

NEW ZEALAND'S PERSONAL COMPUTER MAGAZINE

# BITS & BYTES

June 1985: \$2.00

## MSX is here!

### Spectravideo's 728 MSX computer reviewed

Machine Language

Online Databases

NCR's new PC

Networking

Toolbox



## Round-up — Dot matrix printers



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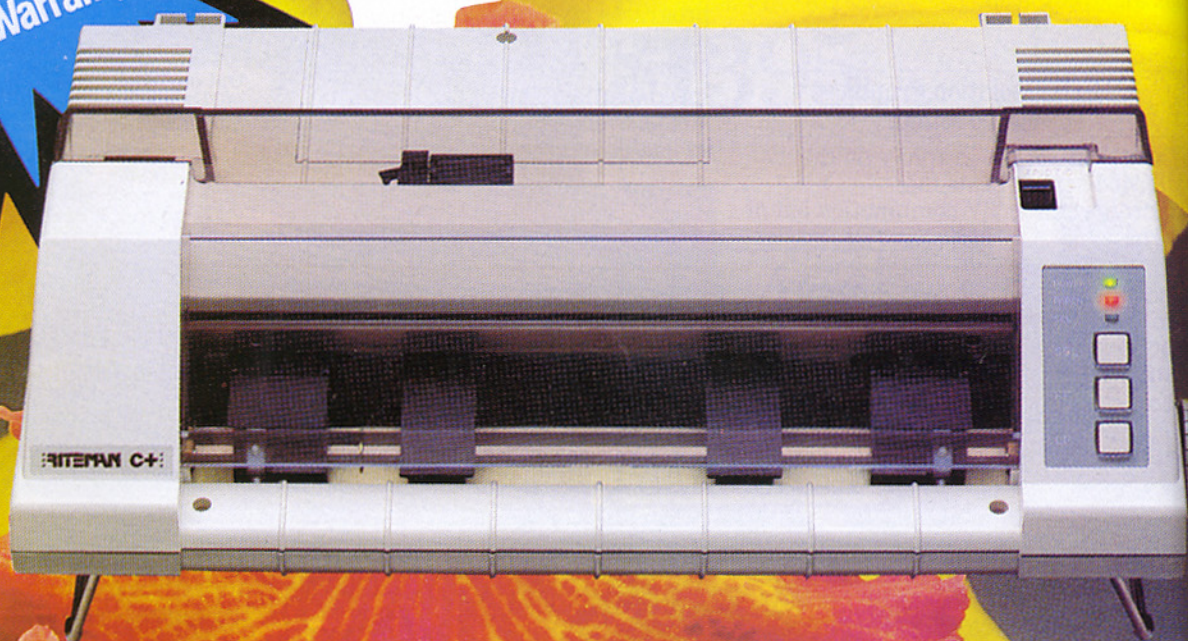








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Sord already has something of a technological edge. Add Mitsui's commitment and the future impact on the New Zealand computing scene is likely to be big indeed.



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## FEATURES

### Printer roundup

The time of our annual printer round-up has come again. Shane Doyle has been running the rule over more than 100 printers. We begin with a batch of dot matrix printers.

16

### Hardware reviews

The Spectravideo SV728 is aimed at the top end of the home market, according to the promotion. Check how it measures up to this claim with Gordon Findlay.

32

NCR is the latest to join the ever-growing queue of IBM look-a-likes. Peter Ensor tells us how he sees the PC 41 fitting into the bunch.

NCR PC 41.....35

### Communications

Darryl Roots provides an introduction to the secrets and skills of networking . . . what it is, how it works, what you can get out of it.

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New Zealanders now have access to more than 1000 databases around the world, covering everything from the day's news to daily updates of tendering opportunities in Japan. Dave Keet tells you how to tap into the system.

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### Beginners

Gordon Findlay provides a few hints on the hard decisions that have to be made when it comes to changing computers.

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## COLUMNS

**New this month:** A series which sets out to develop programming techniques for use in all manner of programs. Gordon Findlay opens his toolbox of routines for the first time.

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**Apple:** Asian pirates crack the Apple IIe. John MacGibbon tells how.

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**Atari:** Michael Fletcher struck "beaut double trouble" in the midst of the immortal World World 1 flying game, "Blue Max".

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**BBC:** Pip Forer goes "mousing about".

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**Commodore 64:** Joe Colquitt continues his series on drawing sprites.

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**Commodore:** Games galore . . . reviewed by Andrew Mitchell.

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**Machine language:** Using ML from BASIC with Joe Colquitt.

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**Spectravideo:** Barbara Bridger explains how the Spectravideo is nicely in tune with music macro language.

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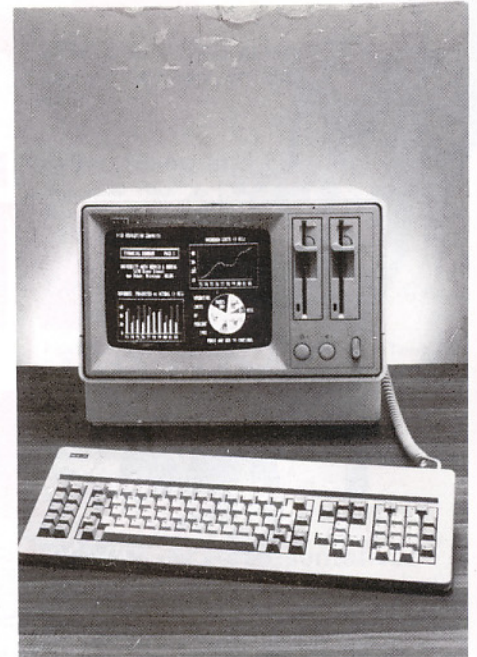
**Spectrum:** Gary Parker looks over some recent software . . . Personal Banking System, Ultimon, and a cassette magazine.

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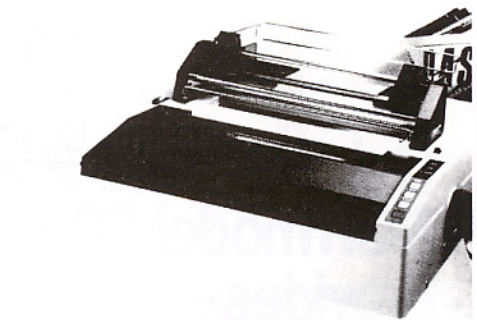
**Tandy:** A program which inverses all the graphics characters on the screen.

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# Meetings made easy

ICL New Zealand has introduced a software package designed to solve the problems of storing and retrieving information from meeting minutes and related documents.

The Committee Minutes System is described by ICL's senior product manager, Andrew Mason, as the answer to speedy management of board meetings or town council meetings.

Data is easily entered through an ICL terminal or word processor and then held centrally on a mainframe computer. Text markers can be inserted to identify the key components of a meeting such as date, title, those attending and associated reports so that CMS can index the information stored on the mainframe.

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1985 is the year when Sales Tax is down and the goods tax not yet introduced. Buy mail order NOW if you know what you want and demand the best prices. It will never be less expensive!

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# New printer range

The Seikosha range of computer printers is being marketed in New Zealand by the recently formed New Zealand Peripheral Distributors. (P.O. Box 9447, Wellington).

The Seikosha range includes the BP5420, high speed, dot matrix printer which costs \$3509 (including tax).

It has a maximum print speed of 420 characters per second, eight print fonts which can be altered by a switch on the front of the printer, even during operation, and a built-in 18K-byte (about seven pages) buffer to accept new data while printing.

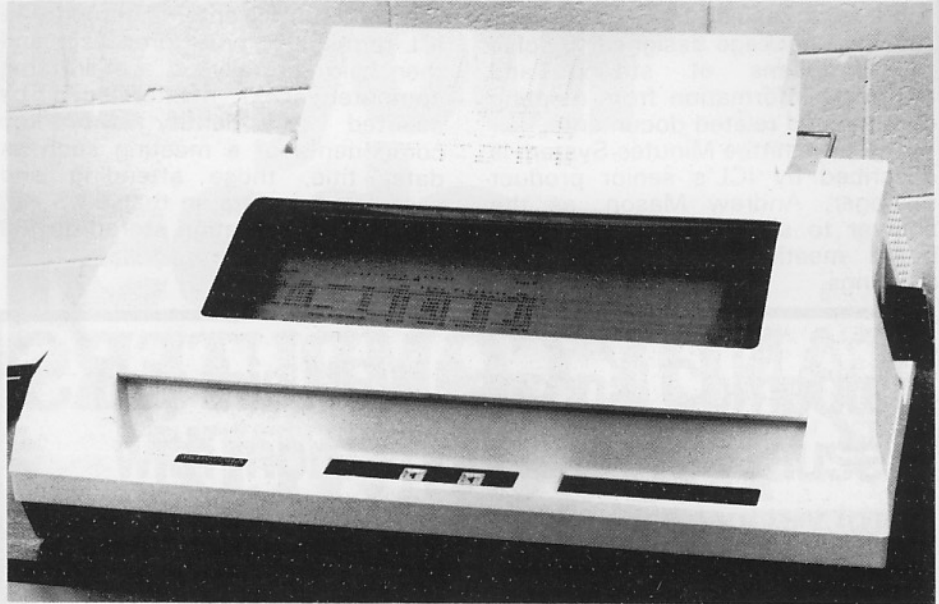
It has built-in parallel and serial interfaces, selectable by one external dip switch, and works quietly. It can be IBM-PC compatible, comes with traction and friction feed options and offers either a replaceable ink pad on a cassette or a reloadable cassette.

The middle-of-the-range SP-800 prints at 80cps. The GP-700A is a seven-colour dot matrix bidirectional printer with a speed of 80cps; costing \$1089 (including tax), and the small GP-50A, costing \$303 (including tax), is a parallel printer with a speed of 40cps.

## Ratebook swap

AMP agents around the country are swapping their life insurance ratebooks for hand-held computers.

Nearly a third of the reps are using



*The Seikosha BP-5420*

Hewlett-Packard HP 71-B computers to provide clients with "instant answers". Calculations can now be made on the spot instead of a client having to wait two or three days following consultation while the local office calculates costs.

Stuart Nichol, publicity officer at the AMP's head office in Wellington, says the time saving is "amazing".

He says the initial suite of programs, which were in cassette form, included Investment Link — a replacement for the agent's rate

book. Additional programs included an education fees plan and a capital needs analysis. All programs were written at the AMP's Sydney headquarters.

The HP 71-B has a 64-byte enhanced BASIC operating system which supports seven file structures, providing high calculation speeds. It combines the power of a computer with the size of a calculator — 19 by 9.7cm. It has built-in user memory capacity of 17.5K. Up to four 4K memory modules can be plugged in to boost accessible user memory.

## Q-Link launched

Up to eight microcomputers of assorted makes can be linked on the Q-Link network's shared disk launched by Quorum Computers in England.

Q-Link provides the operating environment for sharing its fixed disk between multiple personal computer users. It is multi-tasking and multi-access but not multi-user.

Each microcomputer on the network can have up to 16 directories with between 0.5 and 16 Mbyte on the shared fixed disk and a supervisory program allows up to 64 directories to be created on the fixed disk. Directories can be designated as private and read/write or as public to store programs and contain read only information.

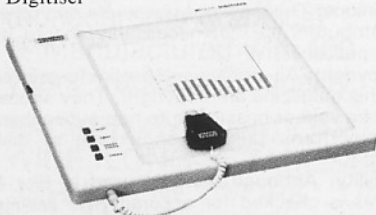
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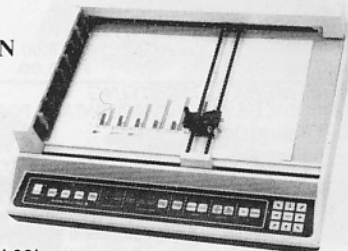
**MICROGRAPHICS DIVISION**

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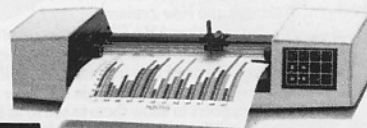
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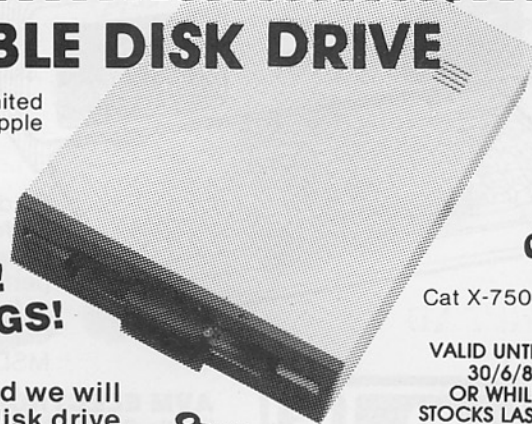
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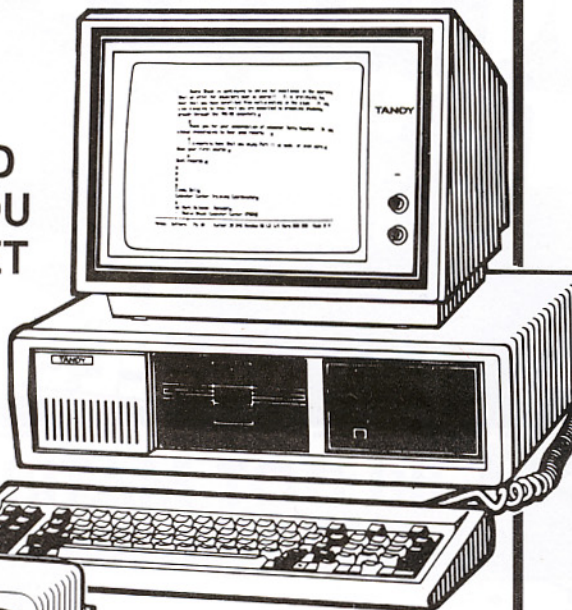
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## MICRO NEWS

### Keep it clean

AWA New Zealand Ltd (P.O. Box 50-248, Wellington) is distributing a range of products formulated to clean computer screens, keyboards and tape drives.

A cleaning kit, which contains a 40g bottle of screen clean, a 40g bottle of key clean, 10 lint-free wipes and 10 cleaning wands, costs \$17.50. Products can also be bought individually.

The products have been developed locally, but the manufacturer has recently secured an export order to Japan and in New Zealand they are available from all AWA branches, computer and stationary suppliers.



*The cleaning kit*

### Japanese peripherals

New Zealand Peripheral Distributors (P.O. Box 9447, Wellington) has established links with several large Japanese companies. Its agencies include Seikosha and Mitsui printers, Esprit terminals, ITS electronic mail communication equipment and various brands of CAD high resolution screens, digitisers and plotters.

It is likely the company will soon be handling a laser printer from one of its Japanese associates.

### Ada compiler

Sperry Corporation has signed an agreement with Intermetrics Inc, Cambridge, Massachusetts to develop an Ada programming language processor for use with Sperry Series 1100 large scale computers.

Ada has been developed by the US Defense Department as the standard higher order programming language for all services mission critical systems.



# The Great Commodore Software Competition

Write a Commodore program and you could win.

Prizes worth \$5000 to be won.

Special prize for school/class entries.

Write your own program to run on a Vic 20, C64, C16, Plus 4, CBM 4000, or CBM

8000; and enter in any of three categories:

Best Game.

Best Education Program.

Best Home/Business Program.

Best School/Class Entry.

Winners in each category will receive Commodore equipment or software of their choice from the Commodore Computers NZ range to the value of \$1000. The runners up in each category win Commodore equipment or software worth \$200.

And three consolation prizes of book packs worth \$50 will be awarded in each category.

There's a separate prize for the best specialist program, and the best school class entry, plus 5 spot prizes of \$50 book packs, drawn at random.

In all, over 20 prizes, worth a total of \$5000 can be won.

You can forward as many entries as you like, until August 12, 1985, when the competition closes.

All entries must be on the Official Entry Form, available only from your Commodore Specialist Dealer.

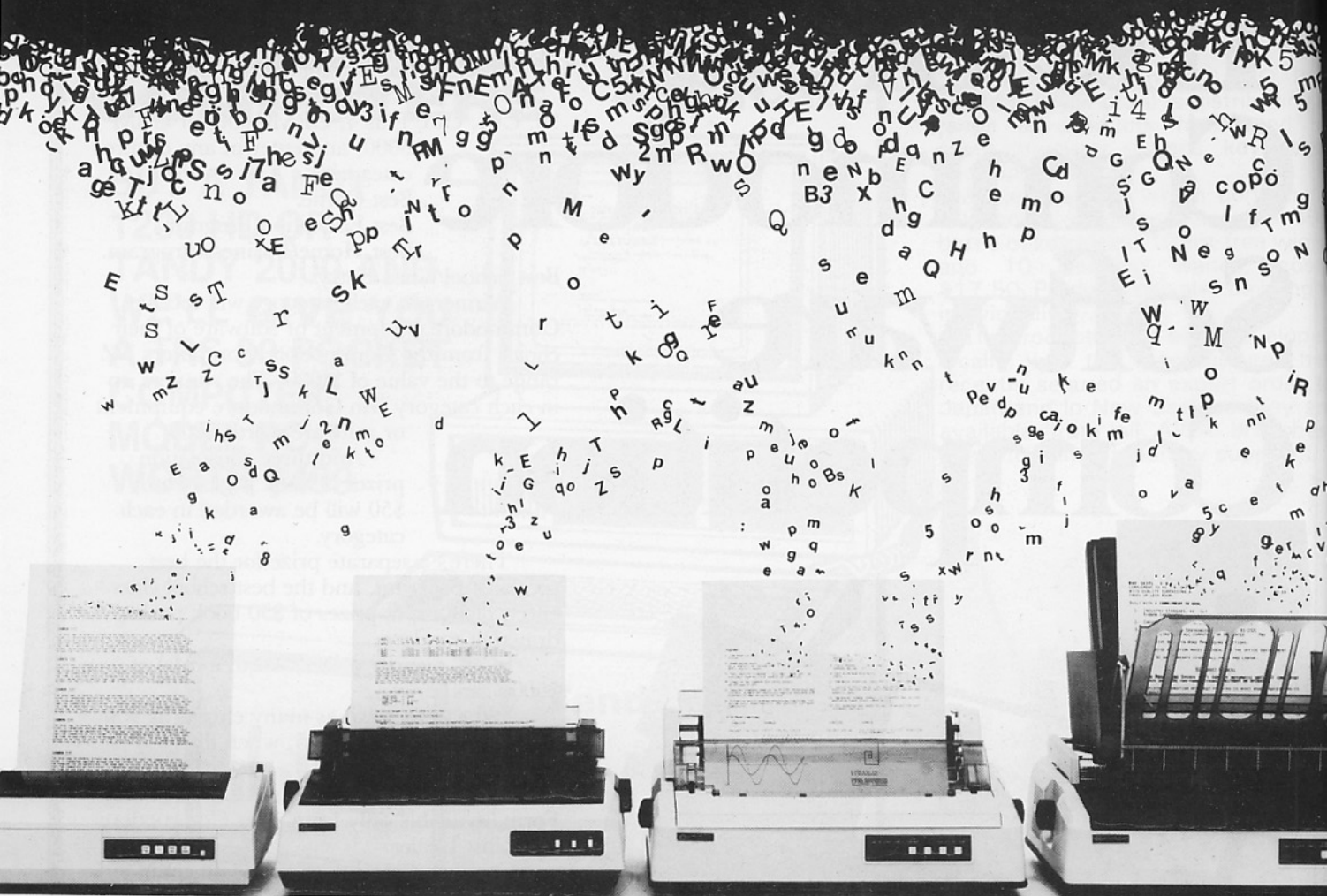
Get along to him fast, and you could write your own prize list.



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CMP27





18 CPS

25 CPS

40 CPS

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# C.Itoh Daisies

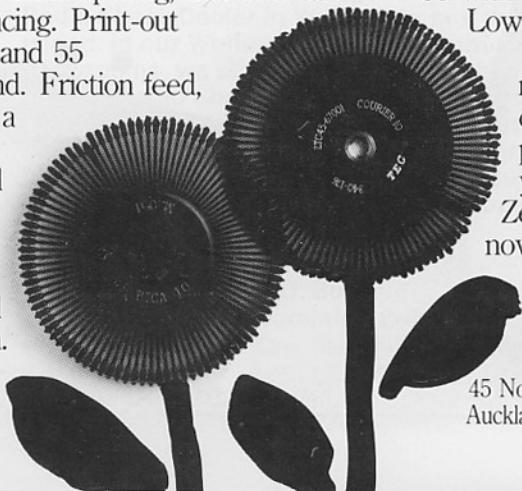
## What a bunch of characters!

Such personality. C.Itoh Daisy Wheel printers always make the right impression. In a wide range of fonts. Enhanced with bold, shadow and underline. And proportional spacing, incremental line and character spacing. Print-out speeds of 18, 25, 40 and 55 Characters Per Second. Friction feed, tractor feed – or add a Sheet Feeder for 100% automatic word processing.

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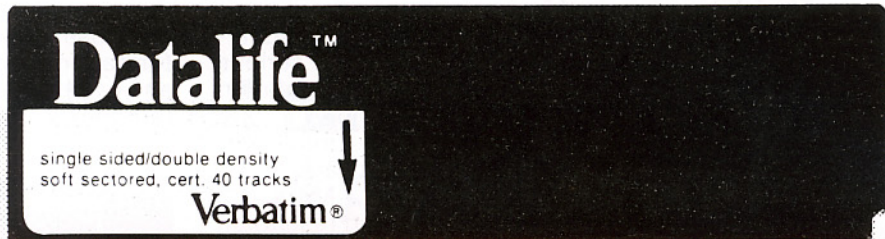


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## Videotex terminals

A new range of colour videotex terminals which can be adapted to existing and future communications developments and requirements is being marketed by Precision Technology Ltd. (P.O. Box 9040, Wellington).

Manufactured by Barco Industries, of Belgium, the new CV 33-2 range consists of three models.

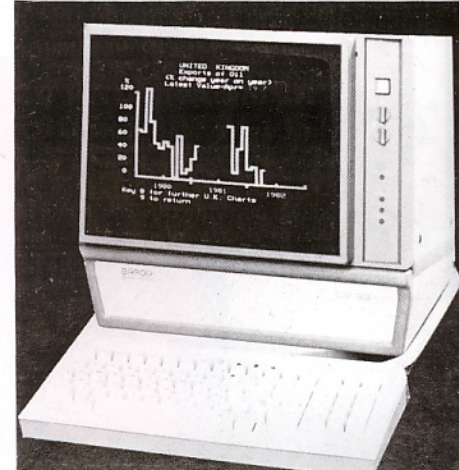
The basic model CV 33 S Mark 2, costing about \$4000, offers standard videotex protocol in

accordance with Prestel specifications. It has a high quality tube, accepts frames with 24 line 40 characters per line format and has a four or 16 page video memory.

The CV 33 HE Mark 2 "Super-editor" is designed for serious editing work with its high resolution tube, 16 page memory, filter supplied as standard, intelligent functions and editing package.

The CV 33-TTY Mark 2 multipurpose offers a high resolution

picture tube suitable for operation with a 24 x 40 or 24 x 80 display. The operator can select the required screen format manually or it can be determined automatically by the database. It also retrieves information from external data banks and can be used as an electronic mail terminal and as an asynchronous data processing terminal.



The CV 33-TTY terminal

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Book: 240 pages, 8x9 1/4, softbound  
ISBN 0-672-22024-5, © 1983

\$45.00

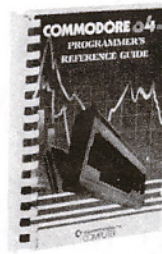
#### THE CAD/CAM PRIMER



Computers have always been good at generating reams of alpha-numeric printed information. Computer graphics allow us to condense this multitude of print-outs into neat little pictures that can be easily understood. Learn the basics about CAD/CAM and its probable impact on our lives. Daniel Bowman. 160 pages, 8 1/2 x 11 softbound, ISBN 0-672-22187-X © 1984

\$41.95

#### COMMODORE 64 PROGRAMMER'S REFERENCE GUIDE



A Top 10 best-seller since its introduction, this programmer's working tool and reference source is packed with professional tips and information on exploring your C-64. Includes a complete, detailed dictionary of all Commodore BASIC commands, statements and functions. BASIC program samples then show you how each item works. Mix machine language with BASIC and use hi-res effectively with this easy-to-use guide. Commodore Computer. 486 pages, 5 1/2 x 8 1/2 comb-bound, ISBN 0-672-22056-3, © 1982

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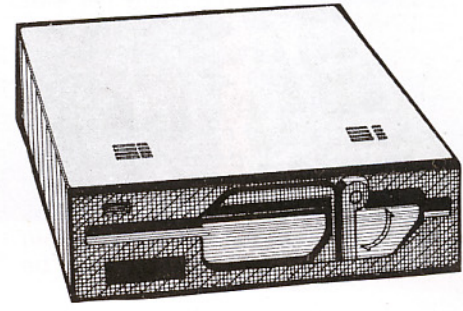
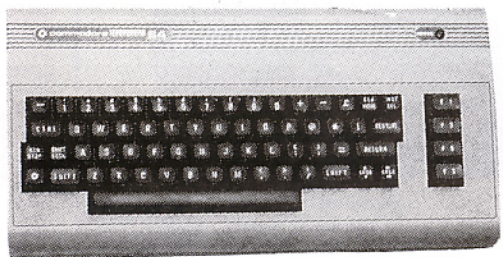
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# PRINTER ROUNDUP

By Shane Doyle

On re-reading my introduction to last year's printer roundup (June 1984), I realised little can be added to what I wrote then. There has not been much change in the technology, but the trend has been for previously up-market features to creep down the range - apparently by revamping the driving electronics - to give under \$1000 units such goodies as letter quality print mode and IBM PC graphics compatibility. Figure 1 illustrates LQ mode on a Star SG-10 (\$1135).

I remain unimpressed by the print quality of low cost thermal transfer printers - OK for program listings but they lack the features and quality for more ambitious users. There are more colour printers around overseas, but they are a bit slow in getting here, and only two or three new ones have yet been released in New Zealand.

A few notes of clarification of some of the items in each entry may be useful.

Print speed is always the maximum possible at standard 10cpi pica font mode, and this reduces in other print modes, drastically when compressed or double strike modes are used. Characters/line is the maximum available in compressed mode (usually 15-17cpi), standard values at 10cpi are 80 characters for 10in printers and 136 for 15 in units.

While most printers have both friction and tractor feed capability, few of the lower priced units feature true removable tractor feeders, and in those cases, there is an optional accessory.

