

Special!! Program Inside

MIDLAND'S PERSONAL COMPUTER MAGAZINE

# BITS & BYTES

June 1984: \$1.50

## Printers under \$2000 on the market

Dick Smith's Challenger to IBM

Sord Lap computer

Enlarged Commodore section

- Regular VIC column
- More for the 64

school computer report



Atari is back! the new Atari 600 and 800XL reviewed

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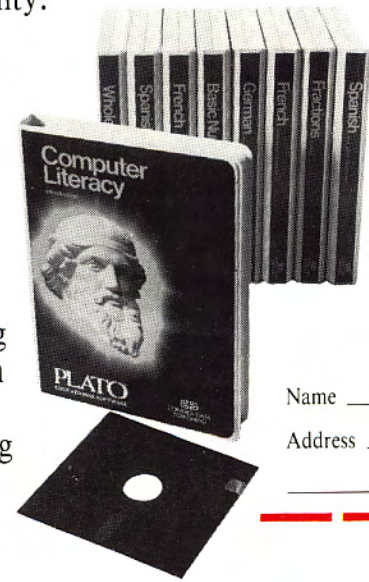
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## FEATURES

### The second printer round-up

Shayne Doyle pilots the micro user through the shoals of printers that are coming on to the market. Plus a very useful introduction, full of tips on what to look for in a printer. **10 to 25**

### Hardware reviews

Peter Ensor looks at two new Atari machines, the 600XL and the 800XL, and at an interesting printer available as a peripheral. **27**

Dick Smith, successful in New Zealand with the TRS-80 workalike, the System-80, has landed the first of the Dick Smith IBM PC workalikes. John Slane reports. **29**

Sord IS-II: A lap machine from Japan. Easy to carry round it comes with Sord's PIPs system. **32**

### Program special

|                        |            |              |                |
|------------------------|------------|--------------|----------------|
| Spectravideo           | 49         | Vic 20       | 53             |
| TRS-80 Colour Computer | 49         | Commodore 64 | 54, 55, 59     |
| Colour Genie           | 50         | TRS-80/      |                |
| ZX81                   | 50, 51, 52 | System 80    | 55, 56, 57, 59 |

### Beginners

A first look at graphics — sprites and all. **44**

Disks: the third article in the introductory series. This month the topic is operating systems. **48**

### New cartoon strip

Matt Killip's new cartoon, Micro Moments, which will appear regularly in *Bits & Bytes*, begins this issue. **2**

### The Great White Elephant-paper

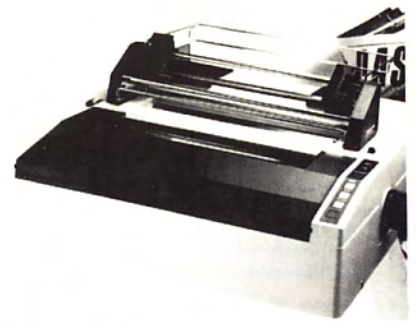
Enlightened and determined citizens have obtained the release of the long-secret 1982 evaluation of microcomputers for schools. Nick Smythe evaluates the report, backgrounds it, and explains the background. **35, 41**

## COLUMNS

|  |        |                  |        |
|--|--------|------------------|--------|
| This month we start an enlarged Commodore Section:           |        | Apple            | 66     |
| Commodore 64   | 60     | BBC              | 67, 68 |
| Commodore: debugging and error messages for VIC, 64 and PET. | 63     | TRS-80/System 80 | 69, 70 |
| VIC:   | 64, 65 | Spectrum         | 74     |
| 64 Business software: sorry delayed till next month.         |        |                  |        |

## REGULARS

|                  |    |               |                 |
|------------------|----|---------------|-----------------|
| Advertiser index | 76 | Club contacts | Back next month |
| Books            | 72 | Glossary      | 75              |
| Book Club        | 37 | Micronews     | 2, 4, 6, 8      |



Printers ..... 10



Atari 600 and 800 ..... 27



Programs ..... 49-59



Sord IS-II ..... 32



Dick Smith Challenger ... 29

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**Cover and graphics:** Sally Williams.

**Typesetting:** Focal Point.

**Printed:** in Dunedin by Allied Press.

## New BITS & BYTES computer show in Wellington

The first computer show in Wellington dedicated solely to microcomputers is now being organised by **BITS & BYTES**.

The Wellington Computer Show will be held in the Overseas Terminal from August 31 to September 2 and will cover microcomputers for home, business and educational uses.

Last year **BITS & BYTES** organised the highly successful Christchurch Computer Show (to be repeated on November 23 and 24 this year) which attracted nearly 6000 visitors in two days.

