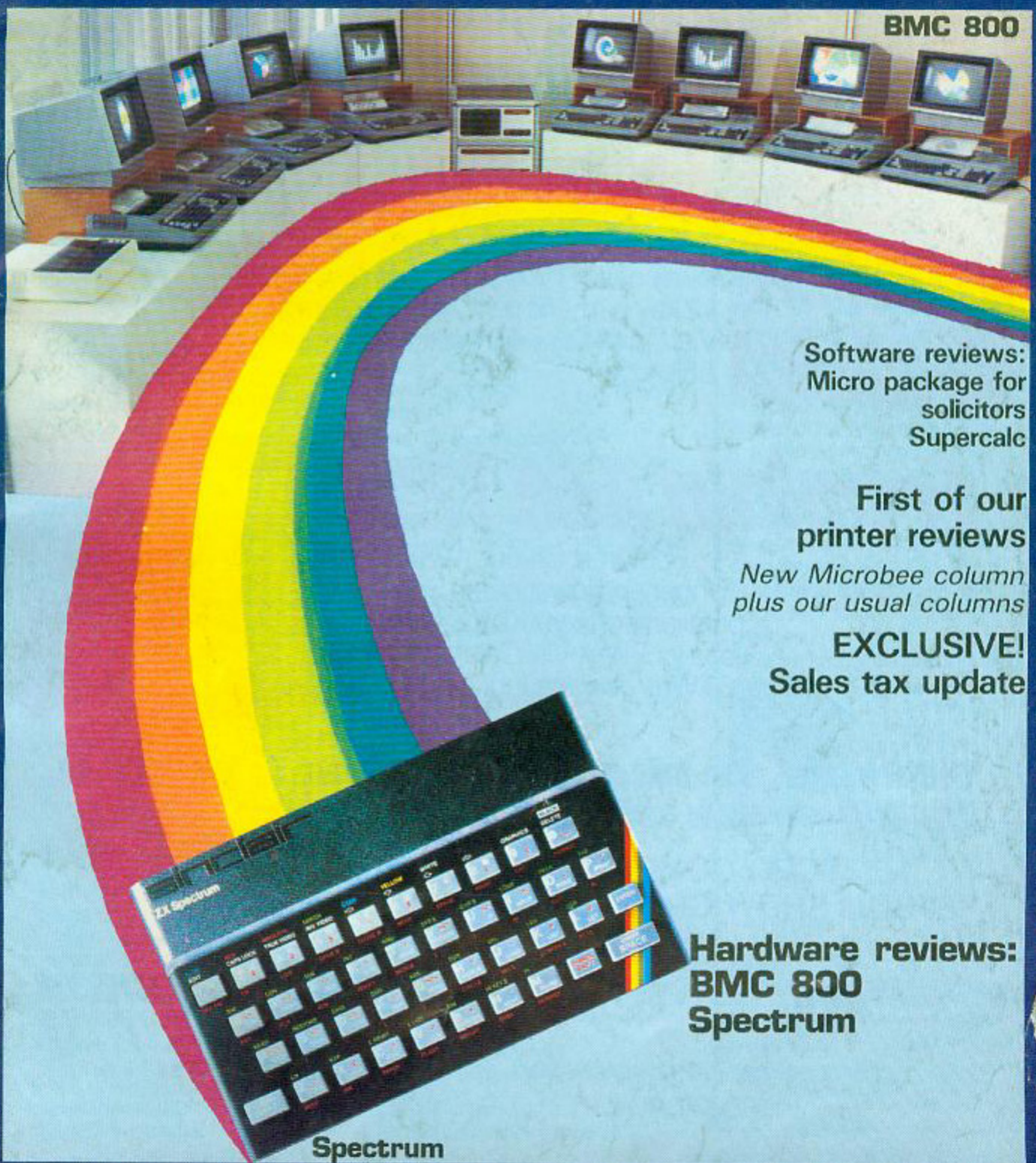
NEW ZEALAND'S PERSONAL COMPUTER MAGAZINE

BITS & BYTES

ISSN 0111-9826

Issue No. 10, July 1983: $1.00



Software reviews:
Micro package for solicitors
Supercalc

First of our printer reviews

New Microbee column plus our usual columns

EXCLUSIVE!
Sales tax update

Hardware reviews:
BMC 800
Spectrum

Franklin's Declaration of Independence.

"No other computer system has as many features included as standard function for the money, as the Franklin Ace 1000 and Ace 1200."

APPLE II® COMPATIBLE
The Ace 1000 will run Apple II® programs and peripherals without modification.

Franklin Ace 1000

Features: 64K RAM; Upper and lower case; Typewriter style keyboard; 12 key numeric pad; Alpha lock key; Visi Calc® keys; 50 Watt power supply; Built-in fan.

Franklin Ace 1200

Features: Colour; 128K RAM; Upper and lower case; Serial and parallel interfaces; Cursor key pad; Alpha lock key; Visi Calc® and CP/M keys; 50 Watt power supply; Built-in fan.

APPLE II® AND CP/M® COMPATIBLE
The Ace 1200 will run Apple II® and CP/M® programs and peripherals without modification. The included CP/M® card more than doubles the universe of software available to Ace 1200 users.

Declare your own independence with a Franklin Ace 1000 or Ace 1200, on show and available now at:

NZ MICRO COMPUTER CLUB SHOW,
EPSOM SHOW GROUNDS, JULY 2ND 1983.
(STAND 28)

FRANKLIN
COMPUTER CORPORATION

Franklin Computers Marketed and Distributed by
HITEC MICRO LTD. P.O. Box 1978, Auckland. 1.

GSI 503 001

inside BITS & BYTES..

Issue No. 10, July 1983

Sales Tax update
Page 2
Is the sales tax on computers about to be reduced? See our editorial.

Two micros reviewed
Pages 6-8 the Spectrum
This Sinclair creation is finally available in New Zealand and Steven Cragg finds out it really does have all the colours of the rainbow.

Pages 10-12 the BMC 800
Mike Wall investigates this machine that "bobbed" up in the Education Department list of recommended computers and discovers it certainly isn't a photocopier.

Printer review
Pages 13-14 the Compute Mate
Selwyn Arrow puts this under $1000 dot matrix printer through its paces.

Business Software
Pages 15-17, 26 Supercalc
This spreadsheet program for micros running the popular CP/M operating system is tried out by Peter Brown.

Page 18 Solicitors' package
Shayne Doyle has a look at one of the few solicitors' packages available for microcomputers in New Zealand.

International
Pages 20-22
Pip Forer continues his report on the overseas microcomputer scene.

Robotics
Page 23
Neill Birss reports on the Automation '83 seminar at Massey University.

Education
Pages 24-25
An education program from a primary school teacher and how computer studies is taught at one North Island college.

Farming
Pages 27-28
Chris McLeod discusses the boom in farm computing — when and if it will come.

Games
Pages 34-36
Win or lose a fortune in this sharemarket game from Martin Downey that can be converted to run on most micros.

Beginners
Pages 38-40
Gerrit Bahlman concludes his series on machine language while Gordon Findlay explains subroutines in his BASIC series.

Books.

Reviews Pages 46, 47, 50.
Book club bargains in the centrespread lift-out section.
Machine columns
Page 30 — Quickdrawing on the Atari.

Page 31 — New Microbee hardware, software and books available.

Page 32 — Memory expansion on the VIC and points to remember when trading your VIC for a 64.

Page 37 — Examining Device Control Blocks for the System 80/TRS 80.

Page 41 — Apple arrays, Part 2.

Page 43 — Books for theBBC.

Page 45 — Two programs for the Sinclair ZX81.

Page 49 — Using the SET command in PIPS III.

PLUS

Micro News — Pages 3, 4, 12, 40,

Classified — Page 50
Club contacts — Page 51
Glossary — Page 52
Letters — Page 36
Advertiser index — Page 52.

Molymerx is the largest source of TRS-80 Software in Australasia

And if you think that's impressive, wait till you see the catalogue

But low prices are only one feature of our new catalogue. We think you will start using it as an invaluable reference tool. 270 programs, 80 pages.
And that's not all.
As we publish new software we send you an update. Our offer is to keep you abreast of new products, new services and our regular special prices.
Fill in the coupon and return it to:

Molymerx

Molymerx Ltd.
P.O. Box 60152
Titirangi,
AUCKLAND
NEW ZEALAND

Tel.: (817) 4372

Please send ☐ copies of the Molymerx Software Catalogue.
Please use BLOCK CAPITALS

Name/Company .....

Address .....

..... Zone .....

I enclose $ ..... @ $4.50 per copy

Australasian distributors for: Aardvark, Acorn, Big Five, C.A.U., A.J. Harding, Hexagon, ICR Futuresoft, Logical Systems, Micro Systems Software, Mumford Micro Systems, Pioneer Software, Understanding, ABC, Powersoft.

BITS & BYTES is published monthly, except January, by Neill Birss, Dion Crooks and Paul Crooks. Head office – first floor Dominion Building, 91 Cathedral Square, P.O. Box 827, Christchurch. Telephone 66-566.

Advertising

Advertising co-ordinator – Paul Crooks, telephone 66-566, Christchurch.
Advertising representatives
Auckland – Wendy Whitehead, telephone 794-807, Box 534, Auckland.
Wellington – Marc Heymann, telephone 858-481 or 844-985, P.O. Box 27-205, Wellington.

Editorial

Editor – Neill Birss, P.O. Box 827, Christchurch.
Editorial representatives
Auckland – Cathy and Selwyn Arrow, 30A Bracken Ave., Takapuna
Wellington – Shayne Doyle, 18 Holdsworth Ave., Upper Hutt, telephone 280-333 ext. 892 (w), 278-545 (h).

Production: Roger Browning, Graeme Patterson.
Typesetting: Focal Point.
Cover and Graphics: Sally Williams.
Technical Editor: Chris O'Donoghue.

Subscription rate: $8 a year (11 issues) adults
$6 a year for school pupils.
Subscriptions begin from the next issue of BITS & BYTES after the subscription is received.
Subscription addresses:
When sending in subscriptions please include postal zones for the cities. If you label is incorrectly addressed please send it to us with the correction marked.

Distribution inquiries:
Bookshops – Gordon and Gotch, Ltd. Computer stores – direct to the publishers.

Printed in Christchurch by D.N. Adams, Ltd.

COPYRIGHT: All articles and programs printed in this magazine are copyright. They should not be sold or passed on to non-subscribers in any form: printed, or in tape or disk format.
LIABILITY: Although material used in BITS & BYTES is checked for accuracy, no liability can be assumed for any losses due to the use of any material in this magazine.

EDITORIAL

Sales Tax drop imminent ???

Pressure continues to mount against the crazy 40 per cent sales tax on computer hardware – and the latest pressure comes from an influential cabinet minister.

Mr Hugh Templeton, Minister of Trade and Industry, has publicly promised to press for a reduction in the 40 per cent sales tax.

He said the cabinet would consider the matter early in July when it revised the recent report of the Industries Development Commission on the electronics industry.

The commission recommended reducing the sales tax to just 10 per cent.

Earlier this year another cabinet minister, the Minister of Science and Technology, Dr Ian Shearer, also hinted he was in favour of a tax reduction when he said, "reduced sales taxes is one of the options the government is considering to encourage the development of a vigorous computer servicing and software industry in New Zealand.

"I am determined that every effort is made to ensure that potential is realised," he said.

BITS & BYTES enquiries have revealed that an inter-departmental committee has been instructed to prepare a paper on the Industries Development Commission report with "due haste".

A Customs Department official on that committee, Mr Warwick Crooks, told BITS & BYTES he expected the report to go to the powerful cabinet economic committee before the end of June.

And the final decision on the tax is expected to be made by the full cabinet at one of its regular Monday meetings this month. The decision could be announced immediately afterwards or in the budget which usually falls in late July or early August.

But with at least two cabinet ministers, the influential Industries Development Commission and not to mention the whole computer industry pressing for sales tax relief, what can stop the reduction being approved?

It seems the only thing that could block the reduction is Government policy on indirect taxation (including sales tax).

And here the Minister of Finance, Mr Muldoon, and Minister of Customs (the Customs Department is responsible for sales taxes), Mr Allen, will have an important say.

But even they must realise that a 40 per cent tax is carrying indirect taxation too far and especially in such an important industry as the computer industry.

They should also take into account the words of British tax expert, Mr John Kay.

In New Zealand last month to advise Treasury on tax matters he said, "the most unbelievable single element of the New Zealand tax system to an outsider is the 40 per cent tax on computers. That really took my breath away."

But which ever way the Government goes they must make a decision and announce it quickly, for who is going to buy computer equipment if they think that the price is about to drop by up to 30 per cent?

So BITS & BYTES calls on the Government to act responsibly – reduce this ridiculous sales tax and do it quickly.

BITS & BYTES has made its views known to Government and if you wish to also we suggest you write to one or all of the four key ministers involved (Mr Muldoon, Mr Allen, Mr Templeton and Dr Shearer).

Nb: If you are wondering what has happened to the unresolved question of Customs Duty on software (originally reported in the February issue of BITS & BYTES), a departmental report is still being prepared for Mr Allen to consider. A "considerable number of indepth submissions" were received by the Customs Department including a number from BITS & BYTES readers.

If its micro news in Christchurch – telephone 66-566

Home Computer from Sord

A home computer from Sord will be released here in August. The M5 or Creative Computer is similar in appearance to the Sinclair Spectrum and has the same type of rubber keyboard.

The M5 comes with 16K video and 4K user RAM, a BASIC-I (i.e. introductory BASIC) tape and one games tape. On the back of the computer are a parallel printer port, a cassette port, two joypad ports, a sound port (which allows the M5 to be connected to your stereo), a video port for connecting to a black and white or green monitor and an RF port for connecting to a colour television.

In addition a lift-up lid on top of the computer reveals a plug-in cartridge slot. A BASIC-G cartridge which provides a BASIC similar to Microsoft but with a lot of extra commands and a spread-sheet cartridge called FALC are already available. Both these cartridges add an extra 8K of user RAM.

Within three months after release date an expansion box allowing disk drives, an extra 32K of RAM, and extra cartridges to be added, will be available. The drives, 3½ inch micro drives with 190K of storage per side, will also be available within three months of release date.

This gives the M5 an edge over the Spectrum as its micro drives are still not available in the UK let alone New Zealand.

The graphics capability of the M5 also sounds good with a resolution of 256 x 192 pixels and 32 sprites (moveable graphic objects) available.

The M5 will retail for "well under $1000" here say New Zealand agents Challenge Computers (P.O. Box 3249, Wellington).

A full review of the M5 will appear in our September issue.

Dick Smith's new colour computer

Hot on the heels of its Australian release, Dick Smith's new baby the VZ 200 is being released here this month.

And the price for this colour computer in the Spectrum mould is only $349.

The VZ 200 comes with 8K of RAM with 6K available for the user. A 16K memory expansion module which plugs directly into the back of the VZ 200 will be available for $149.

A peripherals slot is also provided (a $99 printer interface will allow any Centronics-type printer to be connected to the VZ 200) together with ports for a cassette (the Dick Smith datacassette will cost $129), monitor and television.

The keyboard is similar to the Spectrum with rubber keys and each key having several different functions.

There are two graphics modes available: 32 x 16 and 128 x 64 pixels.

The New Zealand agents are Dick Smith Electronics (Private Bag, Newmarket, Auckland) and a full review of VZ 200 will appear soon.

Rainbow from Digital

Digital's Rainbow 100 personal computer is now on sale in New Zealand.

The feature of the Rainbow is its twin processors, the 8 bit Z80 and the 16 bit 8088, which means it can run CP/M 80 and CP/M 86 operating systems and all the software available under those operating systems.

The computer automatically senses which processor is required once the program is entered.

Other standard features include 64K RAM (expandable to 256K), twin floppy disk drives (400K capacity on each), 103 key keyboard, communications port and printer port. Digital also provides a year's free service.

HAMILTON BOYS' HIGH BUYS BMC

In what is believed to be the largest ever purchase of microcomputers by a New Zealand school, Hamilton Boys' High School has decided to purchase twenty four BMC800 microcomputers.

In announcing this, Boys High Headmaster Mr Tony Steel, said the decision to purchase the BMC800 had come after a very thorough investigation into the machines recommended by the Department of Education.

Of the twenty four BMC800 purchased, sixteen will be installed in a new computer room and will be networked on a MX6 computer manufactured by the BMC distributors, Microprocessor Developments Limited of Auckland.

"One of the major factors which influenced our decision," said Mr Steel "was the ability of the BMC installation to run a Winchester Disk Drive. We will be installing an 18 Megabyte drive, for we believe it is important to retain hundreds of pupils files simultaneously," said Mr Steel.

"Another factor, is the printer in each BMC machine. Whether a

COMPUTER CLASSES

Introduction to Computing
only $35.00

Intermediate Computing
(an introduction to business systems)
only $65.00
AT

COMPUTER PLUS

103B Riccarton Rd, Christchurch
Ph. 488-519, P.O. Box 8100

See our free offer on page 4

COMPUTER OWNERS

WE WILL MARKET YOUR SOFTWARE IN N.Z., AUSTRALIA AND THE U.S.A. ANY ORIGINAL APPLICATION OR GAMES PROGRAM WILL BE CONSIDERED.

FOR FURTHER INFORMATION WRITE TO:
THE REMARKABLE SOFTWARE COMPANY LIMITED,
P.O. BOX 9535, HAMILTON, N.Z.

boy has a machine at home, a teacher is programming in the staff room, each person always has a printer available to them.''

The other eight machines of the order, will be used in a stand alone mode for individual programming by seventh form students, by teachers, for use in school administration, the library, and one machine will be regularly used by boarders at Argyle House, the school's boarding Hostel.

Auckland company selling Seiko

A new Auckland company, Century 21 Computers Ltd, is now selling the Seiko 8600 16-bit microcomputer in New Zealand.

Mr Bruce Sullivan is the managing director of the new company. The 23-year-old electronics expert is also the owner of New Zealand's leading video-game manufacturing company, Century Electronics, Ltd.

Mr Andrew Tearle aged 38, is the marketing director and was previously manager of the first Byte Shop, in Auckland.

Century 21 Computers says it will initially concentrate its operations on the Auckland area, extending nationally at a later date.

Among the policies of the company are a number aimed at the businessman ready to take the first steps into the computer age. They include a free seminar to businessmen, at least six hours training on any system purchased, a 24-hour support service for queries, and a 12-month warranty on all equipment supplied.

The Seiko system will be distributed through Transnational Data Systems (N.Z.), Ltd, of which Mr Sullivan is the managing director. It is based on an 8086 microprocessor, with 128K bytes of memory and 640K byte floppy disc drives. Other disc storage options (up to a 40 megabyte Winchester drive) are available.

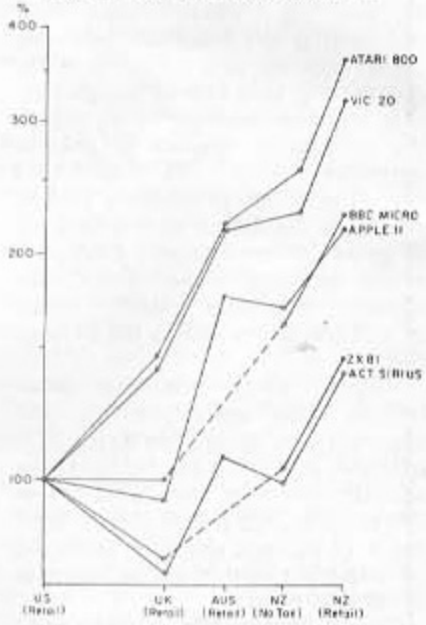
Aimed at the small business market, the Seiko 8600 fits in the $14,000 and upwards price range.

Century 21 Computers will also sell the Morrow Micro Decision desk-top microcomputer, which is priced between $5000 and $8000, and the Otrona Attache portable computer, priced at $7500.

The Relative Cost of Computing

This diagram was unfortunately not included with Pip Forer article last month comparing the cost of computing in different countries.

FIG 2. THE RELATIVE COST OF COMPUTING



University buys Panasonics

The Accountancy Department of the University of Canterbury recently bought 17 National Panasonic JB-3000 micro-computers, including four for other teaching departments.

Professor Bevan Clarke said the computers, which use MS-DOS and the 8088 16-bit microprocessor, were chosen after an exhaustive — and exhausting — 10-month evaluation and bench-marking of 30 machines and configurations.

''We were impressed both by the diversity of computers available in New Zealand and by the rate at which the new technology is improving,'' he said.

YOUR ONE STOP HOME AND BUSINESS COMPUTER SHOP

16K RAM Pack
WAS $149.00
NOW $99.95

ZX81
WAS $199
NOW $149.95

ZX Printer
WAS $ 239
NOW $199.95

ZX Spectrum
$599 16K
$799 48K

GAMES, HOME FINANCE, EDUCATION, BUSINESS

Computer Classes

Introduction to computing $35.00
Intermediate Computing $65.00
(an introduction to business systems)

BBC $1995

Atari 400 WAS $1295 NOW $999

Please send me by return mail

☐ Information on classes _____computer or
☐ ZX81 ☐ Atari 400 ☐ ZX Spectrum ☐ BBC
qty _____ qty _____ qty _____ qty _____
My cheque/Money order is enclosed

NAME .....

ADDRESS .....

FREE!! with every purchase one year's subscription to BITS & BYTES

COMPUTER PLUS

103B Riccarton Rd
Christchurch, Ph 488-519
P.O. Box 8100

THIS IS THE COMMODORE 64

This is the new Commodore 64 Personal Computer.
It costs $1295. 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	$1295
ADVANCED FEATURES	
Built-in user memory	64K
Programmable	YES
Real typewriter keyboard	YES (66keys)
Graphics characters (from keyboard)	YES
Upper & lower case letters	YES
Function keys	YES
Maximum 5¼" floppy disk capacity per drive	170 K.B. to 1 M.B.
AUDIO FEATURES	
Sound Generator	YES
Music Synthesizer	YES
H-Fi Output	YES
VIDEO OUTPUT	
Monitor Output	YES
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

COMMODORE COMPUTER (N.Z.) LTD
P.O. BOX 33-847, Takapuna, Auckland
Telephone 497-081

or

Contact your local dealer

Spectrum: it gives value for money

by STEVEN CRAGG

Steven Cragg is a first-year student in engineering at Victoria University of Wellington.

He has owned a ZX Spectrum for about eight months, previously having owned a ZX81 and has recently added a sound board and joystick ports.

On first sight the Spectrum is unimpressive: 233mm wide 144mm deep, 30mm high — about the size of a large book. It is moulded in the same black plastic of the ZX81, but unlike its predecessor, it has a typewriter-like keyboard which takes up much of the top surface. On the back of the machine are the sockets for the power supply, TV aerial lead, and tape recorder sockets along with the 28-way expansion port. The Spectrum has small rubber feet which are really effective in stopping it from sliding during a game of space invaders.

The Spectrum is supplied in a well-packed yet surprisingly small box which also contains the cassette leads, TV lead, power supply (which is the 1.2 amp version originally supplied with the ZX printer) and manuals.

Unpacking and assembling is straightforward using the introductory manual which gives step by step instructions for connection of all the leads and the use of a sleeve plug for the power supply, as opposed to the jack plugs for the cassette leads, which cuts down the area for confusion.

Display

The high-resolution colour graphics of the Spectrum must be one of the major selling points for this system. The graphics facilities are exciting and are

sinclair SUPER JULY SAVINGS!

ZX81
THE BIGGEST SELLING SMALL
HOME COMPUTER
Compact, smart, easy to store, easy to run and now the price is even better.
USUALLY $199 NOW $149

SAVE $50

ZX PRINTER
For keeping a record of what is on screen.
USUALLY $239 NOW $199

RAM PACK
Increase the ZX81 memory by 16 times.
USUALLY $149 NOW $99

NEW KEYBOARD
Easier and more accurate push-button control
ONLY $39.95

SPECTRUM
16k or 48k RAM, full-size moving key keyboard, colour and sound and high resolution graphics.
16k RAM $599 — 48k RAM $799

Whitcoulls
21 COMPUTER CENTRES
THROUGHOUT NEW ZEALAND

controlled by a new "user friendly" version of the Sinclair BASIC. The screen has a resolution of 256 x 192 pixels with up to eight colours available as well as flashing and brightness controls.

The colours are:—

0 Black
1 Blue
2 Red
3 Magenta
4 Green
5 Cyan
6 Yellow
7 White

There is one constraint placed on the use of the colour. Each character cell (an 8x8 matrix) can have only two colours associated with it, background and foreground, which means that if the foreground colour of a cell is blue and a pixel is plotted in green then all the blue pixels turn green. However, this is not a major problem as most high resolution displays are done in only two colours anyway.

The BASIC commands available for control of the graphics are:

DRAW
X,Y,R: This draws a line from the last plot position to the pixel X along, and Y up, turning through an arc of R radians in the process (the R parameter can be left off if desired).

CIRCLE
X,Y,R: This draws a circle of radius R pixels at position X,Y.

PLOT
X,Y: Sets a pixel at position X,Y.

PAPER
X: Sets the background to colour X.

INK X: Sets the foreground to colour X.

INVERSE: Inverts the ink and paper colours.

FLASH: Sets specified character cells flashing.

BRIGHT: Sets one of two levels of brightness.

OVER: Allows over printing of one or more characters.

POINT
(X,Y): Tests whether the pixel at X,Y is set.

ATTR
(X,Y): Returns a value corresponding to the ink and paper colours of the character cell, and whether the cell is flashing or the brightness is set.

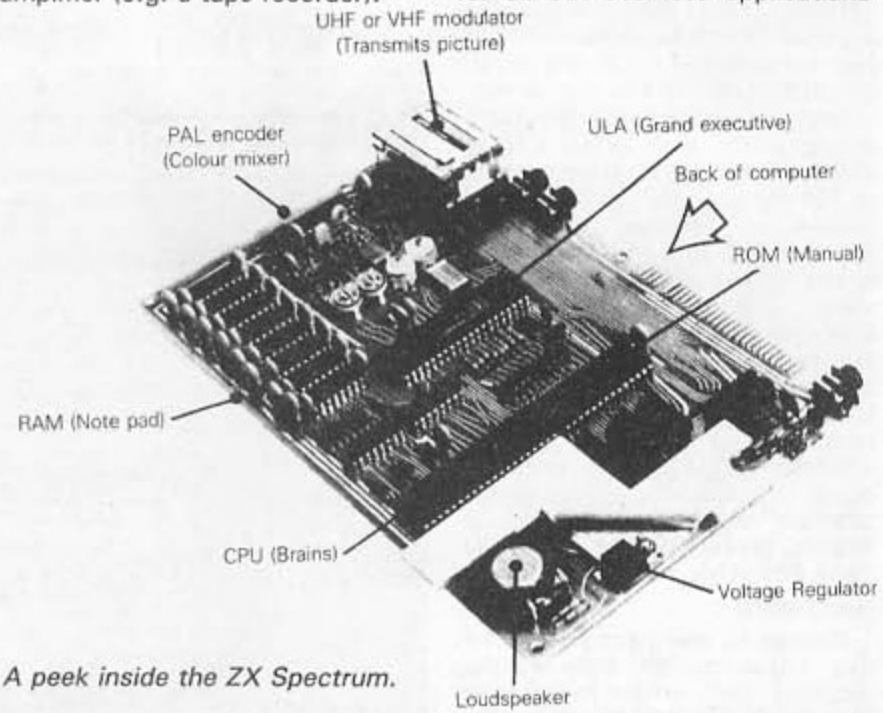
BORDER
X: Sets the border of the screen to colour X.