This round-up by no means represents all printers available in New Zealand, but covers those importers who replied to our questionnaire within the requested publication time frame. Future questionnaires will be presented in an update in a future issue.

```
STAR SG-10 DOT MATRIX PRINTER
SAMPLE OF LETTER QUALITY MODE
Star SG-10 Dot Matrix Printer
Sample of Letter Quality Mode
STAR SG-10 DOT MATRIX PRINTER
SAMPLE OF LETTER QUALITY MODE
```

Figure 1

## Dot matrix — under \$1000

### Commodore MPS-802

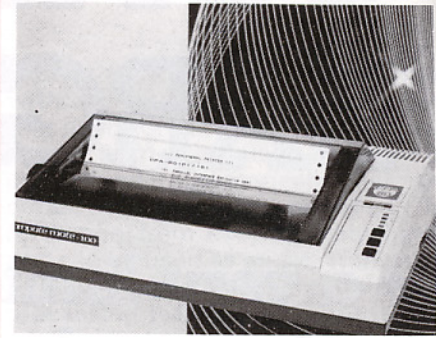
Print speed: 80cps  
Max. chars/line: 80  
Paper width: 10in  
Paper feed: Friction/tractor  
Buffer size:  
Ribbon type: Cassette  
Graphics modes:  
Interface: CBM serial  
Features: Bidirectional logic seeking  
Business quality print  
Options:  
Retail price: \$749  
Agent: Commodore Computer NZ Ltd

### Commodore MPS-803

Print speed: 60cps  
Max. chars/line: 80  
Paper width: 10in  
Paper feed: Friction  
Buffer size: 90 bytes  
Ribbon type: Cassette  
Graphics modes:  
Interface: CBM serial  
Features:  
Options: Tractor feed \$75  
Retail price: \$549  
Agent: Commodore Computer NZ Ltd

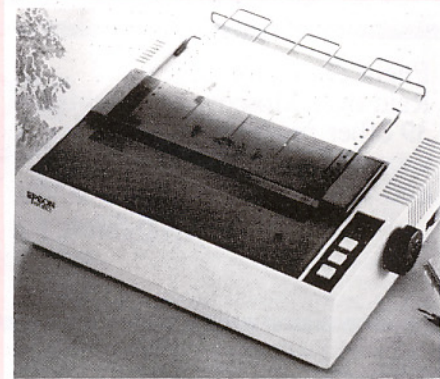
### Epson RX80

Print speed: 100cps  
Max. chars/line: 137  
Paper width: 10in  
Paper feed: Tractor  
Buffer size:  
Ribbon type: Cassette  
Graphics modes: 48/64/72/96/120 dpi  
Interface: Parallel  
Features: Quiet mode  
Super/subscript/underlining  
Options: Basic serial interface \$96  
IEEE 488 interface \$225  
Intelligent serial interfaces  
Retail price: \$948  
Agent: MDL



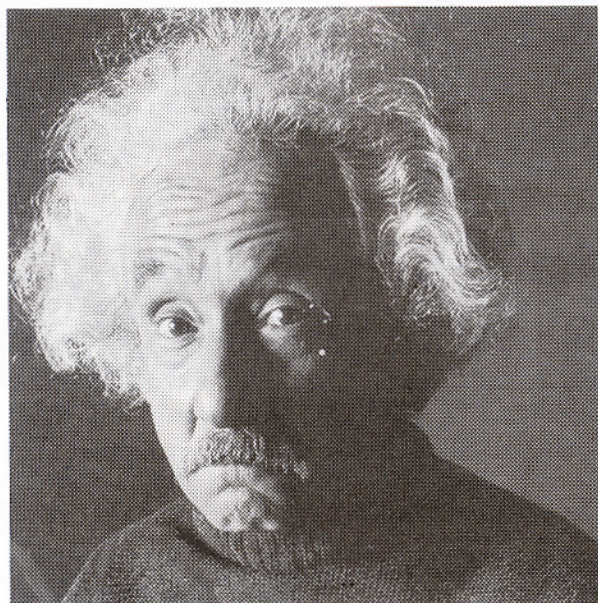
### CTI CPA80

Print speed: 100cps  
Max. chars/line: 142  
Paper width: 10in  
Paper feed: Friction/tractor  
Buffer size: 117 bytes  
Ribbon type: Cassette  
Graphics modes: 64/128 dots/inch  
Interface: Parallel  
Features: Pica/elite/italic fonts  
Options: Serial interface \$100  
Hispeed (19200bps) interface  
Expandable RAM buffer  
Retail price: \$799  
Agent: David Reid Electronics

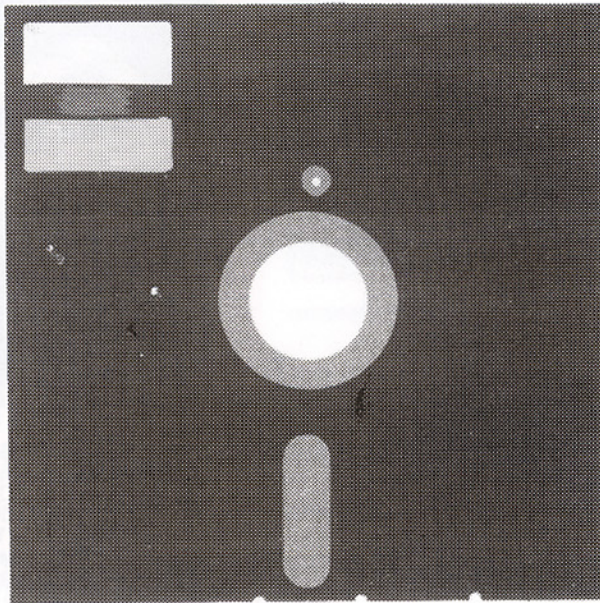




# GREAT LOOKALIKES



**Einstein Lookalike**  
Left school Age 9  
Works as caretaker in glue factory  
Failing Memory  
Likes a drink



**Maxell Floppy Disk Lookalike**  
One of several floppy disks on the market  
Inferior production techniques  
Unreliable characteristics  
Prone to losing data  
Deceptive Appearance

## ARE NO SUBSTITUTE FOR THE GENUINE ARTICLE

Take floppy disks for instance there are a lot of them around and they all look like Maxells, but there's only one MAXELL FLOPPY DISK.

MAXELL are acknowledged experts in the field of magnetic media because MAGNETIC MEDIA IS ALL THEY DO.

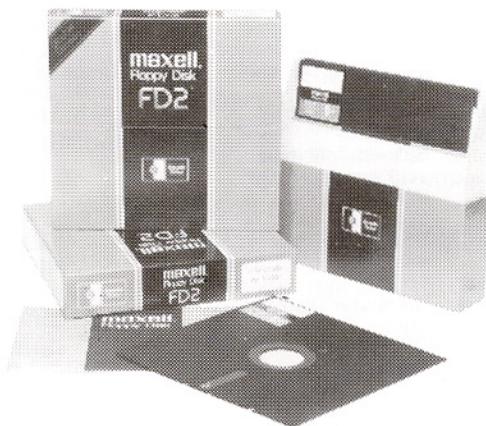
As a result of their long-standing, technological experience in this area, their superior know-how and rigid inspection standards, MAXELL produce Floppy Disks of an unparalleled performance and reliability which is widely recognised by computer manufacturers around the world.

Unfortunately these important distinctions are sometimes disregarded when choosing a floppy or floppy disk replacement from the wide selection available.

As one floppy disk looks much like another, scant

regard is sometimes paid to the type being used with your equipment. When something goes wrong, as it always does, your irreplaceable data can be lost for ever.

Assure yourself of Quality, Durability, Range, Interchangeability and Capacity. Make sure it's a genuine MAXELL FLOPPY DISK, not just another lookalike.



**maxell** Floppy Disk

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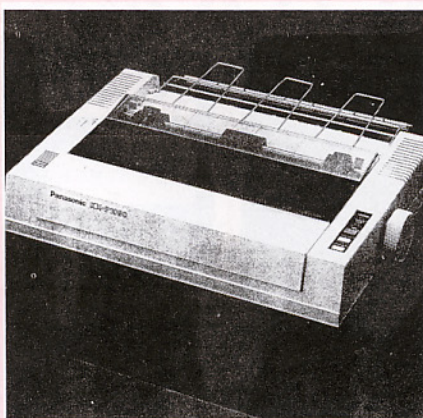


# PRINTER ROUNDUP



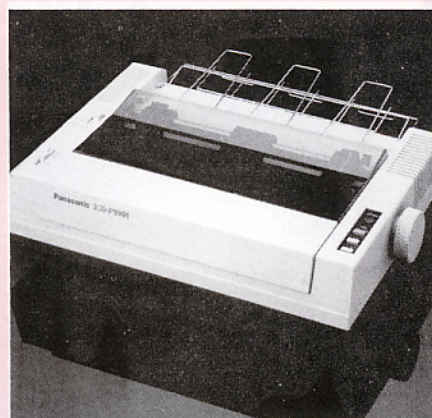
## OKI Microline 82A

Print speed: 120cps  
 Max. chars/line: 132  
 Paper width: 10in  
 Paper feed: Friction/pin  
 Buffer size: 80 bytes  
 Ribbon type: Spool  
 Graphics modes: 72 dots/inch  
 Interface: Parallel/serial  
 Features: Heavy duty low cost printer  
 Apple compatible  
 Bidirectional logic seeking  
 Options: Hispeed RS232 interface \$98  
 Tractor feed unit \$158  
 IEEE-488 Interface \$203  
 Retail price: \$852  
 Agent: AWA NZ Ltd



## Panasonic KXP1090

Print speed: 96cps  
 Max. chars/line: 158  
 Paper width: 10in  
 Paper feed: Friction/tractor  
 Buffer size: 1 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 58/115 dots/inch  
 Interface: Parallel  
 Features: Bidirectional logic seeking  
 Options: RS232 interface \$206  
 4K print buffer  
 Retail price: \$797  
 Agent: MEC Dealer Products



## Panasonic KXP1091

Print speed: 120cps  
 Max. chars/line: 132  
 Paper width: 10in  
 Paper feed: Friction/tractor  
 Buffer size: 1 kbytes  
 Ribbon type: Cassette  
 Graphics modes: 48/58/64/72/96/192 dpi  
 Interface: Parallel  
 Features: IBM PC compatible  
 NLQ mode from front panel  
 Options: RS232 interface \$206  
 4K print buffer  
 Retail price: \$911  
 Agent: MEC Dealer Products

## SV3000

Print speed: 80cps  
 Max. chars/line: 142  
 Paper width: 10in  
 Paper feed: Friction/tractor  
 Buffer size: \$203  
 Ribbon type: Cassette  
 Graphics modes: 64/128 dots/inch  
 Interface: Parallel  
 Features: Sub/superscript/italic modes  
 Bidirectional logic seeking  
 Built-in graphics symbols  
 Options: RS232 interface \$250  
 4K buffer  
 Retail price: \$675  
 Agent: Computer Distributors Ltd

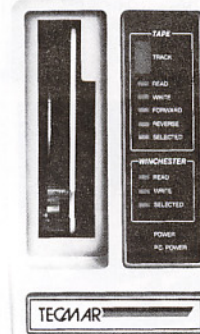
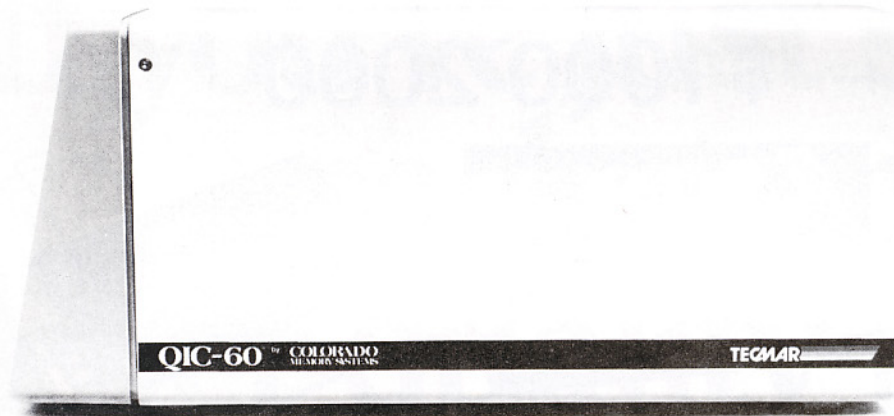
## SV 3100

Print speed: 100cps  
 Max. chars/line: 142  
 Paper width: 10in  
 Paper feed: Friction/tractor  
 Buffer size:  
 Ribbon type: Cassette  
 Graphics modes: 64/128 dots/inch  
 Interface: Parallel  
 Features: Sub/superscript/italic modes  
 Bidirectional logic seeking  
 Built-in graphics symbols  
 Options: RS232 interface \$250  
 Retail price: \$699  
 Agent: Computer Distributors Ltd

## SV3200

Print speed: 130cps  
 Max. chars/line: 142  
 Paper width: 10in  
 Paper feed: Friction/tractor  
 Buffer size:  
 Ribbon type: Cassette  
 Graphics modes: 64/128 dots/inch  
 Interface: Parallel  
 Features: Sub/superscript/italic modes  
 Bidirectional logic seeking  
 Built-in graphics symbols  
 Options: RS232 Interface \$250  
 4K buffer  
 Retail price: \$795  
 Agent: Computer Distributors Ltd





## QIC-60 Product Line

QIC-60 is a high-performance family of tape and disk products which provides up to 60 megabytes of tape backup and up to 20 megabytes of hard disk storage for the IBM PC, XT, and AT computers.

### FEATURES

#### *Mirror image backup and restore*

Puts a mirror image of your disk data out to tape. During restore, QIC-60 detects bad sectors and remaps data around them, resulting in perfect restores to any identically formatted disk.

#### *File-by-file backup and restore*

Offers file selectivity during restore. Defragments long disk files by restoring them as contiguous file blocks. The result is significantly faster disk operations.

#### *QIC-60 is fast!*

10 megabytes can be backed up in 2:00 minutes using Mirror Image backup or in 5:00 minutes (typical) for a file-by-file backup.

#### *User-friendly software*

Graphic menus and scrolling directories make QIC-60 easy to use. HELP screens are available to answer questions. Simple function key commands backup

and restore data with just a few keystrokes. Command-line control offers advanced users the speed and power to customize backup programs. QIC-60 software works equally well with PC DOS 2.0, 2.1, and 3.0.

#### *Status LED's*

Indicate QIC-60's power and status and show the current tape track number.

#### *Automatic power detection*

QIC-60 automatically detects loss of CPU power and instantaneously locks the write lines to ensure against data corruption. Power can be applied to the QIC-60 before powering up the computer without worrying about accidental data loss.

#### *Tape readability*

The exclusive closed loop tape head positioning used on the QIC-60 ensures that data recorded on one QIC-60 can be read on any QIC-60. Allows easy sharing of data or software between computers.

#### *Cost Sharing*

The QIC-60H uses a low cost host adaptor. By installing extra host adaptors in each PC needing backup, a single QIC-60 can be easily moved from PC to PC, plugged into the back panel and quickly used. In this way, costs may be spread over several workstations.

### CONFIGURATIONS

Part No.	Product	Description
811603	Q60-H	60 Meg tape in a cabinet
811608	Host Adaptor	Adaptor for Q60-H
811604	Q60-AT	60 Meg tape in PC AT
811601	Q60-W20	60 Meg tape with 20 Meg Winchester disk in cabinet
811611	Q60W20AT	60 Meg tape with 20 Meg Winchester disk in cabinet for PC AT
8116014	Q60-AT	20 Meg Winchester disk in PC AT

### SPECIFICATIONS

#### *Tape Drive Specifications*

Storage Capacity:

up to 60 megabytes

Recording Form:

9 track serpentine

Tape Speed:

90 inches per second

Data Transfer Rate:

90 Kbytes per second

Start/Stop Time:

300 mSec maximum

Soft Error Rate:

less than 1 in 10<sup>8</sup> bits

Hard Error Rate:

less than 1 in 10<sup>10</sup> bits

#### *Tape Drive Environment*

Temperature

Operational:

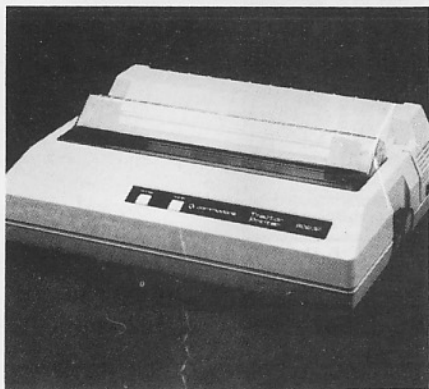
+ 5 to + 45 degrees C

Non-operating:

- 30 to + 60 degrees C

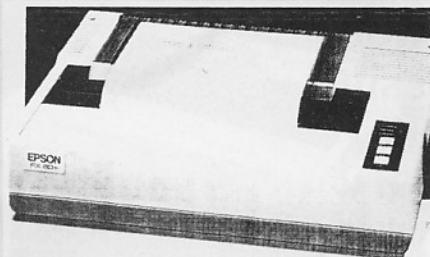


# Dot matrix — \$1000-2000



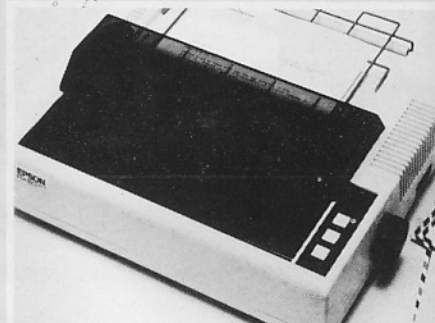
### Commodore 8023P

Print speed: 150cps  
 Max. chars/line: 160  
 Paper width: 15in  
 Paper feed: Tractor  
 Buffer size:  
 Ribbon type: Cassette  
 Graphics modes:  
 Interface: IEEE 488  
 Features: Enhanced characters  
 Paging on/off  
 Reversed image  
 printing  
 Options:  
 Retail price: \$1695  
 Agent: Commodore Computer  
 NZ Ltd



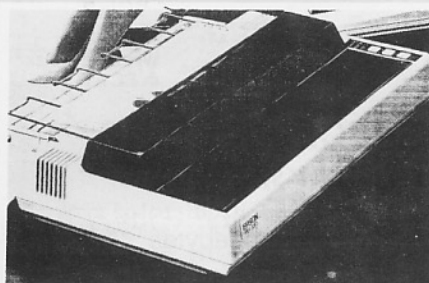
### Epson FX80+

Print speed: 160cps  
 Max. chars/line: 137  
 Paper width: 10in  
 Paper feed: Friction/tractor  
 Buffer size: 3 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 48/58/64/72/96/192  
 dpi  
 Interface: Parallel  
 Features: 10 graphics modes  
 Roman/Sans serif fonts  
 (WP card)  
 Proportional mode &  
 Hex dump  
 Download character  
 set  
 Front panel font  
 selection  
 Options: Interfaces as for  
 RX80  
 Word Processing card  
 \$373  
 Single bin sheet  
 feeder \$1067  
 Retail price: \$1849  
 Agent: MDL



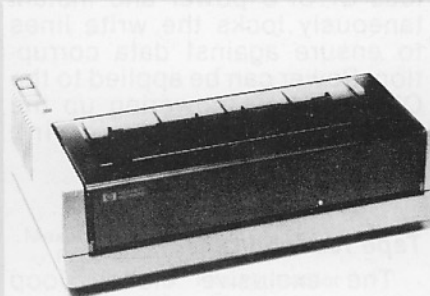
### Epson RX80 F/T

Print speed: 100cps  
 Max. chars/line: 137  
 Paper width: 10in  
 Paper feed: Friction/tractor  
 Buffer size:  
 Ribbon type: Cassette  
 Graphics modes: 48/64/72/96/120 dpi  
 Interface: Parallel  
 Features: Cut sheet feeder  
 \$1118  
 Quiet mode & hex  
 dump facility  
 NLO mode with  
 special card  
 Options: Interfaces as for  
 RX80  
 Tear Bar \$39 Roll  
 holder \$54  
 NLO font card \$436  
 Retail price: \$1311  
 Agent: MDL



### Epson RX100

Print speed: 100cps  
 Max. chars/line: 233  
 Paper width: 15in  
 Paper feed: Friction/tractor  
 Buffer size:  
 Ribbon type: Cassette  
 Graphics modes: 60/80/90/120/240  
 dpi  
 Interface: Parallel  
 Features: Quiet mode & hex  
 dump facility  
 Super/subscript/under-  
 lining  
 Options: Interfaces as for  
 RX80  
 NLO fonts card \$436  
 Retail price: \$1849  
 Agent: MDL



### Hewlett Packard Thinkjet

Print speed: 150cps  
 Max. chars/line: 142  
 Paper width: 9in  
 Paper feed: Friction/tractor  
 Buffer size: 1 Kbytes  
 Ribbon type: N/A  
 Graphics modes: 96/192  
 Interface: Parallel  
 Features: Quiet printing 4  
 pitches/underline/  
 bold face  
 Roman 8 font  
 Printable control  
 codes  
 Portable (battery)  
 version  
 Options:  
 Retail price: \$1374  
 Agent: Hewlett Packard



### OKI Micro line 83A

Print speed: 120cps  
 Max. chars/line: 224  
 Paper width: 16in  
 Paper feed: Friction/tractor  
 Buffer size: 136 bytes  
 Ribbon type: Spool  
 Graphics modes: Block graphics only  
 Interface: Parallel/serial  
 Features: Heavy duty low cost  
 printer  
 Apple compatible  
 Bidirectional logic  
 seeking  
 Options: Hispeed RS232  
 interface \$150  
 IEEE-488 interface  
 \$203  
 Retail price: \$1420  
 Agent: AWA NZ Ltd



# If you've just spent a packet on a letter-quality printer, get your hanky out.

You're about to discover an extraordinary new range of dot-matrix, near letter-quality printers that cost only a fraction of what you would have expected to have to pay in the past.

It's the EPSON® "Plus" series. The EPSON FX-100+ and the FX-80+.

Their print quality is superb. They will print near letter-quality pages, quick drafts, even complex graphics, with a definition that's seldom equalled in any price range. And you can vary between different timesteps.

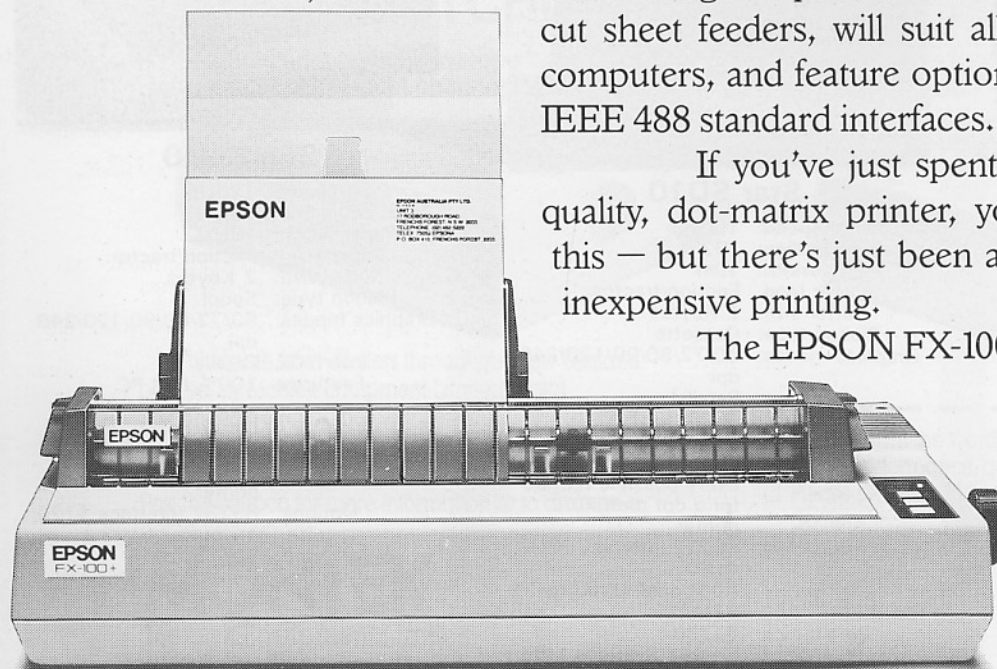
Their speed has been enhanced, not by increasing the number of characters per second (in this case, up to 160 cps), but by speeding the rate of paper throughput.

The result is an effective overall speed which rivals that of printers costing much more.

As well, the EPSON "Plus" range of printers have provision for optional cut sheet feeders, will suit all popular brands of computers, and feature optional serial and intelligent IEEE 488 standard interfaces.

If you've just spent a packet on a letter-quality, dot-matrix printer, you won't want to read this — but there's just been a new standard set in inexpensive printing.

The EPSON FX-100+ and the FX-80+.

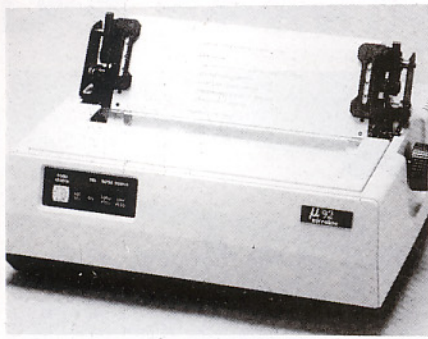


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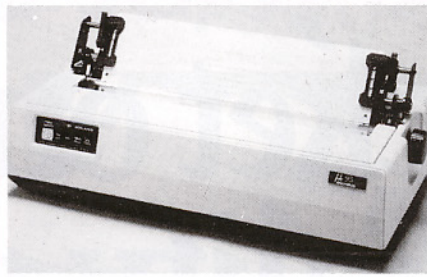


# PRINTER ROUND-UP



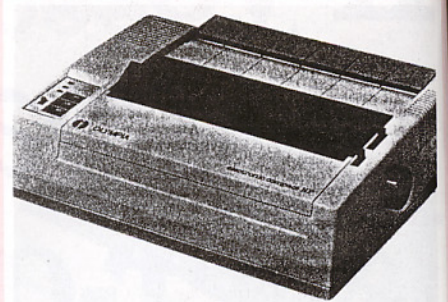
## OKI Microline 92A

Print speed: 160cps  
 Max. chars/line: 136  
 Paper width: 10in  
 Paper feed: Friction  
 Buffer size: 256 bytes  
 Ribbon type: Spool  
 Graphics modes: 72  
 Interface: Parallel  
 Features: Near letter quality mode  
 Heavy duty medium speed unit  
 Download character set  
 Bidirectional logic seeking  
 Options: Tractor feed unit \$158  
 Hispeed RS232 interface \$146  
 Retail price: \$1234  
 Agent: AWA NZ Ltd



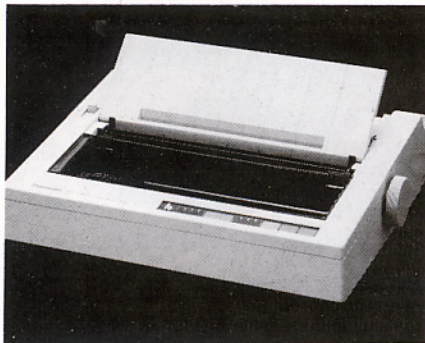
## OKI Microline 93A

Print speed: 160cps  
 Max. chars/line: 233  
 Paper width: 16in  
 Paper feed: Friction/tractor  
 Buffer size: 256 bytes  
 Ribbon type: Spool  
 Graphics modes: 72 dots/inch  
 Interface: Parallel  
 Features: Near letter quality mode  
 Heavy duty medium speed unit  
 Download character set  
 Bidirectional logic seeking  
 Options: IBM compatible graphics \$50  
 Hispeed RS232 interface \$185  
 Retail price: \$1715  
 Agent: AWA NZ Ltd



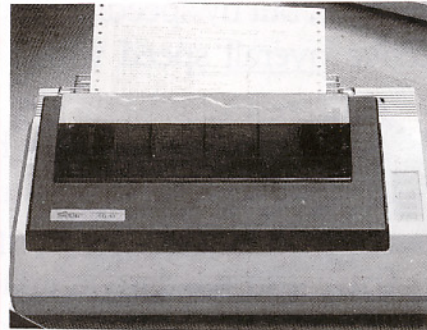
## Olympia Electronic NP

Print speed: 165 cps  
 Max. chars/line: 136  
 Paper width: 10in  
 Paper feed: Friction/tractor  
 Buffer size: 256 bytes  
 Ribbon type: Cassette  
 Graphics modes: 48/64/96/128/192 dpi  
 Interface: Parallel  
 Features: IBM PC compatible  
 Near letter quality mode  
 Options: RS232 interface \$295  
 Retail price: \$1195  
 Agent: Montek Equipment



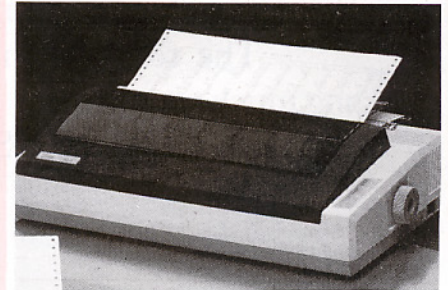
## Panasonic KXP1092

Print speed: 180cps  
 Max. chars/line: 132  
 Paper width: 10in  
 Paper feed: Friction/tractor  
 Buffer size: 7 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 48/64/72/96/192 dpi  
 Interface: Parallel  
 Features: IBM PC compatible  
 NLQ/proportional spacing  
 Easy paper loading  
 Options: RS232 interface \$206  
 Retail price: \$1422  
 Agent: MEC Dealer Products



## Star SD10

Print speed: 160cps  
 Max. chars/line: 132  
 Paper width: 10in  
 Paper feed: Friction/tractor  
 Buffer size: 2 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 60/72/80/90/120/240 dpi  
 Interface: Parallel  
 Features: 100% IBM PC compatible  
 Letter quality mode  
 Every possible feature for a dot matrix printer  
 Options: RS232 interface (4K) \$180  
 Additional 4K buffer \$155  
 Retail price: \$1750  
 Agent: Genisis Systems Ltd

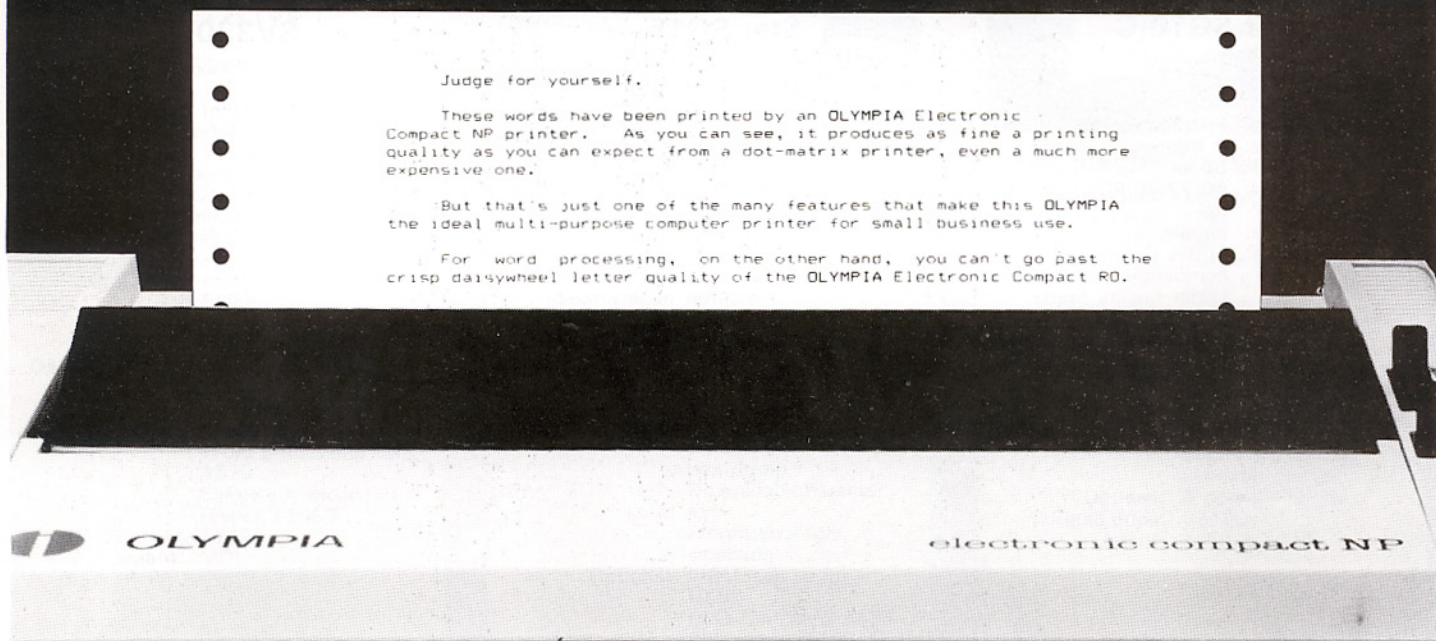


## Star SG10

Print speed: 120cps  
 Max. chars/line: 132  
 Paper width: 10in  
 Paper feed: Friction/tractor  
 Buffer size: 2 Kbytes  
 Ribbon type: Spool  
 Graphics modes: 60/72/80/90/120/240 dpi  
 Interface: Parallel  
 Features: 100% IBM PC compatible  
 Letter quality mode  
 Every possible feature for a dot matrix printer  
 Options: RS232 interface \$120  
 4K buffer \$162  
 Retail price: \$1135  
 Agent: Genisis Systems Ltd



# Olympia. Comes out tops for performance, quality and value for money!



## OLYMPIA ELECTRONIC COMPACT NP

- High speed draft mode (165 characters per second).
- Pushbutton Near Letter Quality mode for word processing use.
- Wide range of print fonts and pitch options. (In fact, the Olympia is PC code-compatible.)
- Full graphics capability.
- Extremely quiet operation, essential in the modern office environment.
- And best of all is the price.