We are sure many people from Wellington and surrounding areas will also welcome the opportunity for "hands-on" evaluation of popular and newly-released microcomputers, peripherals and software. More details will be announced in coming issues.

Any organisation or individual interested in displaying a computer product at the show should contact Marc Heymann, P.O. Box 27-205, Wellington, telephone 844-985 or Paul Crooks, P.O. Box 827, Christchurch, telephone 66-566 for further details.

### This month...

In this issue **BITS & BYTES** has continued to expand its coverage of specific computer brands with the addition of a new monthly VIC-20 column (any contributions or queries for this column should be sent to Peter Archer, P.O. Box 860, Nelson) and more for the Commodore 64.

Also featured is another program special covering several different brands. These specials will now be more regular and we welcome program contributions (send to P.O. box 827, Christchurch) from ZX81 to MS-DOS running machines.

### Next month...

July sees the start proper of our new Atari column plus a series reviewing software for the larger CP/M and MS-DOS computers.

This series will cover popular applications software such as spreadsheets, wordprocessors, database managers and the new "window" type programs.

We are sure this series will be of wide interest to many people as these types of software are increasingly becoming available, and used, on more and more computers.

## Atari fans!

The Atari reviews featured in this issue are just the start of a regular Atari column which will include hints, software and hardware reviews, programs and so on dedicated to Atari users.

This column is in response to numerous requests from Atari computer users and several have promised to contribute regularly. But we urge all Atari users with original ideas and programs to contribute to ensure its success (past Atari columns have failed because of lack of support).

### EDITORIAL ASSISTANT

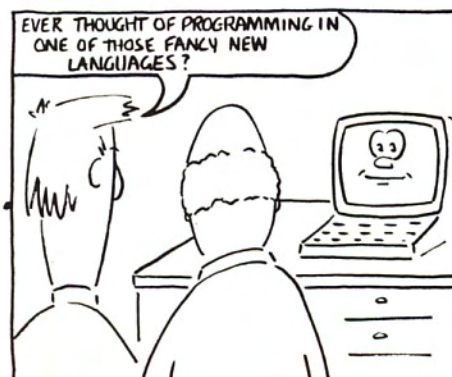
*Bits & Bytes* would like the help of someone in Christchurch for a few hours a week. The task will be to help in the co-ordination and preparation of program specials and software reviews.

Some technical knowledge would be a help.

Write: Ed. Assistant  
Bits & Bytes  
Box 827  
Christchurch

## MICRO MOMENTS

BY MATT KILLIP



# Minor Miracle:

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23 goes from high-speed  
24 draft...to letter quality  
25 printing is a positive  
26 miracle!

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# MDL

## MICRO NEWS

### Apple v Franklin

The New Zealand High Court has brought down a copyright decision that should close the Apple v Franklin dispute in New Zealand. It bars the New Zealand agent for Franklin from infringing Apple operating systems. However, it should not affect Franklin sales in this country. Apple and Franklin have now buried the hatchet in America, following a \$US2.5 million out-of-court settlement under which Franklins with Apple cards were allowed still to be sold pending the production of Franklins with their own operating systems (but still Apple compatible). The deadline for

the sale of the Franklins with the new operating systems in New Zealand was May 1. This is being met, and the High Court decision was brought down about a week after that. All Franklins being shipped in New Zealand now have the new Franklin operating systems. Franklin is now negotiating with IBM so that it may introduce a machine later this year which will be both IBM and Apple compatible and will run CP/M. Also coming up is a Franklin briefcase model, which should be in New Zealand soon.

### Apple dealers

Fifteen Andas (formerly Armstrong and Springhall, Ltd)

centres will become authorised Apple dealers. Andas Engineering, Ltd, which has 20 branches and employs about 150 electronics technicians and engineers has been made the official back-up service agent for Apple in New Zealand. The move was jointly announced by the chairman of Andas, Mr K.E.S. Faser, and Mr Mike Lord, general manager of CED Distributors, Ltd, a division of Consolidated Enterprises, Ltd.

### Acorn gets to market

Unexpectedly ahead of the second processor, Acorn has got its teletext adaptor and IEEE interface up to the market in Britain. The Teletext adaptor allows the BBC to link in to the broadcast information services offered by the BBC and the independent channels (and now by the Broadcasting Corporation of New Zealand). Its main attraction in Britain is that free software can be loaded down over the air from a constantly refreshed pool provided by the BBC. More generally it can also download factual information and, for instance, access a data base display from which it can abstract the values into its own memory graphing or analysis by its own programs. It is understood that Barsons is looking at the possibility of release of a VHF version in New Zealand in June.