SCREEN$
(X,Y): This returns as a single character string the content of the specifed cell.

In addition to the above, 21 user defined graphics are available as well as the usual Sinclair block graphics. With a small amount of programming the whole character set can be redefined.

Sound

The Spectrum has an internal beeper (controlled by the BEEP statement) which can be varied above or below middle C with control only of the length and tone, but reasonable sound can be produced, although unless you are in a quiet room you will need to play the sound through an amplifier (e.g. a tape recorder).



A peek inside the ZX Spectrum.

Tape interface

The Spectrum has a sophisticated and very fast (1500 Baud) cassette-tape interface which in addition to the normal LOAD and SAVE commands, also includes VERIFY (allows you to check that something has been saved to tape) and the facility to MERGE two programs from tape. Arrays, variables, and screens may also be saved. Machine code can be saved and loaded at a given memory address.

Manuals

There are two manuals for the Spectrum. The first of these is a getting-started manual for the absolute beginner and covers such matters as operating the keyboard, use of the colour and sound as well as the basics of programming etc.

The larger of the two manuals contains an excellent BASIC programming course, as well as example programs, summaries to all the chapters and all the basic entry points to the system.

Keyboard

This is the device that has had the most criticism levelled at it on the Spectrum and indeed, "typewriter-like" is flattering. The keyboard consists of 40 rubber keys, which is probably adaquate for all but business applications and offers full upper and lower case with descenders and auto repeat on all keys. It is virtually impossible (so I'm told) to use the touch-type method designed for the typewriter. The other feature Sinclair widely advertises is

ZX SPECTRUM
NOW AVAILABLE
AT
COMPUTER PLUS
103B Riccarton Rd, Christchurch
Ph. 488-519, P.O. Box 8100
See our free offer on page 4

single-key entry.

The Spectrum has up to five functions and several modes, which means that two levels of shift have to be used and this is where the system breaks down. However, beginners and two-finger (hunt and peck) typists will love it as combined with the syntax checker it means that hardly any errors occur at run time.

Expansion

This is one of the more exciting aspects of the Spectrum. It can best be summed up in one word: MICRODRIVE. This is the as-yet-unreleased device that is Sinclair's trump card and offers 100K storage with a date-transfer rate of 16K per second. The microdrive should be released in Britain shortly and David Reid Electronics hopes to have them here later this year. The main peripheral available at the moment is the ZX printer, which now offers full upper and lower case as well as high resolution graphics. Other peripherals include the as-yet-unreleased RS232 and network board. Independent suppliers produce digitised arms, sound boards, joysticks, light pens, I/O ports and other items.

Hardware

Access to the hardware is by five screws in the base of the machine (not under the rubber feet as in the ZX81), and once these are undone the top of the Spectrum lifts off to the extent of two ribbon cables which connect the keyboard to the printed circuit board.

This is where the problems begin in describing the Spectrum, the reason being that there are two versions of printed circuit board. I shall describe only the later one as this is almost certainly the one that is found in the New Zealand machines. The main feature is the large number of sockets for the RAM. This is so that the 48K of the fully expanded Spectrum fits inside the case. For those who feel that 16K is enough or is all they can afford, it may be of interest that David Reid Electronics intends to market upgrade kits later in the year.

Apart from the RAM, other components include the Z80A processor, ULA for the video circuitry, 16K ROM, containing the BASIC, and speaker for the sound. At the rear of the board is the expansion port which is slightly larger than the ZX81 one and now offers all the Z80 buses.

Disadvantages

The main fault must be the single key entry. This, I feel, should have been either discarded completely or offered as an option with the main emphasis being on "normal" typing. However, this would have needed a proper typewriter keyboard which would have made the Spectrum more expensive.

The lack of good sound is another problem, as the Spectrum's sound is not only too quiet; it is of low quality when compared with the VIC 20 or BBC micro.

The last two faults are minor hardware quibbles. The first is that the power supply is separate, as with the ZX81. This means another box that contributes to the general mess that seems to envelop me whenever I use my Spectrum. There is, however, one other disadvantage with having the power supply separate and that is that it allows the suppliers to charge $19.95 for it. With these considerations in mind I would have liked the power supply inside the machine.

The final problem is that the tape leads have no remote jack for controlling the tape recorder and also when a program is being saved, not all the leads can be connected as this produces a feedback loop. So that to save a program one of the EAR plugs (from either the computer or the tape recorder) has to be unplugged.

Microcomputer Summary

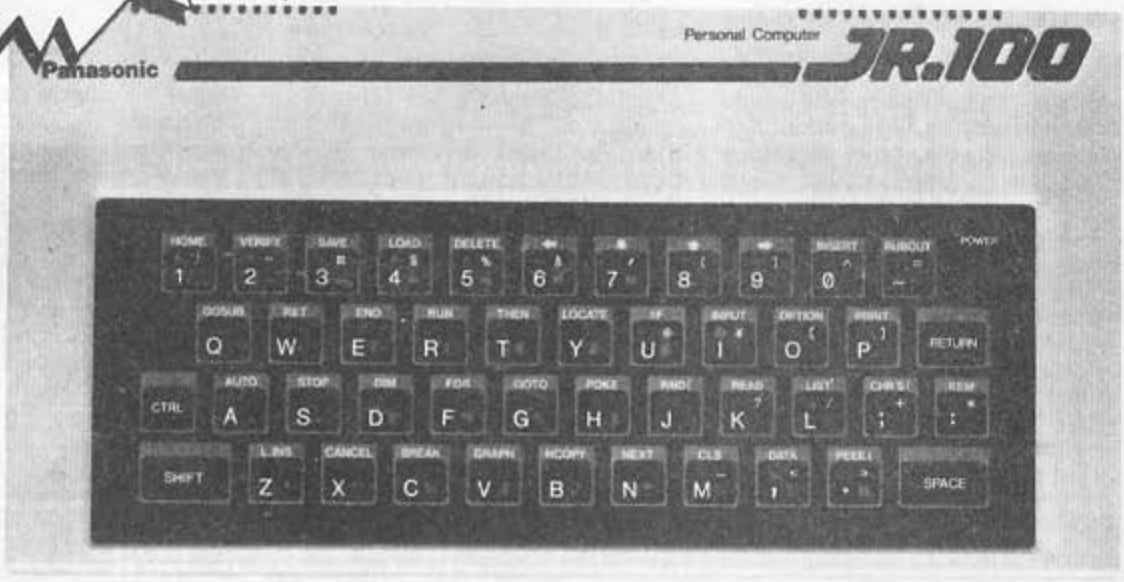
NAME:	Sinclair ZX Spectrum.
PROCESSOR:	Z80A running at 3.25 MHz
RAM:	16K expandable to 48K
ROM:	16K
I/O:	Cassette port. Sinclair expansion port.
KEY BOARD:	40 key typewriter style, variable speed auto repeat on all keys.
LANGUAGES:	Sinclair BASIC standard. LOGO, Pascal, FORTH, Compiled BASIC etc. available from independent suppliers.
SOUND:	Internal beeper producing variable tone.
COST:	16K–$599 48K–$799
OPTIONS:	ZX Printer, up to 8 Microdrives + RS232 Board (See text)
DISPLAY:	32 rows x 24 lines of text which can be freely mixed with the 256 x 192 pixel graphics. 8 foreground & 8 background colours with flashing, brightness and overprinting. High level – user friendly BASIC to control all features.
CHARACTER SET:	ASCII full upper & lower case (with descenders) plus 21 user defined graphics normally available and the facility to redefine normal character set.
REVIEWER'S RATINGS:	(on a scale from 1 to 5): Documentation 5, ease of use 4, language 5, expansion 4, value for money 5, support 3, tape system 4.

Although areas of the Spectrum still have rough edges the machine is a top seller in Britain and at the price ($599 for 16K model and $799 for 48K model) it is sure to prove a success here as long as David Reid keeps the price of software reasonable.

I believe that the Spectrum is the best value for money of any machine on the market at the moment, and as well as being an excellent beginner's computer, it contains a high enough degree of sophistication to keep the most ardent of computer enthusiasts happy for years.

MEC

Panasonic



FUNCTIONAL SPECIFICATIONS

- Microprocessor
  Model: MN1800 (equivalent to 6802)
  Clock frequency: 890KHz
  System Reset Function
- Memory
  ROM: 8K Bytes
  RAM: 16K Bytes
  Video RAM: 1K Bytes

- Keyboard
  System: Software scanning
  Keys: 5-shift key mode with 45 keys, SHIFT key and CTRL key
- Display interface
  Screen size: 24 lines × 32 characters
  Characters: 64 characters with 6 × 7 dot matrix
  64 semi-graphic characters with 8 × 8 dot matrix
  Characters & symbols specified by user: 32 characters with 8 × 8 dot matrix
  Attribute: Inverted display function
  Composite video signal: with 75 ohms, 1V p-p or with RF flip-flop converter
- Cassette Interface
  System: FSK system 1,200Hz (space), 2,400Hz (mark)
  Baud rate: 600 Bauds
- AC Adaptor
  Input Voltage: AC 110V, 120V or 220V ± 10%, 50/60Hz
  Output Voltage: DC 17V, 7.8V and −8V
  Power Consumption: 12.5W
- RF Modulator

THE MICROCOMPUTER ELECTRONIC COMPANY LTD
IN ASSOCIATION WITH FISHER & PAYKEL LTD.

Panasonic
just slightly ahead of our time

27 GREAT SOUTH ROAD, NEWMARKET,
P.O. BOX 9224, AUCKLAND 1, NEW ZEALAND.
TELEPHONE (9) 504-774.

The BMC 800 — news with a capital N

By MIKE WALL

When the BMC 800 (also described as the BMC Model 10) appeared in the now infamous Education Dept. list of recommended computers, it didn't attract very much attention. In fact, few people had even heard of it. It had arrived on the New Zealand scene so recently, and had made such a small impact that I foolishly referred to it as "possibly a photocopier included in the list by mistake" and Nick Smythe left it out of his networking articles altogether.

But the largely unknown Japanese machine has refused to be ignored. None other institution than Auckland Grammar School has recently bought a set of 16 of them. Hamilton Boys' has signed up for 24. The BMC 800 is now news with a capital N.

The whole issue is a particularly interesting one. The New Zealand distributor of the machines is interesting; the machine itself is interesting; and its use at Auckland Grammar and Hamilton Boys' will be nothing less than fascinating.

THE DISTRIBUTOR

The New Zealand distributor, Microprocessor Developments Ltd (hereinafter referred to as MDL) appears to epitomise kiwi ingenuity in the microcomputer business. As well as holding the distributorships for a number of well accepted hardware items, MDL has also been in the game of building its own micros from imported components.

According to MDL's handouts, its "MX" family has been quite successful and the company's technical expertise has certainly been demonstrated. This technical competence is important, because its latest home-grown micro, the MX-6 is also being marketed as the network controller for a system of BMC 800s.

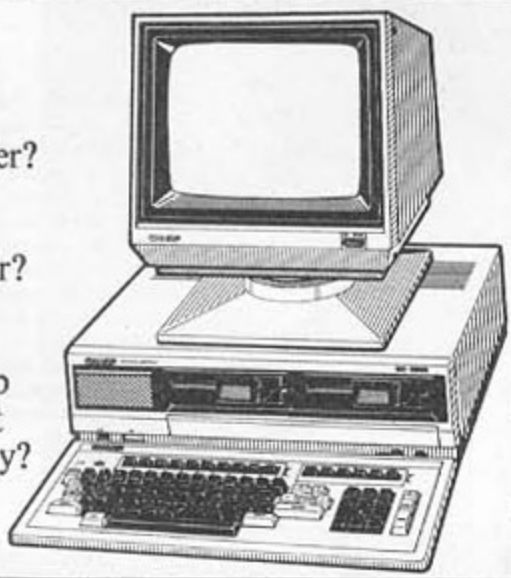
MDL is quite a colourful organisation all round. The boss, John Lovelock, is the man who headed the now legendary "anti-Poly" deputation to the Minister of Education. In a television documentary on the matter, screened earlier this year, he was

CONFUSED ABOUT MICRO COMPUTERS?

Are you thinking of purchasing a computer?

Have you recently purchased a computer?

Do you want to find out how they can help your business without being pressured to buy?



Have you got sufficient backup staff if your operator should leave?

- ☆ **Computer Familiarisation courses for school learners and businessmen**
- ☆ **Operator training courses**
- ☆ **In house training of your own staff**

THE COMPUTER TRAINING CENTRE

PO Box 47-327
Ponsonby
AUCKLAND

Telephone 734-104
accommodation arranged
for visitors to Auckland

painted as a "sherriff of Nottingham" figure who kicked Polys out of the mouths of starving children. Emotive and "patriotic" issues aside, the request for an independent assessment of micros must have seemed like a good idea at the time.

The "report" itself and the subsequent hoots of scorn and derision, must cause Mr Lovelock more than a little sadness. He is a brave man to publicise that he was responsible for initiating the whole fiasco.

THE COMPUTER

Compared with other micros, the BMC can hold its head up high.

The heart of the machine is a Z-80A microprocessor, ticking over at 4 MHz. This works with 64 K of user RAM along with an extra 48 K just to support the high-resolution graphics. These are drawn on a 640 by 200 pixel page and in up to 8 colours — unusually fine resolution for a machine this size. Separate graphics memory is not unique to the BMC (Poly, for one, uses a similar system) but it is a very nice feature and one that other graphics-capable micros would do well to build in.

The user sits down to a very full keyboard. As well as the normal typewriter keys, the BMC 800 also boasts a numeric pad, a set of cursor-moving and editing keys and 10 programmable function keys.

However, it is just behind the keyboard that the really big surprise lurks. Sitting smack in the middle of the "lid" is an inbuilt 80 col, 80 cps dot-matrix printer. People who are used to the "teletype" terminals, found round larger systems, wouldn't bat an eyelid at this feature but on a stand-along micro it is fairly radical. Special keys for "hard copy" and "form feed" sit just above the numeric pad.

Also unusual is an inbuilt clock with battery back-up, and an inbuilt light pen interface.

The standard floppy disk drive, which is separate from the main console, uses double-sided, double-density formatting to stack 380 K on a normal 5 inch diskette. But MDL offers a large range of alternative storage configurations and the system purchased by Auckland Grammar uses a 40 MB Winchester hard disk accessible to all the micros through a network.

Polycorp saw fit to place the BMC second in its "independent evaluation"; high praise indeed.

PRICES

The following prices are quoted by MDL in its handout dated January 1983. The desire for customers may well make most of them open to negotiation. Auckland Grammar is rumoured to have received substantial discounts . . . MDL declined to say precisely what money changed hands.

A 64K computer with inbuilt printer and a 14 inch high resolution colour monitor costs $2800.

Add a 380K disk drive and operating system, and the price goes up to $4050.

These prices are not high; compared to the cost of an Apple IIe with colour screen, twin disks, a printer and an 80 column card; the BMC is a very reasonable proposition.

However, whether you would buy a printer for every micro if you had the choice is another argument altogether.

If, like Auckland Grammar, you could write a letter to every parent and friend, knocking them up for $30.00 each then you might get into networking.

The system that AGS bought; 16 micros, MDL's very own network controller and a 40 MB Winchester disk would set back an "ordinary" educational customer, using green screens, about $42,000 without software. Depending what languages and basic business packages you wanted, you would pay anywhere from several hundred to many thousands of dollars.

Assuming that the final cost was $45,000 then each micro is costing about $2800; add about $500 for colour screens.

From the hardware point of view, that looks like a good deal. It is a fairly luxurious system, but isn't costing an unreasonable amount of money.

The BMC 800 . . . has refused to be ignored

USE IN EDUCATION

BUT . . . the BMC 800 is designed for business, just like dozens of other micros on the market. This does not mean to say that it is unsuitable for educational use but, there are some very real snags.

US, U.K. and Australian educational circles have never heard of it. Nor, for that matter, has any publisher of educational software that I could find. MDL has never found any either according to one of its employees. Unless other schools make the same sort of commitment that AGS and Hamilton Boys' have made, there isn't even going to be much home-grown educational

software to use.

On the other hand, for many of the courses taught in schools, a computer is a computer is a computer, as the poet said.

Programming is teachable on more or less any machine and should be excellent on the BMC with its professional language options. Many schools suffer no ill effects from running their computer awareness sessions with software that has been written "in-house". All word processing and data processing tasks will be a breeze, depending on what software MDL throws in at the time of initial purchase.

Overall though, being pioneers is never easy.

Being the first in the western world is even less easy.

There is no disputing that the BMC 800 looks like a good machine and one that offers value for money. In a business environment, or the school office, it would probably be great.

In education, however, "going it alone" only works up to a point. Many computer uses will be highly satisfactory, but unless a goodly number of schools follow Auckland Grammar's first brave steps, general classroom use is going to be severely limited.

Mr Ken Eagle, the Marketing Manager of MDL was contacted for his comments on the BMC review.

On the matter of educational software he agreed that there simply wasn't any but added that schools "like Auckland Grammar, Wellington College and Christ's College . . . schools with 90% success in Bursary, aren't interested in CAI (computer assisted instruction) or CAL (computer assisted learning). That's their last consideration."

Enquiries at Christ's College suggest that Mr Eagle has drawn completely unjustified conclusions.

In copies of Auckland Grammar correspondence which were forwarded by MDL, the headmaster, Mr John Graham writes;

"Auckland Grammar School staff members have for some time been investigating networked micro-computer systems for classroom teaching. Such teaching includes computer awareness for all pupils at the school and *computer-assisted learning* and programming in subjects where appropriate. Mr A. Calvert, . . . was sent to the USA last year . . . to research *computer-assisted learning.*" (my emphasis)

MDL has also publicly claimed to convert whatever software a school presently holds for BBC, Apple etc, to run on the BMC. When questioned further, this offer is only made for software which meets ALL the following conditions;

1. Written in BASIC.
2. Written *in the school* or *officially* classified as "public domain."
3. Does not access many machine specific locations. (i.e. few peeks & pokes)

These conditions are sensible and I would expect that MDL can convert most complying software. However, the conditions are certainly not stated by MDL at the time the conversion pledge is made.

REMEX RFD 960 $695

5¼" DISC DRIVE — 80 TRACK
DOUBLE SIDED — 96TPI — 5ms TRACK-TO-TRACK
ACCESS-TIME — DIRECT DRIVE DC BRUSHLESS MOTOR —
NO BELTS OR HEAD LOAD SOLENOID — UNIQUE CLUTCH
AND SPINDLE DESIGN — (OPTIONAL EXTRA: CASE AND POWER SUPPLY)

JOHN GILBERT ELECTRONICS
PARNELL RISE, BOX 37245
AUCKLAND PH (09) 30-839

Successful first Computex Show

Visitors from Tauranga to Wellington flocked to the Computex 83 computer show in Palmerston North from May 27 to 29, swelling the total attendance over three days to more than 6000.

Even the Lions playing Manawatu did not empty the convention centre during the Saturday afternoon. Radio 2ZA made a great job of promoting the show, and in running it.

There were scores and scores of school pupils, but at least two persons in their seventies admitted at the "Bits & Bytes" stand to being hooked on their micro's.

The hardware sellers said they usually count on at least two or three visits to the shop by a customer before a deal is closed, but at least one well-known retailer was seen to leave the show for more machines, they were going across the counter at such a rate.

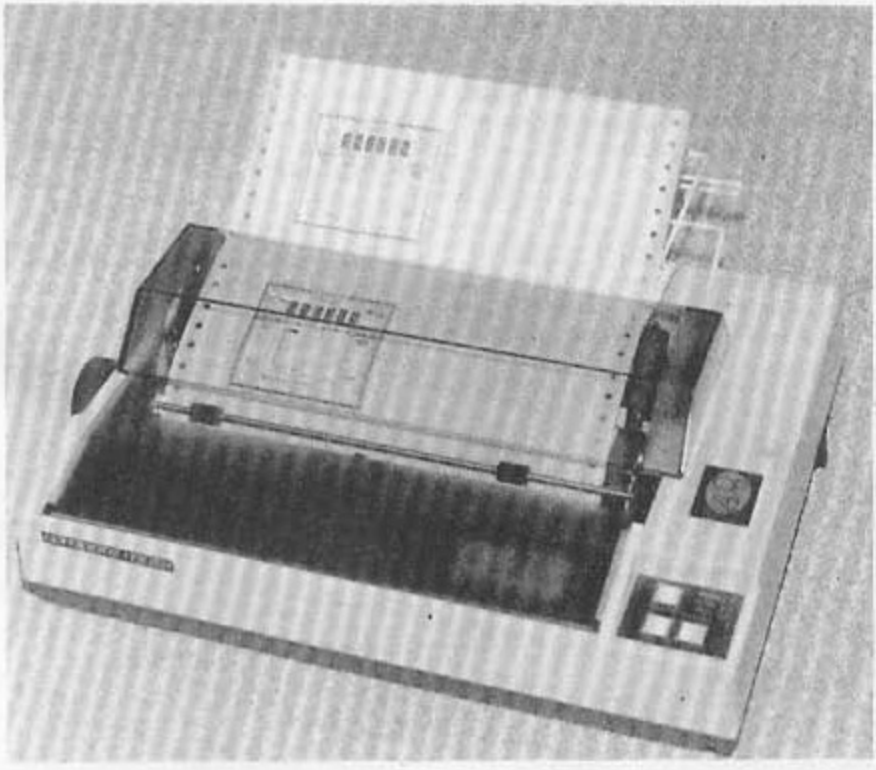
It is hard to single out which machines created the most interest, but at one end of the downstairs hall, the Microbee, Commodore 64, Spectrum, and BBC were competing for attention. The new Epson QX10 with its loads of memory, some of it non-volatile (you can switch the power off and it is still recorded) attracted much admiration, and there was a lot of interest in the little-advertised Apple look-alike, the Alpine, which was selling for $1100.

The Apple Lisa shared pride of place with a fine stand from Massey University upstairs, and the IBM promotion came complete with a walking, talking Charlie Chaplin.

A tiny, 8K, 5-key stenographic keyboard from Candy Business Machines aroused the curiosity of many. Using a unique coding system, which the distributors say is very easy to learn, the Microwriter is designed for secretaries, writers, etc, to use as input for word-processing. The distributors say that it is quite easy to achieve 30 words per minute on it.

New dot matrix printer available for under $1000

The Compute Mate printer



By SELWYN ARROW

The $1000 printing barrier has been broken with the release of the Compute Mate printer an EPSON type look-alike/work-alike.

It is a fully functional dot matrix printer with nearly all the functions of its more expensive brother the MX 80 type III (not now produced) with only two relatively minor drawbacks. Only 8 pins are used although the print head has 9 available. All characters are thus one dot shorter. They are still very readable and of course have proper descenders as in "y".

The only control code missing is the ability to designate different countries special character sets. In place of this are five additional codes, the most important of which is the ability to change the character set to italics.

Two operation modes are available. Text mode prints all the alpha, numeric, symbols and graphic characters on receipt of the required ASCII coded inputs. Bit Image mode is used to print dot

MicroPro™

SPECIAL OFFER TO ALL APPLE USERS

$695
SPECIAL OFFER
+ $45 SALES TAX

WORDSTAR OR INFOSTAR PLUS
STARCARD – (CP/M Z80 Soft Card) with
☆ 6 Mhz Z80 B Processor — 64K RAM on board
☆ Full CP/M 2.2 O/S — full disk buffering
☆ 70 Column high Resolution Capability
☆ Fully Compatible with Apple II or IIE

ORDER NOW

WordStar is a sophisticated, screen oriented word processing system specifically designed for the non-technical personnel in the microcomputer market.

OVER 100,000 USERS WORLDWIDE

InfoStar is an advanced Data Base Management System designed for non programmers with easy-to-use Data Entry Reporting and Sorting capabilities.

THE DATA BASE SYSTEM THAT'S TAKEN THE U.S.A. BY STORM

Use this form to order NOW! (Valid while stocks last)

Name: _____ Company: _____

Address: _____

[ ] Send a brochure or please supply [ ] WordStar [ ] InfoStar

Send with remittance to: P.O. Box 13-054, CHRISTCHURCH, or PHONE (03)891-109 or TELEX NZ4664

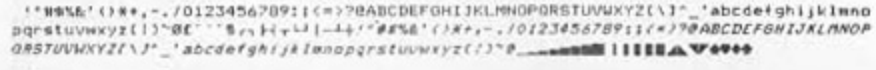
MicroAge

Normal print
_Double width
_Compressed print
_Compressed/double width
Emphasised normal print
_Emphasised double width

Italic print
_Double width
_Compressed print
_Compressed/double width
Emphasised normal print
_Emphasised double width

Some of the Compute Mate character functions/type styles.

Characters available on the Compute Mate.



Printer Summary

Name:	Compute Mate CP-80 Type I.
Type:	Dot matrix.
Printing format:	Alpha-numeric — 7 x 8 dots in 8 x 9 dot matrix field. Character graphic — 7 x 8 dot matrix. Bit image graphic — vertical 8 dots, horizontal 640 dots/line.
Character size:	Height — 2.4mm x Width 2.1mm.
Character set:	228 ASCII characters; 96 normal, 96 italic alphanumerics and symbols plus 32 semi graphics and 4 special characters.
Printing speed:	80 cps, 640 dots/line per second.
Printing direction:	Normal — bidirectional logic seeking. Superscript and bit image graphics — unidirectional left to right.
Dot graphics density:	Normal — 640 dots/190.5mm horizontal. Compressed — 1,280 dots/190.5mm.
Line spacing:	6 or 8 per inch, programmable in increments of .35mm (1/72") and .118mm (1/216").
Columns/line:	Normal size — 80. Double width — 40. all are mixable Compressed print — 142. Compressed/double width — 71. on one line
Paper feed:	Fanfold or single sheet.
Ribbon:	Cartridge — EPSON type.
Print head:	Replaceable, life of approx 3 million characters.
Dimensions:	W — 377mm x D — 295 x H — 125mm (incl cover)
Weight:	5.3kg.
Interface:	Standard Centronics parallel (36 pin Amphenol). Optional RS232C serial.
Data transfer rate:	4,000 cps max.

Review model supplied by Advanced Control Ltd, 16 St Marks Road, Newmarket, Auckland.

by dot to reproduce drawings, graphs etc. direct from the computer screen. There are two Bit Image modes, normal density (640 dots across the page) and dual density (1280 dots across the page).

There are approximately 45 different control codes. These include character codes for; normal, italic, double width, compressed, emphasised, double strike, superscript, subscript and underline. Emphasised print is the only mode that cannot be mixed freely with the other print codes. Other codes are; tabulation, line spacing, column width, form width, back space, buzzer, unidirectional print, dot graphics and the mandatory carriage return, line feed, form feed, etc.