**ONLY \$1195!**



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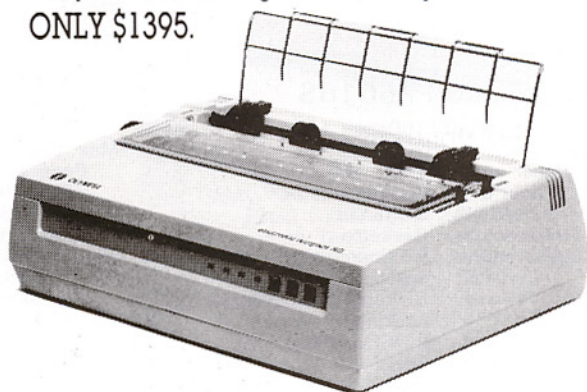
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P.O. Box 78.118, Auckland, New Zealand.  
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COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

TELEPHONE \_\_\_\_\_



# PRINTER ROUND-UP

## Star SG10-C

Print speed: 120cps  
Max. chars/line: 132  
Paper width: 10in  
Paper feed: Friction/tractor  
Buffer size: 2 Kbytes  
Ribbon type: Spool  
Graphics modes: 60/72/80/90/120/240 dpi  
Interface: Parallel  
Features: 100% Commodore compatible  
Letter quality mode  
Every possible feature for a dot matrix printer  
Options:  
Retail price: Price on application  
Agent: Genisis Systems Ltd

## Star SG15

Print speed: 120cps  
Max. chars/line: 233  
Paper width: 15in  
Paper feed: Friction/tractor  
Buffer size: 16 Kbytes  
Ribbon type: Spool  
Graphics modes: 60/72/80/90/120/240 dpi  
Interface: Parallel  
Features: 100% IBM PC compatible  
Letter quality mode  
Every possible feature for a dot matrix printer  
Options: RS232 interface \$90  
Retail price: \$1640  
Agent: Genisis Systems Ltd

## SV3300

Print speed: 130cps  
Max. chars/line: 272  
Paper width: 15in  
Paper feed: Friction/tractor  
Buffer size: Cassette  
Ribbon type: Cassette  
Graphics modes: 64/128 dots/inch  
Interface: Parallel  
Features: Sub/superscript/italic modes  
Bidirectional logic seeking  
Built-in graphics symbols  
Options: RS232 interface \$250  
4K buffer  
Retail price: \$1095  
Agent: Computer Distributors Ltd

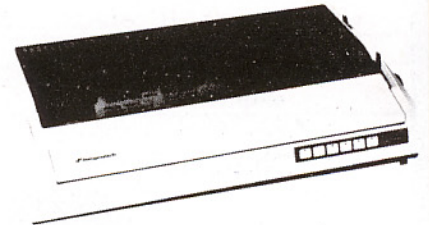
# Dot matrix — \$2000-4000

## Casio FP6016S

Print speed: 160cps  
Max. chars/line: 233  
Paper width: 15in  
Paper feed: Friction/tractor  
Buffer size: 3 Kbytes  
Ribbon type: Cassette  
Graphic modes: Bit image capability  
Interface: Parallel  
Features: Bidirectional logic seeking  
IBM PC compatible  
Options: Serial interface \$387  
IEEE interface \$387  
Retail price: \$2095  
Agent: Moutek Equipment

## Commodore 8024

Print speed: 160cps  
Max. chars/line: 132  
Paper width: 15in  
Paper feed: Tractor  
Buffer size: Cassette  
Ribbon type: Cassette  
Graphics modes: IEEE 488  
Interface: IEEE 488  
Features: Double width characters  
6/8 lines/inch  
Self test  
Options:  
Retail price: \$3495  
Agent: Commodore Computer NZ Ltd



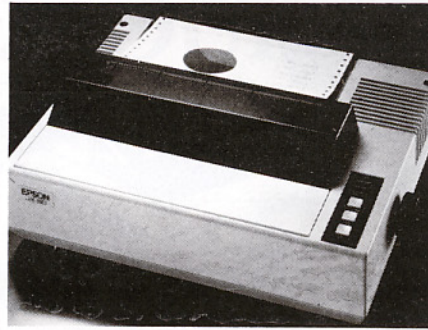
## Dataproducts DP8020

Print speed: 180cps  
Max. chars/line: 132  
Paper width: 15in  
Paper feed: Friction/tractor  
Buffer size: 2 Kbytes  
Ribbon type: Cassette  
Graphics modes: 84/168 dots/inch  
Interface: Parallel/serial  
Features: IBM PC compatible  
Menu driven soft setup  
Letter quality mode  
Self loading single sheet  
Options:  
Retail price: \$2451  
Agent: MEC Dealer Products



## Epson FX100+

Print speed: 160cps  
 Max. chars/line: 233  
 Paper width: 16in  
 Paper feed: Friction/tractor  
 Buffer size: 3 Kbytes  
 Ribbon type: Cassette  
 Graphics modes:  
 Interface: Parallel  
 Features: 10 graphics modes  
 Roman/sanserif fonts  
 (WP card)  
 Proportional mode &  
 hex dump  
 Download character  
 set  
 Front panel font  
 selection  
 Options: Interfaces as for  
 RX80  
 Word processing card  
 \$373  
 Single bin sheet  
 feeder \$1067  
 Retail price: \$2495  
 Agent: MDL



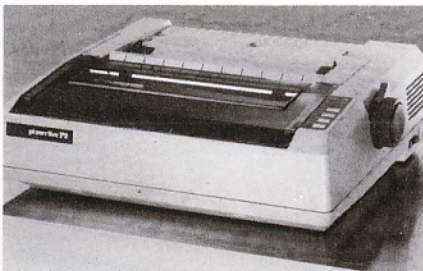
## Epson JX80

Print speed: 160cps  
 Max. chars/line: 160  
 Paper width: 10in  
 Paper feed: Friction/tractor  
 Buffer size: 3 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 48/58/64/72/96/192  
 dpi  
 Interface: Parallel  
 Features: 7 colour text/graphics  
 printer  
 Proportional mode and  
 hex dump  
 Download character  
 set  
 Front panel font  
 selection  
 Options: Interfaces as for  
 RX80  
 NLQ font card \$436  
 Roll paper holder \$54  
 Retail price: \$2424  
 Agent: MDL



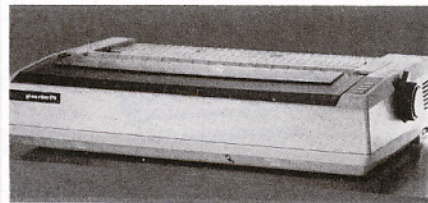
## Lear Siegler Versaprint 500

Print speed: 180cps  
 Max. chars/line: 224  
 Paper width: 16in  
 Paper feed: Tractor  
 Buffer size: 2.5 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 72/144 dots/inch  
 Interface: Parallel/serial  
 Features: Near letter quality  
 mode  
 Front panel setup  
 switches  
 Sound suppressing  
 acoustic design  
 Options: 4 colour ribbons  
 Retail price: \$3180  
 Agent: AWA NZ Ltd



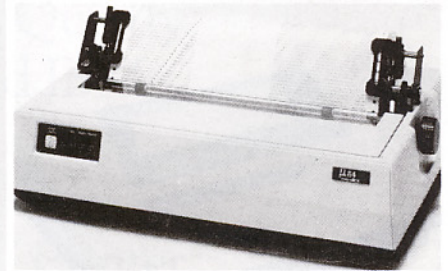
## NEC Pinwriter P2

Print speed: 180cps  
 Max. chars/line: 136  
 Paper width: 10in  
 Paper feed: Friction  
 Buffer size: 3.5 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 120 dots/inch  
 Interface: Parallel  
 Features: Near letter quality  
 mode  
 Sub/superscript/  
 underlining  
 Download character  
 set  
 Proportional  
 spacing/selftest  
 Interchangeable  
 interfaces  
 Options: RS232 interface \$514  
 Tractor unit \$174  
 Bidirectional tractors  
 \$351  
 Retail price: \$2075  
 Agent: Scollay Computers Ltd



## NEC Pinwriter P3

Print speed: 180cps  
 Max. chars/line: 233  
 Paper width: 16in  
 Paper feed: Friction  
 Buffer size: 3.5 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 120 dots/inch  
 Interface: Parallel  
 Features: Near letter quality  
 mode  
 Sub/superscript/  
 underlining  
 Download character  
 set  
 Proportional  
 spacing/selftest  
 Interchangeable  
 interfaces  
 Options: RS232 interface \$514  
 Bidirectional tractors  
 \$403  
 Cut sheet feeder  
 \$943  
 Retail price: \$2370  
 Agent: Scollay Computers Ltd

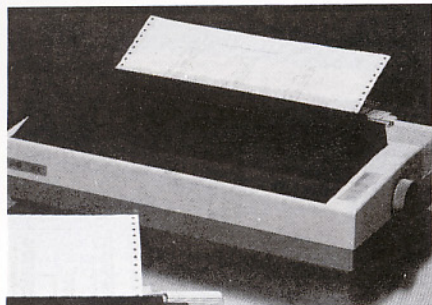


## OKI Microline 84

Print speed: 200cps  
 Max. chars/line: 233  
 Paper width: 16in  
 Paper feed: Friction/tractor  
 Buffer size: 256 Kbytes  
 Ribbon type: Spool  
 Graphics modes: 72 dots/inch  
 Interface: Parallel  
 Features: Heavy duty low cost  
 printer  
 Near letter quality  
 mode  
 Proportional spacing  
 Bidirectional logic  
 seeking  
 Options: IBM compatible  
 graphics \$50  
 Cut sheet feeder  
 \$829  
 Hispeed RS232  
 interface \$252  
 Retail price: \$2093  
 Agent: AWA NZ Ltd

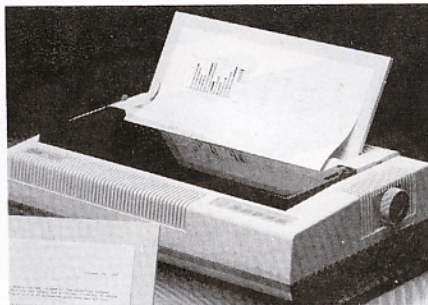


## PRINTER ROUND-UP



### Star SD15

Print speed: 160cps  
 Max. chars/line: 233  
 Paper width: 15in  
 Paper feed: Friction/tractor  
 Buffer size: 16 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 60/72/80/90/120/240 dpi  
 Interface: Parallel  
 Features: 100% IBM PC compatible  
 Letter quality mode  
 Every possible feature for a dot matrix printer  
 Options: RS232 interface \$85  
 Retail price: \$2300  
 Agent: Genisis Systems Ltd



### Star SR15

Print speed: 200cps  
 Max. chars/line: 233  
 Paper width: 15in  
 Paper feed: Friction/tractor  
 Buffer size: 16 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 60/72/80/90/120/240 dpi  
 Interface: Parallel  
 Features: Auto single sheet insertion  
 Letter quality mode  
 100% IBM PC compatible  
 All features required in a dot matrix printer  
 Options: RS232 interface \$65  
 Retail price: \$2995  
 Agent: Genisis Systems Ltd

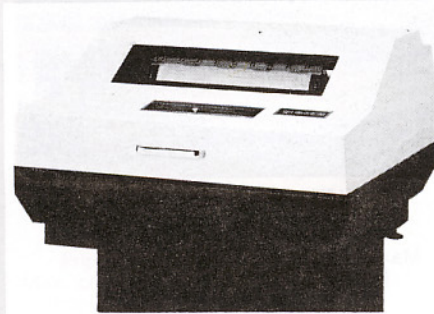
**Our  
 printer  
 roundup  
 continues  
 next  
 month**

## Dot matrix — \$4000-plus



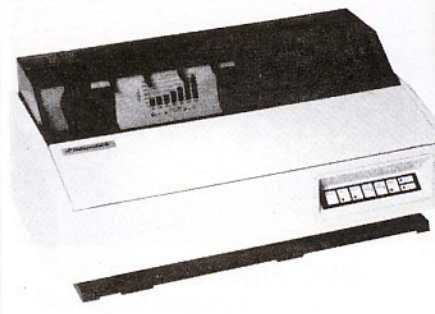
### C. Itoh CI300

Print speed: 3001pm  
 Max. chars/line: 222  
 Paper width: 15in  
 Paper feed: Tractor  
 Buffer size: 3.5 Kbytes  
 Ribbon type: Spool  
 Graphics modes: 24 Dots/inch  
 Interface: Parallel/Serial  
 Features: Quiet compact heavy duty unit  
 Options: Stand \$750  
 Stacker \$150  
 Retail price: \$11,610  
 Agent: MEC Dealer Products



### C. Itoh CI600

Print speed: 6001pm  
 Max. chars/line: 222  
 Paper width: 15in  
 Paper feed: Tractor  
 Buffer size: 3.5 Kbytes  
 Ribbon type: Spool  
 Graphics modes: 60-200 dots/inch  
 Interface: Parallel/serial  
 Features: Quiet compact heavy duty unit  
 Options: Stand \$750  
 Stacker \$150  
 Retail price: \$14,835  
 Agent: MEC Dealer Products

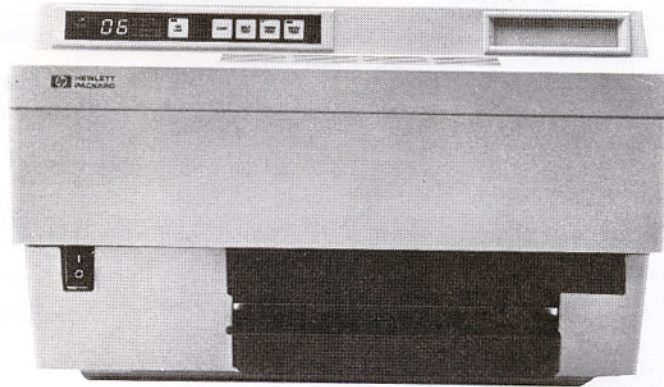


### Dataproducts DP8050

Print speed: 200cps  
 Max. chars/line: 225  
 Paper width: 15in  
 Paper feed: Tractor  
 Buffer size: 5 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 84/168 dots/inch  
 Interface: Parallel/serial  
 Features: Auto sheet feed  
 Proportional spacing  
 Letter quality mode  
 Download character set  
 Lotus 123 compatible colour  
 Options: Colour \$501  
 Retail price: \$4674  
 Agent: MEC Dealer Products



# LETTER QUALITY, LASER QUIET, LIGHTNING QUICK.



The new LaserJet Professional PC Printer from Hewlett-Packard. Mixes different type styles on a single page. Does graphs, charts and illustrations. Quickly — eight pages a minute. Quietly. And cost-effectively. HP 150 and IBM PC compatible, too.

Come in for a demo today.

LaserJet—The Professional PC Printer from Hewlett-Packard.

Setting You Free.



Hewlett-Packard Personal Computers

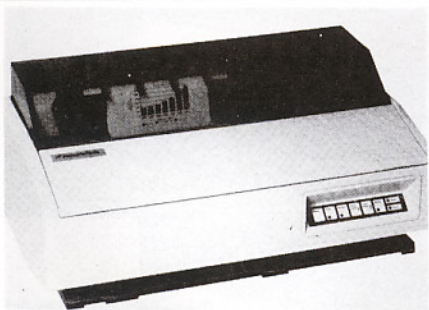
For further information, call or write to Hewlett Packard.  
Wellington — P.O. Box 9443, Telephone 877-199  
Auckland — P.O. Box 26-189, Telephone 687-159



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PACKARD

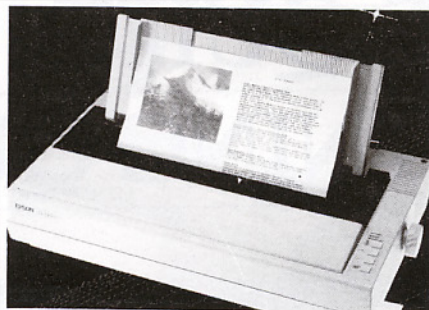


# PRINTER ROUND-UP



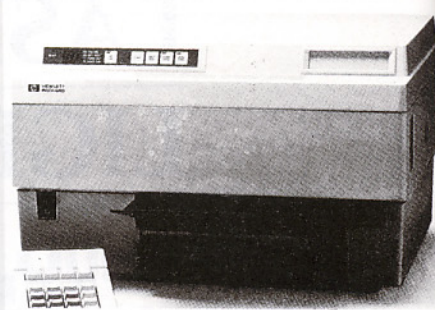
## Dataproducts DP8070

Print speed: 400cps  
 Max. chars/line: 225  
 Paper width: 15in  
 Paper feed: Tractor  
 Buffer size: 5 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 84/168 dots/inch  
 Interface: Parallel/serial  
 Features: High speed print  
 Letter quality mode  
 Proportional spacing  
 Options: Colour \$501  
 Retail price: \$5925  
 Agent: MEC Dealer Products



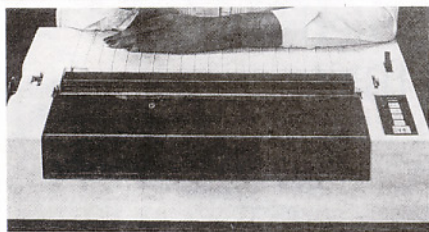
## Epson LQ1500

Print speed: 200cps  
 Max. chars/line: 272  
 Paper width: 16in  
 Paper feed: Friction/tractor  
 Buffer size: 2 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 816x8 to 2448x24  
 dpl  
 Interface: Parallel  
 Features: 24 pin printhead (3  
 col. x 8)  
 Single & double sheet  
 feeders  
 10 graphics modes  
 Download character  
 set  
 Automatic paper load  
 Options: Single sheet feeder  
 \$1594  
 Serial & IEEE 488  
 interfaces  
 NLQ sanserif font card  
 \$441  
 Retail price: \$4694  
 Agent: MDL



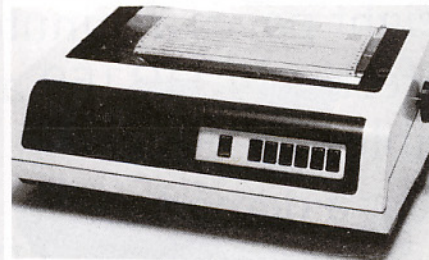
## Hewlett Packard Laserjet

Print speed: 8 pages/minute  
 Max. chars/line: 188  
 Paper width: 0in  
 Paper feed: Friction  
 Buffer size: 59 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 75 dots/inch  
 Interface: Serial  
 Features: Quiet operation  
 Multiple fonts per  
 page  
 Compact (18x16x11  
 inches)  
 Up to 8 A4  
 pages/minute  
 Retail price: \$10,183  
 Agent: Hewlett Packard



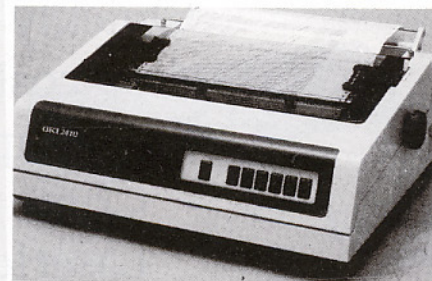
## NDK Printstar 5025

Print speed: 180cps  
 Max. chars/line: 163  
 Paper width: 15in  
 Paper feed: Friction  
 Buffer size: 400 bytes  
 Ribbon type: Cassette  
 Graphics modes:  
 Interface: Parallel  
 Features: 24 pin head for letter  
 quality  
 IBM PC/QUME  
 compatible  
 Download character  
 set option  
 Options: 16K buffer \$694  
 Tractors \$260  
 RS232 interface \$197  
 Auto sheet feeder  
 \$1827  
 Retail price: \$4200  
 Agent: MEC Dealer Products



## OKI 2350

Print speed: 350cps  
 Max. chars/line: 233  
 Paper width: 16in  
 Paper feed: Tractor  
 Buffer size: 2 Kbytes  
 Ribbon type: Cassette  
 Graphics modes: 60/72 dots/inch  
 Interface: Parallel/serial  
 Features: High speed heavy  
 duty printer  
 Bidirectional logic  
 seeking  
 Automatic platen gap  
 adjust  
 2 colour printing  
 Options: Black/red ribbon \$56  
 Retail price: \$5006  
 Agent: AWA NZ Ltd



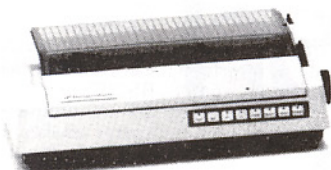
## OKI 2410

Print speed: 350cps  
 Max. chars/line: 233  
 Paper width: 16in  
 Paper feed: Tractor  
 Buffer size: 2 kbytes  
 Ribbon type: Cassette  
 Graphics modes: 60/72/120/144  
 dots/inch  
 Interface: Parallel/serial  
 Features: Correspondence  
 quality mode  
 2 colour printing  
 Automatic platen gap  
 adjust  
 Bidirectional logic  
 seeking  
 Options: Single bin sheet  
 feeder \$824  
 Black/red ribbon \$56  
 Retail price: \$5345  
 Agent: AWA NZ Ltd



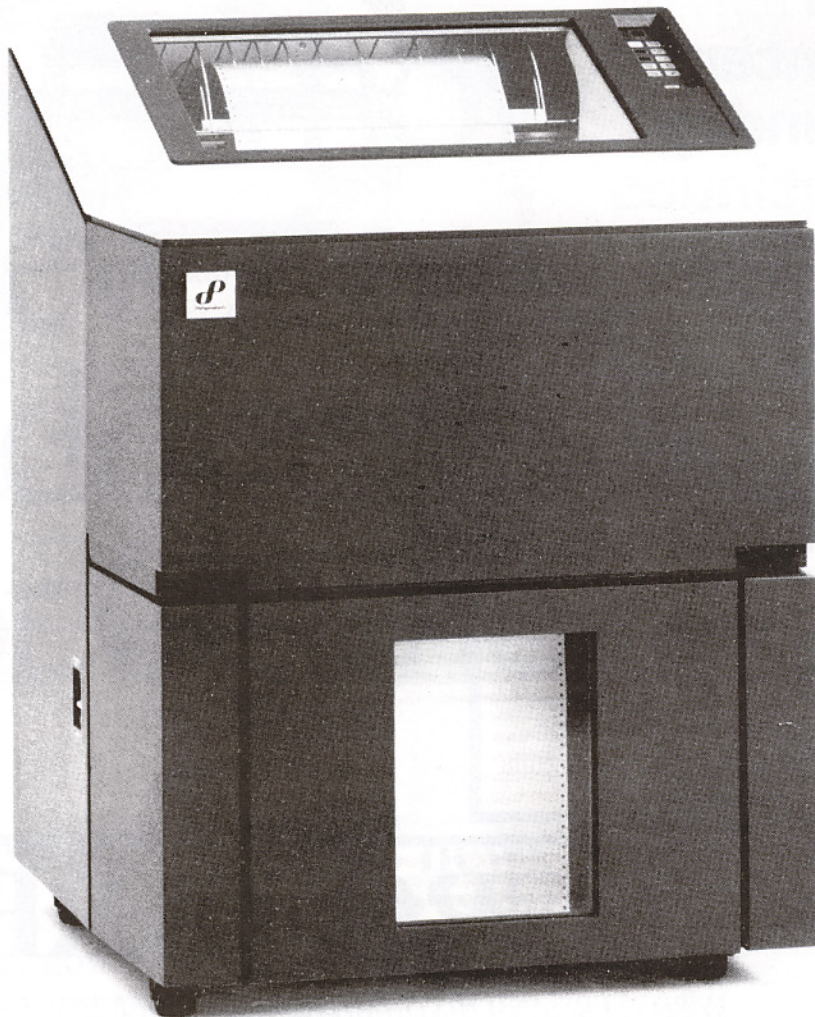
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IN NEW ZEALAND**

**From  
this**



**to this**

**Nobody puts  
ideas on paper  
so many ways.**



## **Dataproducts computer printers.**

For 22 years, they've been something of a secret shared by a cadre of high-technology customers — mainly the leaders of the computer industry.

Dataproducts makes more different kinds of computer printers than any other independent printer company in the world.

Dataproducts have learned more about when and where and how people use their computer printers. What jobs they need them to perform.

For example, if you're using your printer with a personal computer, you probably need one that can handle a variety of functions.

The pint-sized Dataproducts printer in the picture costs about as much as one good software package.

It prints spreadsheets, graphics and illustrations, labels, multi-part forms — even letters that look like they were typed.

The printer on the right finishes a full computer printout page in less time than it takes to sneeze. At 2,000 lines a minute, it prints much faster than you can see.

In between these two special-duty Dataproducts printers are whole families of other Dataproducts printers.

No matter what it is you will use your computer printer for, we ought to get acquainted.



THE MICROCOMPUTER ELECTRONIC CO LTD,  
27 GREAT SOUTH ROAD, NEWMARKET, AUCKLAND.  
P.O. BOX 9224, AUCKLAND 1, NEW ZEALAND.  
TELEPHONE (09) 504-774, TELEX NZ 60721 MEC.