The IEEE interface box gives access to the most common laboratory equipment control network, the IEEE-488 bus, the standard originally established as the Hewlett-Packard interface bus (HPIB). With this up to 14 independent laboratory devices or peripherals can be controlled simultaneously. It appears that the interface, which operates from a separate box plus using an additional ROM in the BBC machine, will work in the background for many tasks. The IEEE interface in Britain is marketed at roughly \$750 and the Teletext adaptor at roughly \$450.

### ... and gets silly

As a result of a High Court injunction, the magazine, *Personal Computer World*, has paid \$150,000 in an out-of-court settlement to Acorn Computers. The payment is in response to an injunction by Acorn as a result of an article that showed Acorn users how to transfer their existing tape-based Acornsoft programs to disks for more convenient use. Acorn claimed this was piracy. To get its January issue out the magazine settled out of court, leaving the legal point unresolved.

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# MICRO NEWS

## More on the QL

The Sinclair QL ("Quantum Leap") specifications are now available in greater detail. The chip used is the Motorola 68008, a 68000 with an 8-bit data bus. It runs at 7.5 MHz with a 1 megabyte linear addressing capability. It has 32K ROM and expansion to 640K RAM with twin microdrives built in to one end of the machine. Display is up to 85 characters by 25 lines with graphics in four colours at 512 x 256 or 8 at 256 x 256. Built-in software includes a structured basic with full screen editor and a multi-task (time sliced), multi-window operating environment. Although well set up for ports (TV, RGB, 2x RS232, 2x joysticks, 2x LANs, memory expansion sockets) it has no interface for a standard disk drive. The price of about \$1000 is tax inclusive in Britain. It weighs 3lb and measures 472mm by 138mm by 46mm.

The first of the QL's have been delivered. Announced in January with the promise of a 30-day delivery, the first of the machines were shipped to customers in mid-April, when there was a backlog of 13,000 orders. A last-minute

technical hitch was the cause of the delay. It was found that the machine's operating system was too large to fit the chip built for it. An additional chip had to be added, and on early models at least, its housing juts out from the rear of the computer case.

## Cat and Challenger launch

Both of Dick Smith's new computers, the IBM PC compatible Challenger and the Apple compatible Cat, will be launched in Auckland this month.

The Challenger is reviewed in this month's issue and next month we will feature the Cat.

## Mac in Britain

Presumably with a rather grey image, but one fitting to the British climate, the Macintosh has been released in Britain with a price around \$3600. This puts it below the IBM-PC and just above the ACT Apricot in that market. The interpretive structured BASIC and Pascal released there look attractive. Advance publicity material shows program development using multiple windows: one for graphics, one for text output, and one with a program listing with the currently active

statement constantly highlighted as the program executes. Selling well in the United States, it will be interesting to monitor progress in Britain.

## Price reductions start again

Last month's 40 per cent drop in the price of 16K Spectrum computers by David Reid Electronics has triggered another round of price cuts by competitors.

The prices of both 16K and 48K Spectrums were reduced \$200 by Reids (to \$299 and \$499 respectively).

Commodore Computers responded by cutting the price of the VIC-20 by \$100 to \$399 and Dick Smith Electronics in turn has dropped the price of the VZ-200 by \$100 to \$199.

The original move by David Reid Electronics was believed in part to be aimed at hitting the independent importers who have been undercutting the national agents in recent months.

The price moves do raise a question mark over the price and future of the Sinclair ZX81 here. Some special prices on this computer are expected in the next few months as stocks are cleared.

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 - The Grapevine, February, 1984.

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# MICRO NEWS

## Bid for education

Competition for a share of the education market continues to hot up with a number of companies offering special come-ons and deals to win the educationalists over.

Imagineering, the New Zealand agent for Micropro International Corp, hosted Dean Scott, Micropro's senior marketing manager from California, in Auckland last month while he announced new strategy aimed at putting Micropro into New Zealand educational institutes.

Software programs and computer peripherals were being offered at "very affordable prices", according to Imagineering's general manager, Paul Dixon, who said training centres would be offered up to 90 per cent off the retail price on Micropro and other products.

Micropro has a philosophy of developing software which those who lack programming experience can use — particularly in the business environment.

To enhance its Wordstar word processing software, Micropro has released the Wordstar Professional, a package which includes an integrated set of programs including:

- Mailmerge — an enhancement for Wordstar allowing the user to develop computerised mailing lists for personal and volume mailings;

- Correctstar — a spelling corrector which verifies typing and spelling errors and automatically suggests corrections. It has a 65,000 word dictionary.