The first section of the A5 sized 48 page manual occasionally breaks into Jenglish, ie "gently back the unit to lay flat on a firm surface, position the printer front be face to you". The more technical (and exacting) sections are written in much better English. Obviously, more care was taken where it really matters.

A few niggles were apparent, there was a constant hum from the power transformer and the two internal DIP (dual in-line pin) switches are well hidden making them difficult to get at. Of course these need only be set initially for the user's specific requirements and most of these preset control modes can be changed by issuing control codes at any time.

Two types of paper can be used; sprocket feed fanfold paper from 4" to 9.5" and single sheet up to foolscap size. The sprocket holes/sheet feeder is used to push the paper through the mechanism, so unlike most other dot matrix printers, this means that the top of the first sheet is printable.

For just under $1000 this printer is pretty good value for money so if you are looking for a low cost dot matrix printer with the trimmings then here it is. Incidentally, this is not the only model now available, at least one other is on sale that uses the same print mechanism but has a different case and key layout. Who knows perhaps competition will bring the price down even more?

SuperCalc — a powerful tool for micros running CP/M

By PETER BROWN

Sorcim Corporation's SuperCalc is an electronic spread-sheet program for those microcomputer users who have CP/M operating systems.

Like other spread-sheet programs, it taps the power of the computer to solve practical business and financial problems that would take hours or days with just pen, paper, and calculator. SuperCalc is also of use in scientific and engineering applications — a good example of this is given in the manual.

The first task after acquiring your SuperCalc software is to "install" the program. The installation procedure makes a back-up copy of the SuperCalc disk and tailors the program to the particular make of microcomputer being used. This involves setting up the video display and the printer (if you have one) to the format you want for final input. The procedure also includes steps to check the spread-sheet is working properly before you begin to use it.

You will also need to specify which of your disk drives is the "system" drive, since SuperCalc operates from that drive only.

Correct installation is important and problems will cause an "Overlay Error" when the program is run. If this happens, you must re-install the SuperCalc program. "Overlay Errors" can also arise if the version of CP/M being used is incompatible with the SuperCalc program (it may be an early or outmoded version), but this is rare.

Once you have installed SuperCalc successfully, you do not need to worry about this procedure again. At least until you change machines and have to customise the program to your new system.

SuperCalc provides you with a worksheet 63 columns wide (labelled A to BK), and 254 rows deep (labelled 1 to 254). The intersection of these columns and rows, given in column-row form (e.g. AI, BK254, Z29, etc.), identifies individual cells of the worksheet.

Each of these cells may contain text, numerical constants, or formulas. Formulas may refer to other cells, using their addresses as variables, and may also use the wide range of mathematical functions built into the SuperCalc program.

These functions include not only the standard ones like +, −, / (for division), and * (for

The Portable Business Computer

$3815.00
This includes double density!

OSBORNE 1™

Sirius Systems
2 Manukau Rd Epsom Auckland
Phone (09) 504-895 (3 lines)
Visit our showroom.

AUTHORISED NEW ZEALAND DISTRIBUTOR

CONTACT YOUR LOCAL DEALER NOW!

OSBORNE DEALERS

COMPUTER SYSTEMS (NORTHLAND) LTD: Commerce St, Whangarei. Ph (089)84-979. PO Box 1647. Mr Michael Timmins, Director.
COMPUTER WORLD LTD: Cnr Lorne & Victoria Sts, Auckland. Ph 31-394. PO Box 967. Ms Gail Righini, Manager.
FINANCIAL SYSTEMS LTD: 161-163 Jervois Rd, Herne Bay, Auckland. Ph 789-068 or 789-069 (Specialists in financial modelling). PO Box 46-068, Herne Bay. Mr Mike Snowden, Manager.
MACHINEHEAD COMPUTER CO: 9 Marmion St, Auckland. Ph 771-566. PO Box 47-053. Mr Warren Wilson, Director.
TECHNOLOGY RESOURCES LTD: 8 Thackeray St, Hamilton. Ph 393-601. PO Box 4063. Mr Wally McKenzie, Director.
WAIKATO COMPUTER CENTRE LTD: 6 Princes St, Hamilton. Ph 393-416. PO Box 1094. Mr Bob Dean, Director.
LAKELAND TV & STEREO: 43 Horomatangi St, Taupo. Ph 88-888. PO Box 892. Mr Harry Leusink, Director.
TIMMS' BUSINESS EQUIPMENT LTD: Tennyson St, Napier. Ph 54-250. PO Box 308. Mr Neville Bannister, Sales Exec.
COMPUSALES SOFTWARE & HARDWARE LTD: 75 Ghuznee St, Wellington. Ph 844-146. PO Box 11-819. Mr Chris Gray, Director.
EINSTEIN SCIENTIFIC LTD: 177 Willis St, Wellington. Ph 851-055. PO Box 27-138. Mr Raju Badiani, Manager.
PEANUT COMPUTERS: 5 Dundee Place, Chartwell, Wellington. Ph 791-172. Mr M.S. & B.A. Stevenson, Directors.
ROSS & STAIG TV SERVICES LTD: 58 Collingwood St, Nelson. Ph 80-397. Mr Malcom Howard.
SMALL BUSINESS SOFTWARE LTD: 2nd Floor, IBIS House. Ph 64-617. 183 Hereford Street, Christchurch. PO Box 1013. Mr Bruce Foulds, Managing Director
ECLIPSE RADIO & COMPUTERS LTD: 134-136 Stuart St, Dunedin. Ph 778-102. PO Box 5270. Mr Bruce McMillan, Manager.
LEADING EDGE COMPUTERS LTD: South Cith Mall, Dunedin. Ph 55-268. PO Box 2260.Mr George Orr, Mrs Elaine Orr, Directors.

multiplication), but also exponentiation, the basic trigonometric functions (SIN, ASIN, COS, ACOS, TAN and ATAN), and a range of other useful functions such as ABS (absolute value), LN (natural logarithm), SQRT (square-root), AVERAGE (arithmetic mean), and so on.

Also built in are the logical operators AND, OR, and NOT. These are very useful for any really serious approach to solving practical problems. As is the ability, provided by SuperCalc, to construct IF....THEN.... statements.

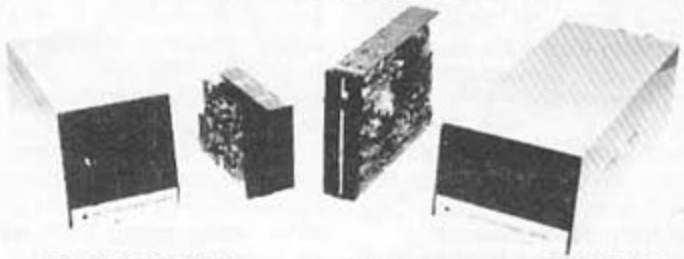
Because there are 16,002 cells to choose from, they cannot all be displayed at once on the VDU. Instead, the screen acts as a "window" onto the spread-sheet, showing a limited number of rows and columns at any one time. This window can be easily moved around the spread-sheet so that you can view any portion you wish. It is possible, as well, to split the sheet (horizontally or vertically) so that distant parts may be seen, and compared, together.

By locking rows and columns into place, and using them for labels and titles, it is possible to set up headings and explanatory notes that are permanent reminders of the use to which you have put a particular row, or column. For instance, the first row could be used to set up headings for years, months, areas, departments, or whatever else is relevant to your application. Similarly, the first column can be used for titles such as sales, expenses, salaries, commissions earned, and so forth.

At the bottom of the display are three lines that are not part of the worksheet itself. One of these provides your entry-point into the spread-sheet — where you can enter, and edit, data in the individual cells. The spread-sheet program will prompt you as you do this, giving, if needed, extra information on the various options available. The other lines are used by the system to give information which may be helpful; such as the address of the bottom right-hand cell of the current sheet, and how

SUPER DISK DRIVES

Tandon



5¼" FLOPPIES

TM100-1 SS 48 TPI 200K
TM100-2 DS 48 TPI 500K
TM100-3 SS 96 TPI 500K
TM100-4 DS 96 TPI 1000K

5¼" WINCHESTERS

TM 602-S 6.4 Meg
TM 603-S 9.6 Meg
TM 603-E 14.4 Meg

8" FLOPPIES
THIN LINE™

TM848-1 SS 48 TPI 800K
TM848-2 DS 48 TPI 1600K

Give us a call?

WINCHESTER CONTROLLERS

for: Apple II
Q Bus
Multibus
S-100
IBM PC

ADVANCED CONTROL LTD.

Electronic Business Equiment
16 St. Marks Rd, Newmarket
P.O. Box 37-180, Auckland 1.

Sales Service
Phone: 504-690
504-691

Radio Shack®

NEW ZEALAND'S MAJOR SUPPLIER
OR TRS-80 COMPUTERS AND SOFTWARE
IS

Porterfield Computers Ltd.

103 Dominion Road, Auckland 3. Telephone 686-084

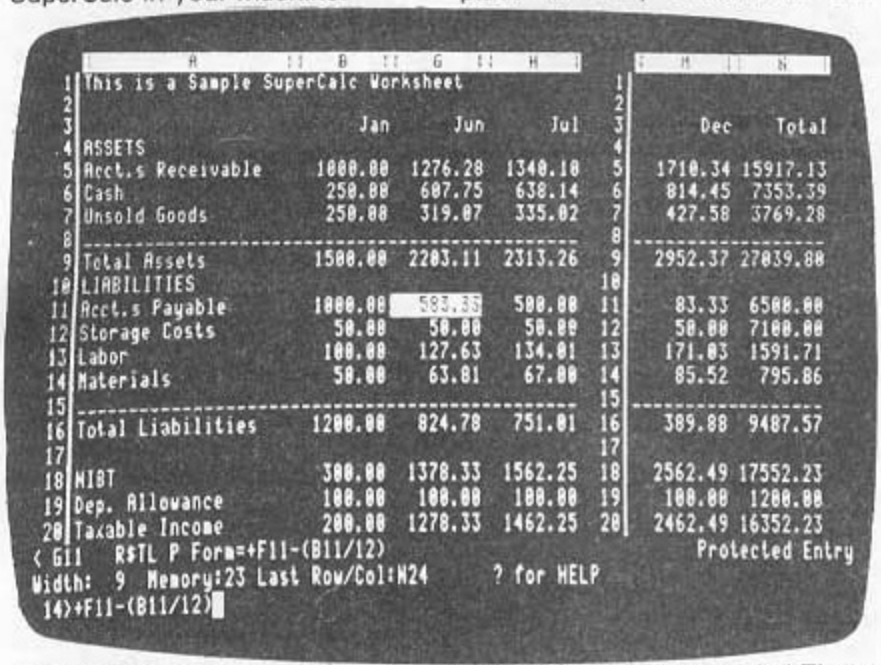
VISICALC
SUPER-SCRIPSIT
PROFILE III &
TIME MANAGER

much memory you have left.

The manual that comes with SuperCalc is particularly good for less experienced users.

It provides a clear and easily understood introduction to SuperCalc, without assuming more than a passing knowledge of either computing or CP/M, and begins at the beginning — by explaining exactly how to install SuperCalc in your machine.

The more detailed reference section of the manual could be improved with a little reorganisation, and a lot more detail. It left me with the feeling that a litle experimenting with the various commands would be necessary to extract their full potential. (That may be a result of the structure of the section, which makes you look in more than one place to fully understand the extent of some commands.) There is an index but is not anywhere near as extensive as it should be in a manual like this.



A typical SuperCalc worksheet.

Next come nine lessons to familiarise you with the facilities offered by the program. Each of these lessons is an easy and thorough tutorial on a particular aspect of the system. Although they all build on previous lessons, they are independent enough to allow experienced users to go directly to those areas they find difficult. Having completed these lessons you will have a very good understanding of the workings of SuperCalc, and should be able to use it successfully.

Additional help is given in the form of three examples (two commercial, one engineering) which follow the lessons. These are good, though much simplified, examples to follow if you're in need of that last little bit of assistance.

Unfortunately, the skill shown in preparing the tutorial section of the manual hasn't flowed through into other areas.

In general, SuperCalc is typical of the electronic spread-sheet programs available for microcomputers. For those users with the background, and inclination, to use if effectively, it is a powerful and effective tool for exploring possibilities, and comparing alternatives, in everyday decision-making activity.

SuperCalc does, however, have two facilities which I think are very useful, and which are not always found.

One is the ability to protect data from being accidentally overwritten or deleted. This is through the "Protect" command which labels specified cells as containing formulas or constants (text or numbers) that cannot be changed until "Unprotected".

Turn to page 26

MAIL ORDER SOFTWARE

Best range available in N.Z. for home computers

ZX81

ZX Pilot
ZX Man
ZX Trek
ZX Penetrator
ZX Casino
ZX Word etc etc
Mystery House Adv.

VIC 20

Frogger
Defender
Chopper Raid
Space Maze
Shark Attack
Traxx etc etc

CBM 64

Business programs
New games
all just arrived

Send for our catalog

ALL DISPLAYED & DEMONSTATED

Mail Orders Welcome

BANKCARD · VISA · CASH PRICES

K'RD VIDEO & COMPUTER Co

65 PITT St., AUCKLAND
Ph. 399-655

Specially for solicitors

By SHAYNE DOYLE

A solicitor's package providing comprehensive trust accounting, mortgage accounting, and time recording facilities for the Apple III computer has been developed by Micro Programming Ltd.

The Lower Hutt firm, Murphy Morahan & Manning (Mike Manning is a partner in Micro Programming) is using the system which provides an economical and reliable accounting system for law firms of varying sizes.

Designed to conform to conventional solicitors' accounting procedures as far as practical, it can be operated by legal office staff who may have only a very basic knowledge of solicitors' accounting practices.

The system uses the Apple III PROFILE hard disk unit, operating most efficiently on a volume of up to 2500 transactions a month, and with a maximum number of 3000 clients ("transactions per month" is the average total of receipts, journal and cheque entries).

The system does, however, have data storage capacity to manage a greater volume of work. The programs can produce "online", printed reports on all transactions for the previous 15 months (for trust account and time billing) and for the previous four years in the case of mortgage accounting.

Printouts of all account histories can be obtained at far more regular intervals to provide "hard copy" of the trust and other records. This also satisfies audit requirements. In addition, the data held on the PROFILE hard disks is periodically backed up onto floppy disks for media security reasons.

The trust accounting program has been designed in a form familiar to most law firms. Each client has a unique trust code and instead of having trust ledger cards, a client's trust account history is recorded on ordinary computer paper.

There is, of course, no reason why a client cannot have more than one trust account and consequently, more than one code. Once a client is allocated a code, neither the code nor the client's name can be altered. The account can be closed however, and removed from the computer, providing certain conditions are satisfied.

The program uses the "advance by firm" method of trust accounting, whereby a client's trust account may never have a debit balance. For example, a $50 disbursement is paid from the trust account even though the client may have a nil balance, and the client's balance is recorded as "Advance by firm — $50". At the same time a special firm account within the trust account (called the "advances account"), which is always maintained in credit, is debited with the $50 amount.

The result is that the total of all credit balances in the trust account remains the same. The client's account (although showing an advance by the firm of $50) can continue to be treated as a nil balance because the firm's account within the trust account was debited by that amount. At the same time, the exact amount owing by the client to the firm is shown by the total advanced.

This system has numerous advantages. It allows the firm to keep track of all disbursements paid on behalf of clients and can also mean the firm's debtors ledger is contained within the trust accounts. Fees can be debited against the client's account in the same manner, whether there are sufficient funds or not.

The system is menu driven, the major menu handling client record creation and maintenance, ordinary transactions input, ordinary transactions reports, ordinary account histories, and savings accounts transaction entry/history reports. Each of these options has its own detailed sub-menu catering for all possible requirements.

Space does not permit detailed description of the entire system, and I have concentrated on the trust accounting program, as this area is one of the more demanding sides of solicitor's accounting from an audit point of view.

Detailed and well presented documentation is part of the system, and any solicitor wanting further information should contact: Datalink Ltd, Welllington, which is marketing the software on behalf of Micro Programming.

For further information on the Solicitors Accounting Program contact:

DATA LINK LTD

220 WILLIS STREET, WELLINGTON.
TELEPHONE: (04) 724-634.

apple computer
Authorized Dealer

When everyone else is predicting gloom, here's how you can brighten your future!

Digital USA have at last released a revolutionary micro chip technology PDP-11 Computer. But that's only half the story. The best news is that this is a full capacity micro which small professional firms can afford! Capable of time sharing with either other practices or your clients.

We have 10 years experience in developing high quality, field proven software products and currently have close to 50 installations utilising our programs. As everyone who knows the computer business will agree, it's the software that counts. Full in house staff training and continuing software support is available to all clients.

Business Computers Ltd can show you how you can cater for future growth, efficiently and economically. You may think you will only need one screen. Experience has shown us that our Chartered Accountants, Consulting Engineers and Law Firms grow to multi terminal systems. This is our real strength.

Think of the future with confidence.

Remember it's the software that counts

Contact: Paul Grainger or Stuart Columbus

BUSINESS COMPUTERS LIMITED

Cnr Colombo Street and Bealey Avenue, P.O. Box 13309, Christchurch. Telephone (03) 791-427.

To Business Computers Ltd
P.O. Box 13309, Christchurch

Please send me information on the new Digital PDP-11 Micro Computers and "Professionals" Software Programs.

Name _____

Address _____

_____

A Short Circuit II

Microcomputing in Britain

By Pip Forer

This second look at the overseas microcomputer scene will try to review more closely the impact that microcomputers are having in British homes, business, and education.

This is not such a simple task for the home as it seems at first sight. While I was visiting the Council for Educational Technology in London someone remarked to me that there were almost a million microcomputers in people's homes and no-one had the faintest idea what people were doing with them. The sales figures suggest that they are playing games, indulging in hobby programming, and having the odd non-programming educational experience on them (the word "odd" was carefully chosen). No-one really knows. We can make some better guesses about business and education than about the home.

Business machines

The main trend in business work is for both small and large companies to go for 16-bit microcomputers, while the educational market is still solidly associated with 8-bit machines. The streets seem awash with 16-bit clones mimicking the original Sirius and IBM model of disk plinth, monitor on plinth, and detachable keyboard. Departures from this standard model, such as the Burroughs and Wang PCs, get off on a good foot just by relieving the boredom. Hard disks are becoming available, but for some reason disk drives in Britain are inordinately expensive. Some small businesses are also holding back, thinking of the benefits of waiting for removable-cartridge hard-disk drives, which have yet to be available in Britain.

Manufacturers come to this market place by many routes: from office equipment (Olivetti and Victor), from mainframes (IBM and DEC), and from the ground up (the British-made Torch Future, for example). To the first-time user there is little to distinguish the slower 8088-based machines from 8086 and 68000 ones with their greater potential (apart from the price). The inevitable exception is the Apple Lisa, which stands apart also on its breathtaking operating system. Its practicality has yet to be proved, but as an eye-catcher and creator of a product image it is remarkable.

The one clarity in the mind of new users (disputable but seldom disputed) is that 16-bit is best. Small businesses are buying computers in a large way. Larger businesses are also moving, but are in some cases delaying until a better communications system appears, particularly a good and cheap local area network (LAN). The competition is intense and to date British manufacturers have suffered by producing few machines in this area, and in truth few popular 8-bit business machines either. The dominant machine in business seems to be the ACT Sirius. Designed by the PET designer, Chuck Peddle (and marketed in the United States as the Victor 9000), this machine was one of the first of the 16-bit machines to be released and featured very high screen resolution and very high floppy disk capacity (600K per drive). In the year or so between its European release and the arrival of its American rivals (IBM, DEC, and Wang) the Sirius enjoyed very little real competition and attracted large sales. Many software developers looking for a widely used 16-bit machine were attracted to the Sirius early on. The result now is that in Europe it enjoys the competitive advantage of broad-based software and hardware support. The graphics kernel currently on beta release is an example of this. Few machines in its price range offer the chance to access eight entire graphics screens and 10 character sets at once from any language. The Sirius could be seen as an example of a particular type of microcomputer. Apart from the graphics kernel it enjoys in-built voice synthesiser and programmable keyboard. It has a design philosophy that maximises the capability for expansion and communication. It has many things currently unused.

Sirius — "dominant machine in business"

It is not alone in this. Several other machines on the market have similar untapped potentials. Present software barely touches the capabilities of these machines, and they will survive in the market-place. They can grow. Many of the offerings rushed to market-place in Britain are not so well prepared for the future. We may argue that the frills are not needed for today's applications and software. The truth is that today's frills are tomorrow's necessities for further sales. Only designers with prescience will build machines that survive.

A second machine that has scope and is arguably the best British challenger in the business microcomputer stakes is the Torch. Starting (inevitably in Cambridge) from scratch, Torch computers have rapidly made impacts on sales and, with a remarkably short production record, made it to the Civil Service approved suppliers list. The Torch emerged at first as an 8-bit, Z-80 based machine with colour graphics. In fact, its internal workings make it very much a kind of BBC business computer. Although it uses a Z-80 for CP/M compatibility it also houses a 6502 that acts just like a BBC machine handling input and output functions. The Torch made a slow start, largely because it

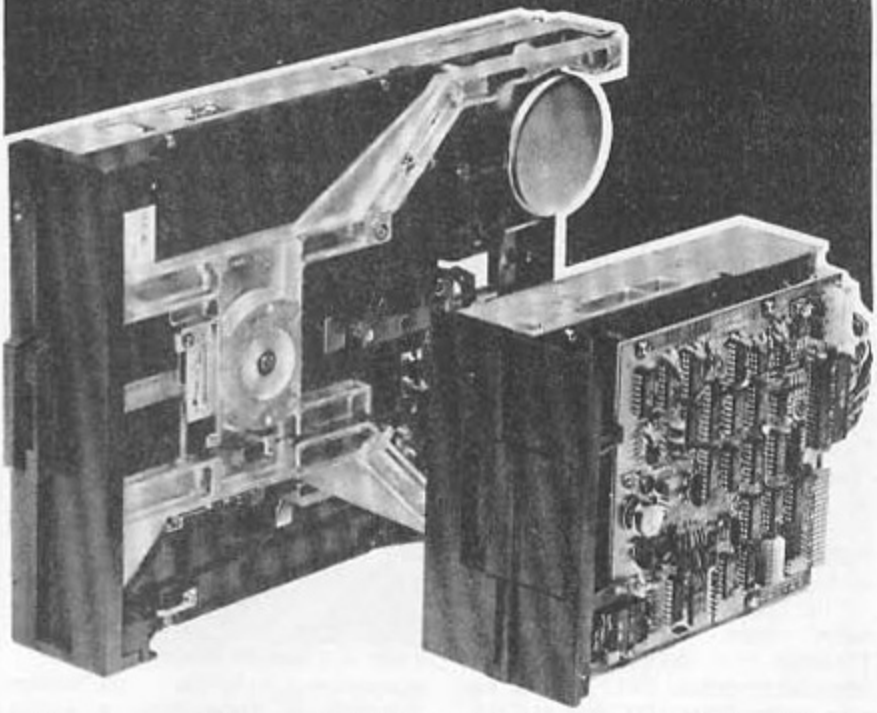
was 8-bit, apparently costly, and was portrayed in its publicity as externally rather dominating for the desk-top. However, with a re-design and the availability of a 16-bit 68000 processor upgrade, the Torch radically altered its appeal. This is particularly true for the businessman with heavy telecommunications needs, since the cost represents a very 'bundled' product, including for instance twin disks, colour monitor, and communications modem. Communications is its strong point. Software includes auto-dial menus for the executive, electronic mail, networking through Torchnet (an enhanced Econet) and various built-in ports. The Torch is also capable of handling a large private Prestel system through Torchnet and some relatively cheap software. The Torch represents another approach to producing a successful business computer: optimise communications. Many multi-branch firms welcome this, and the consequent flexibility it gives as to where and when different tasks get done.

With the belated arrival of some American machines, particularly the well rated Wang, DEC, and Corvus P.C.s, the competition in Britain gets stronger. It will certainly be an interesting market to watch. The other noticeable impact, which mirrors international trends, is the emergence of the portable computer for the executive and salesperson. Filling a slightly different set of needs the portable business computer is selling very quickly and again is reorganising how work is getting done.

Education:

For me, this was the area of greatest fascination. The change in attitudes to computers in education over just two years since 1981 was considerable. Interest in employing the technology as widely as possible had spread from a small, sometimes over-zealous clique to a far wider base of educational administrators and teachers. New ideas on how to use the computer in the classroom rubbed shoulders with more radical initiatives in education, such as greater use of distance learning. The use of a

YE-Data
Double Density
Floppy Disc Drive
for higher capacity,
higher reliability.



YE Data manufacture only double sided double density floppy disk drives to an unequalled standard of reliability and performance. They feature low power consumption and fast seek step speeds.

YD 180 Slimline 8" 1.6M Byte.
YD 280 5.25" 160 track 1.0M Byte.
YD 480 Slimline 5.25" 1.0M Byte. (New)
YD 580 Slimline 5.25" 500K Byte. (New)

Available from:
● Leading dealers throughout New Zealand.
● N.Z. Distributors

CONTROL
MICROCOMPUTERS

55 Upper Queen Street, Newton, Auckland.
P.O. Box 68474, Auckland, New Zealand.
Telephones (09) 773-389, (09) 793-619

TWA 2139

variety of new educational technologies, including Prestel and teletext, to open more flexible learning paths for students (termed open learning) was also widely discussed. Primary schools had recently jumped in to the arena (and that amounts to some 10,000 schools in Britain) and applications for the handicapped were also energetically being pursued. Inevitably much of the work in the classroom was tentative, but the momentum in the movement to wider computer application had gathered considerbly.

There is, however, still much confusion in Britain in actual computer developments, mainly because the hardware base is so diverse. The map shows how confused this was before 1982. The drift is now to standardising on British machines (from Acorn and Research Machines).

In some ways, New Zealand has advantages over Britain in hardware provision... fewer machine types, widely available Pascal and Logo, and until recently almost as many machines per high school. The difference has been the co-ordinated institutional support for software and teaching.

The spur for this in Britain has been from several sources. Through programs on microelectronics (MEP), information technology (IT) and subsidy of school computer purchase a ground swell of support for microcomputers has emerged. While much of the motivation for this support has been commercial (the favoured hardware is all British) the spin-offs to education have been considerable. It has allowed, for instance, the concentrations of finance and expertise necessary to produce useful, sound and higher quality software (although to be accurate experience has shown this to be a necessary but not sufficient condition for good software production).

Three conferences

Perhaps the best way I can encapsulate the shifts in British educational computing is to relate specific impressions of three conferences I attended and which were the main reason for my trip. The first conference was one of geographers. It may come as a surprise to old-timers who recall Capes and Bays geography, but geographers are very active in educational computing. In the United Kingdom they are one of the priority subjects for software development under the MEP. This first conference showed that their interest is internationally strong.