TCC11004



## PRINTER ROUND-UP

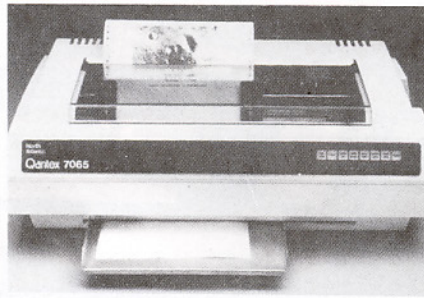
Our  
printer  
roundup  
continues  
next  
month



**COMPUTERS  
FOR PEOPLE**

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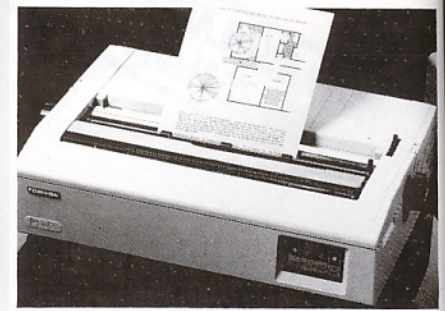
35 Taranaki St, Wellington  
Phone 847-668, 847-628  
69a Rutherford St, Lower Hutt  
Phone 664-069



**Qantex 7065**

Print speed: 300cps  
Max. chars/line: 231  
Paper width: 15in  
Paper feed: Friction/tractor  
Buffer size: 4.7 kBytes  
Ribbon type: Cassette  
Graphics modes: 60/72/120/144 dots/inch  
Interface: Parallel/serial  
Features: Also includes 20mA interface  
Front and bottom paper feed  
Epson compatible control codes  
Rugged construction designed for 24 hour operation

Options:  
Retail price: \$5996  
Agent: MDL



**Toshiba P1351**

Print speed: 192cps  
Max. char/line: 136 std 226 max  
Paper width: 4in to 15in  
Paper feed: Friction/pin  
Buffer size: 4K  
Ribbon type: Cartridge  
Graphics modes: 180/180 dots/inch  
Interface: Centronic/Parallel or RS232 serial  
Features: 24 pin printhead  
Letter quality 24x24  
Draft quality 16x11  
Optional downloadable fonts may be specified  
Options: Tractor feeder  
Sheet feed

Retail price:  
Agent: Southmark Electronics Ltd

# MICROWARE (N.Z.)

IMPORTERS AND DISTRIBUTORS OF COMPUTER HARDWARE AND SOFTWARE

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RS232 Lead ..... \$39.00  
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IEEE488 Interface; RAM Expansion

Selected items available from:—

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Chess (Psion version — 3D graphics) ..... \$105.00  
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32K SWR ..... \$239.00  
128K Solidisk ..... \$599.00  
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For use if Acorn DFS also required ..... \$199.00

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Complete with leads and utilities disk ..... \$769.00  
5802SD As above but single drive in dual  
case with enclosed power supply ..... \$910.00

Or Direct from the importers:—

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**P.O. Box 6309**  
**Wellington**

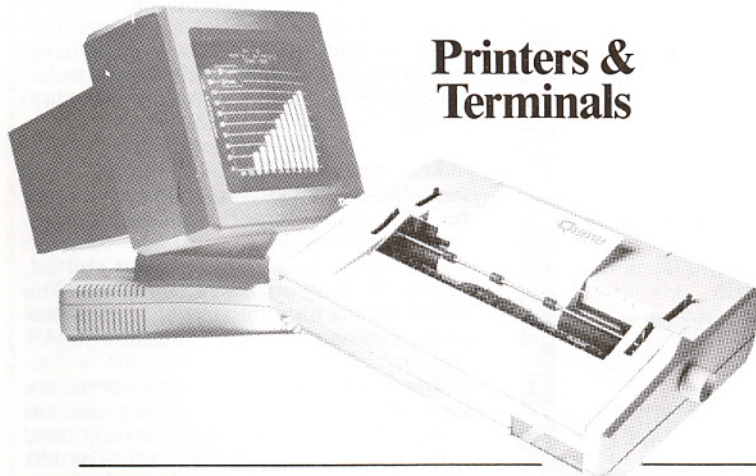


# QUME

## ITT is now the New Zealand headquarters for Qume

### Good news for dealers

If you are not already aware of the outstanding merits of Qume, now could be your opportunity to stock this excellent low cost range of letter quality printers, and terminals — backed by the ITT nationwide service network. Existing dealers can now enjoy even better margins and support.



**Printers &  
Terminals**

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P O Box 26-064 Auckland, P O Box 40-140 Wellington

The best ideas are the ideas that help people. **ITT**



## HARDWARE REVIEW

### SPECTRAVIDEO 728

# 'Room to grow in to'

By Gordon Findlay

The SVI 728, Spectravideo's latest entry in the home computer stakes, was released in New Zealand for the first time at the recent *Bits and Bytes* PC 85 show in Auckland.

The 728 is an MSX standard machine, and any review of it must be very much a review of MSX itself. The MSX standard was formulated by several Japanese manufacturers, in conjunction with Microsoft, who wrote both the BASIC and the operating system. Spectravideo has subsequently adopted it.

The aim of the standard is to make software for computers in the home market available to more than one machine. Any MSX machine should run software from any other, subject only to the provision of sufficient memory (RAM), and appropriate peripherals.

The hardware of the MSX standard requires:

- A Z80A eight-bit microprocessor, with 3.6MHz clock rate;
- the Texas Instruments TMS 9918A video controller, which provides colour graphics and supports sprites;
- The General Instruments AY-3-8910 programmable sound generator, which is a very versatile chip providing three voices, covering eight octaves and a white noise generator;
- 40-column display, with 24 lines;
- 16-colour capacity;
- Support for cassette storage;
- Expansion slots for cartridge and an



The Spectravideo 728

- add-on disk drive;
- Standard keyboards;
- Joystick port;

- 32K of ROM, with MSX BASIC resident;
- at least 8K of RAM.

The Spectravideo incorporates this requirement in a light, white plastic unit, 405mm by 215mm, and 72mm high, but with 80K of RAM. Of this, 16K is video RAM, for graphics use, and 64K is user RAM. Basic programs have over 28K to play with.

The keyboard unit is compact yet versatile. The keyboard itself has a numeric pad, with a numeric pad, cursor movement keys, special editing keys and five function keys. These may each be used shifted, giving 10 programmable functions. The keyboard is a full-stroke, typewriter style, with a rather firm stroke.

The keyboard unit is compact yet versatile. The keyboard itself has a numeric pad, cursor movement keys, special editing keys and five function keys. These may each be used shifted, giving 10 programmable functions. The keyboard is a full-stroke, typewriter style, with a rather firm stroke.

The various switches and sockets are distributed around the keyboard unit. On the right side is the on-off switch, and the socket for the power cord. The left side has two joystick connectors; cartridges (mainly games programs I expect) and some expansion cards plug

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## Microcomputer Summary

<b>Name:</b>	Spectravideo 728
<b>Manufacturer:</b>	Spectravideo International, Hong Kong
<b>Microprocessor:</b>	Z80A 8-bit
<b>Clock speed:</b>	3.6MHz
<b>Memory:</b>	RAM 64K (excluding 16K screen RAM); ROM 32K.
<b>Input/Output:</b>	TV, video, audio, tape, cartridge, parallel printer, joysticks, disk drives.
<b>Keyboard:</b>	90 key, 10 programmable, numeric pad, cursor control.
<b>Display:</b>	24 x 40
<b>Graphics:</b>	256 x 192, 16 colour
<b>Languages:</b>	MSX BASIC and perhaps others
<b>Sound:</b>	Programmable sound generator, no internal speaker
<b>Cost:</b>	Computer unit \$695; Cassette recorder \$89; Joystick \$29.95; disk drive \$995; 80 column card \$375.
<b>Reviewer's ratings (5 the highest):</b>	Ease of use 4; documentation 4; languages 5; expansion 5; value for money 5.

*(Review unit supplied by Computer Distributors Ltd, Auckland).*

in a slot in the top of the main unit. On the rear panel are sockets for TV, monitor, audio, cassette unit, disk drive, and printer.

The graphics display is 256 x 192 pixels, and both text and graphics displays may use 16 colours. The quality of the display on a colour television was exceptionally good – steady, with good, saturated colours and no herring-bone bars. A variety of special characters, such as lines, blocks and card pips, are supplied. These may be typed directly from the keyboard, using two special "shift" keys, labelled "graph" and "code". Text display was good, but the font used doesn't accommodate descenders on lower case characters as well as some.

Graphics displays may make use of up to 32 independently programmable sprites, again with 16 colours. The programmable sound generator is extremely versatile, and relatively easily accessed from BASIC, using a sort of music macro language, written as BASIC strings, and used as input for a PLAY statement.

The built-in MSX BASIC interpreter is a version of Microsoft BASIC, with substantial additions, mainly in the graphics, sprite and sound areas. Commands allow for trapping of events such as a joystick button being pressed, a key being depressed, sprite collisions, or at a given time interval. The program being executed may jump to a given line number when one of these trapped events occurs.

Graphics commands include PSET, to set a point, LINE to draw a line, CIRCLE, PAINT (to fill an area), commands to define the patterns carried by sprites, and many others. The DRAW command draws whole figures, defined in a graphics macro language, on the screen. Many other statements and commands are included, and I did not notice any significant gaps.

Tape is used as the primary storage medium, and was trouble free and reasonably fast, with the supplied Spectravideo datasette. It is not necessary to use the special recorder – any standard cassette should do – but the supplied one was convenient.

On-screen editing of BASIC programs was very simple and rapid, using the cursor and editing keys. Rudimentary debugging tools only are incorporated – why doesn't Microsoft do something about the TRACE command?

Provision for printers is a parallel output port, with an "MSX-standard" plug – a small D-plug, which is rather uncommon, so special cables will be needed. Apart from this need, any parallel printer should be fine. Addition of a disk drive, and an 80-column display card, gives access to two disk operating systems, CP/M and MSX-DOS. CP/M is an old faithful of course, MSX-DOS is rather similar, but with some (limited) ability to read MS-DOS data (not programs of course!). The disk drive plugs into the rear; the 80-column card into the cartridge slot. The disk drive has a capacity of 320K.

Various other peripherals are listed in the catalogue – extra memory, serial output, a modem and so on. The addition of these peripherals and a printer could make a small business machine.

In use, the computer behaved flawlessly. The manuals are clear, with both introductory and more technical material covered in a readable, easy to follow style. There did seem to be a lot of plugs and cables, and a separate transformer in the power cables of the computer, the disk drive and the cassette recorder did increase the clutter.

The 728 is aimed at the first time computer buyer, but with lots of "room to grow in to". This puts it in the top of the home computer bracket. Naturally, the success of the machine is entirely

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# HARDWARE REVIEW

dependent on the supply of software. Many titles - around 180 - are listed overseas, including many games, utilities, languages and semi-business software. The use of the standard should help make more software titles available. Current SV-318 and 328 owners may

be interested in a soon-to-be-here device to allow some degree of compatibility between their machines and the MSX standard.

This is a very suitable machine for the home user, with lots of good points, and lots of room for expansion.

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NCR PC 4i

# NCR joins the queue

By Peter Ensor

NCR is the latest to show its name on the ever-expanding range of IBM look-a-likes or – as NCR prefers to call it – industry standard machines. NCR is well known for its range of business machines and for it to produce a 16-bit machine is no surprise.

NCR New Zealand is promoting two main versions of the unit. The first has a monochrome screen with a 10Mb hard disk while the second machine is supplied with a colour screen and a minifloppy drive in place of the hard disk. Both units have a second mini-floppy drive supplied as standard as well as 256K of RAM, MS-DOS and GW-BASIC.

Seven industry standard expansion slots are available but the unit is already supplied with a Centronics parallel port and a serial RS-232C port.

The first thing you notice when collecting the unit is its weight. The colour version weighs over 22kg – which makes you think twice about moving it from desk to desk or into the car.

Included in the carton is a set of keytops for use with other languages. The keyboard is set out in a conventional manner with the keys grouped (from left) in function keys, QWERTY, cursor control and finally, a numeric and dedicated function keyboard.

Turn the power on and the unit starts performing a self-test of the memory before loading the operating system off the disk. Both disk drives on the unit supplied were noisy.

## Good resolution

The screen gave good resolution with the character font easily readable. The 640 by 400 pixels resolution is the level to which IBM recently stated it would be upgrading its machines. To maintain compatibility with the software between the two machines, the software in the NCR machine will fill out the standard IBM resolution so that the pictures appear on the NCR machines as they do on other machines.

Of the software supplied with the unit, two are of special interest to the first-time buyer.

INSTRUCTOR is a tutorial program



The NCR PC 4i

that takes the user through the keys and explains their uses. The package is extensive and well worth the time if you have not used a computer before. For those who have not used an MS-DOS machine before, the package also deals with using the function keys to edit the command lines.

The second package takes two disks and is a tutorial program dealing with the operating system and the utilities that go with it.

Once the tutorials have been mastered, there is a good level of documentation, with chapters included in the front on how to care for the computer system and the disks.

## Special interests

A further three manuals are available for those with a particular interest – a programmers manual which includes the macro assembler; a technical manual; and a service manual.

The standard unit has three more disks.

A diagnostics disk contains a package to test out the internal

portions of the unit including the keyboard. The second disk is the programmer's tools, containing the linker, debugger and associated programs. No assembler however – that comes with the programmer's manual. Booting off this disk produced what appeared to be a German error message which didn't make any sense – something that won't happen again, according to NCR.

The final disk contains the BASIC and the DOS 2 utilities, plus a program to demonstrate the use of the RAM disk that could be enabled. The speed increase using it was significant, with the RAM disk being about 13 times faster than the floppy. In addition, the second floppy disk was also faster than the first, no matter which way the disk drives were located. This may have been due to internal buffering as it did not happen on a second machine in the showroom.

Another catch with the RAM disks is that if they are set up as shown for the demonstration, there is not enough room left for the BASIC to load. The local dealer would be able to show you how to change this, or



## HARDWARE REVIEW

alternatively, more memory could be added.

### Help program

This disk also has a help program which gave good full explanations of the commands as chosen from a menu.

The additions and upgrades available for this machine include extra disk drives, both hard and flexi, memory expansion boards, co-processors and a DLC communications package.

Like others already on the market, this machine is competing for the same user wanting an industry standard piece of hardware. As NCR is late coming onto the market, it will be interesting to see how it fares.

Certainly, the tutorials are going to make an impression on the first-time buyer and those with staff who have not been introduced to a computer before. Other than this, the other major selling point is that NCR has been around for a while and would be able to give good support, such as a 12 month warranty and back-up.

## Microcomputer summary

<b>Name:</b>	NCR PC 4i
<b>Manufacturer:</b>	NCR
<b>Processor:</b>	8088, 8087 co-processor optional
<b>Clock speed:</b>	4.77MHz
<b>RAM:</b>	256K bytes expandable to 640kB
<b>ROM:</b>	8kB
<b>Input/Output:</b>	Parallel Centronics: serial RS-232C; serial keyboard; expansion slots
<b>Keyboard:</b>	10 function keys; QWERTY; cursor control; numeric/dedicated function
<b>Display:</b>	80 by 25 lines, 16 colours
<b>Graphics:</b>	640 by 400 pixels
<b>BASIC:</b>	GW-BASIC
<b>Cost:</b>	Dual flexi-drive and colour \$8760 (including tax); 10mB hard disk, monochrome \$12,910 (including tax).
<b>Options:</b>	Disk drive (10mB) \$4160; adapter \$1980; memory expansion (64kB) \$750; 64kB increment \$220; DLC communications adapter \$575; 8087 arithmetic co-processor chip \$485.
<b>Reviewer's ratings (5 the highest):</b>	Documentation 5; ease of use 3; language 4; expansion 5; value for money 3; support 5.

*(Review unit from NCR Auckland).*

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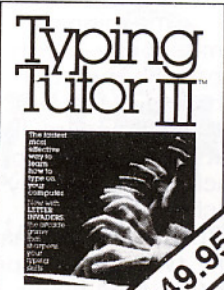
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# FOUNTAIN *User* NEWS



In this issue:

**Plot the path of Halley's Comet!**

**Choose your circuit for  
the Pole-Position Grand Prix**

**See the legendary Spitfire in action**

**Flight Simulator for the C16**

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Volume 1 — Issue 5.

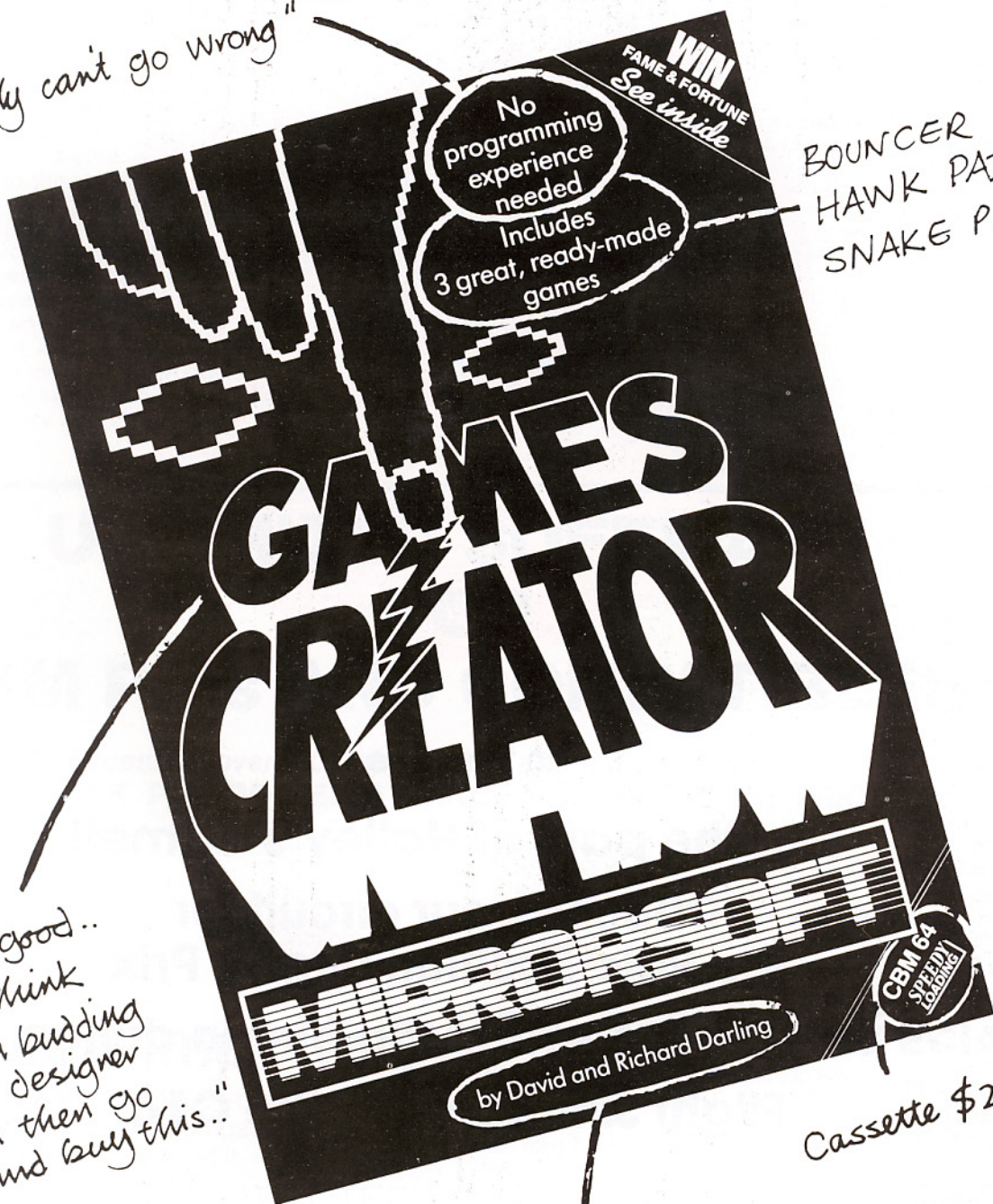
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# GAMES WITHOUT END..

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CCI Magazine,  
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Personal Computer News, 10 November 1984

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"Programmers of the year"

CCI Magazine, December 1984



**HI!!**

The time of the year is perfect for home computer fans — the nights have drawn in and there are none of the distractions caused by lots of sunlight late at night!

This month we look at some stunning new programs for the COMMODORE 64.

We look at another game for the VIC-20.

And we introduce more new titles for the COMMODORE 16 and the PLUS/4.

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**SUPER HUEY UH-1X.** This was one of the featured games last month. SUPER HUEY is NOW IN STOCK!! The first helicopter flight simulator for the COMMODORE 64. The Rescue mode challenges you to rescue men stranded in the mountains using a special homing device, the Explore mode allows you to map uncharted country, the Instructor mode actually teaches you to fly the helicopter and the combat mode allows you to fly a mission into enemy territory to do battle against enemy helicopters with rockets and machine guns.

**SUPER HUEY is in stock NOW!!**

**SUPER HUEY UH-1X from U.S Gold on cassette for the COMMODORE 64. Rec. Retail \$29.95.**

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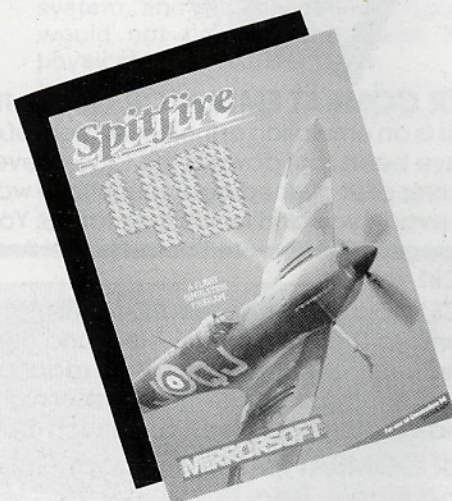
While we are up in the air I will tell you about another flight simulation for the COMMODORE 64.

**SPITFIRE 40.** This is not only the closest you're likely to come to flying one of the most famous aircraft of all time — it is a spectacular war-time adventure as well!!

Taking the part of a young Spitfire pilot in 1940, you must undergo thorough training in the techniques and practice of flying a Spitfire before going into practice combat and then full combat for real! You will discover the special capabilities of the Spitfire and as you learn, you can save your growing experience on disk or cassette. You can save your combat experiences as well, allowing you to rise through the ranks of the RAF towards the coveted position of Group Captain, VC, DSO and DFC.

Included with the programme is a booklet not only explaining the theory of flying the SPITFIRE in practice and in combat, but also telling the history and background of this famous aircraft. Superb graphics and realism make this one that must be seen to be believed!

**SPITFIRE 40 from Mirrorsoft on cassette for the COMMODORE 64. Rec. Retail \$29.95.**



Another arcade classic has been translated for the COMMODORE 64. This is —

**POLE POSITION.** With POLE POSITION you are in the driver's seat on a Grand Prix track. You can either race the first lap against the clock to try to achieve the Pole Position or you can race eight other cars on your choice of four circuits! To help you achieve your aim there are high and low gears with terrific sound. To test your skill oil slicks and road signs appear at various intervals. With the realistic scenery and graphics it's enough to make you want to try your hand at Formula 1 racing!!

**POLE POSITION from U.S. Gold on cassette for the COMMODORE 64. Rec. Retail \$29.95.**

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The mysteries of the night sky are revealed with —

**STAR SEEKER.** This is a fascinating introduction to astronomy for the beginner with no previous knowledge or a useful reference guide and practical tool for the amateur astronomer. STAR SEEKER accurately plots on-screen the position of more than 500 of the most prominent stars in the night sky. It will map the sky seen from any point on Earth at any day and time in this and the next century! You can access information on any selected star or one of 53 constellations. In addition, the rotation of the Earth is simulated, so that you can watch the stars change position as the night progresses and much more. Star maps and charts can be printed out via a printer.

Also included is a companion program SOLAR SYSTEM which locates the planets in the sky and plots their orbits relative to the sun and each other. You can obtain the rising and setting times of your chosen object, and

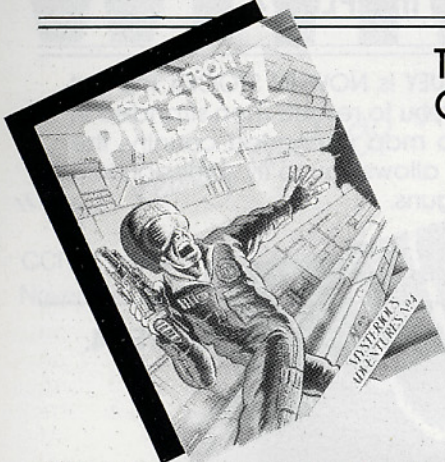




much more. Information on the sun and moon is also included. SOLAR SYSTEM also plots the course of Halley's Comet, last seen in 1910 and due in our skies in 1985 and 1986. The manual accompanying the package provides detailed information on using all the options within the programs, and some ideas for using the program itself. The manual also includes the necessary background information on the science of astronomy, latitude and longitude tables, constellations and star names included.

Both STAR SEEKER and SOLAR SYSTEM were written by Dr Paul Phillips of the London Planetarium. All in all, a magnificent package for anyone who is even vaguely interested in the night sky.

**STAR SEEKER from Mirrorsoft on cassette for the COMMODORE 64. Rec. Retail \$29.95.**



## Two NEW titles have become available for the COMMODORE 16 and the PLUS/4.

**ESCAPE FROM PULSAR 7.** You are alone on a gigantic space-freighter. The rest of the crew have died horribly at the hands of a mutated Zoo specimen. Your only chance of escape is to reach the trail shuttlecraft. But the lurking Monster is hungry and you are the only food it has left!!! A text adventure from Mysterious Adventures!

**ESCAPE FROM PULSAR 7 from Channel 8 on cassette for the C16 and Plus/4. Rec. Retail \$29.95**

**AIR COMBAT EMULATOR (ACE).** This is more than a flight simulation! This is an emulation of the excitement of aerial combat! All your comrades have been shot down in the face of overwhelming odds. You are the last fighter pilot pitched against multiple waves of enemy fighters. They will try to evade you and reach their target. You must shoot them down before they get YOU! You are the last hope! Are you good enough to be called ACE?

ACE is your chance to feel the thrill of flying a jet fighter in high speed aerial combat. Dive, climb, roll — find and destroy the enemy with conventional and heat-seeking rockets using radar and visual contact. With ACE you have the choice of daytime, dusk or night flying, a pause feature, intelligent and cunning opponents and much more!!

**AIR COMBAT EMULATOR from Cascade on cassette for the C16 and Plus/4. Rec. Retail \$29.95**



## For the VIC-20

**CRAZY KONG.** Kong has gone mad and captured your girlfriend! He has taken her to the top of his steel fortress. To save her you must first cross the elevator, avoid the custard pies and conquer the fortress. While climbing the ladders to your loved one, be careful not to be killed by the barrels which Kong is hurling down at you from his fortress. Remember, before getting to the top of each screen you must collect all of the diamonds, for they are a girl's best friend!!

**CRAZY KONG from Computer Classics on cassette for the VIC-20. Rec Retail \$24.95**

## THIS MONTH'S TOP SELLING SOFTWARE

### For the VIC-20

1. Gorf (cart)
2. Jupiter Defender (cass)
3. Video Vermin (cart)
4. Sargon Chess II (cart)
5. Maths Beginners (cass)

### For the COMMODORE 64

1. Raid Over Moscow (cass)
2. Beach Head (cass)
3. Bruce Lee (cass)
4. International Soccer (cart)
5. Zaxxon (cass)

That's all for this month.  
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# Networking: an introduction

By Darryl Roots

The objective of modern communication technology is to provide the fastest, most efficient and cheapest method of transmitting ever-increasing amounts of information.

Data communications encompasses the methods used in exchanging information between computer systems. The connection — whether physical or logical — of a number of computer systems results in the creation of a network.

Networks evolved during the 1970s in the transition from batch to on-line processing systems. A network consisted typically of a computer with a number of terminals attached to it. The sophistication and efficiency of such systems varied between manufacturers, but the principle remained the same. Computers became less expensive yet had greater processing power and more terminals could be added.

It was possible for a company with a large central computer to allow its user departments, often from many different locations, access to

corporate databases and application systems.

The means of data transmission mainly involved access to existing public telephone networks. Digital data was encoded and decoded into/from analog signals by modems at either end of the telephone line.

## Limitations

Since existing telephone networks are designed to carry voice transmission and not data, there are limitations in terms of speed, quality of transmission and efficiency.

Telephone conversations take place over relatively long periods, whereas data communication occurs in rapid bursts. Because calls are charged from connection to disconnection time, the user pays for the line even when data transmission is not taking place.

This makes a permanent connection between computer systems over the telephone network an expensive business. In answer to this, a number of alternatives have

been developed including the use of public packet switched networks which will be discussed later.

