASCII encoded qwerty keyboard and enclosure, 5 Amp computer power supply. Write D. Schwartz, Flat 22, 570 Adelaide Rd, Wellington.

WANTED TO SWAP Apple Adventure Games. I. Harris, Pungare Road, RD 2, KERIKERI.

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