With reports from North and Latin America and Europe it also became clear that New Zealand, in general educational computing terms, may be disadvantaged compared with some countries, but that our teachers' and parents' initiatives have us well ahead of others (surprisingly, including the Netherlands and Sweden). A chance to see a range of international software in a little more depth also confirmed one

Poly — "pat on the back"

suspicion. While software quantity is improving, a stolid worthiness still typifies much new development. The best designers are still working on the 27th generation of "Space Invaders". Good educational programmers are one of the world's areas of current skill shortage.

A pat on the back, too, for Poly. Slides of some of the sequences from New Zealand geography programs developed by the University of Canterbury on a Poly drew strong positive reaction from the audience. The five overlaying screen concept of the Poly was both a new idea and highly rated by symposium attenders.

The second conference was in Bristol and was an international, multi-discipline conference on Computer Assisted Learning. Here the real change in British educational computing came home. Two years before, this conference could have been described as mainframe university in terms of machinery and attendees. In 1983 mainframes were as common as takahes on Lambton Quay and the loudest component of attendees were primary school teachers, although the research presented was still largely university based. Perhaps in some ways symptomatic of the whole area of educational computing the exhibits at this meeting, software and hardware, far outshone the papers.

The language, LOGO, gaining in popularity in New Zealand, was to the fore. Several controllable turtle robots linked in to the BBC computer were on sale. The current price restricted them to rich, compulsive doodlers who seek to decorate their alabaster marble floor, or to larger schools, but they attracted a lot of interest. So, too, did the computer-controlled use of videotape and video disk. Progress has been slow here, and developments to date disappointing in quality. The Open University is trying new units this year, however.

The Acorn stand featured a video-disk player... but with only a film of Indian railways with which to display its control capabilities. More useful was a sequence on the Tacoma Narrows Bridge collapse that ran just on its own disk player using cues and the standard remote control unit.

Of interest, too, was the amount of initial material aimed at helping teachers get into the classroom with a computer and intact confidence. More general material, with noticeably greater publisher involement, was less convincing in its depth.

At this conference I narrowly missed Seymour Papert, the high guru of LOGO: the first of two times. I was destined to repeat the exercise the next day in Exeter at the third conference. Here, I ran into the high end of the market in terms of where developments were leading. I ran into the New Apple LOGO and structured BASIC and into PROLOG, claimed to be the foundation language for the Japanese fifth-generation computers. This provided to be the highlight of the Short Circuit, which will conclude next month.

A trip into the future

Tomorrow's fact will be more exciting than today's fantasy, if the Automation 83 production-technology seminar at Massey University is any guide.

Experts in high technology from Australia and New Zealand took those at the seminar from May 23 to 25 on a trip into tomorrow.

Professor Guenther Arndt, of the Univesity of Auckland, and Dr Ken Whybrew, of the University of Canterbury Engineering School, described what is happening in flexible automation overseas.

Details of the various parts of the new manufacturing technology were filled in by such experts as Dr Alex Holzer, of Australian CSIRO (robotics), Mr Peter Warnes of the DSIR (CNC machines), Mr John Brown of Perkin-Elmer (computer-aided design), and Mr Lindsey Wallace, of Laser Lab, and Mr Tony Frith, of Radiation Research, on laser technology.

Micros featured in most sections of the technology — running CNC machines, programming robots, controlling laser cutters. However, in computer-aided design, mini-power is still needed for many applications.

A trade show was so successful that delegates, and later, the public, queued to see the exhibits. Of special interest to micro users was the Mitsubishi Move master micro-robot which links to a microcomputer. It sells in New Zealand for just under $2500.

A potential new hobby for micro lovers surfaced with a micro CNC lathe. Priced at about $6000, this is aimed for the educational market. It should find a ready market in polytechnics, but may well appeal to the person with a love of model engineering as well as computer technology.

Those at the seminar included delegates from the Engineers' Union, who did not take the chance to express their opinions, as end-of-lecture questions often moved to the field of how society will adapt to the new technology, which in many ways may have as big a social impact as the Industrial Revolution did. For example, one thing emerged as obvious: the old assumption that underlies much of economic theory — returns of scale, is being negated by flexible automation. This will allow three items of a good to be made virtually as cheaply as 10,000 in a large number of cases.

But more disturbing than any of the views or forecasts was the ignoring of this important gathering by politicians of all the main parties. They stayed away in droves.

Neill Birss

The mini-CNC lathe on display at Massey.

Project Computers

IBM Authorised Dealers now demonstrating the

IBM PERSONAL COMPUTER

- Local Area Networking with Etherlink
- SDLC and Bysynchronus Communications
- PCXT with 10 megabyte hard Disc
- D-Base 11
- Lotus 1-2-3
- Wordstar
- Projecta (Critical path analysis)

Visit our Showroom, 1st floor
20 Brandon Street, Wellington
***Mail inquiries to* Box 9382, Wellington**
or
Phone: 731-152

Equal status for computer studies

By R.H. BUTLER

Waiopehu College, Levin, is offering computer studies as a fifth form option, equivalent to other fifth form options, this year.

In 1980, during a family trip to the UK, I visited several schools in various areas where computer studies was being taught as a full subject from the equivalent of third form level through to seventh form level.

This has now been the case for almost 10 years, and in recognition of the subject's national importance, the UK government several years ago, provided a micro-computer for every school.

On my return, Waiopehu College decided to offer computer studies as a third form option in 1981, with a view to developing the course through to a fifth form subject this year.

A syllabus was written, largely by combining the desirable features of syllabi collected in the UK. The course, involving about 40% programming, is centred on two disk-based TRS-80s and eight networked System-80s.

The syllabus covers: the history of computing; uses of computers; social implications; computer systems; problem solving techniques; programming; computer operation; information and its handling.

The motivation for introduction of the course stemmed from the belief that, as felt by P. Park, of Dunedin (Bits and Bytes, February), its time had well and truly come. We could wait for an official syllabus, and wait . . . and wait . . . and wait . . .

Public support has been overwhelming. In its first year, the option was chosen by two classes of third formers who this year, have become one fifth form class. In its third year of computer studies, the school has three third form classes (two hours a week), two fourth form classes (three hours a week) and one fifth form class (five hours a week). Three teachers are now involved with the course which has been modified and improved with experience.

Some of course, disagree with the content. For example, there is no use of flow charting as a method of program development. Rather, structured programming is introduced formally at fourth form level and considerable stress is placed on the importance of good program design.

Secondly, BASIC is the main language but fifth formers will have a close look at both machine language and PASCAL, along with brief examination of one or two of the other major languages.

The "History of Computing" is out of favour in some quarters, but at Waiopehu, it is felt it deserves a place in the course. The same applies to an elementary understanding of logic gates, and binary and hexadecimal arithmetic. Considerable time is spent examining trends and future implications and developments.

At the completion of the fifth form year, pupils will receive a Waiopehu College computer studies certificate — as happens in social studies which has been a successful internally assessed, fifth form subject at the school for the last eight years. Computer studies will have the same status in the school as all other fifth form options.

In common with many other schools, we also offer a 12-hour computer awareness unit as part of the fourth form social studies curriculum.

Further information on the course can be obtained from: Mr R.H. Butler, Waiopehu College, P.O. Box 370, Levin.

News from primary schools

Where are all the computer users in primary schools? Computers seem to be concentrated in the secondary schools, although the APPLE people are bidding for attention of primary teachers.

But something has been happening at Kaiapoi North School. Nobody has actually bought a computer for the school but Brian Sullivan, a teacher who has bought a System 80 of his own, describes some of the things he has been doing.

About 18 months ago, along with my two sons, I bought a System 80 which I have used fairly regularly in the classroom. I have found a computer is certainly a popular addition to the classroom — to the extent that at 4pm I have usually had to throw the pupils out.

I have used the computer to demonstrate and give some hands-on instruction. What is a little different perhaps is that as well as using the computer with Form 1 and 2, I have also used it with Standard 3 classes and with infants (I am teaching five and six year olds).

Some of the software we have used has been Scurve Invaders and Hangman from Dick Smith; Super Hangman and Billy Goats Gruff from Micro-80; Maths 1 from Radio Shack; and Arithmetic and Numbers from T. Rugg & P. Feldman.

Some of these programs have been keyed in and others bought. The Maths 1 programme was bought from Radio Shack when I was in the States last year, along with a book on Level 2 basic

EPSON
COMPUTERS
PRINTERS
PROGRAMS
NZ FINE CHAINS LTD, 231 KHYBER PASS RD, AUCKLAND 2. Ph 774-268

programes by Tom Rugg and Phil Feldman.

I needed another program which would help in teaching the alphabet. With all my travels and searching, I have not found anything suitable so my son and I wrote our own; I wrote the specification and Craig wrote the code.

The alphabet program (right) has been consumer tested in the classroom and I believe it contains everything a good educational program should have.

For those using System 80 hardware it is possible, by adapting the "set" positions, to use the video cut and make a version with larger figures. I use both versions — the large figure version for whole class use, the standard 64 character for individuals.

```
1 '              * * * * * * * * * * * * * * * * * *
2 '              * WRITTEN BY : CRAIG SULLIVAN      *
3 '              *      WHITEFIELD STREET           *
4 '              *           KAIAPOI                *
5 '              *         NEW ZEALAND              *
6 '              * * * * * * * * * * * * * * * * * *
7 '

10 CLEAR50
20 CLS:PRINT@10,"* * *  MENU   * * *"
30 PRINT@320,"1.   WHAT COMES  AFTER ??, WITH ALPHABET"
40 PRINT@384,"2.   WHAT COMES  AFTER ??, WITHOUT ALPHABET"
50 PRINT@448,"3.   WHAT COMES BEFORE ??, WITH ALPHABET"
60 PRINT@512,"4.   WHAT COMES BEFORE ??, WITHOUT ALPHABET"
70 PRINT@576,"5.   << INSTRUCTIONS >>"
80 PRINT@708,"PLEASE PRESS NUMBER OF CHOICE"
90 A$=INKEY$:IFA$<"1"ORA$>"5"THEN90ELSE100
100 IFA$="5"THEN470
110 IFA$="3"ORA$="4"THEN130ELSE120
120 CLS:B=RND(25):B=B+1:D$=CHR$(B+64):Z$=CHR$(B+63):GOTO140
130 CLS:B=RND(25):B=B+1:D$=CHR$(B+63):Z$=CHR$(B+64)
140 CLS
150 K=1
160 PRINT@208,"A L P H A B E T        S Q U A R E S"
170 FORE=40TO60
180 SET(E,34):SET(E,40)
190 NEXTE
200 FORF=34TO40
210 SET(40,F):SET(60,F):SET(50,F)
220 NEXTF
230 IFA$="1"ORA$="3"THENPRINT@458,"A B C D E F G H I J K L M N O P Q R S T U V W
 X Y Z";
240 IFA$="1"ORA$="2"THENPRINT@655,"WHAT COMES AFTER ...";ELSE PRINT@655,"WHAT CO
MES BEFORE ...";
250 PRINT@795,"?";
260 FORJ=1TO10
270 NEXTJ
280 PRINT@790,Z$;:PRINT@919," ";
290 INPUTC$
300 PRINT@930,"    ";
310 IFC$="2"THEN20ELSE320
320 IFC$=D$THENGOTO330ELSE390
330 CLS
340 SET(30+K,25+K):K=K+1:IFK=12THENGOTO350ELSE340
350 SET(30+K,48-K):K=K+1:IFK=42THENGOTO360ELSE350
360 FORJ=1TO400
370 NEXTJ
380 GOTO100
390 CLS
400 SET(36+L,12+L):L=L+1:IFL=30THEN410ELSE400
410 L=1
420 SET(66-L,12+L):L=L+1:IFL=30THEN430ELSE420
430 FORJ=1TO400
440 NEXTJ
450 L=1
460 GOTO140
470 CLS:PRINT@10,"I N S T R U C T I O N S"
480 PRINT@82,"------------------------"
490 PRINT@256,"     ALPHABET SQUARES IS A GAME BASED ON THE ALPHABET.":PRINT:PRI
NT"       CHOOSE FROM THE MENU THE GAME LEVEL YOU WANT."
500 PRINT@512,"IF YOU WOULD LIKE TO GO BACK TO THE MENU DURING A GAME OR TO
    STOP THE GAME THEN PRESS << 2 >> THEN << NEW LINE >>."
510 PRINT@710,"D O N ' T       FORGET!! - AFTER CHOOSING A LETTER
       ALWAYS PRESS << NEW LINE >>"
520 PRINT@904,"TO GO TO THE MENU NOW - PRESS << SPACE BAR >>."
530 E$=INKEY$:IFE$=" "THEN20ELSE530
```


Computer Camps
for school children
August 21st-28th
Telephone 606-079
P.O. Box 68083 Auckland
Computer Camps Ltd.

PCB Draughting.
URGENT WORK ACCEPTED
Prototype Constructed.
POLYPROCESSOR PRODUCTS
771-820 Auckland.

FOR SALE

APPLE II with single disk drive, green monitor screen, includes Pascal and Logo software. Only 9 mths old, has had a small amount of personal use $3000 ono.

Contact Father Van der Kaa, C/- Viard College, PORIRUA. Phone 377-557.

e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc²

COMPUTERS FOR ALL *FROM* **EINSTEIN COMPUTERS**

*ZX81 *Spectrum 16K *Spectrum 48K *Commodore VIC20 5K
*Commodore 64K *BBC Micro *Osborne *Hewlett Packard
*Epson HX20 *TRS80 Colour Computer

We look forward to your visit. Write for Mail Orders.

EINSTEIN SCIENTIFIC LTD

Wellington Branch
177 Willis Street, P.O. Box 27-138
WELLINGTON. Tel: 851-055

Auckland Branch
369 Khyber Pass Road, P.O. Box 8602
AUCKLAND. Tel: 794-045

e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc² e=mc²

How to buy a computer by the numbers

Introducing the Cromemco C-10 Personal Computer. Under $4860, including software, and you get more professional features and performance for the price than with any other personal computer on the market. We've got the numbers to prove it.

The C-10 starts with a high-resolution 12" CRT that displays 25 lines with a full 80 characters on each line. Inside is a high-speed Z-80A microprocessor and 64K bytes of on-board memory. Then there's a keyboard and a 5" disk drive with an exceptionally large 390K capacity. That's the C-10, and you won't find another ready-to-use personal computer that offers you more.

But hardware can't work alone. That's why every C-10 includes software — word processing, financial spread sheet, investment planning and BASIC. Hard-working CP/M based software that meets your everyday needs. Software that could cost over $2000 somewhere else. FREE with the C-10. There's really nothing else to buy.

But the C-10's numbers tell only part of the story. What they don't say is that Cromemco is already known for some of the most reliable business and scientific computers in the industry. And now for the first time, this technology is available in a personal computer.

DEALER ENQUIRIES INVITED

Cromemco
Tomorrow's computers today

Z-80A
64K RAM
390K DISC DRIVE
12"CRT
COMPLETE SOFTWARE
$4855
includes sales tax

CROMEMCO

McLEAN
INFORMATION TECHNOLOGY

Auckland. 459 Khyber Pass Road, Newmarket, P.O. Box 9464, Newmarket, Auckland 1, Tel: 501-801, 501-219, 587-037.

Wellington. 5th floor, Westbrookhouse, 131 Upper Willis Street, P.O. Box 496, Tel: 844-425.

FULL IMS Ascent
Accounting Software packages
NOW AVAILABLE

BUSINESS

From page 17

The other is the provision of a "Help!" command. If you ever run into difficulty when working on the spread-sheet, just press the "?" key and the system will bring you, on the screen, additional information on the choices available to you at the time. You can do this at any point, even in the middle of entering a complex formula or command. Pressing any key will bring back the worksheet display.

Software Summary

Program: SuperCalc.
Made By: Sorcim Corporation Inc., USA.
Hardware Required: Any machine that runs under CP/M. Disks must be able to be formatted to leave 132K free to take the SuperCalc package. Printer is optional but worthwhile.
Uses: Financial forecasting, budgeting, preparing tables & reports, modelling, etc.
Options: None.
Price: $399.
Documentation: Good overall. Instructional sections excellent. Reference sections only OK. Well presented and readable (also understandable).
Ease of Use: Very good for those who like setting up this sort of thing.
Facilities & Functions: Excellent range of functions and operations available.
Value for Money: Excellent.
Other Versions: There is a separate version of the standard SuperCalc for IBM PC users, which has minor, housekeeping, differences to the version reviewed here.

SuperCalc-2 for 16-bit machines with MSDOS, CP/M-86 will be available soon at a cost of around $480.

Review copy provided by New Zealand agents MicroAge Ltd P.O. Box 13-054, Christchurch.

LIFTOUT

The BITS & BYTES Computer Book Club

ZX81 Users! Take a look at these

The Sinclair ZX81 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 idea in many different ways afterwards. Large, "off the peg" programs, but you can also use these as working examples to illustrate the programming ideas at the beginning of the book. Financial, banking and educational programs, and a lot more.

Macmillan Our price $27.50 **You 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 **You save $1.45 and earn 2 bonus points**

Software tapes available

Advanced Programming for the 16K ZX81
Mike Costello

Written for those who have had time to get used to their ZX81 and are now looking for more information in order to exploit it to the full. Investigation of the ZX81's operating system, discussion of BASIC subroutines and techniques used in a wide range of programs, including business applications and games. Also the use of assembly language programming techniques and mixing BASIC with machine code.

Macmillan Our price $25.15 **You save $1.25 and earn 2 bonus points**

Special offer!

Buy all three for $74.95 — and earn 6 bonus

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.
Our current price now $15.15 **You save 80c on current normal retail price and earn a bonus point**
Sybex

How it works

Once you've bought a book, you're in the club. So just pick out the books you want, fill in the coupon and post it in.

We are offering savings on the cash you pay for each book PLUS we give credit bonus points on each purchase. These are stored to your credit.

Books for the buff

TRS80 For Kids from 8 to 80 Vol 1
Michael Zabinski
Enjoyable, easy to follow, and very effective. Suitable for beginning TRS80 programmers of any age, especially youngsters. No special background is needed. Same principles used at the American National Computer Camp help you quickly begin writing computer programs and encourage you to try many examples. For System 80, too, of course.

Sams — Our price $19.85 **You save $1.00 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/System 80 and other generalised CP/M based systems as examples. This edition has a new chapter on the Microsoft BASIC compiler.

Our current price now $33.70 **You save $1.80 on the new current retail price and earn two bonus points**

dilithium Press
(Note June special offer on the Knecht book has now expired)

Atari Games and Recreations
By 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 **You save $1.45 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 fine points of the language and how to write your own programs. This is what "Interface Age" said: "This excellent book . . . teaches BASIC without talking down to the reader." The exercises run on the Atari 400, Atari 800, and the new 1200XL.

Sybex — Our price $21.80. **You save $1.14 and earn two bonus points**

Some Common BASIC Programs: Atari Edition
Lon Poole et al
Seventy-six short programs to key into your Atari 400 or 800, giving you a powerful collection of financial, statistical, and maths programs. Each program is complete with source listing, documentation, and sample execution.

Osborne/McGraw-Hill — Our price $29.90 **You save $1.60 and earn three bonus points**

Software!

MICROBEE programs

MBCALC A low cost spreadsheet program allowing creation and manipulation of financial models. These may be saved and reloaded to tape, or printed out. Full documentation plus customising instructions.
$22.50

CHEQUE Bank account database — cassette data files, print summary by minor code within major code, update, maintain, sort, interrogate data.
$22.50

OTELLO A graphic version of the game Othello, using the MicroBee's PCG graphics. This implementation is for two players.

MBFOX A quick PCG graphics version of the old Fox and Hounds game.
$14.00

PCGDEF Defines PCG characters on a screen matrix — 3 characters wide. Three-function operating keys allow toggling a pixel, automatic toggling of pixels, automatic toggle to end of line. Cursor wraps around successive lines.
$7.00

PDGREE Enables the pedigree animal breeder to maintain a database of blood relationships within a particular breed. This database, held on cassette, may be interrogated or used to print out a 5 generation pedigree certificate. Originally written for dogs but may be used for any animal.
$14.00

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

PORT2 Pilot your landing capsule over the mountain and down into the landing pad. Adapted from the Earth Port 2 program.
$14.00

COLDTZ Adventure game — you have to break out of Colditz castle.
$14.00

FARMS Farm management simulation.
$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 HIRES or LORES. Once drawn, the picture may be saved to tape, incorporated into other programs, edited, etc. The picture is reduced to a set of co-ordinates which is passed to a simple plotting routine for subsequent reproduction.
$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 HIRES graphics and plotting commands to draw the 3 dimensional perspective views from within the maze. The timid maze traveller can resort to a location display and plan view to assist him.
$14.00

NOTE: Bonus points do NOT apply to software.

Applesoft BASIC A Teach-Yourself Introduction
Barrie M. Peake
A manual for New Zealanders. A one-book method of learning BASIC with the Apple, instead of picking information from two or three. "You get quite a wide view of the Apple system with one book instead of three or four," writer/reviewer Mike Wall in the March issue of "Bits & Bytes". Model answers. Inquiries regarding terms for class sets welcomed.

John McIndoe — Our price $9.45 **Save 50c and earn a bonus point**

Basic Programming on the BBC Neil and Pat Cry
You've seen the machine on television, and thi
is the book prepared to go with the programme
It's designed for the new BBC, and teaches ho
to write programs, draw and animate picture
and graphics in full colour, design sound effec
and program games. Detailed glossary.

Our price $19.25 **You save $1.**
and earn two bonus poin

Books for the beginner

Keyboarding for Information Processing Robert Hanson and Sue Rigby

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.

McGraw Hill — Our Price $8.95 **You save 57c and earn one bonus point**

Quick Keyboarding Vonnie Alexander

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

Methuen — Our price $6.50 **You save 45c and earn one bonus point**

This month's bonus points offer (July only)

You can use three accumulated bonus points to get $3.50 off the price of any order from us for books (the bonus points scheme does not apply to software). This offer is open only to those who have three bonus points to their credit, or will have with a purchase from the club this month.

Special

You save $3.50

Just write "use three bonus points" on the order form and deduct $3.50 from the order price.
This offer will NOT apply to orders received by the club after August 3, 1983.

We pay the post and packaging

PLEASE USE THIS COUPON FOR PURCHASES

BOOK TITLE	Author surname	Club price $	Bonus** Pts (+ or −)
1.	.....	.....	.....
2.	.....	.....	.....
3.	.....	.....	.....
4.	.....	.....	.....
	(total)		("+" for points earned "−" for points used)

GET THIS IN THE MAIL TODAY:
To buy, cut out this coupon and post it to:

Free-post 125
"Bits & Bytes"
Books
Box 827
Christchurch

(If you address it in this way no stamp is needed). Free postage only within New Zealand.
Pay with order: Cheque, money order, or fill in the Bankcard/Viscard boxes.

NAME: .....
ADDRESS: .....
.....
..... (zone) .....
Is this your first club purchase? YES/NO

I enclose payment for the above order:
☐ Viscard ☐ Bankcard
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

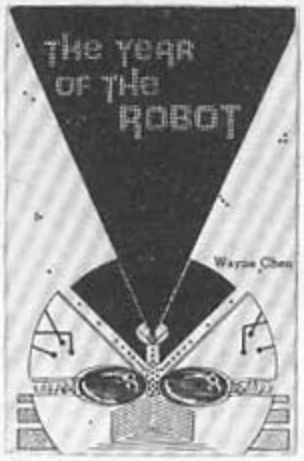
Cardholder signature .....
Date card expires .....
Cheque ☐ Cheque No .....
Postal order ☐ Postal note ☐

Please note any machines you are interested in of other special areas of interest .....
.....
.....

The world of robots

Robots on Your Doorstep
Winkless/Browning
Subtitled A Book about Thinking Machines, this is a stimulating introduction to robots and artificial intelligence. It is written by two American robotics pioneers, and they believe that there will be a big surge in amateur robotics, as there has been the rise of home computing.

Robotics Press Our price $15.15 **You save 80c and earn 1 bonus point**



The Year of the Robot
Wayne Chen
Educator/philosopher-engineer Wayne Chen, dean of the engineering college of the University of Florida brings all of his fields into play as he introduces the reader both to robotics and to human personality as analysed using the concepts of robotics. Has been described as a unique blend of philosophy, science, speculation and evangelism.

dilithium Press Our price $15.15 **You save 80c and earn 1 bonus point**

We can indent this title for you from America. The current price is about $36.

The Handbook of Advanced Robotics
Edward Safford, Jun.
A chunky (468pp), systematic introduction to robots, radio controlled robots, control programming, hands and arms, hobby robotics, eyes, speech and other sensory systems, numerically controlled machines. Also discusses linkage with microcomputers. Advocated for educational and hobby libraries by the "Bits and Bytes" Reviewer. Value for money.

Commodore 64 Programmer's Reference Guide
Packed with tips and special information for getting the most out of your Commodore 64. Includes dictionary of all Commodore BASIC commands, statements, and functions, followed by BASIC program examples, showing how each item works. Also tells you how to mix machine language with BASIC, use hi-res more effectively, and much more 486pp.

Sams Our price $39.70 **Save $3.00 and earn 3 bonus points**

VIC 20 Programmer's Reference Guide
A complete VIC 20 BASIC vocabulary, a section on machine-language programming, a programming-tips guide with suggestions on how to improve your programming skills, and a special section on VIC 20 input-output operations. An easy-to-use, detailed manual that helps you program your VIC 20 like a prof. By Commodore Computer. 289 pages.

Sams Our price $33.85 **You save $2.00 and earn 2 bonus points**

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

Sams Our price $33.75 **You save $2.00 and earn 2 bonus points**

From Chips to Systems: An Introduction to Microprocessors Rodnay Zaks
An excellent start to unravelling the mysteries of hardware. That's the opinion of the "Bits & Bytes" reviewer. The history of microprocessors, the microprocesor chip itself, its support components, and the design of an actual microcomputer system. Lavishly illustrated. Easy to understand. By one of the great names of microcomputing. "Good value," as the "Bits & Bytes" reviewer concluded.

Our current price now $37.95 **You save $2 on the new current retail price of $39.95 and earn 3 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**

Plus 1 bonus point

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

Macmillan Master Series Our price $9.45 **Save 50c**

Plus 1 bonus point

Price rises

We regret to advise that because of currency changes, the prices of several imported books have risen. The new prices are effective immediately. All prices listed by the club are current. The margin has been pared, and we regretfully must pass on all increased import prices. Because of our national economy these rises are likely to happen fairly frequently. Club members should not delay in buying the books of their choice. We must reserve the right to pass on increased import prices.

The dearer they get the more you save with us!

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.

Sybex Our price $19.90 **You save $1.05 and earn two bonus points**

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.

dilithium Press Our price $37.95 **You save $2 and earn 3 bonus points**

Mastering VisiCalc Douglas Hergert
Written both for newcomers to the spreedsheet program and for those who are already using it. Shows how to set up VisiCalc spreadsheets for finance, buisness and numerical applications; how to change the paramaters; how to create the formulas; how to use the DIF file function. A complete guide.

Sybex Our price $19.90. **You save $1.05 and earn two bonus points**

Microcomputer Design and Troubleshooting
Eugene M. Zumchak
Contains 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.