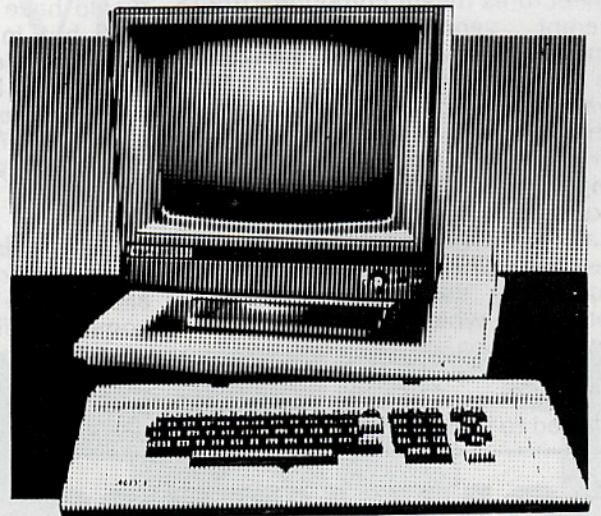
Of course, the addition of more and more terminals to the network often created bottlenecks and overheads which resulted in unacceptable response to users. The computer was spending a large portion of its time controlling the network, and less and less time processing user data.

To reduce these overheads, computer vendors produced data communication hardware and software to manage the network, leaving the processor free to work on application systems. In fact, in some cases, the network would be transparent to the application system, and the application program would not be concerned with the physical requirements of transmission to the electrical interfaces, the use of multiplexing, multidropping, etc.

This capability allows for very large, efficient networks. But since a lot of companies could not afford the

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## COMMUNICATIONS

necessary equipment or expertise, many purchased smaller, less expensive computers to be sited locally. Each of these smaller systems would control its own network of terminals.

### Distribution

This had the advantage of distributing the load across a number of systems but meant each site often had to store and maintain the same data. Information at the corporate level was often out of step with that at the remote site. It was also difficult to exchange data with the corporate system in an orderly and timely fashion.

A number of larger computer vendors have developed networking architecture to overcome this problem.

Each computer is regarded as a separate entity, yet it can exchange data (and in some cases, devices such as terminals) with other hosts in the network. In this way, a terminal connected to Host A may access application systems and data at Host B as would any of Host B's local terminals. Again, this is usually across public telephone networks with their inherent limitations.

The implementation of these architectures meant computers from different vendors could often communicate with each other, and this requirement helped start the development of public network architectures such as X.25.

From about 1978, public networks using the X.25 standard were introduced in a number of countries. Data from X.25 capable devices is assembled into "packets", also containing destination address information, which are passed to the network.

A virtual call is established with the destination node and the packet is passed to it. Users pay only for the

data volume transmitted, and this may represent great savings for larger networks. It also gives users of different equipment the opportunity to freely communicate with each other as each type of system must meet the X.25 standard.

### Emergence

In parallel with the development of data communications for larger computers came the emergence of the microcomputer into the business world. This allowed smaller companies to access the new technology previously beyond their financial means, and since departments of larger companies could afford their own, a proliferation of different micros could be found in large organisations, each chosen for their benefits to each department.

No longer did user-departments have to wait to have local applications implemented; they could do it themselves quickly, and usually inexpensively on their own system.

They could also make use of the many readymade packages, spreadsheets and office automation tools. Of course, many departments would have liked to share common data but in many cases this was beyond the capability of their equipment. Not only was data being duplicated on their mainframes, but also on their micros.

This forced the development of micros that could share information while still acting as independent workstations. They can share disk, and peripherals such as printers, and allow the implementation of common office automation software across the entire organisation.

These networks of micros, or local area networks (LANs) as they have become known, are available on a

number of micros from different vendors. Their architecture however, is quite often similar.

There are two main network types: baseband and broadband.

Baseband networks allow only one message to be sent over the communication line at one time and usually at a single frequency. A single protocol is used which controls access to the line. Baseband networks are best used when only one type of data will be transmitted.

Broadband networks allow the simultaneous transmission of different types of information such as data, voice, and even images, over multiple frequencies on a single line. Multiple protocols can be used because the line is split into multiple frequencies.

### Protocols

There are three main protocols in use by LANs today. The protocol defines the rules for the transmission of data over a line.

1. Carrier Sense Multiple Access (CSMA). In this environment, every station can see signals passed down the line. Each station ignores messages that do not have the address attached. Each station competes for access to the line and must wait until the line is free before it can send its message. Because of the time it takes for messages to go along the line, it is possible for a station to sense no activity on the line, and thus send its message when a station at the other end has already transmitted its message.

In this case, a collision would occur and there are a number of ways of managing this problem.:

- CSMA/CD (collision detect) requires the first station detecting a collision to stop the line so that no more messages

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can be sent. The two users who transmitted the conflicting messages must wait for a certain amount of time before they can resend their data.

- CSMA/CA (collision avoid) avoids collision by requiring stations to listen to the line for a random time period before sending a message. If collisions occur, they are solved by a CSMA/CD.
- CSMA/FA (fast acknowledgement) requires stations to acknowledge messages received before other stations can access the line.

CSMA networks are subject to downgrading of response if every user is trying to send messages at the same time, and constant performance cannot be guaranteed. They are best suited to environments where random usage of the network is expected.

2. Token Passing. An electronic token is passed in turn from user to user. Stations cannot transmit messages until they see an "empty" token. After the station has sent its message, it waits for a positive acknowledgement before allowing other stations to transmit messages.

Data is sent in packets of a fixed size; some networks allow the station to send only one packet at a time so it can take some time before a long message is completely delivered. Token Passing is relatively slow compared with CSMA, but it does not downgrade as much in situations of heavy usage.

3. Polling. Each station connected along the communications line is assigned a unique address and polled by a control station in turn to determine if it has a message to send. If this is the case, it accepts the message and carries on to the next station in turn. This protocol is similar to that used by large computers.

*Daryll Roots is data communications specialist to Burroughs NZ Ltd).*

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Microsoft has released a word processing package for the Macintosh. Word uses the Mac's features to allow full visual representation of text and graphics on-screen. Standard edit functions — cut, copy, paste — are used for moving and copying text, including between documents.

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This package will sell at \$535 in New Zealand.

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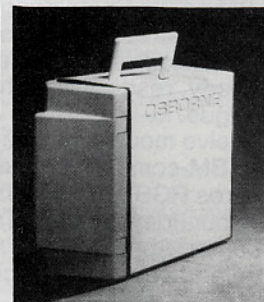
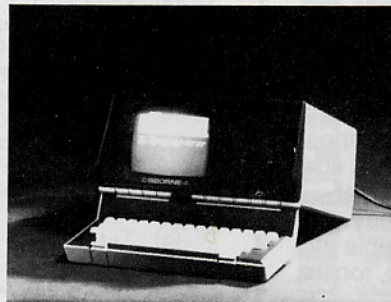
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# Turning on the taps

By Dave Keet

New Zealanders now have access to well over 1000 electronic databases around the world, including USA, Europe, and Australia. They cover everything from the content of the world's major newspapers to daily updates of tendering opportunities for Japanese government purchases.

Access to these databases is increasingly becoming necessary for New Zealand businesses if they want to stay competitive, and for New Zealand scientists, horticulturists and agriculturists to gain access to banks of scientific information and marketing intelligence.

This article is about the databases, and how to access them.

A year after Rob Fullerton wrote his article, "The link with DIALOG" (*Bits and Bytes*, Sept 1983), the Post Office's packet switched network (PSN) began commercial operation. Almost immediately, it was connected to the international packet switching service (IPSS). Anyone in New Zealand with a telephone and the necessary (relatively cheap) equipment and with the appropriate passwords can dial-up databases all around the world, and gain access to vast quantities of stored

information.

Pre-PSN, the Post Office's OASIS service was used for this purpose in the main centres. (See Pat Churchill's article "OASIS: a pool of information" — *Bits and Bytes*, Sept 1983). The old service operated at 300 bits per second. Both 300 and 1200 bits per second speeds are accommodated by the new service.

The databases and databanks (databases are usually defined as text-based, while databanks contain numerical and statistical information) are made available for information searches by database "hosts" in the different countries. DIALOG is one example, with more than 200 databases available. They can be divided into different categories; DIALOG divides them into category 1 — business, category 2 — chemistry, etc.

Most of these databases have abstracts (short summaries) of articles in them — which can be searched using the host's "search language". This article is followed by a copy of such a search.

Although originally predominantly scientific (DIALOG started in 1972 with three scientific databases), the databases now cover a much broader field, with emphasis lately on business and marketing information. The growth rate has been phenomenal. From the three in 1972, there were about 300 in 1975 (with more than 1 million searches performed on them) to more than 700 databases available on a worldwide basis in 1981. The number of searches in 1981 was estimated to be 6,900,000.

The last figures I have seen show there were well over 200,000 users by 1982, spending over \$US2 billion per year,

accessing 1200 online databases. DIALOG reportedly grosses over \$3 million per year. More than 100 million records are available through DIALOG databases, alone.

Of interest among these, for microcomputer users, are microcomputer "software directories" such as the BRS hosts SOFT databases, ORBIT's Microsearch covering main hardware and services, and DIALOG Microcomputer Index, among several others.

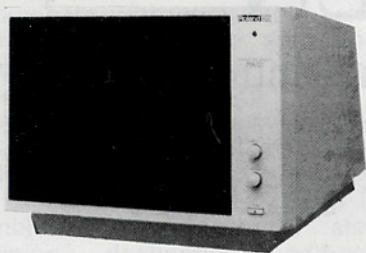
The three largest database hosts — DIALOG, ORBIT and BRS — are in USA. Each has its own search language, pricing and "stable" of databases with substantial number available on more than one host.

In Europe, we have access to the ESA IRS (European Space Agency) system with a search language similar to DIALOG. ESA has many of the major scientific or technical databases available in USA, and some unique ones such as PASCAL, the French database and World Transindex, a database of translations into English and the European languages.

In Britain, Pergamon-Infoline has number of unique databases available such as a database of patents from more than 48 countries, called INPADOC. In Australia, AUSINET has an increasing number of databases available especially business related ones.

That's the background — vast store of information, explosive growth, expanding use. If knowledge is power then New Zealanders had better get into the act!

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## Here's how

- Paperwork:
  - (a) Contact the Post Office (address below) for an application form for a PSN password, called a NUI (network user identifier).
  - (b) Write to the database hosts of your choice, asking for a password to their system. This is usually free and is accompanied by a newsletter and brochures.
- Hardware:
  - (a) Terminal — you will need a computer terminal (or microcomputer!) asynchronous, ASCII, and capable of operating at 300 baud speeds and, preferably, 1200 baud. The terminal can be either a VDU, or printing; it is usually wise to be capable of keeping a printed copy of your searches.
  - (b) Modem — A 300 or 1200 baud modem. These can be hired from the Post Office, or bought. The Post Office will have to make alterations to your telephone

connection in most cases. The Post Office also has terminals available for hire at most major centres.

- (c) Microcomputers — of course microcomputers can be used; the simplest way is to emulate a terminal. However, it is possible to use the microcomputer's most sophisticated capabilities. In either case, you also need

- Software — cheap software is available for most micros which enables them to operate as a "dumb" terminal. An example of such a program for a BBC micro follows this article. More sophisticated software allows data to be captured onto disk and is available commercially. These programs also allow "search command lists" to be sent from the disk to the online host computer, thus saving time and expense. An example is CROSSTALK, which costs about \$640 or 'Mite-86'.



## How to do it

So you have your passwords, your terminal and modem hooked up. What now? When you get your NUI back from the Post Office, you will be given a small AID CARD which tells you to dial various numbers for different services, according to the region you are in.

For example, to dial in to the PSN in the Wellington region at 300 baud, you dial 08740 (for 1200 baud access it's 08741).

After ringing the appropriate number, the phone usually rings about three times before the PSN replies with the normal computertone. At this point the terminal begins communicating with the PSN (if you are using a modem you switch to

data mode). If you are using 300 baud transmission speed, then you type an "H" followed by a carriage return. At 1200 baud, this is not necessary. PSN types onto your terminal or screen PACNET. The various passwords or codes are then typed in, for example:

?NAABB1234-0311041500020

which will connect you to DIALOG. (The codes between the ? and the - are not echoed on the terminal, and are different for each user, being your NUI. The second part is the NUA (network user address, for DIALOG).

## The costs

The Post Office's basic charge is \$4 per two months for one NUI. Additionally each call is charged at a rate calculated from the number of characters passed back and forth, and the number of seconds using the PSN. In my experience, a rule of thumb is that searching at 300 baud works out about \$25 per hour, for communication (PSN) costs. In the OASIS days, we calculated that a normal use of the system under the same conditions worked out at \$30

per hour.

A typical search of several BRS databases used about 10 pages of printout and about half an hour search time. In this case, the PSN charge was just over \$14.

The BRS search charges would depend on the databases searched, but could be expected to cost in the region of \$NZ25-50 for 15 minutes.

So the charges are not small.

## Training & manuals

The DIALOG and ORBIT hosts have training sessions scheduled in the major cities regularly each year. These are announced in their newsletter. BRS has no training sessions in New Zealand as yet.

Introductory courses usually last a day and cost between \$100 and \$150. If you are intending to search the databases for other than casual purposes, attending a course is definitely worthwhile.

DIALOG and ORBIT also hold "advanced user" courses which concentrate on particular subject areas.

Numerous manuals can be obtained to help you use the systems. Some are

absolutely necessary, others not. Host "system user manuals", which detail the search language and commands you can use to search the databases, and some information about the databases on the host, fall into the first category. If you intend to search particular databases, buy the "database chapters" which are quite detailed treatments of each database.

Some database producers publish their own manuals for searching their particular database.

A useful guide to manuals held at its library, has been published by the DSIR Central Library.

## "End-user" systems

Both DIALOG and BRS have introduced "user-friendly" services aimed at the "end-user" of the data — the actual consumer of the information, as opposed to "search intermediaries" such as librarians. The BRS/After Dark Service is available only in USA and Canada. It features cheaper access after hours and a simplified "menu-driven" search language, suitable for casual users. This has apparently gained quite wide acceptance in USA. It is expected that BRS will shortly introduce BRS/After All service which will offer the menu-

driven approach during the day, but at normal rates during working hours. This makes it likely that the service will be available here.

Microcomputer "search software" packages such as DIALOG's Insearch are another approach, with menus and online help for the micro user. However, they do not work in New Zealand as yet.

Coverage by overseas databases of New Zealand is nowhere near comprehensive. The subject of "information colonialism" has been identified as a problem in Canada and

Australia; the same situation applies here (if not to an even greater extent!) However, there is some movement in the direction of a local database industry. This will be covered in next month's *Bits and Bytes*.

## Help & advice

Most main centres host occasional seminars and discussion groups of local users of online systems, for mutual help and advice. Information about these groups will usually be available from the reference librarian at local universities.

For help on technical subjects, local DSIR libraries have librarians trained to search technical databases. Their addresses are included at the end of this article.

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# COMMUNICATIONS

## EXAMPLE OF BRS/SEARCH SYSTEM ONLINE SEARCH

```

-}-
PACNET
?-0311031500020

COM
BRS
ENTER BRS PASSWORD
*****
ENTER BRS PASSWORD
*****
ENTER SECURITY PASSWORD

*****
THE BROADCAST MESSAGE WAS LAST UPDATED ON 03/06/85 AT 12.42
ENTER Y OR N FOR BROADCAST MESSAGE.: Y
CUSTOMER SERVICE HAS A NEW PHONE NUMBER. NOW YOU JUST DIAL:
*****
1-800-345-4BRS *****
THIS EASY-TO-REMEMBER NUMBER IS AVAILABLE IN CANADA, THE
VIRGIN ISLANDS, PUERTO RICO AND ALL STATES EXCEPT ALASKA.
IN ALASKA, CALL COLLECT: 518-783-7251
*****
..SDI AND ..EDIT NOT AVAILABLE TODAY.
*****
FOR SORTING OFFLINE PRINTS PLEASE ENTER SO= NOT SORT=
ENTER DATABASE NAME: PTSP
*SIGN ON 20:22:43 01/07/85
PTSP FEB 1985 (ISS 06)
BRS SEARCH MODE - ENTER QUERY
1: ZEALAND OR NEW-ZEALAND
RESULT 2230 DOCUMENTS
2: SOFTWARE
RESULT 10708 DOCUMENTS
3: 1 AND 2
RESULT 5 DOCUMENTS
4: ..P 3 TI/DOC=ALL
1

```

TI Wirtschaft: ACT/Barson: Joint venture in Australien.

2  
TI Foreign software developers are finding California an attractive entry point for US markets.

3  
TI New Zealand Telecommunication System Support Centre (New Zealand) is a new software designer.

4  
TI Philips Data Systems, subsidiary of NV Philips Gloeilampenfabrieken of Eindhoven (Netherlands), will market Diebold automated teller machines worldwide.

5  
TI Inasc (US), a company set up to sell UK software, has gone into liquidation.

END OF DOCUMENTS IN LIST: ..P 3 ALL/DOC=2

2  
AN 913132 PROMT, 8308, Entry Date: 83/05/26.

SO datamation, Issue: 83/03/00 pp 74-79.

YR 83..

PN \*computer-software (PC7372000).

PN \*marketing (EC240).

CN \*california (CC1906).

TI Foreign software developers are finding California an attractive entry point for US markets.

AB Holland Automation chose California as headquarters for its US marketing operations due to the size of the California market. United Software Systems & Services, which markets products of 6 French software marketers, chose Los Angeles as its headquarters because W Coast companies are not afraid to be first to try an advanced product. They plan to establish themselves on the W Coast and then move into E Coast markets. Progeni Systems, which sells New Zealand-developed software programming aids for Burroughs mainframes, found an 'existing inertia in the East. For example, Detroit's technology is 20 yrs behind the times,' according to Pres G Mann.

END OF DOCUMENT

ENTER DOCUMENT SELECTION.: ..OFF

\*CONNECT TIME 0:06:09 HH:MM:SS 0.103 DEC HRS SESSION 1169

EST PTSP COST: C-HRS DB-ROY CIT-ROY COMM TOTAL

S2.06 S6.70 S2.22 S.00 S10.98

\*SIGN OFF 20:28:03 03/07/85

CLR PAD

## Online access aid pages

### Addresses:

Packet switched network, modem connections etc. nearest New Zealand Post Office regional engineer's office. (In Wellington it's P.O. Box 293, Wellington.)

**DIALOG** DIALOG Information Services Inc  
3460 Hillview Avenue  
Palo Alto  
CA 94304  
USA

**ORBIT** SDC Systems Development Corporation  
P.O. Box 439  
Milson's Point  
N.S.W. 2061  
Australia

**BRS** Bibliographic Retrieval Services  
1200 Route 7  
Latham  
New York 12110  
USA

**AUSINET** AUSINET  
P.O. Box 42  
Clayton 3168  
Australia

**Pergaman-Infoline** Pergaman-Infoline Ltd  
12 Vandy Street  
London EC2A 2DE

**ESA** ESA Information Retrieval Service  
ESRIN Via Galileo Galilei  
00044 Frascati  
Italy

**BRS** 0311031500020 BRS;  
**AUSINET** 0505235420000;  
0235421000  
**ESA** 0234219201156;  
0208075000394;  
02222620021  
**Pergaman-Infoline** 031109400247;  
0234219200190

## DSIR library addresses

The Reference Librarian  
DSIR Central Library  
16 Kent Terrace (P.O. Box 9741)  
Wellington Ph. 858-939

The Librarian  
Southern Industrial Division  
DSIR  
20 Southward St,  
Christchurch Ph. 62-369

The Librarian  
DSIR  
Palmerston North Research Centre  
Private Bag  
Palmerston North Ph. 68-019

The Librarian  
Auckland Industrial Development  
Division  
11 Albert St,  
Auckland 1. Ph. 34-116.

## Network User Addresses

These are some of the numbers. The list is by no means comprehensive.

**DIALOG** 03011041500020;  
03011041500048;  
03110213000170  
**ORBIT** 031102130003301;  
03106001509



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# What, why and how

By Gordon Findlay

My aim in this series is to develop programming techniques by writing programs as if you were reading over my shoulder, and I was explaining to you as I write. The programs will be of as wide a variety as I can dream up, but with the underlying purpose of developing routines which might be of use in other situations — toolbox routines, in fact.

Whenever programs are written, the problem of which language to use, and which dialect of the language, arises. For the most part, this series will be in Microsoft BASIC, so conversion to whatever machine you have should be relatively easy. Every so often, I'll get the editor to run a little list of reminders about some troublesome areas of program conversion.

Toolbox routines are intended to be sufficiently general to be reused in a variety of programs. Routines can be garnered from all over — books, magazines, other programs. Some sources are very erudite, as anyone who has looked into Knuth's collection will tell you; some are just collections of subroutines such as the justly famous books in the "Subroutine Sandwich" series.

To illustrate what I mean about a toolbox routine, consider my sort routine. Every second program I write needs a sort routine, and who can be bothered writing a sort time and again? So I dug into some books, and found a description of a quicksort routine, which I've coded in BASIC, and thoroughly tested. Since then, I've never typed another.

There are two versions in my disk library, one for sorting numbers, and one for strings; and another version in Pascal for use at school. Every time I need to sort in a program, in goes this subroutine from disk, and it's done. No more repetitive coding, no more typing, and I know the sort will run — even if the rest of the programme is faulty.

As toolbox routines must be easy to use, they will be subroutines or procedures. They will need to have certain variables set up before they are called — entry parameters. They will sometimes need to communicate success or failure back to the program which called them, so may need to set flags. Other than these, the subroutines must be self-contained, and be prepared to check their input carefully.

## Bridge dealing

How could a bridge deal be generated by computer? A deal is four hands — North, South, East and West — with 13 cards in each. The program should generate the hands at random, and print them out in a reasonable facsimile of the way that bridge hands are published. The program must shuffle, deal and print out the hands.

The first, and most vital, decision is how each card should be represented. Some languages, notably Pascal, C and even (in a way) COBOL would allow the card to be handled as a suite (clubs, hearts, spades, diamonds) and a value (A, 2, 3 . . . K). But this is pretty messy in BASIC. The most practical way of representing the deck is as an array of 52 integers. The numbers, one to 52, represent the cards, in the order A, 2, 3 . . . K of clubs, followed by the diamonds, hearts and spades in the same order.

In this arrangement, if we represent the deck by the array CD, and CD(1) is 15, the top card in the deck is the two of diamonds. As you will see, this representation has been chosen to make the programming relatively easy — this is the key to the whole program.

How can the hands be generated? One "obvious" way is to choose a card at random, and assign, it to the first hand, say North. Then another card is chosen, and provided it hasn't already been used, assign it to

North's hand. This can continue for all 52 cards. But this may be a very long process. The sting is in the phrase "provided it hasn't already been used".

Spades	K 6 4
Hearts	Q 5 3
Diamonds	K Q 10 3
Clubs	10 6 2

Once a lot of cards have been dealt, the checking this implies takes a long time and may have to be repeated — if one card is chosen and found to have been dealt already, another must be chosen, and checked from scratch again. And so on it goes. A rough attempt using this approach took several minutes to deal — too long.

A better algorithm here is to shuffle the deck, or arrange it in a random order, then take the top 13 cards as North's hand, the next 13 as East's and so on. Provided the random number generator is a good one, and some are very poor, this will give a suitably random deal.

How to shuffle? Start with the cards in order:

```
1000 for I = 1 to 52
1010 CD(I) = 1
1020 Next
```

Now shuffle:

```
1030 FOR I = 1 to 52
1040 J = INT(RND(0) * 52) + 1
1050 TEMP = CD(I)
1060 CD(I) = CD(J)
1070 CD(J) = TEMP
1080 NEXT
1090 RETURN
```

Line 1040 chooses a random card — by picking a random number between 1 and 52. Lines 1050 — 1070 swap two cards — CD(I) and CD(J). Line 1030 starts a loop, the effect of which is to swap each card in turn with a random card. Depending on what happens (which random numbers are chosen), a card may be swapped several times, and the cards end up in a random order. This is a very efficient form of shuffle.

So the cards are shuffled. Now to print out the hands. North's hand is cards 1 — 13, East's is 14 — 26, South's is 27 — 39, and West has cards 40 — 52. But the display format is not programmer friendly: this the style we want:

(If the computer being used has the symbols for the card pips they can be used instead of the words.)

We've four hands to output, so a subroutine seems to be in order. The things which change for each hand are the starting place in the card array, and the player's name, so these become the "parameters" passed to the subroutine, N\$ and ST (for start):

```
100 N$ = "North" : ST = 1 : GOSUB 2000
110 N$ = "East" : ST = 14 : GOSUB 2000
120 N$ = "South" : ST = 27 : GOSUB 2000
130 N$ = "West" : ST = 40 : GOSUB 2000
```

Now all we need is the subroutine at 2000! First get the cards for the



# TOOLBOX

hand being output, into a separate array where they can be handled more easily (the array will be reused every time the subroutine is called):

```
2000 FOR I = 1 TO 13
2010 HD(I) = CD(ST + I - 1)
2020 NEXT
```

The arithmetic in line 2010 simply ensures that as I becomes 1, 2, 3 . . . 13, the correct elements of the array are extracted, starting, when I is 1, with number ST.

Now sort the hand. If you check back, you will find that the numbering of the cards was such that the higher ranked suites are given higher numbers, so sorting the hand into descending order will automatically get the suits in the right order as well. So the next line must be:

```
2030 N=13 : GOSUB 3000
```

At 3000 we will place my sort routine, which needs to know how many entries it has to sort, hence the N = 13.

At this stage, we have a collection of 13 random numbers, in descending order, representing the cards of one hand. To print them in the usual format, we pass through the array printing all the spades, then the hearts, then diamonds and clubs.

## Let's hear it

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Auckland.*

To keep track of where we have reached in the array we use CU (for "current card").

```
2040 CU = 1
2050 PRINT N$; ":"
2070 PRINT "Spades ";
2080 IF HD(CU) < 40 THEN GOTO 2100
2090 N = HD(CU) : GOSUB 4000
2095 CU = CU + 1 : IF CU <= 13 THEN
GOTO 2080
2100 PRINT
```

This looks more complex than it is. After printing the name of the hand (line 2050), and the suite (line 2070), we look at the current card. If it is not a spade, we may move on. If it is a spade, we get its value, as N, and print out the value, (GOSUB 4000), then move to the next card (line 2095) and if we haven't finished the whole lot, go back and see if the next card is still in spades.

This may be repeated for the remaining suits. For the last suit we needn't check to see whether the next card is still in the same suit or not — once one club is found the rest of the cards must all be clubs. Putting two more chunks like the spades routine, and a modification for clubs, gives us:

```
2110 PRINT "Hearts ";
2120 IF HD(CU) = 27 THEN GOTO 2150
2130 N = HD(CU) : GOSUB 4000
2140 CU = CU + 1 : IF CU = 13 THEN
GOTO 2120
2150 PRINT
2160 PRINT "Diamonds ";
2170 IF HD(CU) = 14 THEN GOTO 2200
2180 N = HD(CU) : GOSUB 4000
2190 CU = CU + 1 : IF CU = 7 = 13 THEN
GOTO 2170
2200 IF CU = 13 THEN RETURN
2210 PRINT
2220 PRINT "Clubs ";
2230 FOR I=CU TO 13
2240 N=HD(I) : GOSUB 4000
2250 NEXT I
2255 PRINT : PRINT
2260 RETURN
```

The main thing to watch is that CU isn't allowed to exceed 13.

This subroutine which is missing in the output just the value of card N. Here is what it looks like:

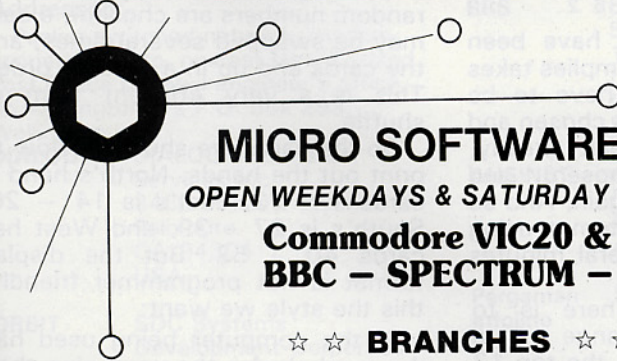
```
3999 REM output the value of one card
4000 IF N > 13 THEN N=N-13 : GOTO 4000
4010 IF N = 1 THEN PRINT "A " ; : RETURN
4020 IF N = 11 THEN PRINT "J " ; : RETURN
4030 IF N = 12 THEN PRINT "Q " ; : RETURN
4040 IF N = 13 THEN PRINT "K " ; : RETURN
4050 PRINT N ;
4060 RETURN
```

Line 4000 takes advantage of the ordering of the cards, subtracting 13 repeatedly until the value is in the range 1 - 13. Then there are special cases: A, K, Q and J which are handled individually, and the rest of the cases just involve printing the number.

I have used multi-statement lines a lot in this program. There are good reasons for not using them, but here the main reason is to avoid a lot of redundant GOTO statements, and in these cases I prefer the forms above.

Now putting the bits together with some preliminaries:

```
5 DEFINT A-Z
10 DIM CD(52), HD(13), AUX(20,1)
20 CLS: REM clear screen
25 GOSUB 1000
```



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and we have a complete program. Line 5 is unusual — leave it out if your computer doesn't know about integers being faster than real number for arithmetic. Line 10 dimensions the card deck, a single hand, and a little auxiliary array used in the sort routine. Now bind or merge the sort subroutine at 3000, and it is finished. A complete listing is included, and a sample of the output — who wants a game?

What special features has the program? Subroutines used to make the program easier to write and debug, and the importance of a good data representation are the main ideas, but I hope there are other little quirks which are useful. The final result isn't perfect by any means. I'm sure it could be made a little faster, although it isn't slow now. Aces are still printed last in the list of cards, rather than first as they ought to be, and the output doesn't line up in nice columns — a few TAB(20)s scattered through lines 2070, 2110 etc would help. The challenge is over to you.

**North:**

```
Spades  Q  5  3  2
Hearts  Q  6
Diamonds Q J  6  A
Clubs   9  6  2
```

**East:**

```
Spades  10  9  8  6
Hearts  8  3  2
Diamonds K  4  3
Clubs   10  7  A
```

**South:**

```
Spades  7  4  A
Hearts  K J  9  4  A
Diamonds 10  7  5
Clubs   Q  5
```

**West:**

```
Spades  K  J
Hearts  10  7  5
Diamonds 9  8  2
Clubs   K  J  8  4  3
```

```
5 DEFINT A-Z
10 DIM CD(52),HD(13),AUX(20,1)
20 CLS:REM clear screen
25 GOSUB 1000
100 N$="North" : ST = 1 : GOSUB 2000
110 N$ = "East" : ST = 14 : GOSUB 2000
120 N$ = "South" : ST = 27 : GOSUB 2000
130 N$ = "West" : ST = 40 : GOSUB 2000
998 END
999 REM shuffle cards.
1000 FOR I = 1 TO 52
1010 CD(I) = I
1020 NEXT I
1030 FOR I = 1 TO 52
1040 J = INT(RND(0) * 52) + 1
1050 TEMP = CD(I)
1060 CD(I) = CD(J)
1070 CD(J) = TEMP
1080 NEXT I
1090 RETURN
1999 REM output a hand: parameters N$ and ST
2000 FOR I = 1 TO 13
2010 HD(I) = CD(ST + I - 1)
2020 NEXT I
2030 N=13
2040 CU = 1
2050 PRINT N$;": "
2070 PRINT"Spades ";
2080 IF HD(CU) < 40 THEN GOTO 2100
2090 N = HD(CU):GOSUB 4000
2095 CU = CU + 1: IF CU <= 13 THEN GOTO 2080
2100 PRINT
2110 PRINT"Hearts ";
2120 IF HD(CU) < 27 THEN GOTO 2150
2130 N = HD(CU):GOSUB 4000
2140 CU = CU + 1: IF CU <= 13 THEN GOTO 2120
2150 PRINT
2160 PRINT"Diamonds ";
2170 IF HD(CU) < 14 THEN GOTO 2200
2180 N = HD(CU):GOSUB 4000
2190 CU = CU + 1: IF CU <= 13 THEN GOTO 2170
2200 IF CU > 13 THEN RETURN
2210 PRINT
2220 PRINT"Clubs ";
2230 FOR I=CU TO 13
2240 N=HD(I):GOSUB 4000
2250 NEXT I
2255 PRINT:PRINT
2260 RETURN
2999 REM quicksort subroutine
3000 IF N=0 THEN RETURN 'empty
3010 PA=0:PB=0
3020 PC=1:PD=N
3030 DN=PC:UP=PD:FLAG=-1
3040 IF HD(DN) >= HD(UP) THEN GOTO 3070
3050 PA=PA+1:FLAG=-FLAG
3060 TEMP = HD(DN):HD(DN)=HD(UP):HD(UP)=TEMP
3070 IF FLAG=1 THEN DN=DN+1 ELSE UP=UP-1
3080 IF UP > DN THEN GOTO 3040
3090 IF DN < PD - 1 THEN PB=PB+1:AUX(PB,0)=DN+1:AUX(PB,1)=PD
3100 PD=DN-1
3110 IF PC < PD THEN GOTO 3030
3120 IF PB=0 THEN RETURN ELSE PC=AUX(PB,0):PD=AUX(PB,1):PB=PB-1:GOTO 3030
3999 REM output the value of one card
4000 IF N > 13 THEN N=N-13:GOTO 4000
4010 IF N = 1 THEN PRINT "A " : RETURN
4020 IF N = 11 THEN PRINT "J " : RETURN
4030 IF N = 12 THEN PRINT "Q " : RETURN
4040 IF N = 13 THEN PRINT "K " : RETURN
4050 PRINT N;
4060 RETURN
```

A sample output from the toolbox

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# Using ML from BASIC

By Joe Colquitt

ML routines can be considered as very fast "GOSUBS" which are called in a similar fashion to BASIC "GOSUBS". When the routine has finished, it returns to the statement after the one that called it.

For example, Commodore has two keywords for using ML — "SYS" and "USR". Other micros have "CALL" or "USR". As long as you know the BASIC syntax for your machine, and allow for absolute addresses, most of the routines and

explanations should be transferable.

SYS(address) will run an ML routine starting at location (address) and resume at the next BASIC statement if there is an ML "return" at the end of the ML routine. If a "return" is omitted, problems can occur. Unlike BASIC, which has error messages, ML will just lock-up, go crazy, or perform a "stop/restore".

This small program, often called a BASIC loader, will change the border colour on a C64:

```
10 FOR I=0 TO 5:READ ML:POKE 49152+I,ML:NEXT
20 SYS49152
30 DATA 169,0,141,32,208,96
```

The source code (ML listing) for this is:

```
C000 LDA#$00 ;LOAD THE ACCUMULATOR WITH THE COLOUR
      CODE
C002 STA$D020 ;STORE THE CONTENTS OF THE ACCUMULATOR
      IN $D020
C005 RTS ;RETURN TO THE POINT AFTER THE CALL
      INSTRUCTION
```

The '#\$' is to show the number is a value, not an address. Similarly, the '\$' denotes an address. Hexadecimal

numbers greater than 255 are calculated thus:

```
INT(NUMBER/256)=HIGH BYTE VALUE
NUMBER-(HIGH BYTE VALUE*256)=LOW BYTE VALUE
INT(49152/256)=192=$C0 49152-(192*256)=0=$00
THEREFORE 49152=$C000
INT(53280/256)=208=$D0 53280-(208*256)=32=$20
THEREFORE 53280=$D020
```

Commodore "USR" is an obscure, tedious way of transferring BASIC variables to ML routines. It can be replaced easily by direct POKES into

routines without the address setting that "USR" requires.

The small ML routine above is the equivalent of "POKE53280,0". To

make the border a different colour the "0" can be replaced by the code for the new colour, eg. light red (1) 'POKE49153,10:SYS49152'.

Similarly, the receiving location can be changed, after calculating the high and low bytes. "POKE49153:33:SYS49152" makes the receiving address the background colour register (\$D021).

Of course, this format is not limited to colours, but can replace any legal "POKE" statement.

The four important ML registers are the accumulator, the X-register, the Y-register and the status register. There are two others (stack pointer, program counter), but these might not be used by even experienced programmers. All registers except the program counter are single-byte — they each can hold only 0-255.

The accumulator is the busiest location in the computer. Every calculation, statement or operation uses it. Commodore users will find it at location 780 (\$030C). The accumulator can be thought of as a sort of variable, used for manipulating data. It is accessible from BASIC by POKE780, value. If you have the ML colour routine still in memory, try "POKE780:4:SYS49154".

In their simplest uses, the X and Y registers can also be thought of as "variables". But their primary use is in indexing — loops, tables etc. Commodore users will find them at 781 (\$030D) and 782 (\$030E).

ML uses seven "flags" to indicate



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if certain things have happened. The flags are 1) carry 2) zero 3) interrupt 4) decimal 5) break 6) overflow and 7) negative. The flags, each allocated one bit, are stored in the status register.

The stack is an area of 256 bytes (\$0100-\$01FF) used for storing return address, temporary values etc. by the computer, but also available to the user for the same purpose. The stack pointer holds the address of the next available free byte in the stack.

The program counter is a register which holds the address of the next instruction to be executed.

Anyone who would like a copy of the public domain monitor, "Supermon", for the C64, send a cassette or disk and a stamped return envelope to:

J. Colquitt,  
6 Martin Ave.,  
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**Following films**

At a recent trade show in London, software houses announced games based on Paul McCartney's feature film, *Give My Regards to Broadstreet*, the Steven Spielberg film, *Gremlins*, the offbeat *Rocky Horror Picture Show*, and even one based on Frankie Goes to Hollywood's best selling record, *Relax*.

Part of the reason for the current spate of film tie-ins is the huge success of Activision's *Ghostbusters* game which has been a consistent chart topper.

Commodore has announced a game called *Jack Attack* featuring a squat toughy not unlike former Commodore boss, now Atari head man, Jack Tramiel.

**Changing computers**

By Gordon Findlay

Eventually, the hard decisions have to be made. And one of the hardest of all is the decision to change computers. The time must come though when changing computers seems the only way out, and when that time comes, there are no easy options. Let's look at some of the issues in upgrading.

Computers, like clothes, can be outgrown. The amount we expect from our computers increases steadily, and what used to seem like a frill becomes an essential. Not that long ago, few hobbyists thought they would ever need a disk drive. Now they are finding there are a lot of advantages other than just speed to a disk drive, and lots of software which will work with one. Only a matter of months ago, a 10 megabyte hard disk was regarded as enormous — now it's becoming a standard for small business machines.

Like clothes, computers are subject to fashion trends. New models come and old ones go. Often the newer ones are more powerful; sometimes they are just flashier. But an old model, particularly one which is no longer manufactured, can pose a risk as far as support, maintenance and the like is concerned, and no new software will be obtainable. When was the last time you saw a software release for the Compucolor? The hardware is still as good as ever but software developers stopped working with it years ago.

The need for more room, bigger disks, better graphics, or newer software will often dictate a change. The change will obviously cost money for new hardware and software, but there are less obvious costs as well.

barrier to upgrading.

Loss of access to data is another major cost. If the new computer runs the same programs as the old, for example by sharing the same operating system, there is no guarantee that the new one can read the data files, such as word processor files, spreadsheets, accounting records, produced by the old.

The third major loss is knowledge. Only some of the skills, facts and techniques learnt with the old computer will be transferable to the new. Much of the detail will need to be relearned, and while the relearning will be much easier than the original grappling, it will still mean an investment of time and effort.

This makes it sound as if there are no advantages to changing, and of course there are. The new machine will undoubtedly be more up-to-date, an advance in technology, more powerful, and capable of running much more interesting software. It will almost certainly be much more interesting as well, if only for the novelty!

Three options are open to the user about to upgrade. The first is to add on to the existing system. This is the least painful in terms of software replacement and relearning. It probably doesn't increase the level of the technology used, or give access to more modern software. It becomes a limited option once the heart of the system is discontinued — the expansions stop being produced eventually too.

This is a strong possibility with the right basic machine — witness the number of System 80s still being expanded in RAM size, and the number of disks being added. The reason for the continued expandability of the System 80 is the large, even vast, software base, and the involvement of many knowledgeable hobbyists with the machine from the early days.

Expansion of some machines isn't feasible on cost grounds — adding a full complement of RAM and one disk drive might cost five times the original machine — or because the additional

**Useless software**

Changing computers can render all your existing software useless. A computer *is* its software, and the cost of the software can easily exceed the cost of the hardware. The need to replace or rewrite software, at great expense of time and money, is the single largest

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# BEGINNERS

components aren't produced at all.

A second option is to upgrade to a similar machine, with at least some degree of compatibility. The classic example of this is the new IBM AT, which is a logical upgrade for an IBM PC. Much of the existing software — although not all — will still be useful, and provision has been made to carry many of the accessories of the PC across to the AT. This is an upgrade path done properly.

Upgrading from an Apple II+ to a IIC makes sense in that new software becomes available, as does some increase in the level of technology, and the machine is noticeably more up to date with little penalty in obsolescence. The step-up here is much smaller than in the IBM example, but so is the outlay.

## Dog to tail

A danger here is that one can become so wedded to a machine that upgrading becomes a matter of adding a dog to a tail. The apocryphal (we hope) stories of a ZX81 with a 30 megabyte hard disk attached illustrates this. Here the peripheral must spend a lot of time waiting for the central computer to catch up.

The third and hardest option is to bite the bullet and replace from scratch. This is sensible if the step-up required is large or if the first machine was used as a

learning tool. This is the route for those with small games machines, for example, who decide to get seriously into computing or to introduce the computer into a business. It is also the only answer for those of us who have left replacement so late that our existing machine is several generations of equipment behind the frontier.

What can be done with the old machine? One obvious alternative is to sell it second-hand. A strong second-hand market is developing in computers, and while prices are only a fraction of the new prices, half a loaf is better than no bread. Often it will be worth keeping the old machine, initially at least, to access existing data, and use existing software.

For the home user, upgrading mostly means a substantial outlay, and the loss of favourite software which is usually easily replaced with equivalent programs. But for the business user, upgrading may incur substantial costs in recreating data files. Imagine the difficulties faced by a business whose entire accounting data must be transferred.

If the new or upgraded machine uses the same operating system, such as CP/M or MS-DOS, as the old, it may be possible to have the data and programs transferred to disks in the format of the new machine. A number of firms offer this "disk-making" service. Transfer, of data files anyway, may be possible using

a serial — RS-232 — link between the two computers. Certainly, the transfer of systems will be one important factor to discuss when buying a new machine, and in all probability it will be necessary to run the two in tandem for some time.

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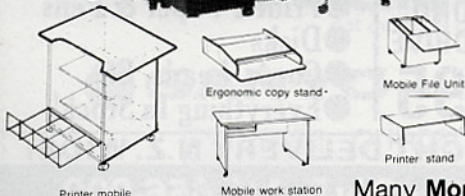
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# Caterpillar

By Michael Pointon

In this 16K game, you are a caterpillar, and must move around eating dots without colliding with you own tail or a wall. You use the arrow keys to move. Note that it is possible to crash by moving back into yourself. You could add a pause command by inserting this line:

```
1012 IF I$="P" THEN PAUSE 65000
```

Then if you press P, the game will pause until you press another key. You can make dot-eating faster by adding these lines:

```
1201 FAST
1265 SLOW
```

```
1 LET HS=0
4 PRINT "PRESS ANY KEY TO STA
RT"
5 IF INKEY$="" THEN GOTO 5
7 CLS
7 PRINT AT 5,5:","
10 FOR N=1 TO 21
20 PRINT AT N,0: "■"; AT N,31: "■"
..
30 NEXT N
40 FOR N=1 TO 30
50 PRINT AT 1,N: "■"; AT 21,N: "■"
..
50 NEXT N
70 PRINT AT 0,0: "SCORE 00000";
AT 0,17: "HI SCORE 000000"
80 LET DF=PEEK 16396+256*PEEK
16397+1
90 LET S=0
120 PRINT AT 0,12-LEN STR$ S;S;
AT 0,32-LEN STR$ HS;HS
140 DIM T(600,2)
150 LET PT=1
160 LET ENDPT=2
170 LET T(1,1)=15
180 LET T(1,2)=10
190 LET T(2,1)=15
200 LET T(2,2)=11
210 LET DIR=-1
220 PRINT AT 15,10: "■"; AT 15,11
■
1010 LET I$=INKEY$
1015 IF I$="" THEN GOTO 1022
1020 LET DIR=-1*(I$="5")-2*(I$="7")
+(I$="8")+2*(I$="6")
1022 LET Y=T(PT,1)
1024 LET X=T(PT,2)
1030 PRINT AT Y,X: "■"
1040 LET PT=PT-1
1050 IF PT=0 THEN LET PT=ENDPT
1050 PRINT AT T(PT,1),T(PT,2):"
```

```
1070 IF ABS DIR=1 THEN LET X=X+D
IR
1080 IF ABS DIR=2 THEN LET Y=Y+D
IR/2
1090 LET P=PEEK (DF+33*Y+X)
1110 IF P=126 THEN GOTO 1300
1120 IF P=27 THEN GOTO 1200
1130 LET T(PT,1)=Y
1140 LET T(PT,2)=X
1150 PRINT AT Y,X: "■"
1150 GOTO 1010
1200 LET ENDPT=ENDPT+1
1202 LET F=0
1204 IF PT=1 THEN LET F=1
1206 LET A=T(ENDPT-1,1)
1208 LET B=T(ENDPT-1,2)
1210 FOR N=>XPT TO PT+F STEP -
1
1220 LET T(N,1)=T(N-1,1)
1230 LET T(N,2)=T(N-1,2)
```

```
1240 NEXT N
1242 IF F=0 THEN GOTO 1250
1246 LET T(1,1)=A
1248 LET T(1,2)=B
1250 LET S=S+10
1251 LET U=1
1252 LET A=RND*29+1
1254 LET B=RND*16+2
1256 IF PEEK (DF+33*B+A) (>0) THEN
GOTO 1252
1257 PRINT AT B,A: ","
1258 LET U=U-1
1259 IF U=0 THEN GOTO 1262
1260 PRINT AT 0,12-LEN STR$ S;S
1270 GOTO 1130
1300 IF S<=HS THEN GOTO 2
1310 LET HS=S
1320 PRINT AT 0,32-LEN STR$ HS;H
S
1330 GOTO 2
```

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## COMMODORE 64

### Function List & Run

By Daniel Moore

This machine code utility allows the two most commonly-used keywords (RUN and LIST) to be produced with a single key-press. Enter the listing exactly as given and save it. Run it, enter NEW, and continue as normal. To list a program, press F1, and to run a program, press F3. You can deactivate the routine with Runstop/Restore and reactivate it with SYS 49152.

```
5 REM F1=LIST,F3=RUN,RUN/RESTORE=DEACTIV
ATE,SYS49152=REACTIVATE.
6:
7:
10 FORX=49152T049232:READA:T+A:POKEX,A
:NEXT
20 IFT<>9654THENPRINT"ERROR IN DATA":END
100 DATA120,169,13,141,20,3,169,192,141
110 DATA21,3,88,96,165,197,201,5
120 DATA208,19,169,3,133,198,169,82
130 DATA141,119,2,169,213,141,120,2
140 DATA169,13,141,121,2,165,197,201
150 DATA4,208,33,169,3,133,198,169
160 DATA76,141,119,2,169,201,141,120
170 DATA2,169,13,141,121,2,160,0
180 DATA162,0,232,224,0,208,251,200
190 DATA192,0,208,244,76,49,234,239,
```

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# Asian pirates crack Apple IIe

By John MacGibbon

Asian hardware pirates have finally cracked Apple's major line of defence for the Apple II series: they have cloned the IIe model. Previous Apple II clones originating from Asia have been based on the older II Plus series.

Rumours of the "breakthrough" have been circulating for a few months, and the development is confirmed in a circular we've seen from a Taiwanese company. In typically quaint Asian business language, the circular announces: "Now we start to offer the Apple IIe for exporting now."

The address is just a "room" in a Chung Chung Road building, and the supplier is undoubtedly one of a number of back-room companies hawking the product.

FOB prices for individual sales of 64K computers, with an 80-column card, range from \$US220 for a one-piece model to \$US250 for a model with a separate keyboard. Quantity discounts are offered, and there is also a "main board" model selling for \$US160.

We have heard of similar offers by other Taiwanese exporters. One is represented in New Zealand by an agent who offers to take a customer's money, and send it, with an offer, to the Taiwan exporter.

The goods are mailed direct to the customer who is responsible for clearing it through customs. The Kiwi agent loads the price by 25%, to cover time and effort, and to finance a "guarantee".

Disk drives and a monitor would have to be bought separately. However, there is no shortage of perfectly adequate third-party equipment already on the New Zealand market.

Japanese Apple-compatible disk drives can be had for about \$400, while monitors sell for as little as \$300. Extended 80-column cards (which expand memory to 128K) have been available for about \$180.

## Eight times

In New Zealand, a genuine 64K/80 column Apple IIe (without disk drive or monitor) retails for more than \$NZ3000: eight times the Taiwanese FOB level. (However the more economic way to buy a 64K Apple here is bundled with one drive, 80-column card and a monitor, for \$4055.)

Apple will presumably be somewhat miffed about the Taiwanese IIe. One reason why it developed the IIe, which contains many custom chips, was to foil the hardware pirates. The strategy worked for two years, and gave valuable breathing space while Apple worked through the failure of its Apple III and Lisa range, and established the Macintosh.

However, Apple's bread and butter still comes from its IIe and IIc models. And one thing that has really helped promote these computers, both to first time buyers and to owners of older Apples, has been the availability of the popular integrated AppleWorks program.

AppleWorks, and a number of other important programs, will not run on older Apples, Franklins or earlier Asian clones. But the new Taiwan clone can handle

AppleWorks. Or so the circular claims.

Would-be buyers should heed a number of factors, not least the ethical implications of the whole deal. They should also remember the typical high failure rate of Asian "Apples", the problems of servicing them, and the possibility they may not be compatible with further developments in the Apple world.

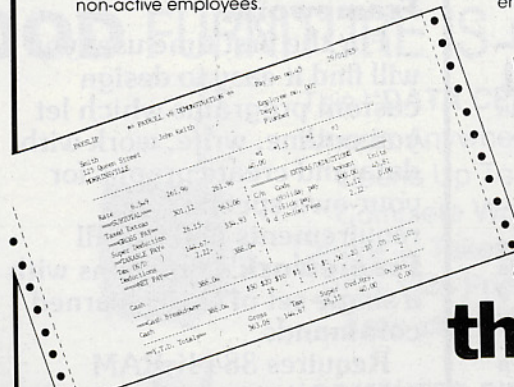
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# Mousing about

By Pip Forer

Undoubtedly, the chic peripheral of 1984 was the mouse: not a wee, timorous, cowering beastie but the slick, seductive desktop pointing aid brought into prominence by the Apple Lisa and Macintosh and quickly copied by everyone in sight. Mice started out life with Xerox and caught the public's gaze working for 16-bit business machines. The AMX mouse is a new option aimed at the eight-bit BBC, although it should work with additional second processors of great power.

A mouse is fundamentally a small box (about the size of a bar of soap) with one or more buttons attached to it and linked to the computer by a cable. On their underside most mice have a single, rotating ball set into a mounting. When moved over a desktop, the ball turns and the mouse senses and reports this movement to the computer. In its turn, the computer notes these movements and translates them into movement of a pointer (or cursor) on the screen.

Thus, hand movements get translated into the ability to point at objects on the screen. The mouse is argued to be nimbler than joysticks, cheaper and less bulky than bit pads, and more reliable and convenient than most light pens. In the classic Macintosh implementation, the mouse is used to link to icons on the screen, each icon a symbol for a command or object.

The AMX mouse clearly owes a great deal to the Apple initiative, although one must stress for the unfamiliar that it lacks the integration with the operating system — crucial to more advanced systems' success.

It comes as a package consisting of a mouse (with three buttons), a ROM, two manuals and a disk. The mouse plugs into the user-port underneath the BBC. The disk contains software for designing icon symbols and a program called AMX ART which offers some of the features associated with the Macintosh and (more limited) Apple II mice, in particular pull-down menus and easy sketching. Two screens produced with AMX ART are shown below. Since this is the first thing the user looks at after the very simple installation procedures (and features heavily in AMX advertising), we might consider this first.

The whole program is mouse driven and options for drawing are selected by pointing at the particular symbol: paint roller to fill a shape, eraser to remove points etc. In addition, the user can select options (such as style of text) by pointing at one of the headings in the top command line. A pull-down menu of options, from which choices can be made, then appears. When finished with, the menu disappears and the pre-existing portion of the screen is reinstated. The second figure shows the menu option at work, as well as some of the fill patterns available to the user. AMX ART works in

(two colour) mode four and the pictures produced can be saved as standard screen images on disk.

AMX ART is an example of what the mouse can do. Also on the disk is a program for editing and creating icon symbols.

As such, both programs are fair pieces of software comparable to many features on the Apple II mouse. However, they are a little limited when set against stronger stuff and one feels AMX ART tries too hard to pretend it is more than it really is. The close aping of the Macintosh MacPaint screen layout is inappropriate, given the inevitable limitations of eight-bit processor and memory space. Notwithstanding this, the features it offers are produced smoothly and quickly.

The AMX mouse is far more impressive for the facilities it makes available for programming the mouse and icons from normal BASIC or other languages, and even for integrating the mouse into commercial programs. This comes about from facilities offered by the ROM through a variety of commands.

Some of these commands (such as \*WINDOW to create working windows) are easily implemented on the BBC by any hacker via VDU calls (and the commands don't include the screen handling needed for pull-down menus), but other commands are really very handily packaged. Two allow mouse movements to be turned into cursor (arrow) keypresses. After \*MCURSOR ON, moving the mouse has the same effect as using the arrow keys. In a wordprocessor, this command before entry to the wordprocessor would allow editing, using the mouse as a pointing device rather than the keys.

Alternatively, the mouse movements can be used to directly drive a graphics cursor on the screen. Under this mode, the programmer can select an icon as a pointing device and use \*MOVEPOINTER to translate mouse movements into a smooth movement of the pointer on the screen. A command to the operating system then allows the pointer's position to be read back BOTH as text locations AND in terms of graphics co-ordinates. The state of the buttons can also be read. Commands exist for making the buttons

automatically equivalent to certain keyboard keystrokes such as [RETURN].

These commands allow simple programming of a pointer on the screen. Others allow for the definition and display of icons. The icons here are symbols 16 dots by 16 dots, composed in reality from a two by two character matrix. In fact, the ROM uses the BBC's font redefinition facility to create new characters and then just handles the maintenance of these in groups as icons. The available commands allow icon creation, loading (in groups of 32) and display. Apart from 32 icons in ROM, you can also create your own sets in RAM.

What you are left with is the ability to place icons and point at the screen or move a cursor over it with great simplicity. The option of letting mouse movements replace editing keystrokes is a bonus immediately apparent when copying and editing a BASIC program. These options provide a programmer with a useful tool for producing programs that are easy to use.

The BBC is particularly well suited to many of these uses and the strength of the AMX mouse, compared with other eight-bit mice, is its ease of integration with other programs. Unlike one mouse environment, for instance, it doesn't save its picture images in a different manner to normal images. The mouse can also be used in any mode. Although AMX ART is the part of the product that strikes you first, it turns out to be the least significant part.

The real query with the AMX mouse is how widely it will be used. The really successful uses of mice occur when the product is integrated with the machine's operating system and there is a wide base of users to encourage mouse-driven software. The full complexities of a mouse-driven environment cannot be implemented on a BBC, but neat new programs can. If you buy an AMX mouse, you get a new tool for writing friendlier programs without altering the fundamental BBC environment. And for that, it works very neatly and can be well recommended.

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As an importer of Clare's BetaBase, it is of importance to me to have the opportunity to reply to Bernard Gunn's review (*Bits & Bytes*, April 1985). He makes a few misleading points, possibly because he has not actually used the system.

"If at this stage, there is not enough room on a disk, you would have to delete some old unused files to make room. To do this . . . "If indeed one was using BetaBase "seriously", one would hardly be likely to have "old unused files" on current disk. But if one should find there was insufficient room for the size of file required, the answer is

simply to place a new formatted disk in the drive you wish to have the file in and then nominate this drive as the new file drive. Should you find there is no unused formatted disk available, the answer to the program's question: "Do you have enough records available?" would still be "Y".

The program would then generate a file to the length of space available. Then all you do is redefine that file by use of the "Redefine" function and nominate, a new disk for this file. As you can see, not "unfortunate" as was stated.

Mr Gunn goes on to say: "other

database managers show the field underlined". Perfectly true, as is, other database managers have fixed field length. "Unfortunately, this is not the same as a name which has been typed "Smith". I, for one, should hope not as when I search for "SMITH", I expect "SMITH" not "Smith" which is of course entirely different. A decided advantage, I would think. Apart from the fact that BetaBase will search for and hold 500, not "300 files", this is an indictment of the BBC not BetaBase, as search files are limited by the amount of memory available in which to store the temporary file while it is being worked on. Strange as it is that one cannot do a sort until the search file is created, is it such a decided weakness to have to wait 60 seconds longer to sort 500 fields to a depth of five search criteria?