Howard Sams Our price $30.75 **You save $3.35 and earn three credit points**

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.
Our price $33.95 **You save $1.78 and earn three bonus points**

Orders

Please allow a few weeks for delivery. We apologise for the late delivery of some titles, due to stocks running out.

The boom that hasn't come . . . yet

by CHRIS McLEOD

An article by Dave McKinnon in the NZ Farmer looks at the computer situation on New Zealand farms. Headed "The big boom that never was", the article discusses some of the reasons why the on-farm computing boom (which people have been predicting for some time) has not happened. This article makes many valid comments. But I would like to take up a few points.

Dave McKinnon accepts the prediction of a computing boom without question I do not. There is little to justify such a prediction at present, and there has been little to justify it in the past.

Many of the boom predictions came from within the computer sales industry. What better way to prompt a reticent buyer than to assure him there is about to be a boom in sales (he might as well be in early!).

First, a little history. In the past, New Zealand's farmers have been quick to take up new technology as it becomes available. But only if there are good reasons for doing so.

When tractors first became available, New Zealand farmers changed from horse power to tractor power more rapidly than any other country in the world. The same situation occurred with the introduction of milking machines.

In these cases, there was a big advantage in changing because a great deal more work could be done by a man in the same amount of time. It was quite obvious to many farmers that the new technology would bring about considerable increases in productivity at little extra cost.

When farmers who had not thought the new technology would help them saw other farmers doing well because of the new technology, they changed their minds and a boom in sales resulted.

However, many of the advantages of using a computer are more obscure than (for example) the case of the tractor. The cost of the required hardware is considerable, and the software has not been developed to a stage where it is available to suit any farmer in any situation.

The factors have resulted in a longer lead-in time. It has taken (and will take) more time for farmers to become familiar with the new technology than was the case with some other new technologies.

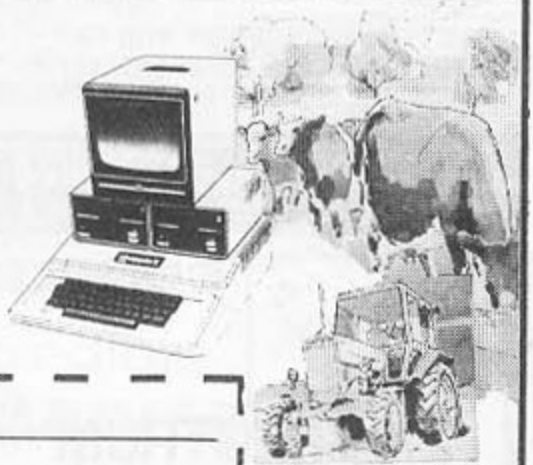
Dave McKinnon points out that on-farm computers have boomed in Britain and USA. But New Zealand farming systems are much more extensive than in Britain and much of USA. Because of the intensive nature of farming in these countries, they are much more suited to computerisation. That doesn't mean we will never have much computerisation in New Zealand — just that it will take longer to get off the ground.

There is a chicken and egg situation with software development. The cost of developing good farming programs is considerable.

Because of the diversity of farming systems, it is difficult to

FARMERS...
Save time and money!

Let Rural Computer Systems take you into the computer age. At last farming programs are available in New Zealand. Produced by farmers with the assistance of a specialist farm accountant. Next time you are in Christchurch contact Alister Burbury at 160 Tuam St, or phone 796-734, or fill in the coupon below. Sit behind a microcomputer with Rural Programs and you'll find it hard to tear yourself away!



NZ distributer:
FARMPLAN

Authorised dealer:
APPLE
SORD

☐ Please send me Rural Computer Information.

☐ Please send me details about Rural Computer Seminars

☐ Please send me details about Rural Computer Newsletter.

Name _____

Occupation _____

Address _____

FREEPOST NO. 100
RURAL COMPUTER SYSTEMS
P.O. BOX 1136 CHRISTCHURCH

- *Stock Recording*
- *Financial Planning*
- *Feed Budgeting*
- *Word Processing*
- *Gross Margins*
- *Farm Diary recording*

provide software for this market. Software could be written in two ways – a lot of specialised programs, from which farmers would select the most suitable or a very comprehensive and flexible program that can be used on a wide range of farm types. Generally, these programs are not being written, because no one will devote such a large effort unless they know that lots of farmers will use the programs and so justify the cost.

On the other hand, farmers will not show a great deal of interest until they can see programs which do what they want. Programs available to date go only part-way in providing farmers with what they want. So only a few farmers are prepared to buy a computer and use the programs.

Many people think farmers will buy computers just to help with financial management. Most farmers I know want much more from a computer than that.

Instead of comparing on-farm computerisation with the commercial sector we should compare it with the industrial sector which places considerable demands on the hardware and software developers.

As well as the commercial type work, there are demands for automated machinery, robots, and the like. This requires developement of specialised sensors so that these machines can monitor what is going on in the production line. Because industry is a much bigger market than farming, the computer industry has concentrated on developing hardware and software for it.

This may benefit the farming sector because much of what is developed for industry will be of use on farms. Because the development work has already been done for industry, and large sales made, the price of these sensors is much lower than had they been developed exclusively for use on farms.

The time is approaching when much of the monitoring and measuring carried out on farms (or which should be carried out on farms) could be done by computers. For example, sheep farmers would be able to produce much better stock if they measured weight gains in lambs, fleece weights, and ewe weights then selected replacements from those animals which perform best.

To do this at present, many farmers would need to employ extra labour because of the time involved. In many cases, this extra cost outweighs the benefits, so the work is not done. If a computer could be fitted with the appropriate sensors, this could be done with little extra work required.

When the hardware and software becomes available at the right price, I think farmers will not be slow in making use of them. Whether this move to computers would constitute a boom, or be a slow increase does not really matter. What is important is what will the situation be in 10 years time? I think there will be few farmers in New Zealand without a computer.

Another comment Dave McKinnon makes is that computers can do little to solve the problems of New Zealand farmers – inflation, shrinking markets etc. This is quite true, but Dave McKinnon then says that because of this, computers cannot have the same income generating or cost saving potential as other businesses.

I believe the reverse is true. Because there are marketing and financial problems facing farmers, they need to make their farming operation more efficient to survive. One way of doing this is to use computers to breed better stock more efficiently, and to keep a tighter control of financial affairs.

There is place for computers on the farm of the future. How much in the future is difficult to determine. For some farms, there is no difficulty justifying a computer right now. But such farms tend to be more intensive than most.

VIC-20 $595

SEND THIS ADVERTISEMENT WITH YOUR PAYMENT & RECEIVE A FREE DATASETTE (COMMODORE CASSETTE RECORDER) VALUED AT $149

JOHN GILBERT ELECTRONICS

PARNEL RISE, BOX 37245 AUCKLAND PH (09) 30-839

COMPLETE AFTER SALES SERVICE

COMPUTER CENTRE LTD

ZX SPECTRUM

16K $599

48K $799

☆ Hi resolution graphics
☆ 8 colours
☆ Supplied with demonstration programs
☆ Terms available

COMPUTER CENTRE LTD 593A COLOMBO ST PH 793-428

AMAZING BREAKTHROUGH!

Colour Computer

$349

P&P $5.50

The incredible DICK SMITH VZ 200 Personal Colour Computer

Here it is at last — the breakthrough you've been waiting for! A personal colour computer with all the right features: colour graphics, sound, standard Microsoft BASIC for easy programming, a whopping 8K bytes of RAM memory, the ability to work with a standard TV set, and much more. Yet thanks to modern electronics and our buying power, the Dick Smith VZ 200 will cost you only $349 — far less than any comparable computer! There'll never be a better time to invest in your family's future.

Yes, for just $349 the Dick Smith VZ 200 gives you amazing computing power — far more than many machines two, three or even four times the price. Now you can find out what computers are all about. The kids can use it with their school work. It can keep track of your home budget. It can even help you in your business!

Still not convinced? Try our exclusive 7 day money back satisfaction guarantee.

Buy the Dick Smith VZ 200 Colour Computer and try it in your home for up to 7 days. If you're not absolutely delighted, you can return it in original condition and packaging for a full refund.
You'll owe nothing — not even an explanation!

Now every family can afford their own personal computer

- **Simple and safe to use**
  Operates from low voltage via a mains adaptor
  Absolutely safe — even for children.
- **Works with any normal TV set**
  It simply plugs in, no need to buy an expensive monitor
- **Uses a normal cassette recorder**
  No need to buy a high cost computer type recorder.
- **Easy to read manuals, Demo cassette**
  When you buy the VZ 200, you get not one but two manuals, a User's Manual and a BASIC Manual, plus a Demonstration Cassette

That's the incredible DICK SMITH VZ 200

ONLY AVAILABLE FROM

DICK SMITH ELECTRONICS

MAIL ORDERS: Private Bag, Newmarket

**98 Carlton Gore Road,
Newmarket, Auckland 1.
Telephone: 504 409**

VISA

DSE/NZ029/JCP

BUSINESS HOURS:
Monday - Friday: 9.00am - 5.30pm
Saturday morning: 9.00am - 12noon

ORDER BY PHONE!
Just phone us on (02) 888 2105 and quote your Bankcard No. Your VZ-200 will be on its way the same day!!!

QUICKDRAW on the Atari 400

By ALEX DAVIDSON

This is a joystick picture drawing program designed to work in modes 3-11. By holding down the trigger button you can draw "rubber-band" lines, and fill areas on the screen. If you let go the trigger button, you can change colours by pressing 1, 2 or 3 (drawing colour), or 0 (background colour).

To make the joystick draw lines, press L, and to fill areas, press F. If you go off the edge of the screen, you will be returned to the starting position.

The program uses the LOCATE command in line 4 to stop the flashing dot (showing the joystick position) from rubbing out anything it crosses. Change line 40 if you want a different set of colours.

BUYING A BUSINESS COMPUTER?
DON'T GET CAUGHT WITH A LEMON

INDEPENDENT ADVICE AND ASSISTANCE available to:

* establish requirements
* evaluate alternatives and suppliers' proposals
* select a system or just advise

CONTACT:
CONSULTING & MARKET SERVICES
32a Maarama Cresc.,
WELLINGTON.
phone 858-481
or 844-985 anytime.

```
0 GOTO 10
1 X=E:Y=F
2 S=STICK(0):COLOR U:PLOT X,Y:DRAWTO E,F:E=E+J(S,1):F=F+J(S,2):COLOR C:PLOT X,Y:
DRAWTO E,F:L=2+STRIG(0)*2:GOTO L
3 S=STICK(0):COLOR Z:PLOT E,F:E=E+J(S,1):F=F+J(S,2):K=PEEK(764):IF K<>56 AND K<>
0 THEN C=K(K)
4 LOCATE E,F,Z:COLOR C:PLOT E,F:L=1+STRIG(0)*2:T=T+(K=56)*(1-T)-(K=0)*T:U=C*(T=1
):GOTO L
10 PRINT "ENTER MODE";:INPUT M
12 DIM J(15,2),K(255):C=1:T=1:Z=0
15 FOR I=1 TO 15:READ D:J(I,1)=D:READ D:J(I,2)=D:NEXT I:GRAPHICS M+16
20 DATA 0,0,0,0,0,0,0,0,1,1,1,-1,1,0,0,0,-1,1,-1,-1,-1,0,0,0,0,1,0,-1,0,0
25 FOR K=0 TO 255:K(K)=1:NEXT K
30 K(50)=0:K(30)=2:K(26)=3
40 SETCOLOR 4,0,12:SETCOLOR 2,12,6:SETCOLOR 1,7,4:SETCOLOR 0,2,4
45 TRAP 44444:X=20:Y=20:E=X:F=Y
50 TRAP 45:FOR V=0 TO 16:SOUND 1,12+V,6,V:NEXT V:GOTO 3
```

WE DON'T JUST SELL COMPUTERS . . .

WE GIVE YOU ALL THE INFORMATION YOU NEED

Commodore 64 + VIC 20 + Atari + BBC + Sinclair ZX81 + Sirius + Access + Spectrum

Patrick Dunphy has over 15 years' computer programming experience and is now combining this with TV and video technology. He can talk to you in English about your computer requirements. We also have a large stock of cheap colour TVs and monitors.

Programs available include:
Chess
Galaxians
Pilot
Moon Lander

Aucklands largest selection of programs, books, games, programming courses, paper, all accessories, cassettes, cartridges, etc.
Business systems also available. Mail orders and all credit cards accepted. Hire purchase available.

SUPATECH ELECTRONICS

430 MT. EDEN ROAD, MT. EDEN TELEPHONE 605-216 P.O. BOX 2600 AUCKLAND

The humming bee

Notes from the beekeeper's Bible

By SHAYNE DOYLE

MicroBee owners not living in the greater Wellington area will be interested to hear of the formation of a Wellington MicroBee Users Club.

From an initial gathering of about 50 local users, a steering committee was formed, and it is hoped to get a newsletter going soon. I suggest you contact the club at P.O. Box 871 Wellington, if interested.

At the second club meeting, Tony Pointon, of Checkpoint Computers, reported on new developments for MicroBee in Australia. These are:

- Much more software will become available as the year goes on, mainly from the new 'Honeysoft' software publishing division.
- New machines will have a new plugpack.
- Basic is now in 2 ROMS.
- The new technical manual (A$60) is likely to be about $90 here!!
- Watch for the MicroBee EPROM programmer.
- Watch too for an RF modulator suitable for 'Bees'.
- Independently written networking ROM and educational programs are now available in Australia.
- The colour upgrades are expected to cost around $300 in New Zealand.
- Keep an eye out for a faster display graphics add-on later this year.
- 64K MicroBee with Zenith green screen, single double sided, double density Hitachi slimline disk in a dual cabinet (400K bytes), with word processor, will cost NZ$3250, $3995 with both disk drives fitted.
- And the bad news about the disk system. At the time of writing, Checkpoint has no intention of selling disk update components piecemeal. You, the poor owner, will have to exchange your present computer for the whole $3250 system or else go without. Bad mark, Checkpoint!
- A beginners guide to programming MicroBee has been written by Evan Vickery, of

Turn to page 50

MICROBEE
☆ **WATCHWORD** ☆
A super-fast word processor for 16k and 32k Microbee.

Cassette version	$30
ROM version	$40
Manual only	$10

Further details from:
M.J. Walker
P.O. Box 17-215, Wellington

NOW OVER 10,000 MACHINES IN USE IN AUSTRALASIA

Microbees

Send for more information or to order:

Check-Point Computers Ltd
Private Bag, Tawa, Wellington
Phone: 326-999

SPECIALS!!!
Zenith green screen monitors
normally $349
NOW $299
Offer expires 31/7/83

16 K Microbee	**$829**	Retail
32K Microbee	**$990**	Retail
64K Microbee	**$1390**	Retail
Single disk drive	**$1509**	Retail

Education prices on application

NEW Microbee 64K, single disk system, CP/M 2.2, screen, software **ONLY $3250**

64K, dual disk system, CP/M 2.2 screen, software **ONLY $3995**

New Import!
SK — eskei mini disks, 5¼ inch single sided, single density, boxed of 10
RETAIL ONLY $52
Education Price $35

Single sided, double density, boxes of 10
RETAIL ONLY $59
Education Price $39

Double sided, double density, boxes of 10
RETAIL ONLY $75
Education Price $49

NAME .....
ADDRESS .....
..... PHONE .....
Visa ☐ Bankcard ☐ Cheque ☐ Expiry Date .....
No: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Microbee ☐
Printers ☐
Screens ☐
Trak Drives ☐
Disks ☐
Software ☐

AT LAST
80 col, 80 character per second Printer for under $1000
PACEMAKER DOT MATRIX GRAPHICS PRINTER
unbeatable value at $989
(limited stocks)

Memory expansion on VIC 20

Some confusion exists over the size of memory to which the VIC 20 can be expanded.

The standard machine comes with a nominal 5K of random access memory (actually 5630 bytes).

Of this, around 2K is used for the VIC's operating system and colour memory, leaving 3583 free for basic programming.

Memory can be added by using one or combinations of 3K, 8K, 16K or 24K cartridges. If more than one is added, a motherboard of some type must be used.

By adding 24K (actually 24576), a total of 28159 can be made available for BASIC programs.

A further 11K (8K + 3K) is also able to be added for machine language only.

So for BASIC, a total of 28159 bytes is available. For machine language, this can go up to 28159 + 11264 = 39423.

Vagaries of a printer and disk drive

Sir — I am the senior programmer (BASIC) of a group called MJC Programs, a group of programmers, computer engineers, and computer operators/word processors.

About a year ago, I did some programs on a VIC 20 for a company in Wellington. Lately, the company, annoyed with the screen size, decided to trade in its VIC 20 for a Commodore 64. Here are a few points to remember when trading your computer for a Commodore 64:

- Do not give your dealer any programs if you own a VIC 20, as they will work and load on a 64.
- If you have a disk drive (the VIC 1540), try and trade that in too, as you will have a lot of trouble with it.

The VIC 1540 disk drive can be used on the 64 but you need a POKE statement to load, save a program and also open, input#, print#. This POKE statement makes the screen blank, so you cannot see what you are typing. Once the program has loaded, you will need another POKE statement to disable the one you just typed in.

I have only two complaints about the Commodore 64 – the disk drive and printer.

You cannot use the printer and disk drive at the same time and so time is lost. When validating, you can't use the printer until it has stopped. It says the disk drive has 64K. Is that ROM or RAM? If RAM, how do you use it?

When I was writing a program, I saved it so that I could finish it off the next day. When I returned the next day and loaded it in, I could type only two lines before it crashed. If anyone else has this problem, take it back to the dealer you bought it from and ask if it could be fixed or replaced.

The printer I was using was the noisiest I have ever heard. I also found that the line feed (e.g. PRINT#5) would not line feed one print line and the printer would print over the line just printed. If this happens to you, ask for a new one.

If you find the printer is not printing and is halfway through a program, take the disk drive, not the printer, back to the dealer you bought it from.

The Commodore 64 and VIC 20 are excellent machines. It is only the disk drive that is giving the problems — BRIAN COOPER (Lower Hutt).

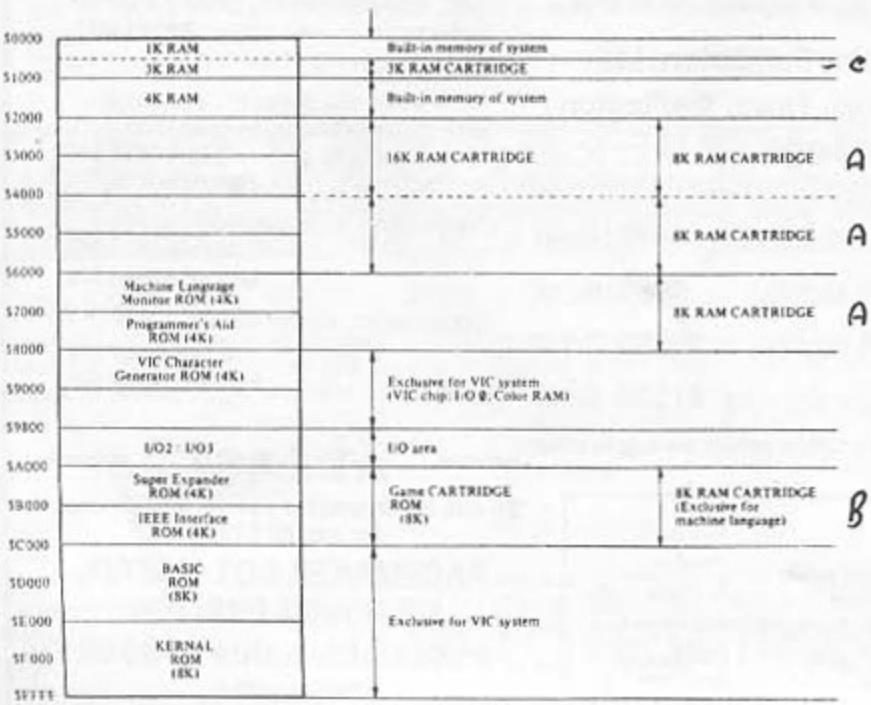
The accompanying system memory map will help further.

The areas marked "A" are usable for BASIC or machine language. The area marked "B" is usable for machine language only and that marked "C" usable for BASIC only if "A" is unused or is used for machine language.

— Graham Truman

VIC-20 SYSTEM MEMORY MAP

VIC system memory map has the following composition:



Changed your address?

Please return your complete subscription label with the new address marked on it.

"Give me one good reason why I should choose a VIC 20 home computer."

1. VIC is outstanding value for money. No other colour home computer can give so much for only $595.

2. Total standard memory 25K made up of 20K ROM and 5K RAM.

3. Fully expandable to 32K of user RAM.

4. Microsoft Basic interpreter as standard.

5. Accessible machine language as standard.

6. Connects direct to monitor or standard television.

7. Full size typewriter-style keyboard.

8. Full colour and sound.

9. All colours directly controllable from the keyboard.

10. 62 predefined graphic characters direct from the keyboard.

11. Full set of upper and lower case characters.

12. 512 displayable characters direct from the keyboard.

13. High resolution graphics capability built into the machine.

14. Programmable function keys.

15. Automatic repeat on cursor function keys.

16. User-definable input/output port.

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

18. Standard interfaces for hardware peripherals.

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

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

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

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

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

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

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

How many reasons was it you wanted?

Accessories include:
- Cassette tape unit.
- Single drive 5¼" floppy disk unit (170K bytes capacity).
- 80-column dot matrix printer.
- 3K, 8K, and 16K RAM expansion cartridges.
- Programming aid packs, machine code monitor cartridge, programmers' aid cartridge, high resolution graphics cartridge.
- ROM Expansion cartridges.
- RS 232C communication cartridge.
- Memory expansion board.
- 1EEE/488 interface cartridge.
- Joysticks, light pens, paddles and motor controllers.

commodore

VIC 20

The best home computer in the world.

COMMODORE COMPUTER (N.Z.) LTD
P.O. Box 33-847, Takapuna, Auckland
Telephone 497-081

or

Contact your local dealer

Playing the share-market

Although written for a TRS-80/SYSTEM 80 Level II, 16K memory computer, this program should be modifiable for other computers. Lines 100-110 and 1000-1030 are the only areas that use TRS-80 graphics and could be removed (replace line 1000 with a RETURN) without loss of program flow. These lines create and display a flashing NEWSFLASH banner.

By MARTIN DOWNEY

A 16K simulation-game for Level II machines. Suitable for TRS-80, PMC-80, SYSTEM 80, Video Genie, and other compatible computers.

- Choice of NINE stocks.
- Realistic economic obstacles.
- NEWSFLASH service.
- EASY-INPUT and attractive display.

After loading the program and entering RUN the playing instructions will be displayed. You then press ENTER to start (SYSTEM 80 and similar computers use NEW LINE in place of ENTER).

After a short delay the display will show the prices and changes in price of nine different stocks. The far-right column shows the number of share you at present own. Your bank balance is shown on the left along with the present interest rate may vary from day to day. The rate shown is per-day which although not strictly realistic does make a more interesting game. Similarly, share prices fluctuate more wildly than they do in the real world.

At the bottom of the screen you will see the instructions to press key N, T and S. Pressing N will move you to the next day of trading (i.e. the stock prices will change and you will be informed of NEWSFLASHs concerning tax etc.). Pressing S will end the game and sell your shares at present prices. Pressing T will allow you to buy and sell stock.

After pressing T you will be asked for the key number of the stock you wish to buy or sell (the number to the left of the stock name). You press a number from 1 to 9. You will then be asked if you wish to BUY or SELL. Press key B

OUR COMMITMENT
to help you before and after the sale

Sinclair
ZX81
+ Spectrum
write or call

Price Slash of $200 on VIC 20
NOW $595

Commodore
VIC 20 + 64

Ashford TV Rentals Ltd
166 KEPA ROAD, ORAKEI, AUCKLAND. BOX 6870.
PHONES 583-570, 583-293.

```
$$$$$$$$$$$$
$$$$$$$$$$$$
$$$$$$$$$$$$
$$$$$$$$$$$$
$$$$$$$$$$$$
$$$$$$$$$$$$
```

or S. Then type in the number of shares you wish to buy or sell and press ENTER (or NEW LINE). If the transaction is valid your bank balance and number of shares will alter accordingly and you will again be asked to press N, T, or S. Note that there are a maximum 20,000 shares of each stock available. Invalid transactions will not be allowed and you may be accused of FRAUD.

The game continues like this until you decide to sell up or the market fails and there is a bank takeover. You will then be graded from "BAD" to "EXCELLENT" depending on your financial prowess.

Although this simulation may not be strictly true-to-life it does provide an interesting game with a number of realistic features.

● Copyright: Martin Downey

WRITE TO US

```
DAY 4                    M A R K E T   N E W S
NEWSFLASH          STOCK    PRICE     CHANGE    SHARES

                   1-LEAD     6       DOWN  10    0
CATTLE BONUS 90 %  2-ZINC     90      HOLDING     0
                   3-TIN      150     DOWN  299   0
                   4-GOLD     1250    DOWN  500   0
                   5-STEEL    60      DOWN  140   0
                   6-SILVER   480      UP   320   5
                   7-OIL      860     DOWN  3200  0
  BANK BALANCE = 624.64
  (AT 6 % INTEREST)
                   8-CATTLE   32       UP   24    0
                   9-WOOL     160     HOLDING     0
```

```
$$$$$$$$$$$$
```

```
1700 GOSUB1600:PRINT@922,"F R A U D"
1710 L=LEN(Z$)/2:IFL<30THENZ$=" INPUT ERROR":GOTO1710
1720 FORN=1TO4:PRINT@(992-L),Z$:FORM=1TO100:NEXTN
1730 PRINT@960,STRING$(62,32)::FORN=1TO60:NEXTN,M
1740 RETURN
1800 Z$=STR$(C(X1))+"     ":PRINT@(X1+64+105),Z$;
1805 Z$="BANK BALANCE £"+STR$(BB)
1810 IFLEN(Z$)<25THENZ$=Z$+" ":GOTO1810
1820 PRINT@642,Z$;:GOTO2100
2000 FORM=1TO500:NEXTM:M1=1:RETURN
2100 FORM=1TO500:NEXTM:IFMF=0THEN10000ELSERETURN
3000 PRINT@,"      SHARE  TAKEOVER";
3010 P=P+64:PRINT@P,A$(I);":  SELL AT";I;"=RND(1000.
3020 P=P+64:PRINT@
3030 BB=BB+C(I)*X:C(I)=0:RETURN
3040 IFC(I)=0THENRETURN
3050 C(I)=C(I)-1:TZ=1:RETURN
3060 PRINT@,"M A R K E T    F A I L S";
4010 PRINT@(P+69),"BANK TAKEOVER";:MF=2
4020 FORI=1TO9:RD=RND(B(I)+4):IFMF=1THENRD=A(I)
4024 Z$="SELL AT     "+STR$(RD)
4026 IFLEN(Z$)<24THENZ$=Z$+" ":GOTO4026
4030 PRINT@(I+64+167),Z$;
4040 BB=BB+(RD*C(I))
4050 NEXT:NC=2+BB/(1000+(1.5)[D)+1.5*IFNC>5THENNC=5
4054 GOSUB1605:FORI=1TONC:READZ$:NEXTI
4056 DATABAD,POOR,COMPETENT,GOOD,EXCELLENT
4060 GOSUB1600:PRINT@832,"AFTER";D;"DAYS OF TRADING YOUR FINAL BANK BALANCE"
4065 PRINT"WAS";BB;"CREDITS. THIS INDICATES";Z$;" FINANCIAL"
4070 PRINT"MANAGEMENT.      PRESS <ENTER> FOR A NEW GAME:";
4080 INPUTA$:RUN
5000 T1=RND(2):R1=RND(40)
5005 P=P+64:FORJ=1TO9
5010 IFR1<>JTHEN5020ELSEPRINT@P,A$(J);" BONUS ISSUE";
5015 C(J)=C(J)+1:T=0:RETURN
5020 NEXTJ:R1=RND(7)
5070 ONR1GOSUB5100,5000,4000,6000,7000,8000,5200
5080 RETURN
5100 PRINT@(I+64+175),"SUSPENDED  ";:T=1:RETURN
5200 PRINT@P,"    MARKET  SUSPENDED";:GOSUB2000
5210 PRINT@P,"                      ";:RETURN
6000 PRINT@P,"TAX BONUS";:TT=RND(100):P=P+64
6010 PRINTTT;"%";:GOSUB6040
6020 BB=BB+BB/100*TT
6030 RETURN
6040 TZ=RND(10)
6050 IFTZ=2THENPRINT@P,"TAX BONUS SUSPENDED";:P=P+64:TT=0
6070 RETURN
7000 PRINT@P,"SUPER TAX";:TT=RND(100):P=P+64
7010 PRINTTT;"%";:GOSUB7040
7020 BB=BB-BB/100*TT
7030 RETURN
7040 TZ=RND(10)
7050 IFTZ=2THENPRINT@P,"SUPERTAX SUSPENDED";:P=P+64
7060 IFTZ<>2THENRETURNELSETT=0:RETURN
8000 PRINT@P,A$(I);" BONUS";:TT=RND(100):P=P+64
8010 PRINTTT;"%";:GOSUB8040
8020 MB=MB+MB/100*TT
8030 RETURN
8040 TZ=RND(10)
8050 IFTZ=2THENPRINT@P,"BONUS SUSPENDED";:P=P+64:TT=0
8070 RETURN
10000 GOSUB1600:PRINT@906,"PRESS <N> FOR NEXT DAY OF TRADING";
10010 PRINT@964,"PRESS <T> TO TRADE          PRESS <S> TO SELL UP";
10015 I$=INKEY$:IFI$=""THENGOSUB1600:RETURN
10020 IFI$="S"THENMF=1:GOTO4020:ELSEIFI$<>"T"THEN10015
10030 GOSUB1600:PRINT@900,"PRESS KEY OF STOCK TO TRADE (1-9)";
10035 I$=INKEY$:IFI$<"1"ORI$>"9"THEN10035ELSEI=ASC(I$)-48
10050 GOSUB1600:PRINT@900,"PRESS KEY <B> OR <S> FOR BUY OR SELL"
10060 I$=INKEY$:IFI$="B"THENY2$="BUY"ELSEIFI$="S"THENY2$="SELL"ELSE10060
10070 GOSUB1600:PRINT@896,"TYPE IN NUMBER OF STOCKS OF ";A$(X1)
10071 PRINT"YOU WISH TO ";Y2$;" THEN PRESS <ENTER>";
10072 PRINT@955,:INPUTZ1:GOSUB1600:Z$=STR$(Z1)+" SHARES"
10075 IF(I$="S"ANDZ1>C(X1))OR(Z1<>INT(Z1))OR(I$="B"AND(Z1*C(X1))>20000)THENGOSU
1700:GOTO10000
10130 GOSUB1500:PRINT@920,Y2$;" ";Z1;" ";A$(X1)
10200 IFI$="S"THEN10300
10210 IFZ1+A(X1)>BBTHENPRINT@984,"OVERDRAWN";:GOTO2100
10220 BB=BB-Z1*A(X1):C(X1)=C(X1)+Z1:GOTO1800
10300 BB=BB+Z1*A(X1):C(X1)=C(X1)-Z1:GOTO1800
20000 PRINT@(I+64+66),M2;:II=I+64+175
20010 IFMB<M2THENOZ=M2-MB:GOTO20050
20020 IFMB>M2THENOZ=MB-M2:GOTO20040
20030 Z$="HOLDING    ":GOTO20060
20040 Z$="DOWN "+STR$(OZ):GOTO20060
20050 Z$=" UP  "+STR$(OZ)
20060 IFLEN(Z$)<10THENZ$=Z$+" ":GOTO20060
20070 PRINT@II,Z$;:RETURN
```


A cure for that Apple renumbering

Sir — Further to my comments concerning the Apple renumbering programme, (April issue), I wrote to the Apple people in USA and was advised the problem could be cured by the following procedures:

LOAD RENUMBER
POKE 4789,172
POKE 4790,171
UNLOCK RENUMBER
SAVE RENUMBER
LOCK RENUMBER

Readers may be interested in this correction — G. PORTENERS (Paramata).

BOUQUET

Sirs — Within six weeks, I will be using, a home computer ZX81; and after reading your magazine I was impressed indeed.

Your first sample copy was to me, very informative and very clearly written and the type of language used, was easy to read, where computer technology was stated, making it so easy to understand and assimilate.

I am looking forward, to your future copies.
— N.H. Halverson,
(Mangere East)

SINCLAIR GAME

Sirs — I recently tried "Catchball" by Jeremy Hollobon (Sinclair, May issue of "Bits & Bytes"). I have only one improvement to make. Add POKE 16389, 76 to the start of the program. It will speed up CLS and PRINT quite a lot.

Otherwise it was a good program. Keep up the good work. Your packaging of your excellent magazine is a very good idea. It arrived clean and flat. Thanks — Dean McGowan, (Dunsandel).

FOLDERS

Sirs — I am writing to enquire if you will be making binders for "Bits & Bytes". I am sure this would be worthwhile as it is a magazine worthwhile saving. Also, if you are planning to have binders, could they be indexed?

We do hope to offer binders at a reasonable price.
— The Editors.

Getting down to DCBs

By GORDON FINDLAY

The key to interacting with the TRS-80 hardware and resident software is an understanding of the device and file control blocks to be found in reserved RAM. Let's examine the Device Control Blocks (DCB) and see if any use can be made of them.

There are three DCB's in the model 1. Here is a map of each, and an explanation of their contents. The contents given are the contents on power-up – very many programs modify these, including most Disk Operating Systems, such as NEWDOS.

LSB means Least Significant Byte (the second in an address), MSB is most significant byte. A driver is a piece of software to control a hardware device.

VIDEO DCB:

Address (hex)	Address (decimal)	Explanation
401D	16413	Device type – 7
401E	16414	LSB of driver address
401F	16415	MSB of driver address
4020	16416	LSB cursor position
4021	16417	MSB cursor position
4022	16418	0 if cursor supressed
4023	16419	LSB and
4024	16420	MSB of RAM buffer

KEYBOARD DCB:

Address (hex)	Address (decimal)	Explanation
4015	16405	Device type – 1
4016	16406	LSB and
4017	16407	MSB of driver address
4018	16408	not used
4019	16409	not used
401A	16410	LSB and
401B	16411	MSB of RAM buffer

PRINTER DCB:

Address (hex)	Address (decimal)	Explanation
4025	16421	Device Type – 6
4026	16422	LSB and
4027	16423	MSB of driver address
4028	16424	number of lines/page
4029	16425	lines printed so far
402A	16426	not used
402B	16427	LSB and
4020	16428	MSB of RAM buffer

Normal driver addresses are:
Video; 0458H
Keyboard; 03E3H
Printer; 058DH.

What can be done with these DCBs? For a start, by POKEing suitable values to 4020/4021H, the cursor can be moved to any given point on the video screen. Remember that the screen is a block of RAM as far as the TRS-80 is concerned, so to move the cursor to a location, just POKE the appropriate LSB and MSB into the DCB.

Custom keyboard and printer drivers are common. The printer driver in ROM is very simple, and it is often desirable to replace it with a more sophisticated (modern?) one. This may be a routine stored in high (protected) memory, with its address placed in the control block in place of the usual driver. The same applies to the keyboard driver. Many programs, such as NEWDOS, Scripsit, and many utilities, have their own keyboard drivers to allow for auto-repeat, JKL screen dumps, 123 entry to DEBUG and so on. These drivers are linked by loading their respective addresses into the DCB.

One not so obvious use is to change the keyboard device type! Changing it to 0 forces a jump to 4033H every time the keyboard is scanned. If 4033H contains a jump to your own routine, you may intercept the program every few milliseconds. A suitable routine may be to filter out special key depressions. To do this, CALL 03E3H first – this sets the key being depressed into the accumulator. Then do whatever you will!

A very common problem is this – what to do with programs which contain LPRINT statements, when you don't have a printer? There are many suggestions in the magazines, most of which involve scanning the program for the LPRINT token (AFH or 175 decimal), and replacing it with the PRINT token (B2H, 178 decimal). The problem with this is that the token 175 can occur as part of a line number, or as a pointer in the program, as well as the LPRINT token. A better way is to replace the printer driver address with the video driver address – this has the effect of diverting printer output to the screen. The reverse of course, diverts screen output onto paper. The necessary replacements can be done quite easily in BASIC:

Convert printer to video:

```
POKE 16422, PEEK (16414)
POKE 16423, PEEK (16415)
```

Remember to store the original values of 16414/5 if you want to restore them without re-booting the computer.

This may be elaborated easily to give the user a choice between screen and video output at different points in the program without coding PRINT and LPRINT statements all the time.

The disk DCB is a 32-byte block of space for each disk file, which is part of the users memory space, not the reserved space. This is reserved by specifying the number of file buffers to be allowed – each buffer has a control block associated with it.

Basic BASIC 9

Gordon Findlay continues a series on BASIC for beginners.

The message this month is "divide and conquer". It might also be "don't keep re-inventing the wheel". In other words, SUBROUTINES.

A subroutine is a part of a program, which can be called into play at any time, and which returns control to the calling program when finished. It is rather like the famous recipe book instruction, for cooking hare: "first catch your hare". The recipe didn't say how to – those instructions could be found in a hunting book. Once the hare was caught, the cook returned to the recipe book for the next step, which might be another "subroutine" or group of instructions – "next skin your hare". Enough of this hare, let's look at a BASIC example.

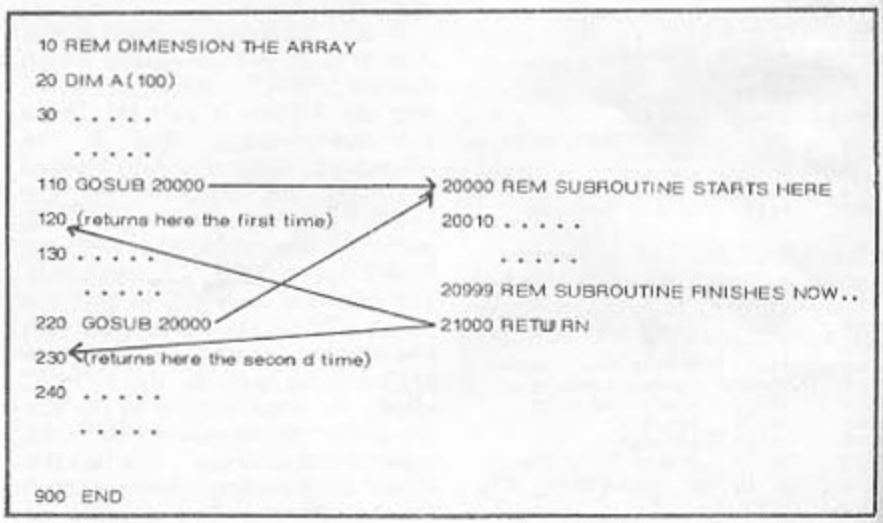
Very often in programming we need to sort arrays into numerical order. Quite often we will want to sort arrays several times in the same program. Wouldn't it be nice if we could write a program including the line:

100 SORT ARRAY A.

Now in one or two very powerful computer systems this is a perfectly acceptable command. In some of the more advanced BASIC there is a similar command. But in most versions of BASIC, the command to SORT would require several lines of programming. And of course, if the same sort was needed in another part of the program, the same lines of code could be copied in. But the subroutine mechanism allows the sorting code to be written once only and used repeatedly.

Let's imagine that the sorting code was written at a high line number – say 20000. Then line 110 above could be replaced by 110 GOSUB 20000.

The GOSUB (GO to SUBroutine) command works just like a GOTO, but the program remembers where it was before the GOSUB. At the end of the subroutine – e.g. at the end of the sorting – place the command RETURN. This command sends the program back to the point it was called from (the next statement actually). If we needed to sort again at line 220, the same instruction GOSUB 20000 could be used. This time the RETURN would transfer back to the statement after line 220. I have drawn a diagram which might make this clear, or might not. The skeleton program is in the left-hand column, the subroutine in the right. The arrows indicate the jumping around which occurs.



(In an actual program of course, the right-hand column would appear beneath the left, with all the statements in numerical order, although there may be large gaps in the numbering.)

There are several reasons for using subroutines. The first, and the original, was to save space by including the code once only, no matter how often it was used. Another important one is that subroutines can be re-used from program to program. In fact, there are books full of tried and tested subroutines, just waiting to be used. Once you have written a subroutine to perform some task, it can be kept for use the next time you have a similar task.

Another use is slightly different. Most people find large programming tasks fairly intimidating. Use subroutines to break the large task into smaller ones. Program each of the smaller tasks, breaking each of these up into even smaller if necessary. Then make each of them a subroutine, and call them (that is, use them as the target of a GOSUB) in turn. It's like shifting a rock – if the rock is too big to move, smash it up, and move each of the little pieces.

Where do subroutines go? The most common place is after the END statement of the main part of the program. This keeps them carefully out of the way. Many versions of BASIC run faster if the subroutines which are used often occur at the beginning of the program. This means that a GOTO is necessary to skip around them when the program begins.

Incidentally, if you really need a subroutine for sorting, have a look at my TRS-80 column in the May issue of "Bits & Bytes."

YIELD SYSTEMS

Specialists in:

Computer systems for Professional People and Businessmen.

Computer Equipment
Computer Programs
Program Customisation

Our prices will astound you!!

Ph Neil Harker 794-929 Auckland

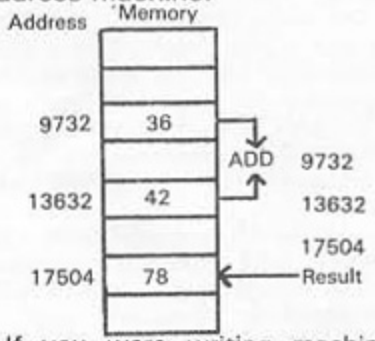
In the Belly of the Beast: Addresses

By GERRIT BAHLMAN

In the last article I began talking about the different sorts of C.P.U.'s (central processing units) in computers. It is the features of the C.P.U.'s which allow us to operate on information. So, it is important that we have some idea of the methods available. I used the analogy of a calculator and suggested that we had to make decisions, about where the numbers used in specific calculations, such as addition, were to come from and where the answers were to be put. The solutions to that sort of question is the basis of why C.P.U.'s are different.

Three address machines

If you wanted to, you could avoid using accumulators or registers altogether in doing something like addition. Why save one of the answers in the C.P.U. at all? You could just load in the two values, add them, and send the answer straight back to where you want it in memory. To do an addition, simply give the addresses of the two values to be added and the address where the answer is to be sent. Then you will have a three-address machine.



If you were writing machine language programs on a machine like this the instructions might look like this:

ADD	9732 first number address	13632 second number address	17504 answer number address

or like this:
Multiply Y, Z, X
which would multiply y and z and put the answer in x. Notice how I failed to say "the thing in Y". We use the letter as a symbol in place of the address and we understand what is meant. The problem is if you don't understand it can be very confusing.

Let's try programming using our three-address machine.

Say we wanted to write a program which would do this.
X = A * B + C + D + E

We have two machine code commands.
Add address1, address2, answer address3
Multiply address1, address2, answer address3

We could do it like this:

```
Multiply A,B,X
Add X,C,X
Add X,D,X
Add X,E,X
```

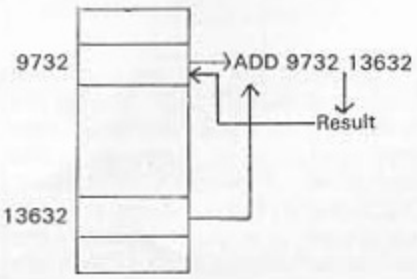
Our answer would be in memory location X as required. Notice we are not using numbers now for the simple reason that it is too complicated. We are using a "symbolic addressing" scheme.

The unfortunate thing about our little program is that we have had to go to memory and re-extract the X value each time and that is wasteful. Also we could have done each of the operations, apart from the first one, using just two addresses but the way in which the three address worked we were forced to give three regardless of whether or not we needed three.

Two address machine

Obviously the two-address machine uses only two addresses for its instructions. Typically, instructions would look like this:

ADD 9732, 13632
or
MPY X, Y



The numbers in the first address and the second address would be combined and the result would be placed in the first address. Can you see a problem with this?

The difficulty with this scheme is that the value in the first address will overwrite the original number stored there. So, we would lose it if we didn't store it somewhere else as well. Let's have a look at the program written for the three-address code using our two address system:

```
MPY A, B
ADD A, C
ADD A, D
ADD A, E
```

It certainly looks shorter! But we now need a new instruction to overcome the problem we recognised.

MOVE X, A. This would move our value A into some storage X. And in fact we need this to get our result into the appropriate address. The upshot of the two-address scheme is the need for a new instruction, but this is no bother and it saves us a lot of needless addressing!

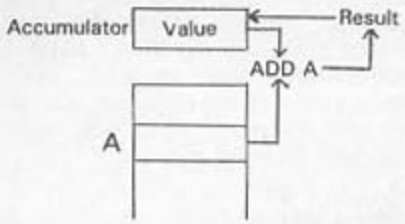
One-address machine

Apart from being simpler, the two-address scheme would also be cheaper for the C.P.U. manufacturer because he wouldn't need as much storage for handling the machine code instructions. Why not have a one-address machine? In this scheme the computer would always know where one of the numbers it had to operate on was. Therefore, it would not need to be told its address. Such a system would not be difficult to set up. After all that's what the simplest of calculators use! There is one accumulator, to which is added the number keyed in.

Computer Camps
for school children
August 21st-28th
Telephone 606-079
P.O. Box 68083 Auckland
Computer Camps Ltd.

Instructions might look like this:

```
ADD A
MPY B
DIV C
```



The instruction tells the machine to add A to the accumulator, multiply the accumulator, multiply the accumulator by A, etc. Clearly we will need an instruction similar to the MOVE instruction used for the two-address system.

The instruction would load the accumulator and might look like this:

```
LOAD A
```

We would also need an 'unload' instruction which would put a value in the accumulator into memory. It might look like this:

STORE A and it would put the accumulator value into memory location A. Lets have another look at our programme.

```
LOAD A
MPY B
ADD C
ADD D
ADD E
STORE X
```

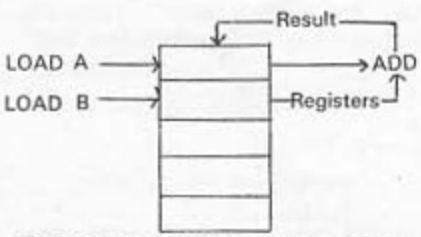
Our program looks simpler, but we had to increase the number of instructions yet again. In other words: if we decrease the number of addresses we increase the number of instructions needed to do a particular job. However, the cost of the C.P.U. will be less. Manufacturers will be after compromise solutions which will balance these two trends.

ZERO-address machines

If something works you may as well take it to its logical conclusion! Why not have a C.P.U. which knows where everything is and does not need to be told where the numbers are. Such machines are called stack machines and use the STACK PRINCIPLE OF PUSH-DOWN LIST or the CELLAR or the LAST-IN-FIRST-OUT QUEUE. These C.P.U.'s have a stack of registers which are loaded first and then the numbers "pop" off in the correct order. The LOAD and STORE commands are vital in this system and they will need addresses, but apart from that the instructions will not need them. Our program would now look like this:

```
LOAD    A
LOAD    B
MPY
LOAD    C
ADD
LOAD    D
ADD
LOAD    E
ADD
STORE   X
```

This pushes the value at address A onto the stack.
This multiplies the top two values on the stack and leaves the result on the top of the stack.



This pops the top value off the stack and saves it at X. Notice the number of instructions has increased once more! The inevitable trend continues. Decrease the number of addresses: you increase the number of instructions. There are other effects apart from cost in a C.P.U. design which a manufacturer must consider. Multi-address instructions are slower than one and zero-address instructions. So, while the programs are shorter to write the decision to pursue a particular sort of C.P.U. design is not a simple one.

We have looked at the possibilities in principle to get an idea of the basic elements of machine language instructions. When you look at your own machine's instruction set, it is hoped you will recognise which decision your manufacturer came to.

This concludes the Belly in the Beast series for the present. It may be resumed next year.

MICRO NEWS

New Software products

MicroAge Limited (P.O. Box 13-054, Christchurch), has announced the release of the following MicroPro products.

PLANSTAR — Super spread sheet, financial modelling program capable of handling 32,000 cells, includes graphing. Price $720.00. Release Date: 1 August 1983.

STARINDEX — Indexing and table of contents program for Wordstar. Price: $280.00. Available: 1 July 1983.

STARBURST: Menu generator that allows you to run programs from common menu. Price: $280.00. Release Date: 1 August 1983.

The following product updates have also been announced.

WORDSTAR — update to Version 3.3

MAILMERGE — update to Version 3.3

SPELLSTAR — update to Version 3.3

CALCSTAR — update to Version 1.45

DATASTAR — update to Version 1.4

All these products are available through the network of MicroPro retail dealers throughout New Zealand.

PETER MULLINS, a lecturer in biostatics at the Auckland School of Medicine, and RONALD JOE MULLINS, a student at the school, conclude their article on Apple arrays.

Apple arrays

Bytes:

1-2 name of the array
3-4 offset pointer to next variable
5 number of dimensions
6- sizes of the dimensions, from Nth to 1st, followed by array elements.

Note: Real numbers take five bytes each, integers take two. Multidimensional arrays are stored with the right-most index ascending slowest; for example, the numbers in the array A (3,1) would be stored in the following sequence:

A (0,0), A(1,0), A(2,0), A(3,0), A(0,1), A(1,1), A(2,1), A(3,1)

The above information is sufficient to enable us to write an Applesoft subroutine or program segment which would BSAVE an image of any array; however, we decided that this would be an inelegant solution, fraught with pitfalls for the unwary. Our approach was rather to use the "ampersand" feature of the Apple: an ability to add new commands to the langauge. Our objective was to produce three new commands:

&ASSIGN &REPLACE and &KILL

which would, respectively, recover a binary file from disk as an array, store an array as a binary file on disk, and delete an array from memory. A machine language program was written to implement these modifications: it is called "ARRAY (V1.1)", and should be run as the first instruction of an Applesoft program which is intended to use these facilities. The code for this program resides in the Apple's memory immediately adjacent to the disk operating system, and consequently there must be no string assignments before running the array program. It is recommended to use line 0 to run the program as follows:

```
0 PRINT CHR$(4) "BRUN ARRAY
    (V1.1)"
```

EXAMPLES AND USER NOTES

A program which will take N real numbers, input from the keyboard, and store them in a file.

```
 0 PRINT CHR$ (4) "BRUN
   ARRAY (V1.1)"
10 INPUT "ENTER N"; N
20 DIM A (N)
30 FOR I = 1 TO N
40 INPUT "ENTER NEXT
   NUMBER"; A(I)
50 NEXT I
60 A (O) = N
70 INPUT "SAVE UNDER
   WHAT FILE NAME?"; F$
80 & REPLACE (F$) = A
100 PRINT "NUMBERS
   STORED IN FILE"; F$
120 END
```

Note that the size of the array has been stored in entry 0. Another

HALF PRICE!!
APPLE II COMPUTERS

Pre-owned APPLE II Europlus Computers workshop tested and complete with 60-day warranty.

FROM $1750

9" B & W Monitor	$250
12" Kaga Green Screen	$380
Disk Drives to suit Apple	$700
16K Add-on Memory	$200
80 Character Card	$800

Talk to Paul Abbot or Dave Best at

COMPUTERWORLD

Corner Victoria Street and Lorne Street, Auckland
Phone 31-394, 399-216
OPEN SATURDAY MORNINGS

useful convention is to have the file name indicate the dimension of the array. For example, we find a filename of the form ###### number of dimensions > BIN" is adequate to indicate a great deal about the file's form and content, e.g. FATLEVELS1.BIN might contain a number of measurements of fat levels in a 1-dimensional array, stored as a binary file.

Example 2

Recover the data entered in example 1, transform to logarithms, and store again under a different name.

```
  0 PRINT CHR$(4) "BRUN ARRAY (V 1.1)"
 10 INPUT "ENTER FILE NAME"; F$
 20 & ASSIGN(F$) = Z
 30 M = Z(0)
 40 FOR I = 1 TO M
 50 Z(I) = LOG (Z(I))
 60 NEXT I
 70 INPUT "STORE AS WHAT FILE?"; G$
 80 &REPLACE (G$) = Z
 90 PRINT "LOGS OF"; F$; "NOW STORED IN"; G$
100 PRINT "ANOTHER FILE (Y/N)"; I $
110 IF LEFT$(I$,1) = "Y". THEN &KILL(Z): GO TO 10
120 IF LEFT$(I$,1) = "N" THEN GO TO 200
130 PRINT "I BEG YOUR PARDON?": GO TO 100
200 END
```

Note that there was no need for a DIM statement in this program, as all of the appropriate information was saved with the header; also note that we were able to use a different name for the array. The & KILL command in line 110 reallocates memory so that the program may be used recursively.