I am very surprised Mr Gunn uses disks to store data and yet does not keep back-up copies! I don't know of a system in use that does not corrupt data when for instance, while writing to the disk, a power surge/spike failure occurs.

I use BetaBase daily to keep a track of repairs carried out in the workshop, and to date have found nothing to come near it, let alone equal it. And I have tried many. As to it being "too frail for serious work," I find that in use it has the most powerful and fastest search and sort facilities at present available for the BBC and now because of the falling New Zealand dollar at \$93, excellent value for money.

— BRIAN MYCROFT (Tokoroa).

## Order please!

We got a bit out of order in our BBC column last month. The section between the headings, "At the chalkface" and "How it works", should have appeared before the heading, "Great claims".

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# Music macro language

By Barbara Bridger

The SpectraVideo is well equipped in the sound department — it can produce a variety of sound effects and three part melody. The programmable sound generator (PSG) has 16 registers which can be accessed through the PLAY and SOUND statements and also by the BEEP command. The PSG can continue to produce sound, while the CPU is carrying on with the program sequence provided the queue of instructions to it is not too long. A string of 21 notes appears to be the limit before program execution is slowed down. This is reduced if the string contains rest, length, or octave instructions.

As the name suggests, the BEEP command produces a beep sound and may be used in a program to remind the user that more input is required, the previous input is incorrect or at any stage of the program that interaction is required. A string of beeps produced by FOR I=1 TO 10:BEEP:NEXT

is less likely to be missed than a single beep. BEEP has the effect of setting all SOUND and PLAY parameters to the default options. This must be kept in mind if BEEP is used in a program where these parameters have been modified.

The SOUND command allows the programmer direct access to the PSG registers and is very useful for generating special sound effects. The PLAY command is more suitable for producing music. It is similar to the DRAW command in that a series of instructions is placed within a string to achieve the desired result. This article concentrates on the commands available in this "music macro language".

Notes can be named as standard in music — CDEFGAB with # or + used to indicate a sharp, — to indicate a flat, (the sharp or flat indication trails the note it refers to rather than preceding it as in sheet music), and O(n) to indicate the octave. There are eight possible octaves, numbered one to eight, and 04 is the default octave. It is also possible to name the note by number using N(n). This makes it easier to transpose a set of notes up or down a number of semitones. Here, n may have values from 0 to 96 inclusive with NO giving a rest.

PLAY '04CDEFGABO5C' or PLAY 'N36N38N40N41N43N45N47' will both give the first octave of the C major scale.

A word of warning if you are planning to use your SpectraVideo to accompany a musical instrument. The pitch of the SpectraVideo is a full tone below a piano tuned to A (440Hz). This table, compiled by John Bridson of the Wellington Users Club, shows the translation necessary to bring your SpectraVideo into tune.

Piano Note Name	Computer Note Name	Computer Note Number	Computer Octave Number
A+, B-	C	36	
B	C+, D-	37	

MIDDLE C	D	38	4
C+, D-	D+, E-	39	
D	E	40	
D+, E-	F	41	
E	F+, G-	42	
F	G	43	
F+, G-	G+, A-	44	
G	A	45	
G+, A-	A+, B-	46	
A (440 HZ)	B	47	

The frequency of the A above middle C has been used as the standard of reference for some centuries but it was not until the 18th century that the tuning fork was invented to give a readily available standard. Previously, each village took its A from the local village organ with the result that the note, A, might be several semitones different from the A in another town. The frequency of A standardised initially at 415 to 428Hz, but over the years increased until in 1953, the International Standards Organization recommended the adoption of A 440Hz as the standard frequency throughout the world. Some orchestras still tune to A 442 or even A 444 to get a "brighter" tone but this poses problems for the instruments which lose quality of sound.

The length of the notes, in relation to each other, is set by the command L(n) where n may range from 1 to 64 with the default value being 4. The actual length of the note is equivalent to 1/n — doubling n halves the length of the note. When the length is to be altered for only one note, n can be placed after the note name without using the L command. For example, PLAY 'L2AAL8BL2GG' and PLAY 'L2AAB8GG' give the same result. The length of pauses or rests is given by R(n), where n may take the same values and has the same effect as in L(n).

The length of notes or rests may also

be adjusted by using a dot (or dots) after a note or rest. Each dot increases the length by 3/2 times, exactly as for a dotted note in sheet music.

The overall speed or tempo of the music is set by T(n). Here n may range from 32 (the slowest) to 255 (the fastest) with the default value for n being 120.

The output volume is set by V(n) where n may range from 0 to 15 and the default value is 8. The sound level you hear is of course ultimately determined by the volume control knob on your TV or monitor.

As for the DRAW command, the versatility of the PLAY command is greatly increased by the option to use variable names instead of n to set the various parameters. It is also possible to include a substring using the command x substring ; which is very useful when it is desired to repeat the same set of notes within a piece of music.

A semicolon is required to separate the commands when variable names of X (substring) are used. For example,

```
10 A$='cdefgab'
20 FOR I=1 TO 7
30 S=I*32
40 PLAY 'T=S; O=I; XA$';
50 NEXT I
```

The SpectraVideo has three sound channels which means three notes can be played simultaneously allowing for three part harmony.

PLAY X\$, Y\$, Z\$

The chief difficulty is keeping the three channels in time with each other which can be done only by keeping a careful check on the length of notes and rests in each of the three strings. Each channel can have different tempo and volume settings.

The final two parameters of PLAY, S and M, are the least straightforward to make use of but permit many interesting variations.

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# Player's choice

*The Games Creator — Mirrorsoft.  
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"The Games Creator is designed to allow you to easily make your own games. No special knowledge of machine code or programming experience is necessary."

That's the promise made at the start of the handbook that goes with this program and it keeps its promise.

This program will allow you to design your own aliens, tune, sound effects, scenery and sprites and the rules that govern their movements and abilities. It's very good value for money.

On loading, an impressive menu appears in the form of a simple maze or branching system. Some choices have further choices within them and you guide your cursor with joystick or cursor keys through the maze to your selection. I will deal with each of the choices you have from the main menu.

## The choices

● **Play:** puts you into whatever game is currently held by the Games Creator. You can then play the game with whatever rules and characters you have invented.

● **Load or Save:** are two separate choices with obvious functions. The Games Creator comes with three ready-made games — Bouncer resides within the program when you load; Hawk Patrol and Snake Pit are on the second side of the tape and can be loaded using the command. These three programs are very different and truly show off the capabilities of the program. Just a note here: all games created by this program can be used only with the Games Creator in memory.

● **Change:** Where the fun starts. Down this branch in the maze lie all the options for changing the game resident in memory or creating your own completely new one. I decided to invent my own game and see how long it took to master the system. I managed to get a playable game going from scratch in about four hours. It still needs refinement, and is not as complicated as the sample games, but I am well pleased.

## What's possible

● **Aliens:** This means anyone who is not the Player. For example, in Bouncer, one of the "aliens" is a key you have to reach to progress to the next level. This branch has two further choices:

— **Movement:** You can decide the amount and direction of random movement, the pattern or path any particular alien will have on the screen and position from which it will start.

— **Rules:** Each alien has certain rules it must obey while on the screen. These include the speed it will animate (refer sprites below), the speed while on the screen, whether it can shoot or not, what happens if it collides with the player, and several others.

● **Sound:** Two choices here:

— **Tune:** You can write any tune you like as long as it is shorter than 22 bars and written in the key of C. The writing has been simplified very much and if you are not musically inclined, you can easily copy your favourite sheet music. You have a choice of five instruments to play it on and the option of having it during the game, only at the end, both, or not at all. A criticism here is that you cannot enter this branch simply to alter your music. To choose this branch is to wipe your previous efforts and start again. I think that's a shame — especially if you've written 21 bars of music that has some small part you don't like.

— **Effects:** There are seven occasions which can have sound effects, player dying, player shooting or jumping and the five aliens dying. You are able to choose which waveform you want and its attack, delay and frequency. There's plenty of variety for everyone's taste.

● **Graphics:** Two choices again:

— **Scenery:** The screen size is 40 x 24 (one line is used for scoring) and you can design the background. Therefore you have up to 960 blocks to use at your leisure. These can be designed on an eight by eight palet (the number of pixels in a block) and there are numerous aids to get the designs you want. There are three types of blocks to design — those that the player can pass over; those that stop the player;

and those which kill the player on contact. Having designed the scenery you can place it on the screen in any of 16 colours.

— **Sprites:** Perhaps the most important part but with one of the smallest sections in the manual. Your imagination can really run riot here. You can design the player and up to five aliens as well as the player's bullet, alien's bullet, three animations of the alien dying and four animations of the player dying. Each alien can have four animations and the player can have eight.

But animations, I mean the different parts of movement. Bouncer for example runs across the screen and this is achieved by flicking through the slightly different animations at the speed determined by you, to give the effect of running. The same holds for the aliens and their movement.

Each sprite can be up to three colours (two common to all other sprites) and as you design the sprite on a pallet which fills nearly half the screen. An actual-size sprite also appears to show you what you are creating.

● **Player:** Really the player rules section, this gets the start position for the player, the keys required for movement (needed even if using a joystick), whether a player continues to move after the key or joystick is released, and whether it is a jumping or shooting game.

Just in case you are a little concerned about all the apparent violence, let me reassure you. The terms used are well known to everyone but do not necessarily have to be taken in the literal sense. The game I wrote, for example, was a non-violent game about the shuttle collecting space garbage, such as dead satellites, from outer space.

I am very impressed with this program. It comes in a large plastic wallet with a reasonably comprehensive book of instructions. There are one or two gaps in the book which could have been filled (I'm still not quite sure about the aliens' movement and their reappearance after they are shot). But to have written a manual that covered every single detail would have made the project larger than necessary and increased the price. I think this is a well thought out program which must have taken months of continual work to get to where they have. I think it is exceptional value.

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"You pays your money, and you takes your choice." That was really the essence of the three tape games Fountain Marketing gave our Andrew Mitchell to review.

## Shades of Michael Jackson

CHILLER Mastertronic \$9.95

This game, inspired I'm sure by the Michael Jackson video, "Thriller", is a good game for those with little to spend and not too particular about quality graphics. The graphics tend to be uninspiring, especially the hero, whose role you take.

The music however, makes up a little for this, and is helpful to the game play in a peculiar way. The response to the joystick is fractionally slow and the graphics sometimes appear to have the hero standing in mid-air without support.

The aim of the game is for the hero to rescue his loved one from the haunted house. To get there, you have to pass through various obstructive screens, including a "perilous forest" and a "ghostly ghetto". Having rescued the victim, you both have to return through the same five screens in reverse order. You control both characters (hero and loved one) — but only at a time!

You start off with a certain energy level which is reduced in proportion to the movements you make (climbing uses energy faster than walking). It is also reduced if any of the various meanies touch you; they are not out to get you specifically, but they often get in the way. The longer you touch one, the more energy you lose. Energy can be regained by eating the magic mushrooms that grow on some of the screens — but beware of the deadly toadstools.

Although, by no means a great game, all the aspects of Chiller fit together

nice and would certainly keep a dedicated game player happy for a while.

## Karate knockout!

Bruce Lee U.S. Gold \$29.95

What can I say! Few games have got me so interested so quickly that I sit down and almost miss "Allo, Allo".

The cover of the cassette gives very full instructions as to what you can do as the character, Bruce Lee, karate expert. You (he) can run, kick, chop, leap, jump, climb and duck — all using the joystick and fire button.

The graphics are superb, and the use of only three main characters makes the action smooth and joystick responsive. The action is fast and with your wits about you, you'll soon progress into the 20 screens of challenge.

Your aim is to find the wizard deep in the fortress's ruined chambers and to claim his wealth for yourself. During the

first six screens, you are pursued by ninja and green yamos (only one of each at a time, fortunately). They can both be karate kicked or chopped out of existence.

However, the ninjas have bokken sticks, and the karate kicks of the green yamo are as deadly as yours. You collect lanterns in each room to progress to the next, but some rooms overlap and you can pass back and forth at will until all the lanterns are collected. This can be very handy, but you'll have to play to find out why.

The only criticism would be that the music gets a little monotonous. But there is always the volume control. Top of the range in price and quality.

## Unfulfilled promise

Tales of the Arabian Nights  
Interceptor \$19.95

This cassette comes in an attractive package rather larger than the normal cassette case. The cover boasts "contains

SPEECH no hardware required." The speech is hopeless; you wouldn't even know what was being said if it weren't printed on the screen in front of you.

The attract mode takes you quickly through each of the eight screens, giving you an idea of what is ahead. The graphics quality is good and the music makes good use of the registers. However, it does get a little tedious after a while. Both "speech" and music can be turned off.

You take the role of Prince Imrahil, out to rescue your sister from the evil clutches of the Sultan Saladin. To do this requires a journey through various hazardous areas. But here the plot falls down. In half the screens, you have to collect golden jugs on which are engraved a letter of the alphabet. These have to be collected in the right order to spell "ARABIAN" — it seems rather silly to me. Why not collect something to enhance the plot, rather than this seemingly irrelevant diversion.

It's a very frustrating game. On the first screen, you are obstructed, either randomly or deliberately by two octupii, a gun firing shots, and two birds, one of which seemed to have a fairly accurate knowledge of your whereabouts. This is succeeded on following screens by wizards throwing spells, flying rocks, crocodiles and evil genies. It took me some time to get past the first screen.

A good game technically, but I feel the complexity and storyline are not of a consistent quality. For me, it was not full of Eastern promise!

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# COMMODORE 64

Multicolour is a little bit tricky. To help demonstrate, type in this small program:

```

10 V=53248:POKEV+32,0:POKEV+33,0
20 POKEV+21,3:POKEV,100:POKEV+1,140:POKEV+2,
  160:POKEV+3,140
30 FOR I=0TO20:POKE 12288+I,85:NEXT
40 FOR I=0TO20:POKE 12309+I,15:NEXT
50 FOR I=0TO20:POKE 12330+I,170:NEXT
60 POKE2040,192:POKE2041,192
70 POKEV+28,2:POKEV+37,1:POKEV+38,2:REM V+28 IS
  MULTICOLOUR ON/OFF
80 POKEV+39,7:POKEV+40,6
  
```

The yellow sprite is in hires, and its colour is determined only by V+39. The right-hand sprite is in multicolour. The colour bands, from top to bottom, are controlled by V+37, V+38 and V+40. Both sprites are set to the same page, but because bit 1 in V+28 has been set to 1, sprite 1 is in multicolour. The bands are caused by the state of "bit pairs". Each byte is made up of four bit pairs like this:



If only the left dot is on, both dots appear in V+40 colour; if only the right dot is on, they appear in V+37 colour; if both dots are on, they appear in V+38 colour; if neither dot is on, they appear in V+33 (background) colour.

That's the reason multicolour sprites are only half the resolution of hires sprites. Next time, more commands and a bit of machine-coded graphics.

If you would like a copy of Alpine Computing's latest sprite editor, complete with full instructions, sample files, programs and printouts, send \$24.95, with your address to:

Joe Colquitt,  
6 Martin Ave.,  
Mt Albert,  
Auckland.

State whether you want a cassette or disk version.

## Right lines

The last few lines of the Commodore 64 program, "Machine Language to Data Statement Converter" in our April issue were wrong. Here is the correct version.

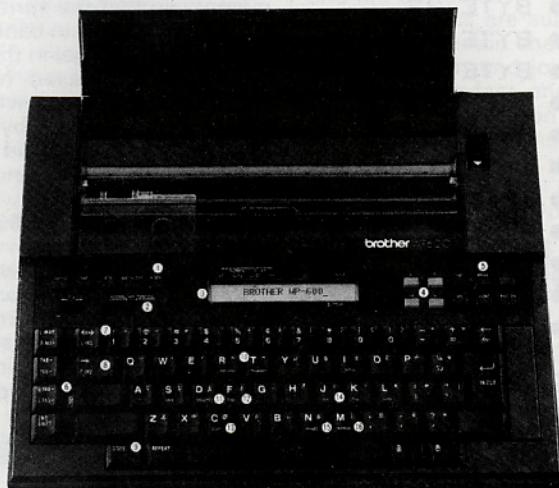
```

40,00,30,01,01,00,00,146
1581,REM END OF NECESSARY DATA
1590 DATA 141,146
  
```

READY

# brother WP-600

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# commodore

## Commodore News

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It was my pleasure to recently attend a computing course at Awakeri School, near Whakatane, being organised by the school's Principal, Mr Robin Clegg. The course was held in the library of the school and pupils from the Primary Schools in the area were invited to attend, being billeted in the evening.

Mr Clegg, who has recently returned from a teaching exchange in Australia, organised an excellent programme of computer education running for the whole week. The programme covered keyboard skills, typing, general computer awareness, LOGO, word processing, logic and adventure games, simulations and project work.

The class of 25 worked on 12 Commodore 64 computers connected by the new MULTILINK network. Teachers and parents from the schools involved were able to attend during the week and observe how to conduct a course of computer education instruction.

I attended for two days and saw a motivated team of students making excellent progress, being creative, expressive and having a ball. It was easily the most effective way of training teachers in the art of presenting a computer education course.

Another development of interest within the world of Commodore Education is the specialised software recently developed by Geoff and Stephanie Williams.

Geoff Williams was attending Waikato University last year doing research into computers in Education. Part of his study led him to investigating the part that educational software plays in the

learning process. Having searched extensively he was not able to locate a lot of evidence collected from the research of good educational software. This prompted Geoff to write his own software and then to give it to his wife Stephanie to use within her classroom of Primary students. The results were very interesting and once the final paper has been written some conclusions concerning 'good' educational software will be drawn. The programs that Geoff and Stephanie used cover Addition, Subtraction and Basic facts and will soon be available from Commodore as part of the Learning is Fun series of software.

As I travel around the country visiting schools with or without Commodore computers it has been interesting to note the trends.

Three years ago everyone was 'into' Computer Awareness and the computing programme usually included a Form 7 computing option with a general introduction to computers being presented in the Junior School. Slowly but surely the emphasis has moved away from computers in their own right and onto computers as learning or productivity tools. In most secondary schools that have been 'computing' for some years the main usage is no longer within the Mathematics Department but rather the English and Economics Departments. Word processing, accounting skills, and economic simulations have opened the door allowing these disciplines entry into the computer world. It is very interesting to note that girls become involved with computers when they see them as a useful processing tool — like word processing to complete assignments. The more practical the application the more interested the girls become.

Today the majority of the established computing Secondary schools are

offering a very wide computer literacy programme covering all areas of awareness, business applications, aided instruction and aided learning. As the software continues to improve the teacher is beginning to realise the computers potential as a 'teachers aid' as part of the learning process.

Developments within Primary schools are also moving along with several schools chancing their arm and introducing the new technology. The ones that have been 'brave' don't appear to have any regrets — they have the advantage of learning from the "Secondary school's" experience. The emphasis being made by the Primary schools — as outlined in the Awakeri example — is on word processing, creative writing, Logo and exciting simulations.

The final trend is occurring within the home. Many parents buy a home computer to assist their youngsters with the learning process to make sure that they aren't disadvantaged. The software is now available to actually assist in the learning process and many parents are taking advantage of this new technology. The important factor is being able to offer a 'balanced' diet of computing experience. A balance between entertainment, education and business.

Overall, therefore, a lot is happening in the world of computer education and the technology boom is spreading into all areas of school, home and business life. The gap between those who 'do' and those who 'don't' compute is closing as the jargon is set aside. People are now becoming interested in what the computer can do and not so much in how it does it. This trend of "back to reality" is a healthy sign within the jungle of computer education theories.



Gary Parker takes a look at some recent Spectrum software.

## Personal banking system

Having had bank account programs before, I know that such programs will never be used if the effort involved in loading them is greater than the benefit gained from using them. A bank account program has to do more than mimic pencil and paper if it is to be used.

Reading the manual which comes with PBS, from Sandfly Software, suggests it is a good program. While programs which keep track of your bank balance are available as magazine listings, PBS does more than just form an electronic version of the cheque stubs. It allows you to correct mistakes, including those items which you entered months ago and have only just discovered are wrong.

After making the correction, the program is intelligent enough to modify all later entries and update the balance. You can give standing orders, where the program will debit or credit your account on specified dates. You can search for particular entries. You can reconcile your PBS records with a bank statement – the program compares the statement with its records and allows you to correct accordingly.

Okay, so the manual looks good. Now I load the program. First, up comes a

screen picture telling me what I am loading, in large letters. Cute, but that adds to the loading time, and I suspect I will get pretty sick of seeing that screen for the thousandth time when I load PBS just to add a couple of items. Then I wait for the program to load . . . and wait . . . and wait. PBS takes a long time to load off tape. Of course, loading time won't be a problem for the minority of Spectrum owners who have a microdrive. Finally, the menu appears. I take a look at the example supplied, which gives an account of Clive Sinclair's wheelings and dealings.

PBS uses Myrmidon's Microprint utility (try saying that 10 times fast!) to produce 51 characters across the screen, and this gives excellent results. The font is better-looking than the normal Spectrum font, and doesn't have the cramped appearance of the 64-column text seen in Tasman Software's Taswide. I alter an entry, and wait while PBS updates the balance. Since the program is written in BASIC, changes such as this take a little time. But a test of the search facility proves this to be reasonably fast, and overall, the speed of PBS is acceptable.

After using PBS for a while, I can say the program is well-written and useful. However, before you leap up and buy it, consider what it is like to use in real life. Say you want to add a few items to your records. You turn on your Spectrum, load PBS, load your data file, add the items, save the new data file, verify it, and turn the computer off. Wouldn't that have been easier with pencil and paper? Yes it would have – even if you use microdrives.

So PBS is really useful only when you want to use its more advanced features. With simple account records, that won't be very often. But with more elaborate accounts, you might use them quite a lot, in which case PBS would be invaluable.

PBS is produced in New Zealand under licence by Sandfly Software (P.O. Box 45, Te Anau). The 48K Spectrum version costs \$29.95. (A 16K ZX81 version is also available for \$19.95, and a BBC B version for \$29.95).

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## Ultimon

The manual which comes with Ultimon has the dubious distinction of having the smallest type I have ever seen. The letters are less than 1mm tall! Can I be bothered reading such tiresome text? Luckily I could, because Ultimon turns out to be a good product.

Ultimon is a monitor and disassembler, allowing you to edit machine code programs and disassemble code into assembly language. After looking at quite a few such programs, I have a fair idea of which features are the real test of a quality monitor. Can it set breakpoints? Does it have trace commands? Does it have some sort of conditional execution

commands? Ultimon has all these features, and quite a few more.

Ease of use is important in this type of program, but is difficult to gauge from advertisements. Ultimon has some good user-friendly features. It uses a "hot keyboard" system, where only valid characters are accepted, delimiters are unnecessary, and use of the ENTER key is often unnecessary. Switching between running of the program being tested and Ultimon is easily done, and output from one won't spoil the other, since a separate screen is kept in memory for Ultimon's output

So is Ultimon the ultimate monitor?

Well, some of the monitors which come as a package with an assembler are at least as good, so I wouldn't go that far. But if you already have an assembler, and want a separate monitor/disassembler, Ultimon is certainly worth considering.

Ultimon for the 48K Spectrum costs around \$59.90, and is produced under licence by Paragon Software (16 Archibald St, Dunedin).

## Cassette magazine

A type of software new to New Zealand is the cassette magazine - a collection of articles, tips, reviews, and programs on cassette which you load into your computer to read and use. The main advantage is that you don't need to type in program listings.

I have seen several British cassette magazines of varying quality. Since they are rather more expensive than ordinary magazines, you expect to get some useful programs. This is not always the case, although there are some good cassette magazines around. Now, the New Zealand Spectrum and QL Computer Club is bringing the cassette magazine to New Zealand. It has a monthly newsletter and a quarterly cassette magazine. I took a look at the February 1985 cassette and the idea looks very promising.

The cassette begins with a professional looking title screen and introduction, and a note of new commercial programs available. Then it has some classified advertisements and an excellent low-res game of laserbikes.

Next on the tape is an alternative character set you can use in your own programs. The letters use two-pixel-thick lines, and are probably the best I have seen on the Spectrum.

There is a good hangman game with a cartoon-like man giving comments as his fate nears, and some software reviews of the latest games by Ultimate, showing actual screen shots from the games. This is an excellent way to review a game, although without any movement, it is still difficult to visualise the real game. Finishing off the tape is a text adventure game, *The Adventure of Nalb*.

If you like the idea of a cassette magazine, this one is definitely worth consideration - although, of course, the quality is dependent on contributions from members and so may vary. A year's subscription including monthly newsletter and quarterly cassette is \$29.95 for the Spectrum (or \$23.35 for the QL if you supply your own microdrive cartridge). The address to write to is NZ Spectrum & QL Computer Club, 37 Sunbury St, Dunedin.

## TANDY

## Characters in inverse

By James Brundell

This program, which is written for a 16K System80, is a machine-code utility which inverts all the graphics characters on the screen. To get the

### SAMPLE

```
0 ON ERROR GOTO 60020
30 X=5/0
60020 ER#="NFSNRGODFCOVOMULBSDD/0IDTMOSSLSTCMM
RRWJEMOFDLS":PRINTMID$(ER#,ERR+1,2)
" ERROR IN LINE "ERL:LIST.
```

### RUN

```
/0 ERROR IN LINE 30
30 X=5/0
READY
```

program working, type it in, RUN it, and then whenever you want to invert the screen type in FIELD.

(Note that this will not work with disk.)

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# Beaut double trouble

By Michael Fletcher

One of the newest games I have recently acquired from the US games house, Synapse, is none other than Blue Max. The now immortal World War I flying game.

Blue Max is a very impressive game. As soon as it's loaded, the player is greeted by the rhythmic melody of Rule Britannia, and an extremely good graphic drawing of a countryside hangar, with the Blue Max aircraft of the legendary British air ace, Max Chatsworth, sitting comfortably outside.

This is where you come in: you, as "The Blue Max", take over the commands of a Royal Air Force Sopwith Camel fighter/bomber. Your mission is to pulverize enemy airfields and destroy as many aircraft, buildings and ground forces as possible. This task is not easy against the might of the Axis Alliance which has sworn to destroy the legend

of "The Blue Max" once and for all.

These are the ingredients of Blue Max. Thrown together with outstanding graphics and an excellent soundtrack, you have one of the most entertaining games of this year.

The action is fast and furious. Once the start button is depressed, you soon find your extremely fragile aircraft taxiing along the runway. Timing is very important. As soon as you reach 100mph, push forward on the joystick, and your aeroplane will slowly rise. It is good strategy in this game to keep your altitude around 40 feet where there is little chance of ploughing into trees.

Once you are in the air, you discover your two main armaments — machine guns and bombs. The joystick controls There are four basic functions for which you can use the joystick. To move up,

push the joystick forward — you can tell if you are rising or not by the shadow of your aircraft on the ground. To move down, pull the joystick back — often a dangerous manoeuvre because if the aircraft reaches 15ft altitude, it will plunge into a tree and be destroyed. Moving left or right causes the aircraft to do the same thing (move left and right).

There are four other functions for the joystick, achieved by pushing or pulling it in the diagonal direction causing the aircraft to rise or fall, while also moving left or right. This manoeuvre is very useful when attacking enemy planes moving faster than you and at a different height.

The 3D action perspective of this game gives a realistic approach, as in Zaxxon.

Once used to controlling an aircraft moving at 200mph, you can proceed with your mission of destroying the main axis industrial city in France.

You have many enemies to battle, including numerous German fighter pilots, armoured canal barrages, ground forces, and anti-aircraft guns.

An excellent way to amass points in Blue Max is to destroy strategic points such as bridges, barges and factories. These factories, however, are often guarded by hidden anti-aircraft guns which can render one of your functions useless (discussed later). These targets can be annihilated only by bombing and not by air to surface machine gun fire.

A great way of destroying enemy ground forces is to strafe-fire the game with your twin 20-calibre machine guns. While this gives only 25 points for each position destroyed, it does alleviate the problem of anti-aircraft fire when you are trying to bomb a strategic target. To strafe fire, level out your aircraft at 25ft, then push the fire button to destroy ground targets.

There are many ways of being destroyed in Blue Max. The most common are smashing into the trees through flying too low, running out of fuel, or (rarely) being hit five times by AA or other aircraft's machine guns. Each time you are hit, one of your plane's functions is destroyed. These functions range from guns and bombs to fuel and manoeuvrability. Your fifth hit destroys you completely.

The furthest a player can proceed is when faced with the task of destroying the main axis industrial city in France. To do this, you have to bomb three industrial reactors along the middle of the street. On completion of this task, the game will end when you next land and you will receive a rating according to your performance throughout the game.