Example 3

We finish with an example which is statistically less trivial: the determination of the eigenvalue of greatest modulas for a square array A, stored as a binary file.

```
 10 HOME:VTAB 12: PRINT "GET MAXIMUM ROOT OF MATRIX EA (EP,EP)"
 20 INPUT "ENTER FILENAME"; F$
 30 &ASSIGN (F$) = EA
 40 EP = EA (0,0)
 50 DIM E1 (EP), E2(EP)
130 GOSUB 15000
135 PRINT : PRINT : PRINT
140 PRINT "GREATEST EIGENVALUE IS:"
150 PRINT " "; EX
160 GOTO 32767
15000 REM MAXIMUM EIGENVALUE ROUTINE
15030 GOSUB 15500
15050 EK = 1 / EN
15070 FOR EI = 1 TO EP:E2(EI) = EK * E1(EI): NEXT EI
15090 GOSUB 25000
15120 EX = EN: REM THIS IS THE GREATEST ROOT
15150 RETURN
15500 FOR EI = 1 TO EP:E1(EI) = 1: NEXT EI
15520 EM = 1:EO = 100:EL = 50
15540 EZ = 0.0001
15550 ET = - 1
15560 REM TOP END OF PSEUDO-WHILE
15580 FOR EI = 1 TO EP
15590 ES = 0
15600 FOR EJ = 1 TO EP:ES = ES + EA(EI,EJ)*E1(EJ): NEXT EJ
15620 E2(EI) = ES
15640 NEXT EI
15660 EN = 0
15670 FOR EI = 1 TO EP
15680 IF ABS (E2(EI)) >ABS (EN) THEN EN = E2(E1)
15690 NEXT EI
15700 ES = 0: FOR EI = 1 TO EP:ES = ES + E2(EI) *E2(EI): NEXT EI
15710 EL = ES
15715 IF ABS (EL - EO)<EZ THEN ET = 0
15720 EK = 1 / EN
15730 FOR EI = 1 TO EP:E1(EI) = EK * E2(EI): NEXT EI
15735 EO = EL
15740 EM = EN
15745 IF ET <> 0 THEN 15560
15750 ES = 0
15800 RETURN
25000 REM NORMALIZE E2 S.T. E2'E2 = 1
25010 ES = 0
25020 FOR EK = 1 TO EP:ES = ES + E2(EK) *E2(EK): NEXT EK
25030 ET = 1 / ES: FOR EK = 1 TO EP:E2(EK) = E2(EK) *ET: NEXT EK
25100 RETURN
32767 END
```

FINAL NOTES:

(i) The string must be a string variable, or a string containing no spaces. This idiosyncracy does not constitute any real disadvantage. Thus

&ASIGN ("THIS FILE") = A

will not work, whereas

F$ = "THIS FILE": & ASSIGN(F$) = A

will!

(ii) These commands will also work in immediate mode. This is a considerable help, as a file can then be inspected and edited without writing, debugging and running a program to do so. However, when executed, each command will result in a "SYNTAX ERROR" message being generated; these messages may safely be ignored.

e.g. to change the (7,11) entry in the 2-D file stored as FATACID2.BIN,

```
&ASSIGN("FATACID2.BIN") = A
SYNTAX ERROR
?A(7,11)
 256
A(7,11) = 731.2
&REPLACE("FATACID2.BIN") = A
SYNTAX ERROR
```

(nevertheless, it is stored!)

(iii) If an array is &REPLACEd as a real array, then it must be &ASSIGNed as one. The facility will work with real and integer arrays, but not with strings. Upredictable results will result if this warning is ignored.

(iv) The authors have adopted the convention of generally using a two-dimensional array, of dimensions N, M, and also follow the convention of putting N into position (0,0), M into (0,1), and generally only storing data in elements (i,j) with i and j both greater than 0.

(v) Note that &ASSIGN and &REPLACE take a string as parameter, and have the forms &ASSIGN(F$) = A and &REPLACE(F$) = A whereas &KILL takes the array as parameter and has the form &KILL(A).

(vi) We readily acknowledge the fact that our solution is imperfect, and perhaps incomplete. However, this system does work, and constitutes a major enhancement to the Applesoft language for the data analyst and statistician. Copies of this software, including simple demonstration programs, are available free of charge. A blank diskette, with return postage, should be sent to P. R. Mullins at the Department of Community Health, Auckland University School of Medicine.

Books for the Beeb

By Pip Forer

When you buy any microcomputer there is a time-honoured sequence of events in which you return to a shopping centre at least twice. The first time is the ritual of "buying the right cable". A well-documented variant of Murphy's law states that no matter how well you check it you will find yourself with at least one pair of pieces of equipment without appropriate cables to link them. The second visit is to buy books: books on your machine, its disks, its graphics, its operating system, its assembly language. One suspects that each microcomputer produced spawns several times its own weight in books.

Like electronic-based software, books have become important factors in selling microcomputers. In the past, the machine appeared, then its manuals. Several months later someone cottoned on that the manuals were often hard to read, frequently omitted important specialist notes to save space and often organised the material in an inappropriate way for different sorts of users. The result was a succession of books re-organising the manual (or linking different manuals into one cover) that have proved their worth with the user. To sell a computer today requires that this friendly service be available and most machines appear with co-ordinated guides from independent publishers. The record to date is the Acorn Electron, for which a book on programming it is already advertised before the first machine has passed over the counter.

Here is a quick preview of what is (or is becoming) available. These comments are not meant to be a replacement for a full review, but simply to indicate the range and quality of what is currently published.

Books on BASIC

The first thing people usually want to do after running some demonstration programs is to get into things themselves. For authors, the obvious first thing to provide is a guide to the machine's main language, in this case BBC BASIC. Unlike some other technical areas companies fully document their author languages so that all the information on syntax is to hand. The books therefore re-package this in both a more palatable way and in a way that teaches programming principles as well as syntax. The first book in this class was "30-Hour BASIC" (Clive Prigmore, NEC), marketed with the BBC project and sufficiently successful in the United Kingdom to spawn a Sinclair Spectrum clone edition. Although widely used I find it rather cluttered in presentation and David Graham, the influential reviewer of "Beebug" magazine, rated it very low in use. Also rated low by him has been another front-runner, "Let your BBC Micro teach you to Programme" (Tim Hartnell, Interface). A better reception has been accorded Cryer and Cryer's "BASIC Programming on the BBC Microcomputer" (Prentice-Hall and reviewed in Bits and Bytes recently). Although not an attractive book, it does cover most areas of BBC BASIC including the sound and graphics commands and it does it well. Johnson-Davis's "Practical Programmes for the BBC Computer and the Acorn Atom" (Sigma) is another reasonable text, but suffers from having to cover two somewhat different BASICs.

The most recent addition to the marketplace is Roy Atherton's "Structured Programming on the BBC Computer". This will appeal to Procedure freaks, although they may be appalled to find that in spite of the title the index has several references to that revisionist lackey of the capitalist running dogs, the GOTO statement. Graphics are used at a low level but intelligently as a visual aid to programme structuring. Although certain areas such as sound are treated lightly in this text, it repays investigation and is a pleasant book to work with.

The Belly of the beast

Books about the deeper hardware and software levels of the Beeb books about the belly of the beast, to borrow a phrase from Gerrit Bahlman) are slower to appear and fewer than books on BASIC. Partly this reflects the

YES, YOU CAN AFFORD A PRINTER!

NOW AVAILABLE IN N.Z. — THE AMBER 2400 DOT MATRIX PRINTER

• Serial and Parallel Input • Full graphics capability — each dot individually programmable • Conventional 25 pin "D" type plug • 24 column print on plain paper • Low cost paper (C101 rolls only 70 cents each) • This is **not** a thermal or spark discharge type printer.

Special interface cables may be needed with some home computers — prices available for these on request.

For orders or more information, phone or write to

THE GADGETS COMPANY
P.O. Box 52-081, Auckland.
Phone (09) 862-260
(SOLE N.Z. AGENTS) DEALER ENQUIRIES WELCOME

PRINTER $395.00

NOW AVAILABLE VIC 20 INTERFACE $95.00

ALSO AVAILABLE FROM K'RD VIDEO & COMPUTERS, 65 PITT ST, AUCKLAND 1. PHONE (09) 399-655.

time it takes for hardware details to leak out. Partly it reflects the fact that users take some time to get concerned with deeper things. To the first-time user, the BBC BASIC is an adventure. In fact it is very much like an adventure game such as Dungeons and Dragons, only here learning to operate the machine replaces the maze one explores. Eventually BASIC is not enough and the user discovers certain non-standard calls he can make to unknown parts of the machine that do new things. Once hooked on that, the user explores deeper and deeper, just as the Adventure fan gets drawn ever-deeper into the tunnels of an adventure game.

I can comment on two books designed to set you on the downward road. One is the tantalisingly titled book, "The BBC Micro Revealed" (Rushton/Interface), which purports to tell all about special locations in the machine. Its claims are overblown, and the book is largely disappointing. Much of it is taken up with a list of what lurks in specific locations in memory, usually accompanied by unhelpful comments on why you might wish to know this (and even why it is totally useless to). The air of haste and shallow depth displayed by this book is heightened by the fact that large proportions of many of the pages are left blank. Perhaps 15 percent of the book is public open space. The alternative read is Mike James's "The BBC Micro: An Expert Guide". This is a far better book with a good review of some of the BBC's hardware features. Although not exhaustive (no small book could be) it gives a very good overview for the comparative novice.

Assembly programming

At the bottom of each maze is an assembly-language programmer. That is when you stop talking English to your machine (and your wife and friends soon after). If this is your fate then you have a true Michelin guide available in "Assembly Language Programming for the BBC Microcomputer" (Birnbaum/McMillan). Not only does it intrigue me (and I am very suspicious of an argument which says I must speak like a machine to get a machine to do what I want) but every reviewer and comprehensible assembly language programmer I have spoken to rates it highly. Stacks of good listings, too!

Graphics

Actually there are not many specifically graphics books out yet, although several publishers have contracts out for them. The main offering so far are the units on graphs and charts and creative graphics put out by the BBC and Acornsoft in conjunction with the original BBC launch, (Harding/Acornsoft and Cownie/Acornsoft respectively). These are available as books and as tapes of programs. Between them they form a good, if somewhat fragmentary, introduction to the intitial and intermediate levels of BBC graphics applications. The Cryers are rumoured to be just finishing a text on BBC graphics and this may be the first independent volume specifically on graphics features.

Magazines

A more fragmentary resource, but a useful one for new ideas and hints, is magazines. Apart from the general magazines, almost all of which in Britain carry regular and irregular BBC features, there are several specialist volumes. The best known are "Acorn User", "BBC User" and "Beebug". My preference is in reverse order to citation. "Acorn User" has the misfortune to share its space with other machines from Acorn, although the BBC dominates. It is a little sycophantic. "BBC User" is straighter and pure BBC. Both are glossy and printed on A4 paper with full colour. "Beebug" is the newsletter of the BBC Users' group. The British group now numbers over 17,000 members. It costs $55 air mail to New Zealand. It is smaller than the other two and less glossy but also more critical and writes at a technically deeper level.

Printed resources

The general picture is that already there is a lot of good help out there . . . and more is coming. There is one aside to this list of books. In general, the first independent books out (Cryer and Cryer excepted) come from small, specialist publishers. Some of these are excellent, but some are very poor. The larger, established publishers are slower to print but their average quality is more dependable.

Anyway, buying books is the easy part. Browsing books in a store is far simpler than browsing software. Software units are more numerous and far more difficult to evaluate than books.

BBC
NOW AVAILABLE AT
COMPUTER PLUS
103B Riccarton Rd, Christchurch
Ph. 488-519, P.O. Box 8100

See our free offer on page 4

BBC
Computer now available — $1995

Over 100 programs in stock from Acornsoft, Superior Software, Bug-Byte, IJK, Program Power.
Acorn User, books, plugs, leads, lightpens, joysticks, printers, disc drives, Eprom programmer.

FREE Pair of Joysticks with every BBC

SAE for list to: COMPUTECH SYSTEMS, PO Box 5986, Wellesley St., Auckland.

SINCLAIR

Serpent Catcher

By DAVID J. SMALL

You must get to the island without being spiked by the appearing-disappearing asterisks. Each time you reach and leave the island you get points.

```
 1 Let z = 0
 2 Let x = 14
 4 Let r = 100
 5 REM BY DAVID J. SMALL
 6 Print "SERPENT CATCHER $$$"
10 Print At 15,0;"**= - - - - -
- - ==- *
20 Print At x,z;"$"
25 Let g=INT(RND*19)
28 Print At 15,g;"**"
30 If inkey$="8" then let z=z+1
35 If inkey $="5" then let z=z-1
38 Print At x,z-1; " "
39 Print At x,z+1;" "
50 Print At x,28;"+"
52 If z=25 then let r=r+1
54 If g=z then let r=r-1
55 Goto 60
65 Print At 8,10;"$ ";r;" "
66 Print "BY DAVID J. SMALL"
67 Goto 10
```

* — (subtraction signs) are inverse spaces (two spaces apart).
"8" key to move right.
"5" to move left.

TIMEX 81

A program to make the ZX81 (1k) a digital watch. From C.J. MURPHY.

```
1 Rem "Timex 81"
2 PRINT AT D,10; "MIN"
3 Input B
4 PRINT ATI, 10; "HOUR"
5 Input C
6 PRINT AT2, 10; "DAY"
7 Input D
10 CLS
20 FOR A = O TO 59
30 PRINT AT 5, 10; A; "SEC"
40 IF A = 59 THEN GOSUB 1000
45 FOR X = 0 TO 24 STEP 1.2
46 NEXT X
50 NEXT A
60 GOTO 20
1000 LET B = B + 1
1010 PRINT AT 10,10; B; "MIN"
1020 IF B = 60 THEN GOSUB 2000
1030 IF B = 60 THEN LET B = O
1035 IF B = O THEN PRINT AT 10,10; B;
"MIN"
1040 RETURN
2000 LET C = C + 1
2010 PRINT AT 15, 10; C; "HOUR"
2020 IF C = 24 THEN GOSUB 3000
  2030 IF C = 24 THEN LET C = 0
2035 IF C = O THEN PRINT AT 15, 10; C;
"HOUR"
2040 RETURN
3000 LET D = D + 1
3010 PRINT AT 20,10; D; "DAY"
3020 RETURN
```

SINCLAIR ZX81
NOW ONLY $149.95
AT
COMPUTER PLUS
103B Riccarton Rd, Christchurch
Ph. 488-519, P.O. Box 8100
See our free offer on page 4

Spectrum ZX81 GAMES

3D MONSTER MAZE -ZX81	$16-50
3D DEFENDER — ZX81	$16-50
BREAKFAST 1K/16K	$12-50
3D TUNNEL —SPEC. 16/48K	$22-50
ESCAPE — SPEC. 16/48K	$22-50
(NEW) 3D KNOT — SPEC. 48K	$23-50

CASSETTE BLANKS GUARANTEED — LOW DROP-OUT
C-10 BOX OF 10 $19.65
POSTAGE AND PACKAGING $1.10

TO: MICRO 81"
P.O. BOX 800-75, AUCKLAND 7.

BBC micro Users Torch Z80 Disc Pack

Turbocharge your BBC microcomputer with Z80 power and twin 400K disc drives

The Torch Z80 Disc Pack comprises an extra 64k RAM and 16K ROM (containing the Torch CP/N operating system) and the twin 400K disc drives.

The extra Z80 dual processor unit allows the existing 6502 processor to handle all peripherals simultaneously giving the BBC micro much more power.

The dual discs hold a total of 800K and are easily connected to the BBC micro via the 'Tube' and disc interface sockets.

The operating system CP/N (Control Program Nucleus) appears identical to CP/M.* Micropro, Microfocus, Microsoft, wordprocessing, desk diary, cardex and most CP/M software in stock. Ask for mailing list.

The smart steel case is strong enough to support a monitor and contains a switchmode power supply.

For more information or a Torch Z80 Disc Pack complete the coupon or phone 03-61275

To Computerpoint (NZ) Ltd
P.O. Box 25091 CHRISTCHURCH
Please send me information immediately on
☐ the Z80 Disc Pack
☐ the BBC Microcomputer
Z80 Disc Packs only $2995
BBC Model B plus Disc Pack only $4995
Please despatch to me immediately —
☐ ..... qty Z80 Disc Pack
☐ ..... qty BBC plus Disc Pack
I enclose cheque No. _____
Name _____
Address _____
SIGNATURE _____

Beginner 80 graphics

"Introduction to TRS-80 Graphics", by Don Inman. dilithium Press, 1979. $19.95. Reviewed by Gordon Findlay.

This is one of a number of books published by dilithium specifically for the TRS-80 owner. Obviously, it deals with graphical output and display. It is a self-instructional volume of 142 pages, suitable for the beginning programmer. Only **BASIC** is used in the examples, which are designed to be entered into the computer, and worked with as the book is read. Suggestions for extensions are given at the end of each chapter.

The first two chapters explain, carefully and clearly, both **PRINT AT** and **SET/RESET** graphics, and the two co-ordinate systems used in the **TRS**-80. The text moves on to the drawing of vertical and horizontal lines, and of rectangles. Bar graphs are briefly considered, then diagonal lines.

Simple animation, performed by removing and inserting pixels is discussed, along with the drawing of "curves" and triangles. Geometrical shapes such as parallelograms and trapezia are covered in depth.

Throughout the book the examples include simple games and video displays to appeal to the hobbyist rather than the professional. The example programs are developed carefully, with full explanations of the way they were devised. These explanations are the most valuable aspect of the book, being very clear and thorough explanations of the programmer's thinking.

The book was written for Level 1 **BASIC** originally, but has been updated to level 2 in an appendix. This causes no real difficulty, provided that you glance at the appendix first.

While the book isn't state of the art, and certainly won't put you in the Big Five league, it contains plenty of information which will be useful for the beginner with a **TRS**-80, model I or III, or a System-80.

The world of robots

"The Year of the Robot" by Wayne Chen. $15.95, dilithium Press. 182pp.

"Robots on Your Doorstep: A Book About Thinking Machines" By Nels Winkless and Iben Browning. $15.95. Robotics Press. 178pp.

"Handbook of Advanced Robotics" By Edward L. Safford, Jun. $31.95. TAB, 468pp.

Reviewed by Neill Birss

Robots should interest most personal-computer enthusiasts. They are also of growing importance to the country, and to the world. At present the 20 per cent of our labour force in manufacturing faces a decade in which jobs will be restructured by these machines and by other automation. Apart from eliminating many jobs, especially the boring and repetitive ones, robots will create new careers in programming, engineering, management, and maintenance. All educationists should be seeking to acquaint their students with this new field. And apart from this serious aspect, they do and will provide increasingly provide, a fascinating hobby, particularly for those with interests in both microcomputing and practical mechanics.

The Chen book is a strange mixture. It is half stimulation and mind-extending, and half junk. The good half is the interesting and individualistic approach to the subject, with a fascinating analysis of the human world using new concepts from robotics. Chen is described in the blurb as an educator-philosopher-engineer, and as he continually re-defines what a robot is, and introduces new concepts, all three of the fields in his background are brought into play.

The junk in the book is the banal novel that makes up the second part. The publishers should have left it out and used the lower production costs to reduce the retail price.

Winkless and Browning have written an interesting book in "Robots on Your Doorstep," but much of it is digressive. The authors, robotics pioneers both, set out to teach partly by a series of letters between two characters. This is an interesting book, for what the authors have to say is not dross, but there is a lot of literary meandering. At times I wished they could have

Computer Camps
for school children
August 21st-28th
Telephone 606-079
P.O. Box 68083 Auckland
Computer Camps Ltd.

Scorpio Books
Interested in leaving this world?
try Dungeons & Dragons
Traveller
Tunnels & Trolls
Chivalry & Sorcery
Thieves World
Arduin Grimoire
& many more
One of these role playing systems must be the key for you.
Send S.A.E. for a booklist
We can help you!
one hereford st 6 oxford tce
phoenix house, christchurch phone 792 892

UNIVERSITY BOOK SHOP
Specialists in COMPUTER BOOKS
Over 1000 titles in stock
PHONE OR WRITE: VISA/BANKCARD
STUDENT UNION BUILDING
34 PRINCES ST AND 34 KITCHENER ST
AUCKLAND 1
TELEPHONE 771 869

put their message into a straightforward, perhaps dull, but quickly assimilated, textbook style. The book is quite strong in its introduction to artificial intelligence, and the reader will learn some interesting things about the human brain, too.

For facts on robotics, the book to buy is Safford's "Handbook of Advanced Robotics." And don't be put off by the word, advanced. Most micro users should have little trouble in understanding this book. It introduces the concepts of robotics, looks at arms, hands, programming, radio control, and sensor systems. It even has a section on numerically controlled machines, which have made an immense impact in manufacturing, but remain little known to the 80 per cent of the population outside the field. Some of the devices used for illustration are probably already outdated (the book was published only in 1982). And this book is not so entertaining to read as the others in this review. But it is full of facts, put forward in a plain, readable style. It should be on shelves of the libraries of all high schools, polytechnics, and universities. It would also be a worth-while addition to the home-computer owner building a library.

If you want entertainment and intellectual stimulation, buy the Chen and Winkless/Browning books, especially the latter.

PET book good in parts

"Parlez-vous BASIC?" by R.J. Campbell and M.R. Ellis, Palmerston North Boys High School, 1983. Published by the authors; available through "Bits & Bytes" Book Club. $9. 115 pages. Reviewed by Steven Darnold.

Computers are entering New Zealand secondary schools in ever-increasing numbers, and teachers are faced with the task of teaching computer awareness and computer programming. Naturally, more and more computer books are appearing in educational book displays, but most of these are from overseas and many are expensive.

"Parlez-vous BASIC" is a welcome change from the usual run of computer books. It is a do-it-yourself effort by teachers at Palmerston North Boys' High School. The A4-sized pages have been run off on a Gestetner, and the binding is only staples and tape, but the authors have made a real effort to make the book attractive and useful. Chapters start with a cartoon and/or amusing quotation; chapters end with projects and questions (answers provided at the back). There are lots of diagrams and charts, and there is even a three-page index.

"Parlez-vous BASIC" is written as a textbook for teaching programming. The version being reviewed is for a Commodore PET with 4.0 ROMs. Since the PET is not on the Department of Education's list of five recommended computers, this version of the book will not be of interest to many schools. I do not know whether versions of "Parlez-vous BASIC" are available for other computers.

After flipping casually through "Parlez-vous BASIC", I liked it. However, once I read it in detail, I was disappointed. Teaching programming is not an easy task. Some pupils dive into programming enthusiastically and require little more than a list of BASIC keywords. Others, however, require a careful, step-by-step approach to programming. Unfornately, "Parlez-vous BASIC" fails to provide a careful, step-by-step approach.

When a pupil sits down at the computer for the first time, there are several things he needs to know before he can start writing programs. He needs to be told how to use the keyboard and how to use direct commands like NEW and LIST. Unfortunately, "Parlez-vous BASIC" leaves a discussion of editing keys to Chapter 10 and spends 12 pages writing programs before covering direct commands.

Most pupils learn a new subject more readily if the simpler aspects are presented first. Then, as their

Turn to page 50

COMPUTER BOOKS

Our Best SELLER for 1983 Only $12.95

EXPECTED SOON

ABC's of I.B.M.

Your first steps with I.B.M. P.C. taken with ease. Learn how to use every feature for business, home and education. $22.95

Z80 APPLICATIONS

With just an introductory level of Z80 programming and this book – it is just another step to use techniques described for own application – engineering, technical & hobbyists.

We represent SYBEX and DILITHIUM. Two world respected publishers of computer books.

TO: Australia and New Zealand Books, BOX 33-406, AUCKLAND

Please send me your regular newsletter on computer books

NAME:.....

ADDRESS:.....

.....

BITS 7

COMPUTASHOP.

COMPUTER PLUS

103B Riccarton Road
Phone 488-519

independent computer specialists

• GAMES • EDUCATION • BUSINESS
• HOUSEHOLD BUDGETS

B.B.C. ★ ZX81 ★ ZX SPECTRUM ★ ATARI ★ TELEVIDEO ★ DEC

MicroAge MicroPro DISTRIBUTOR FOR N.Z.

* WordStar	$595	* SpellStar	$322	* MailMerge	$216
* DataStar	$440	* CalcStar	$380	* ReportStar	$410

IBM PC AND APPLE FORMATS AVAILABLE
MicroAge International (NZ) Ltd
P.O. Box 13-054 353-357 Hereford St, Christchurch.
Phone 891-109

SoftSide $6

The magazine for APPLE, ATARI, TRS80/SYSTEMS 80 Users
Available from March 1982 onwards @ $6/issue post free in NZ.

TME TARANAKI MICRO ELECTRONICS

CENTRECOURT BUILDINGS, NEW PLYMOUTH, PHONE 84-067
N.B. School orders accepted

KAYPRO II Portable Computer
COLOMBIA MPC 16 Bit Computer
Sole South Island distributors

TURNERS Ltd

P.O. Box 1021 Christchurch
Phone 794-820

AVM ELECTRONIC

FOR THE LATEST IN MICROCOMPUTERS
COMMODORE 64 & VIC20
ATARI
SINCLAIR

Lay Buy
Easy Terms
Trade-ins

EARN 14½% INTEREST WHILE YOU SAVE

149 HEREFORD STREET, CHRISTCHURCH PHONE 797-279
(Opp. Reserve Bank)

MICROSHOP

OFFICE REQUISITES LIMITED

apple computer
Authorized Dealer

JUST ARRIVED

APPLE II Plus pre-owned systems
48K, disk drive, screen

***ONLY* $2700**

GENERAL FINANCE BUILDING
CORNER WARING TAYLOR
AND FEATHERSTON STREET
P.O.BOX 3410 WELLINGTON
TELEPHONE 721-902

COMMODORE 64

Now Available From
JAMES ELECTRONICS Ltd

Pollen St
Box 527
THAMES
Ph. 86-893

$1295

Games Cassette—5 Games
Snake, Concentration, Ball in Bucket,
Maths Game and Line Game
ONLY $25 post-paid

Also available payroll and cashbook programs. Write for details.

VIC 20

JAMES ELECTRONICS LTD
POLLEN ST
BOX 527
THAMES
Ph. 86-893

NOW $595

Games tape 1. (needs 8k exp)
Snake-Maths Game-Ball in Bucket
Games tape 2. (no exp reqd)
Formula 1 - Concentration-Line Game
$15 each p&p $1

Also available for VIC20 Payroll and Cashbook programs. Write for details.

More about PIPS-III

By PETER HYDE

PIPS-III's "SET" command allows you to control the system in many useful ways. For example, entering:
SET; BELL = ON
will turn on a key-beep tone which will sound each time a key is pressed. To turn it off, enter:
SET; BELL = OFF

The kind of printer you use is also selected by the SET command. For example, when you enter PIPS, the standard setting is:
SET; PRT = P/O

This means you have a parallel printer with Sord graphics, and do not require extra linefeeds each time a line is printed. An example of this would be the Sord SLP-160 printer. If you have a different parallel printer, you may wish to enter something like:
SET; PRT = P/N/3
indicating it is parallel, does not have Sord graphics, and you want an extra linefeed for every line printed. Finally, if you have a serial printer, you may enter:
SET; PRT = A/N/O

Serial printer connected to the "A" channel, does not have Sord graphics, and no extra linefeeds. In this case, you must make sure you enter this setting each time you enter PIPS, otherwise all printouts will be directed to a non-existent parallel printer.

If you have to interrupt a selected printout, you press the SHIFT and RESET keys at the same time. This will bring you back to the "SELECT COMMAND =" mode. To make sure the printer has emptied its storage buffer, and to set it up for the next printout, you may wish to enter:
SET; PRT = /OAOC

This sends an "OA" (linefeed) then an "OC" (formfeed) character to your printer.

Another example. The SLP-160 normally prints 136-column lines. As the maximum page width in PIPS-III is 150 columns, you need to tell the printer to enter compressed print mode to print maximum sized pages. This is done by entering:
SET; PRT = /16

The "16" code means the SLP-160 will now print 166 characters per line — more than enough for PIPS-III pages. If you do not have a SLP-160, consult your printer manual for information on what codes to send.