Overall, Blue Max is very entertaining and good value for money. A 32K disk, it is available from Stargate Enterprises, P.O. Box 2240, Tauranga South,

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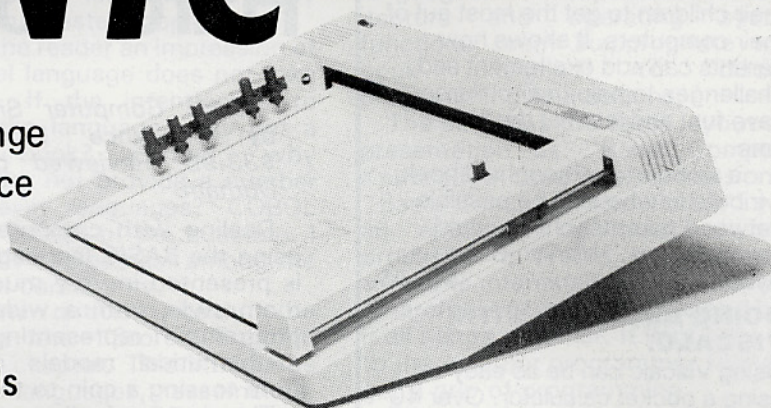
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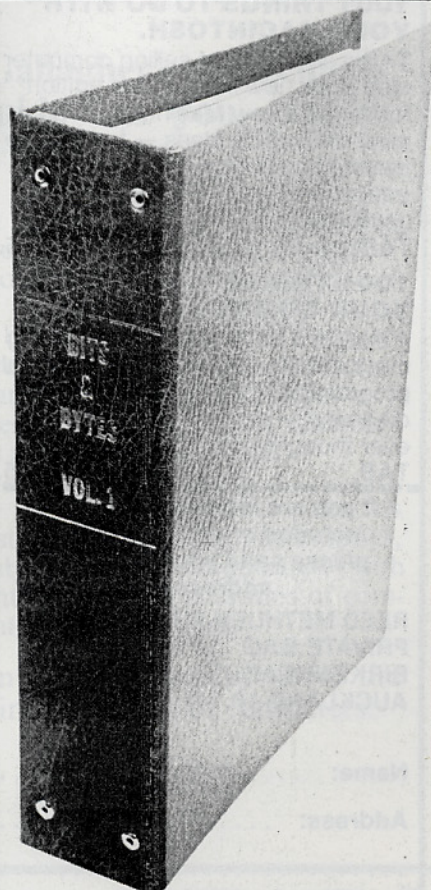
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## BOOKS

# Hard to get into

*Basic Computer Simulation*  
by Lawrence L. McNitt,  
\$33.95. Reviewed by John  
Durham.

Dealing with computer modelling using the BASIC language, the book is presented in very much a lecture room style, with a wide variety of programs representing various mathematical models of subjects from tossing a coin to the economy.

The level of discussion ranges roughly from sixth form maths to university computer simulation material. The reader should be interested in maths, statistics or simulation to follow it in detail.

More of a reference work than a good teaching book, I found that for the non-mathematically inclined person, it was difficult to get into. The models presented are overall a good representation of their subject matter, but often the functioning is

somewhat cryptic, and the level of programming well below that of the maths involved.

Subject matter is dealt with efficiently and concisely, but the author does not become personally involved with the reader, and reading this volume requires some effort and determination as a result.

This would make a good coursework book because of the variety of subjects covered, but it will not teach you anything about BASIC. It is about using computers as a means of studying situations by making models of them. It does make an attempt to discuss other languages used for simulation, such as Fortran, GPSS (General Purpose System Simulation), Simscript and Dynamo, but uses only three pages out of a volume of 337 for this purpose.

At \$33.95, I would need a specific reason to buy it.

## Couple of serious reads

*"Basic Computer Knowledge"* by John Moss. *The Modular Computer Studies Series, Input Two-Nine/Hutchinson. 1978. 129pp. \$19.50.* *Foundations of Programming* by John Moss. *The Modular Computer Studies Series, Input Two-Nine/Hutchinson. 1978. 83pp. \$14.95.* Reviewed by Gerrit Bahlman.

One of the major problems in teaching is determining the level of your students. Once you have the level, the presentation and delivery of material becomes relatively easy. Ensuring that the students are still with you is an ever-present concern but animalistic behaviour and stunned silence can both be helpful pointers.

Writing an instructional book does not have the advantage of real time interaction. The problem of level remains, especially when dealing with a topic such as computer knowledge. The depth, emphasis and inclusion of topics will be disputed by experienced readers.

The two books reviewed here, both by John Moss, have two different intentions but cover material which is similar.

"Basic Computer Knowledge" gives an introductory overview of computer terminology and concepts common to the technology. The level varies from the folksy, "When I was a boy...", to "One of the characteristics of digital computers as opposed to analogue machines is the serial nature of their processing."

The terms, "digital", "analogue" and "serial", are explained at particular points in the book but

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there is no index to help revise them. The glossary of terms does not cover "serial" and if you were thrown by the sentence, very little can be done to salvage understanding.

This example illustrates the variation in level which can obstruct the complete novice. If you understand the sentence immediately, the book will have little to offer you. For the computer salesman or novice computer user, the book can fill in some important gaps.

The emphasis is commercial rather than the homeuser but it could be used by anyone wanting an overview.

The book itself is paperback, A4 page format with chapters that cover: computer types and uses; the role of information in the modern society; units of information in a computer system; coding; architecture; stored program concepts; flowcharting; programming in BASIC; data processing personnel; software and related terms; and the history of the computer.

An impressive list of topics but each has to be treated simply because of the dictates of space. This is where the variation in level

comes in. The chapter on BASIC attempts — in 10 pages — to introduce loops, loop control, array notation, and nested loops.

To give the reader an impression of a high level language does not take 10 pages. If the intention is to introduce the language, why not a complete book? Further, why BASIC? Why not provide a number of high level languages? COBOL would not be out of the question. I am told that it is popular among the commercial community.

The same criticism cannot be directed at the "Stored Program Concepts" chapter. This introduces low level languages, assemblers, etc, very well. The coding chapter was very good. It is not an expensive book but it is a serious read for the novice.

The title of the second book, "Foundations of Programming", is misleading. It will not get anybody started as a programmer although it does embody some of the common-sense techniques used by programmers. Flowcharting, with detailed explanations of standard symbols and decision tables, is well covered. Testing and documentation are advocated with their rationale

and problems explained. But the extensive coverage of low level languages, microprocessor architecture and operating system functions seem inappropriate to a book designed to discuss programming foundations.

The book has the same layout and presentation as "Basic Computer Knowledge" and is an extension of "Basic Computer Knowledge" with an emphasis on machine code problems. It would be of use to someone interested in the whys and wherefores of the hardware and how it all hangs together. It is of little use to the amateur programmer trying to get a grip of programming.

The book appears dated. The machine level emphasis is reminiscent of the bad old days when you had to know about architecture and operation codes to add two numbers. It can be recommended as a general knowledge text and will fill in the gaps for someone wishing to master machine language terminology.

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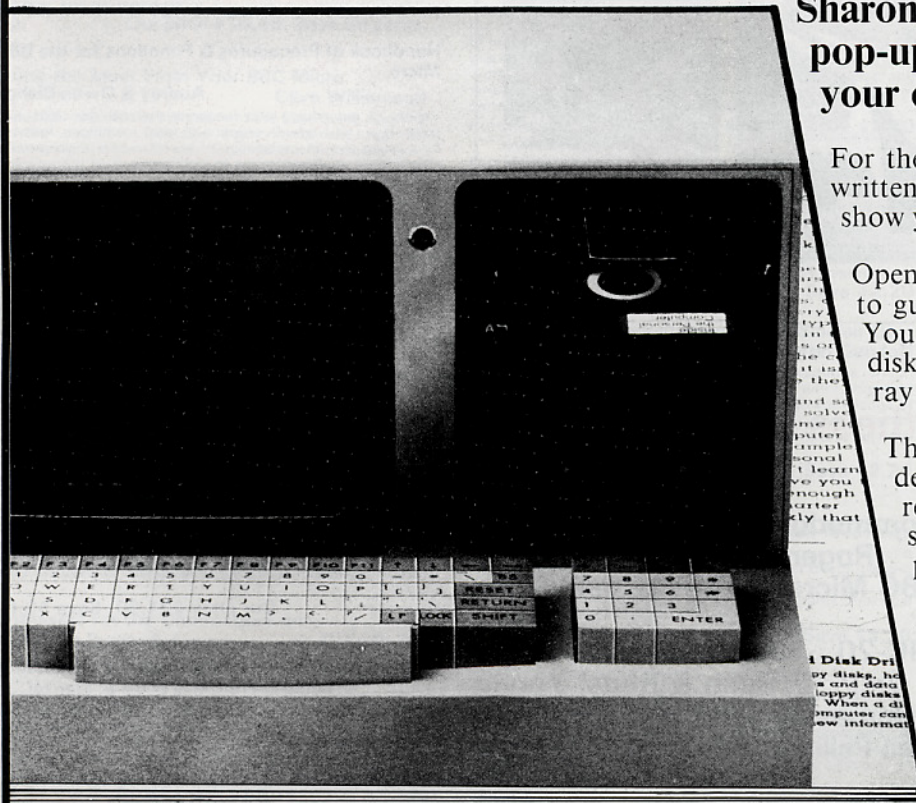
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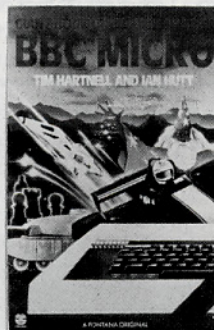
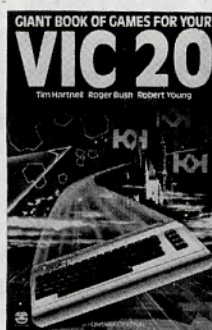




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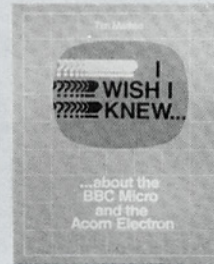
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Designed for programmers who want to write faster and better programs than they can in BASIC. Assumes you have no knowledge of machine code and works through the details to the point where you are linking routines and using routines with BASIC programs.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

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Mike James

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

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

Penguin

Our price \$12.90. Save \$1.05

### Cracking the Code on the Sinclair ZX Spectrum

John Wilson

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

Pan

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**IBM****IBM PC Programming****Richard Heskell & Glenn A. Jackson**

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

Prentice-Hall **Our price \$27.10. Save \$2.20****The IBM PC-DOS Handbook****Richard Allen King**

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

Sybex

**Our price \$20.30. Save \$1.65****The IBM PC Connection****James W. Coffron**

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

Sybex

**Our price \$22.70. Save \$2.25****Data File Programming on your IBM PC****Alan Simpson**

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

Sybex

**Our price \$32.30. Save \$2.65****Your IBM PC Made Easy****Jonathan Sachs**

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

Osborne/McGraw-Hill

**Our price \$29.55. Save \$2.40****Apple****Getting Started With ProDOS****B. M. Peake & D. Rorke**

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

Bluewater Press

**Our price \$6.45. Save 50 cents****Applesoft Basic: A Teach-Yourself Introduction****B. M. Peake**

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

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**Our price \$12.90. Save \$1.05****Fun, Games & Graphics for the Apple II, IIe & IIc.****Paul Garrison**

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

TAB

**Our price \$39.75. Save \$3.20****Apple Logo Programming Primer****Donald Martin, Stephen Pyata & Marijane Axtel Paulsen**

Provides a format for learning Logo. The various elements of the language are presented in readable style, and each chapter includes practice exercises to reinforce learning. Concentrates on breaking concepts down to workable modules and a chapter is devoted to "humanising" programs so that they are more user-friendly. Develops Hangman and States and Capitals in detail.

Sams

**Our price \$43.95. Save \$3.55****Games****Tim Hartnell's Giant Book of Spectrum Games**

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

Collins

**Our price \$13.85. Save \$1.10****The Big Fat Book of Computer Games****Tim Hartnell**

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

Interface

**Our price \$27.70. Save \$2.25****Virgin Computer Games Series****Edited by Tim Hartnell**

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

**Commodore 64 edition \$11.05. Save 90 cents****Spectrum, ZX 81, TRS-80, VIC 20, Oric, Dragon, Atari, BBC editions \$8.30. Save 75 cents****Atari 600XL edition \$14.75. Save \$1.20****Tim Hartnell's Giant Book of Computer Games**

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

Collins

**Our price \$13.80. Save \$1.15****Commodore 64****Cracking the Code on the Commodore 64****John P. Gibbons**

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

Pan

**Our price \$24.95. Save \$2.00****Your Commodore 64: A Guide****John Heilborn & Ran Talbot**

Fully illustrated teaching guide with information for all levels. For the beginner, step-by-step operating instructions and a complete introduction to programming in BASIC, plus information on tapping the C64's graphics and sound capabilities. For the more advanced user, detailed coverage of BASIC statements and functions, an extensive memory guide indicating the most usable memory locations with explanations of what each does and how it works, and a special section on advanced colour graphics and sprite graphics.

Osborne/McGraw-Hill

**Our price \$34.20. Save \$2.75****Commodore 64 Machine Language Tutorial****Paul Blair**

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

Holt-Saunders

**Our price Book & disk \$53.20.****Save \$4.30****Book & cassette \$50.85. Save \$4.10****The C64 Program Factory****George Stewart**

Programs which will put your C64 to work as an entertainer, puzzle generator, teacher and creative assistant. The 20 programs contain puzzles, games and simulations, education and self-improvement, creativity and art, and handy tools. Each accompanied by description of programming methods or techniques, computer requirements, suggestions for entering programs.

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**Our price \$29.60. Save \$2.35****First Steps in Machine Code on Your C64****Ross Symons**

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**Our price \$27.75. Save \$2.20****Basic Subroutines for Commodore Computers****Eddie Adams**

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

Wiley &amp; Sons

**Our price \$29.55. Save \$2.40****Commodore 64: Basic Programs in Minutes****Stanley R. Trust**

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

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

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**Our price \$8.30. Save 65 cents****Keyboarding****Keyboarding for Information Processing****Robert Hanson**

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

Osborne/McGraw-Hill

**Our price \$8.85.****Save 70 cents****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

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# GLOSSARY

- Acoustic coupler:** Connects the RS232 part of a microcomputer to a telephone handpiece.
- Algorithm:** A list of instructions for carrying out some process step by step.
- Applications program:** A program written to carry out a specific job, for example an accounting or word processing program.
- Array:** A data type found in high level languages, which is stored in a contiguous block of memory. Accessed by the array name and an index making it easier to process groups of data in many situations.
- ASCII:** American Standard Code for Information Interchange. An 8-bit code.
- BASIC:** Beginners' All-purpose Symbolic Instruction Code. The most widely used, and easiest to learn, high level programming language for microcomputers.
- Baud:** Speed of transferring data, measured in bits per second.
- Bidirectional:** A printer that prints when moving left as well as when moving right.
- 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.
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- Block graphics:** Chunky graphics, built up in small blocks rather than fine points.
- 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. Short for bootstrap.
- 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.
- Bus:** Also called a trunk or highway - a path on which several parts of a computer system may be connected so that signals can be passed between them.
- 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".
- CAL:** Computer Aided Learning CAL programs are written to take different actions on different student answers.
- Card:** In hardware, a circuit board.
- CCIT:** An abbreviation for International Telegraph and Telephone Consulting Committee. A standard maker.
- Chip:** An integrated circuit on a single crystal of semiconductor, far smaller than fingernail size.
- CMOS:** Transistor technology - when a pair of transistors of opposite type are used together. Means low power use.
- Computer language:** Any group of letters, numbers, symbols and punctuation marks that enable a user to instruct or communicate with a computer.
- Courseware:** Name for computer programs used in teaching applications.
- cpi:** Means character per inch. A common way of describing character density, i.e., how close together characters are in printers.
- CP/M:** An operating system for Z80 based machines. It is by far the most widely used DOS for Z80 based machines and there is an extremely large software base for it. See also disk operating systems.
- cps:** Characters per second. A common way of describing speed in printers.
- Cursor:** A mark on a video that indicates where the next character will be shown, or where a change can next be made.
- Daisywheel printer:** A printer in which the letters are formed by impact of a letter on a disk rotated until the required character is in position. Daisywheel printing is close to traditional typing in appearance.
- Data:** Any information used by the computer either I/O or internal information. All internal information is represented in binary.
- DC:** Direct coupling (telecomputing); or direct current.
- Disk:** A flat, circular magnetic surface on which the computer can store and retrieve data and programs. A flexible or floppy disk is a single 8 inch or 5 1/4 inch disk of flexible plastic enclosed in an envelope. A hard disk is an assembly of several disks of hard plastic material, mounted one above another on the same spindle. The hard disk holds up to hundreds of millions of bytes - while floppy disks typically hold between 140,000 and three million bytes.
- Disk drive:** The mechanical device which rotates the disk and positions the read/write head so information can be retrieved or sent to the disk by the computer.
- Diskette:** Another name for a 5 1/4 inch floppy disk.
- Disk operating system:** A set of programs that operate and control one or more disk drives. See CP/M for one example. Other examples are TRSDOS (on TRS 80) and DOS 3.3 (for Apples).
- DOS:** See disk operating system.
- Dot matrix:** A type of print head, made up of a matrix of pins, e.g. 8x8. When a character is to be printed the appropriate pins push out and strike the ribbon to paper forming the character.
- Dot graphics:** These graphics are individual screen pixels. Used by either turning on or off one pixel.
- Double-density:** Floppy drives that store twice the standard amount of data in the same space.
- Dump:** Popular term for sending data from a computer to a mass storage device such as disks or tape.
- EPROM:** Erasable, user-programmable, read-only memory.
- Execute:** A command that tells a computer to carry out a user's instructions or program.
- 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.
- Floppies:** Thin plastic disks with a magnetic coating used for storing information. Called floppies because they are flexible.
- FORTH:** A compact language. The programmer extends the language as he programs.
- Friction feed:** A type of paper-feeding system for printers: normal paper in a continuous sheet is gripped between two friction rollers as on a typewriter.
- Hardware:** The computer itself and peripheral machines for storing, reading in and printing out information.
- Hex:** Abbreviation for hexadecimal notation, a base-16 numbering system convenient to use with computers.
- High-level language:** Any English-like language, such as BASIC, that provides easier use for untrained programmers.
- IEEE:** A standardisation based on the Institute of Electrical and Electronics Engineers.
- Ink-jet printer:** These printers form images by spraying droplets of ink on to paper. Each droplet is electrically charged and is deflected into the required position by magnetic plates.
- Input:** Any kind of information that one enters into a computer.
- Interactive:** Refers to the "conversation" or communication between a computer and the operator.
- Interface:** Any hardware/software system that links a microcomputer and any other device.
- I/O "Input/output":**
- Inverse video:** When the background is coloured; e.g. on a black and white screen white becomes background and characters are written in black.
- Justified:** Printing is justified when the lines are flush on the left and right sides.
- K:** The number 1024. Commonly refers to 1024 bytes. Main exception is capacity of individual chips, where K means 1024 bits.
- Kilobyte (or K):** Represents 1024 bytes. For example 5K is 5120 bytes (5 x 1024).
- LCD:** Liquid-crystal display.
- Line feed:** A control code character found in the ASCII character set. Its normal purpose is to move the cursor down one line (on screen) or move paper up one line (on printer). Does not return the cursor to the left-hand margin.
- Lower case:** Non-capital alphabetical letters.
- Machine language:** The binary code language that a computer can directly "understand".
- Mainframe:** The very large computers that banks and other large businesses use are called mainframes. Also in microcomputers the term is sometimes used to describe the core of the machine, i.e. the CPU plus memory.
- Mass storage:** A place in which large amounts of information are stored, such as a cassette tape or floppy disk.
- Megabyte (or Mb):** Represents a million bytes.
- Memory:** The part of the microcomputer that stores information and instructions. Each piece of information or instruction has a unique location assigned to it within a memory.
- 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.
- 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.
- Minicomputer:** Originally a computer that went with a single equipment cabinet. Now a computer between a microcomputer and a mainframe. Note that the boundaries between mini's and the classes on either side of it are unclear.
- Modem:** Modulator-demodulator. An instrument that connects a microcomputer to a telephone and allows it to communicate with another computer over the telephone lines.
- Mother board:** A large circuit board that has other boards attached to it.
- Network:** An interconnected group of computers or terminals linked together for specific communications.
- Output:** The information a computer displays, prints or transmits after it has processed the input. See input and I/O.
- Parallel interface:** A type of communications interface used mostly for printers. It sends a whole character of data down eight (commonly) lines, one bit down each line. The most common type of parallel interface for printers is the Centronics interface.
- Pascal:** A high-level language that may eventually rival BASIC in popularity. It incorporates the form of structured programmes.
- 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.
- Pinfeed:** (also called sprocket feed). A method of paper feed in printers using sprockets.
- Pixel:** Picture element. The point on a screen in graphics.
- Plotter:** An output device for translating information from a computer into pictorial or graphical form on paper or a similar medium.
- POKE:** A command that inserts a value into a specific memory location.
- Program:** A set or collection of instructions written in a particular programming language that causes a computer to carry out or execute a given operation.
- RAM:** Random access memory is the very fast memory inside your computer. The access time for any piece is the same. Your program and runtime data are usually stored in RAM.
- REM statement:** A remark statement in BASIC. It serves as a memo to programmers, and plays no part in the running program.
- Resolution:** A measure of the number of points (pixels) on a computer screen.
- ROM:** Read only memory. Any memory in which information or instructions have been permanently fixed.
- Serial interface:** A type of communications interface used for a wide variety of purposes (printers, terminals, telephone correction etc.). It uses a minimum of two wires, and sends the data one bit at a time down one wire. The most common type of serial interface is RS232C.
- Sheet feed:** A type of paper feeding system normally used for high-quality document printers. A special device picks up a sheet of paper and feeds it into friction rollers.
- Software:** Any programs used to operate a computer.
- SP:** Second processor.
- Sprocket feed:** See pin feed.
- System:** A collection of hardware and software where the whole is greater than the sum of the parts.
- Tractor feed:** A type of paper feeding system for printers. Special computer paper with holes along both sides is fed by the tractors gripping these holes.
- Word:** A group of bits that are processed together by the computer. Most microcomputers use eight or 16 bit words.
- WP:** Word processor.



# New Zealand Software Award Winners Announced

A small Auckland software company was the overall winner of the inaugural New Zealand Microcomputer Software Awards presented on May 10 by the Minister of Overseas Trade and Marketing (Mr Mike Moore).

The awards for excellence in New Zealand written computer programs were sponsored by Bits & Bytes, New Zealand's personal computer magazine, Imagineering Ltd, a local software company and the New Zealand Technology Advancement Trust. They were presented at an industry dinner held in conjunction with PC85.

Cadpic, a computer aided design package that allows the user to draw art-like pictures on a computer screen, entered by Kiwisoft Programs Ltd, was named 1985 New Zealand Micro Computer Software of the year.

Cadpic which is already being exported to several overseas countries, also won the category for education and recreational software.

The program took Mr Harold Salive of Kiwisoft a year to develop and write and the \$2,000.00 winner's prize will be used to further perfect and enhance Cadpic and related products.

The winner of the business and farm software category of the awards, was Beancounter, a complete accounting package entered by Interactive Applications Ltd.

Mr Phil Normans, General Manager of Interactive Applications announced Beancounter is to be launched in the competitive United States software market next week.

In all, 35 entries were received for the awards which are aimed at encouraging New Zealand program writers with a view to achieving substantial export sales in the rapidly growing world-wide micro computer software market.

The finalists in the education and recreational category were, Cadpic, a computer aided design and graphics package that has complete facilities for drawing, painting and printing.

Proforma, an authoring program to be used by someone who wants to write educational software. In other words a program that allows you to more easily write a number of

educational programs for specific tasks. This program was entered by M.J. Collett.

Robotics, an obstacle course type game that uses high resolution graphics. This program was entered by Castle Software which consists of three 15 year old Auckland schoolboys.

Tat Menu, a program to help even

incorporates a high degree of flexibility in keeping those employee records.

The Charter Series, another complete accounting package available for a large number of microcomputers. This series has already achieved substantial export sales. This program was also entered by Interactive Applications Ltd.



severely disabled people to communicate using a computer. Even disabled people who cannot move can use this program with the aid of microswitch connected to their eye-brow. This program was entered by the Technical Aids Trust and is unusual among the entries in that it is available free of charge.

The finalists in the business and farming category were,

Farmfax, a complete farming package with versions available for different types of farming and horticulture. Each module in the package intergrates with other modules. This program was entered by Fieldcraft Systems Ltd.

Beancounter, a complete accounting package, with integrated modules that are relatively easy to learn and use. This program was entered by Interactive Applications Ltd.

Payroll, a payroll system that allows for up to 320 employees and

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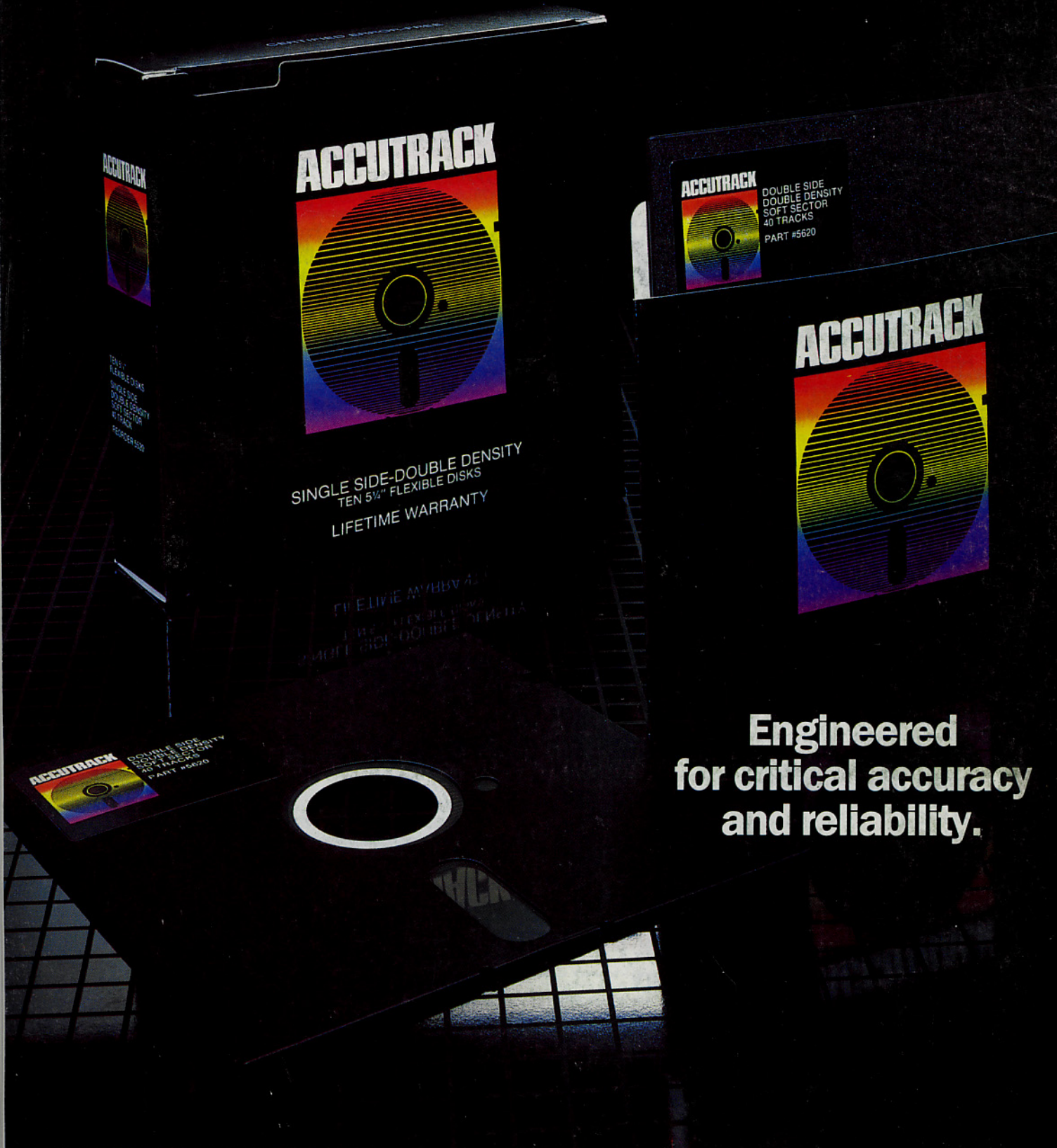
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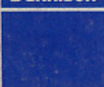


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