To avoid having to enter all this setup information each time you load PIPS, have it done automatically. For example, on page 1 of your data disk you may have this program:
<SETUP>
SET; PRT = P/N/0; SET; PRT = /07;
SET; BELL = ON; SET; KEY = ;G;2;STOP

Don't forget to register the program by entering:
AS; R; 1
when the page is in the buffer in front of you!

This program initialises a few setup options, then gets and displays page 2 (which may contain a logo, menu, or list of instructions). It then returns to "SELECT COMMAND =" so that you can begin your normal processing.

Each time you load PIPS, you can run this program by entering:
AU#SETUP

However, an even easier way exists, involving the use of the function keys (see the "PF" command in your manual).

To make the whole process automatic, enter:
PF; 13;/AU#SETUP
and press RETURN.

The " " symbol represents a space and must be present for this method to work. From now on, WHENEVER PIPS is loaded, it will do the command programmed in function key 13, namely: AU#SETUP. Any command you enter on this key will be automatically executed, provided you precede it by a "/" (slash) and follow it with a space.

PIPS-II users will find that all of these features work just as well in PIPS-II as in PIPS-III.

THE N.Z. COMPUTER GAMES CLUB

CALLING ALL HOME COMPUTER and HOME VIDEO GAMES SYSTEM OWNERS

MEMBERSHIP OF THE N.Z. COMPUTER GAMES CLUB MEANS YOU CAN:

1. Hire computer and video games to try in your home before purchasing.
2. Hire games on a weekly basis at a fraction of their cost and exchange for different games when you wish.
3. Purchase games by mail from the largest selection in N.Z. at discount prices.

Fill In The Form Below For Details Of Cost, Titles Available Etc.

Post to : THE N.Z. COMPUTER GAMES CLUB,
P.O. Box 93, Rangiora. Phone 6200 Rangiora.

Name _____
Address _____
_____

ATARI 400/400 ☐ APPLE ☐ VIC 20 ☐ WIZZARD ☐
SYS 80 TRS 80 ☐ ZX81 ☐ TUNIX ☐
ATARI CX2600 ☐ PET ☐ FOUNTAIN ☐ BBC ☐

BOOKS

From page 47

confidence and understanding grows, they are better able to deal with the more difficult aspects. Most pupils find subscripted variables among the most difficult aspects of BASIC programming. I was astonished to find subscripted variables introduced on page 5 of "Parlez-vous BASIC". I was similarly surprised at the coverage given to Boolean operators, "forbidden" characters and complicated disk file handling.

Some pupils get confused if they are shown something and then told to forget it. Generally it's better not to show them in the first place. It is on this basis that I would criticise "Parlez-vous BASIC" for detailing a flowchart and then saying "we recommend that you don't use flowcharts." Similarly, many pupils will have difficulty reconciling the book's stern insistence on indenting loops three spaces with the fact that these spaces disappear when the lines are listed.

"Parlez-vous BASIC" has some good sections in it and it may indeed be a useful resource if used selectively. However, any teacher who expects to teach programming by going through it page by page will probably have a very rough time.

All books for review must be sent direct to "Bits & Bytes." Inquiries to reviews editor, Box 827, Christchurch. Please include details of recommended retail price and availability.

Coming Up in BITS & BYTES

Hardware reviews:

Proteus — the New Zealand produced business computer
Franklin Ace — the American rival to the Apple

Software reviews:

VIC games
Wordprocessing packages
Commodore 64 software available
CalcStar
Programming — some tips on debugging

CLASSIFIEDS

FOR SALE: Exatron Stringy Floppy plus several wafers and software. Perfect condition. Offers. Upper Hutt 282-182.

Sinclair Club: Software for 1K and 16K available. Contact: Peter McCarroll, 11 Miro Street, Lower Hutt. Phone 662-410.

SHARP Pocket Computer PC1500, for sale, complete with 4 colour printer and cassette interface CE 150. Also extra memory module CE 155 (8K Byte RAM). Charger unit, and manuals, with carry cases. All new, for reasonable price, phone Auck. 480-523 or write, 44 Coroglen Ave, Auck. 10.

FOR SALE: PDP 11/10 Minicomputer with RKO5F (5m bytes). Fixed disk and RK05J (2.4m bytes) removable cartridge disk. All offers considered. Phone Christchurch 558-849 (evenings).

MICROBEE

From page 31

Plimmerton school. No further details yet, but it may be published locally.

I have heard of these MicroBee applications/add-ons so far. Please write to me if you have something which would be of interest to other users.

Two or three technicians at the Post Office in Wellington have got the EA SC-01 votrax voice synthesiser project operating successfully and have been experimenting with text to speech software.

They have also successfully used the Byte music and sound effects synthesiser board (Texas SN76489 chip). I am having mixed success with this board myself.

A couple of local teachers have been transmitting MicroBee programs over the 2M band (146MHz) between Waikanae and Raumati. Most of a program was also picked up in the Wairarapa via a repeater station. I hope to have further data on these developments.

If you've got anything you think could interest other MicroBee users, write to: Shayne Doyle, 18 Holdsworth Ave, Upper Hutt.

TRS 80 Orchestra-85. Stereo music synthesiser. Plugs on to expansion connector $160. Ph. (9) 267-6786.

1802 User Enthusiasts: All those with 1802 computer systems ETI 66 or Cosmac VIP etc who wish to correspond via a circulating letter. Contact Brian Conquer, Box 27206, Mt Roskill, Auckland. SAE welcomed.

FOR SALE: VIC 20 with tape cassette and Avenger, Super Expander, Sargon II chess, Cosmic Cruncher, 8K expansion character and games graphics editor cartridges plus several business and games tapes. Owner has purchased a VIC 64. Warranted in perfect order. D.P. McVay, 40 Esk St., Tauranga. Phone 83-121.

WANTED: Applesoft Adventures to swap with other Applesoft Adventures.
WANTED: Any Apple Computer Graphics Art Programs. Contact Robin Benson, 48 Maungaraki Rd., Korokoro, Wellington.

SHARP PC-3201 user would like to contact other owners of this model with view of exchanging information and programmes. G. Somerville, R.D.2, Kaiapoi. Phone 7616, Kaiapoi.

FOR SALE: ETI 660. 3K RAM, colour, $150. A. Swinn, 6b Matariki, Wainuiomata. Phone 645-694.

For Sale: Commodore 4016, 32K, Cassette Deck, speed chip, various programs, sound. Write D. Emerson, 25 Ventry Street, Alexandra.

Microbee Users: Interested in forming a users group? Contact Stuart Young, 67 Wipere Street, Gisborne. Ph 81-035.

FOR SALE: Apple Visicalc, new. Offers to Belvoir, 9 R.D. Waimate.

FOR SALE: NEC PC8000 colour computer and green screen, 32K RAM 24K ROM, featured in April issue. $1900.00. Phone Dunedin 775-979.

CLUB CONTACTS

BBC MICROCOMPUTER USERS GROUP OF NZ, P.O. Box 9592, Wellington. Local meetings:— Auckland: 2nd Wednesday of the month at VHF Clubrooms, Hazel Ave, Mt Roskill. Ph: Dave Fielder 770-630 ext 518 (b). Wellington: 4th Thursday of the month at the Correspondence School staffroom, 1st floor, Portland Cres, Thorndon, 7.30pm. Ph: Anton, 286-289.

HEATH/ZENITH: The following person is interested in forming a Heath User's group, and would like to hear from other users of the brand. Robert Siebers, 94 Dowse Drive, Maungaraki, Lower Hutt.

SERADO & HART APPLE COMPUTER CLUB, Kerikeri High School, Kerikeri. Lessons, 12:15 to 1:15 weekly. Contact: S. Shearman 79-882 (Kerikeri) or Fairway Drive, Kerikeri.

WHANGAREI COMPUTER GROUP: Tom Allan, 3 Maunu Rd, Whangarei. Phone 83-063 (w). Meets every second Wednesday of the moth at Northland Community College.

NZ MICROCOMPUTER CLUB INC. P.O. Box 6210, Auckland. The monthly Meeting is held in the first Wednesday of each month at the VHF Clubrooms, Hazel Ave., Mt Roskill, from 7.30pm. Visitors are also welcome to the computer workshop in the clubrooms, 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.

Other active user groups within the club are:

APPLE, CP/M, DREAM 6800, SMALL BUSINESS, KIM, LNW, SORCERER, 1802 and 2650. They can all be contacted at club meetings or via NZ Microcomputer Club, P.O. Box 6210, Auckland.

APPLE USERS' GROUP: Bruce Given, 12 Irirangi Rd., One Tree Hill. Phone 667-720 (h).

ATARI MICROCOMPUTER USERS GROUP: Brian or Dean Yakas. Phone 8363 060 (h). Meetings: Second Tuesday.

BBC USERS' GROUP: Dave Fielder, Phone 770-630 ext 518 (w).

BIG BOARD USER GROUP: Steve Van Veen, Flat 5, 111 Melrose Rd, Mt Roskill, Auckland 4. Phone (09) 659-991 (h).

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

COMMODORE USERS' GROUP: Doug Miller, 18 Weldene Ave., Glenfield. Phone 444-9617 (h), 497-081 (w). Meetings: Third Wednesday.

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

DREAM 6800 USERS: Peter Whelan, 22 Kelston St, New Lynn, Auckland. Phone (09) 875-110 (h).

KIM USERS: John Hirst, 1A Northboro Rd, Takapuna. Phone (09) 497-852 (h).

LNW USERS: Ray James. Phone (09) 30-839 (w), 585-587 (h).

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

SORCERER USERS' GROUP (NZ): Selwyn Arrow. Phone 491-012 (h). Meetings: Micro workshop.

SORD USERS' GROUP: Graeme Hall, 5 Brouder Place, Manurewa (266-8133) (h).

1802 USERS' GROUP: Brian Conquer. Phone 655-984 (h).

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

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): Ray Clarke, 1 Dundas Pl., Henderson. Phone 836-9737 (h).

APPLE user group: Don Hagen, 70 Hapua St, Remuera, Auckland 5, 546-748 (h) 547-180 (b). Meetings: 4th Tuesday, odd months.

CMUG (Combined Microcomputer Users' Group): This is an association of Microcomputer Clubs, Groups, etc, formed to co-ordinate activities and to give a combined voice on topics concerning all micro users. Representation from all Clubs and Groups is welcomed to: CMUG C/- P.O. Box 6210, Auckland.

EPSON HX20 USERS' GROUP. Contact: C.W. Nighy, 14 Domett Avenue, Epsom, Auckland. (Ansaphone, 774-268.)

HP41C USERS' GROUP (Auckland): C/- Calculator Centre, P.O. Box 6044, Auckland: Grant Buchanan, 790-328 (w). Meets third Wednesday, 7pm, at Centre Computers, Great South Rd., Epsom.

NZ TRS-80 MICROCOMPUTER CLUB: Olaf Skarsholt, 203A Godley Rd., Titirangi. Phone 817-8698 (h). Meets first Tuesday, VHF Clubrooms, Hazel Ave., Mt Roskill, Auckland.

OSI/BBC USERS' GROUP Secretary, Ken Harley, 77 Boundary Road, Auckland, 7. Meets 3rd Tuesday, VHF Clubrooms, Hazel Ave, Mt Roskill.

SYMPOOL (NZ SYM USER GROUP): J. Robertson, P.O. Box 580, Manurewa. Phone 266-2188 (h).

A.Z.T.E.C.: Brian Mayo, Church Street, Katikati. Phone 490-326. Members use all micros and the club has just bought a Wizzard.

TAURANGA MICROCOMPUTER CLUB: C. Ward, secretary, P.O. Box 6037, Tauranga. Phone 89-234.

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

ATARI 400/800 USER CLUB: Dave Brown, P.O. Box 6053, Hamilton. Phone (071) 54-692 (h).

HAMILTON SUPER 80 USERS': Bruce White, 13 Pollen Crescent, 436-878 (h).

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

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 8556, Waitara.

HAWKE'S BAY MICROCOMPUTER USERS' GROUP: Bob Brady, Pirimai Pharmacy, Pirimai Plaza, Napier. Phone 439-016.

MOTOROLA USER GROUP: Harry Wiggins, (ZL2BFR), P.O. Box 1718, Palmerston North. Phone (063) 82-527 (h).

MICRO AND PEOPLE IN SOCIETY (MAPS): Levin, meets on second and fourth Thursday of each month. D. Cole, 28 Edinburgh Street, Levin. Phone 83-904, or W. Withell, P.O. Box 405, Levin.

WAIRARAPA MICROCOMPUTER USERS' GROUP: David Carmine. 64 Herbert St., Masterton. Phone 86-175.

CENTRAL DISTRICTS COMPUTERS IN EDUCATION SOCIETY: Rory Butler, 4 John Street, Levin, (069) 84-466, or Margaret Morgan, 18 Standen Street, Karori, Wellington, (04) 767-167.

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

BBC USER GROUP: Users of other machines welcome too. Write P.O. Box 1581, Wellington, or Phone 861-213, Wellington.

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.

OSBORNE USER GROUP: Dr Jim Baltaxe, C/- 75 Ghuznee Street, Wellington 1. Phone (04) 728-658.

N.Z. SINCLAIR USERS' GROUP: P.E. McCarroll, 11 Miro Street, Lower Hutt.

NZ SUPER 80 USERS' GROUP: C/- Peanut Computers, 5 Dundee Pl., Chartwell, Wellington 4. Phone 791-172.

OHIO USERS' GROUP, Wellington. Secretary/Treasurer: R.N. Hislop, 65B Awatea Street, Porirua.

ATARI USERS' GROUP, Wellington: Eddie Nickless. Phone 731-024 (w). P.O. Box 16011. Meetings: first Wednesday of month.

WELLINGTON MICROCOMPUTING SOCIETY INC.: P.O. Box 1581, Wellington, or Bill Parkin (h) 725-086. Meetings are held in Wang's Building, 203–209 Willis Street, on the 2nd Tuesday each month at 7.30pm.

WELLINGTON SYSTEM 80 USERS' GROUP: Meets 2nd and last Tuesdays of month.

NELSON MICROCOMPUTER CLUB: Dr Chris Feltham, Marsden Valley Rd, Nelson. Phone (054) 73-300 (h).

NELSON VIC USERS' GROUP: Peter Archer, P.O. Box 860, Nelson. Phone (054) 79-362 (h).

BLENHEIM COMPUTER CLUB: Club night second Wednesday of month. Ivan Meynell, Secretary, P.O. Box 668. Phone (h) 85-207 or (w) 87-834.

CHRISTCHURCH ATARI USERS' GROUP: Contact Edwin Brandt. Phone 228-222 (h), 793-428 (w).

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

CHRISTCHURCH PEGASUS USERS' GROUP: Don Smith, 53 Farquhars Rd, Redwood, Christchurch. Phone (03) 526-994 (h), 64-544 (w), ZL3AFP.

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

OSI USERS' GROUP (CH): Barry Long, 377 Barrington St., Spreydon, Christchurch. Phone 384-560 (h).

CHRISTCHURCH SINCLAIR USERS' GROUP: Mr J. Mitchell, Phone 385-141, P.O. Box 33-098.

CHRISTCHURCH COMMODORE USERS' GROUP: John Kramer, 885-533 and John Sparrow. Phone 896-099.

ASHBURTON COMPUTER SOCIETY: Mr J. Clark, 52 Brucefield Avenue.

SOUTH CANTERBURY COMPUTERS' GROUP: Caters for all machines from ZX81 to IBM34. Geoff McCaughan. Phone Timaru 84-200 or P.O. Box 73.

NORTH OTAGO COMPUTER CLUB: Contact: Peter George, P.O. Box 281, Oamaru. Phone 29-106 (b) 70-646 (h).

LEADING EDGE HOME COMPUTER CLUB: Elaine Orr, Leading Edge Computers, Plaza Theatre Mall, 236 George St, Dunedin. Phone 771-852 (w).

DUNEDIN VIC USERS' GROUP: Terry Shand, 24 Bremner Road, Fairfield. Phone (024) 881-432. Meetings last Thursday of month.

DUNEDIN SORD USERS' GROUP: Terry Shand. Phone (024) 771-295 (w), 881-432 (h).

CENTRAL CITY COMPUTER INTEREST GROUP: Robert Edgeler, Eclipse Radio and Computers, Box 5270, Dunedin. Phone 778-102. Meetings every second Tuesday.

SOUTHLAND COMMODORE USER GROUP: (VIC 20 and 64s). Address: C/- Office Equipment Southland, Box 1079, Invercargill.

***NOTE** If your club or group is not listed, send the details to Club Contacts, BITS & BYTES, Box 827, Christchurch. The deadline for additions and alterations is the seventh of the month prior to the month of publication.*

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

If its micro news in Wellington — telephone Shayne Doyle, 280-33 ext. 892 or 278-545

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 structure common to most high-level languages. Characterised by each element in the array having a specific index.

BASIC: Beginners' All-purpose Symbolic Instruction Code. The most widely used, and easiest to learn, high level programming language (a language with English-like instructions) for microcomputers.

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.

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".

Character: Letters, numbers, symbols and punctuation marks each of which has a specific meaning in programming languages.

Chip: An integrated circuit etched on a tiny piece of silicon. A number of integrated circuits are used in computers.

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.

CP/M: A disk operating system available for microcomputers using a particular microprocessor (that is the 8080 and Z80 based microcomputers such as the TRS 80 and System 80). See also Disk Operating Systems.

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.

Disk: A flat, circular magnetic surface on which the computer can store and retrieve data and programs. A flexible or floppy disk is a single 8 inch or 5¼ inch disk of flexible plastic enclosed in an envelope. A hard disk is an assembly of several discs of hard plastic material, mounted one above another on the same spindle. The hard disk holds up to hundreds of millions of bytes – while floppy disks typically hold between 140,000 and three million bytes.

Disk drive: The mechanical device which rotates the disk and positions the read/write head so information can be retrieved or sent to the disk by the computer.

Diskette: Another name for a 5¼ inch floppy disk.

Disk operating system: A set of programs that operate and control one or more disk drives. See CP/M for one example. Other examples are TRSDOS (on TRS 80) and DOS 3.3 (for Apples).

DOS: See Disk Operating System.

Dump: Popular term for sending data from a computer to a mass storage device such as disks or tape.

Execute: A command that tells a computer to carry out a user's instructions or program.

File: A continuous collection of characters (or bytes) that the user considers a unit (for example on accounts receivable file), stored on a tape or disk for later use.

Firmware: Programs fixed in a computer's ROM (Read Only Memory); as compared to software, programs held outside the computer.

Hardware: The computer itself and peripheral machines for storing, reading in and printing out information.

High-level language: Any Englishlike 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).

Input: Any kind of information that one enters into a computer.

Input device: Any machine that enters information into a computer. Usually done through a typewriter like keyboard.

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".

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).

Machine language: The binary code language that a computer can directly "understand".

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 mircrocomputer 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.

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.

Personal computer: A small computer for one's own use, whether in the home, school or business.

Pixel: Picture element. The point on a screen in graphics.

POKE: A command that inserts a value into a specific memory location.

Printer: Device that prints out information onto paper.

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. Any memory into which you "read" or call up data, or "write" or enter information and instructions.

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.

Simulation: Creation of a mathematical model on computers that reflects a realistic system.

Software: Any programs used to operate a computer.

Storage: See Mass storage.

System: A collection of hardware and software where the whole is greater that the sum of the parts.

Tape: Cassette tape used for the storage of information and instructions (not music).

Teletext: An information service which transmits written information in the spaces in the television signal. A teletext decoder is needed to display this information. It is being implemented in N.Z.

Template: A predefined pattern which can be placed over a blank form. The resultant combination can then be used for a given task. For example, Visicalc is regarded as the blank form, a template can be written with the appropriate headings and calculations resulting in a combination which would work like an application program.

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.

ADVERTISING INDEX

Access Data	B/C	Hi Tech Micros	I/F
Advanced Control	16	James Electronics	48
ANZ Books	47	John Gilbert Ltd	12, 28
Ashford T.V. Rentals	34	K'Rd Video	17
AVM Electronics	48	McLean Information Technology	26
Business Computers	19	Microcomputer Electronic Company	9
Checkpoint Computers	31	Microage	13, 48
Commodore Computers	5, 33	Microshop	48
Compudata Media Systems	I/B	Micro '81	45
Computech Systems	44	Molymerx	1
Computer Camps	25, 39, 46	NZ Fine Chains	24
Computer Centre	28	Polyprocessor Products	25
Computer Games	49	Porterfield Computers	16
Computer Point	45	Project Computers	23
Computer Plus	3, 4, 7, 37, 38, 44, 48	Remarkable Software	3
Computer Training Centre	10	Rural Computers	27
Computer World (Christchurch)	35, 37	Scorpio Books	46
Computer World (Auckland)	41	Sirius Systems	15
Control Microcomputers	21	Supatech Electronics	30
Datalink	18	Taranaki Micro Electronics	48
Dick Smith Electronics	29	Turners	48
Einstein Scientific	25	M.J. Walker	31
Father Van der Kaa	25	Whitcoulls	6
Gadget Company	43	University Bookshop	46
		Yield Systems	38

How to keep the computer revolution from becoming a revolt.

Computers are creating a revolution in the way we work. But because they sometimes lose or confuse information, they also create frustrating problems.

But not all computer errors are the computer's fault. Sometimes, it's a faulty flexible disk. Because of surface inconsistencies, some disks can lose their magnetic properties. And along with them, your information.

The answer: Datalife® flexible disks. Certified 100% error free and backed by a 5-year warranty, they perform flawlessly time after time.

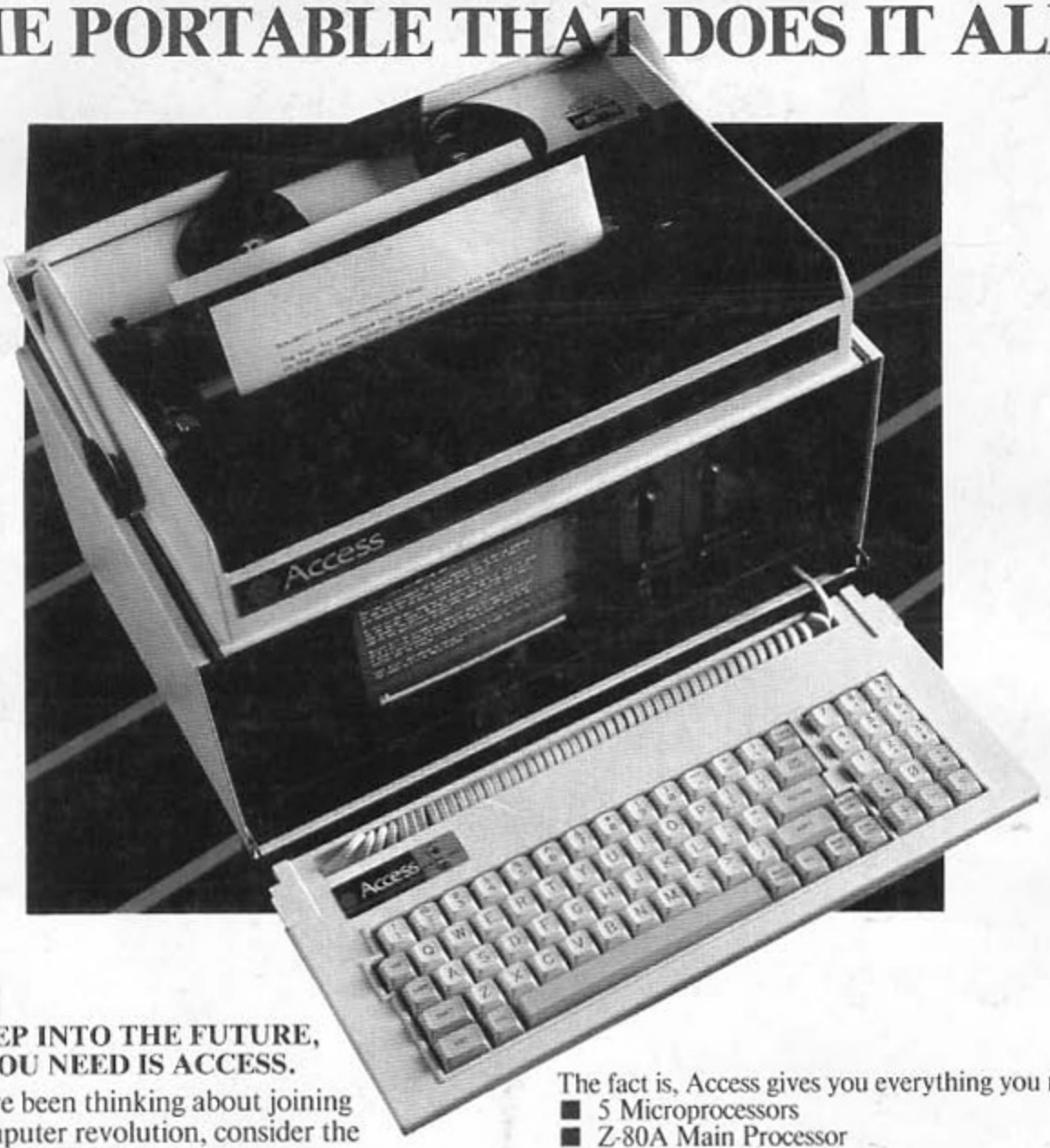
So now you can join in the computer revolution without losing data or your temper. Use Datalife by Verbatim,® the world's leading producer of flexible disks.

Call your nearest Verbatim dealer or master New Zealand distributors

COMPUDATA MEDIA SYSTEMS LTD

BOX 3273 AUCKLAND
TEL 444-6085 TLX 60835

THE PORTABLE THAT DOES IT ALL!



TO STEP INTO THE FUTURE, ALL YOU NEED IS ACCESS.

If you've been thinking about joining the computer revolution, consider the advantages of owning a computer that's on the front lines.

The Access Computer.

Access solves the problems of putting together a computer system because it is a computer system. One that contains a computer, printer, modem, electronic typewriter, and more. Totally integrated in one neat package.

Never before has there been a computer to offer so much capability, so many features, and so much versatility, combined with go-anywhere portability at a price that's about half what you'd pay for a comparable desktop system. If there were a comparable desktop system.

The fact is, Access gives you everything you need:

- 5 Microprocessors
- Z-80A Main Processor
- 64K User RAM
- 7" Amber Display
- 2 Double Density Disk Drives
- 80 CPS Dot Matrix Printer
- High Resolution Graphics
- Detachable Keyboard with 15 Function Keys
- CP/M™, M Basic™, C Basic™, Communications, Fancy Font™, Perfect Writer™, Speller™, Filer™, Calc™
- Diskette Storage
- Double-Sided Disk Drive (Option)

And more. All standard.

All in a package designed to take you where you want to go. Access. The future .

Ready and waiting with everything you need.

A member of the Autocrat-Sanyo Group

access

DATA CORPORATION LIMITED

Ph: Auckland	**686-577**
Hamilton	**393-743**
Taupo	**86-004**
Napier	**436-079**
Wellington	**722-941**
Christchurch	**795-659**