- Spellstar — verifies spellings and typographical errors with an electronic dictionary. Star index means the user can generate customised indexes and table of contents.

- Wordstar tutor — six lessons aimed at taking the user from simple word processing functions to the more sophisticated Wordstar capabilities. Purchasers of Wordstar receive Wordstar Tutor free and existing Wordstar users can upgrade to the new professional package for half price.

## Novell Sharenet

AWA recently announced the local introduction of the Novell Sharenet product.

Novell NetWare is a family of microcomputer local network products, all using the Netware Operating System, which links micros, micro operating systems, network communications, mass storage devices, peripherals and software applications. Operating systems, utilities and applications functioning with one NetWare product will operate with other

NetWare configurations. Major micro operating systems — PC-DOS 1.1, PC-DOS 2.0, CP/M-80, CP/M-86 and the UCSD p-System — are supported and a Unix implementation will also be available.

## Watch out for CIA

The JADE software package developed by Computer Intelligence Applications, is being assessed by IBM, in the USA for inclusion in its world-wide range.

JADE, developed here three years ago by CIA, is a job cost system well suited to electricians, plumbers, builders and other small to medium-sized businesses.

So far, the company has done 70 installations — 60 in New Zealand and 10 in Australia — in companies with staffs ranging from one to 60.

Based on MS DOS the software will run on any IBM compatible machine or machines which run MS DOS. The package includes five systems — job costing, bill of materials, invoicing, debtors ledger, price book and inventory file — and costs \$2600 all up.

Managing director, Barry Sexton says the price compares well. But more importantly, he believes the professional approach to packaging has been instrumental in gaining overseas attention.

## C64 top of the pops

Commodore 64 has been awarded the "Home Computer of the Year" title in a series of popularity polls conducted by computer magazines in Europe and the USA.

The polls were conducted by the six magazines among their readerships, and staff and machines entering the poll were required to offer a usable, fully addressed system which was available on the market. There also had to be software for entries, and the system has to be proved through use.

Commodore 64's powerful sound facilities and wide range of software, including word processors, some serious business packages and selection of games, were the factors which took the machine to a clean win.

## New Club

The Wellington Apple Users Club inaugural meeting recently attracted users from as far afield as Levin. The club expects to have a membership of 90 by December. Other clubs may be interested in the fees set: \$100 "corporate", \$20 family, \$15 individual, and \$10 student.

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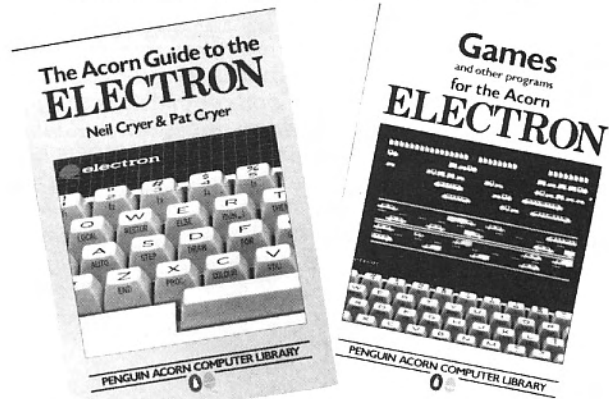
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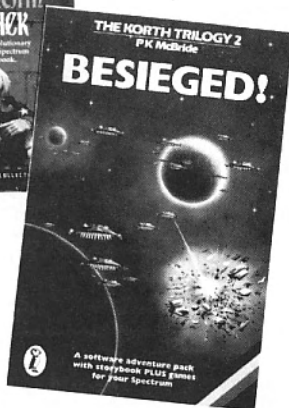
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# Introduction: What to look for

Since my original brief dot-matrix printer summary printed in the December, 1983, edition of *Bits and Bytes* there has not been a lot of change in the New Zealand printer market. A few new entries appear, and I have dropped a few that don't appear to be actively marketed in the country. Additions include the full Star range, Riteman, Olivetti PR2300 and Hewlett Packard ink-jet printers, and the just released, high-performance Epson LQ-1500. — S.D.

By Shayne Doyle

A reasonable-quality printer sporting most of the usual features will still cost you between \$700 and \$1500. Some of these may be common print units wearing different clothes. When choosing a printer for home use, running costs may be a consideration, especially if operating on a limited computing budget.

There are a couple of areas to watch here to conserve running costs. First, consider the type of ribbon the printer requires: some units still use the good old standard 2in Underwood-style typewriter ribbons available everywhere for between \$3 and \$7. Most printers seem to favour the endless cassette type of ribbon; this enables the manufacturer to eliminate ribbon direction change mechanisms but you pay for that in the end as average cassette ribbon costs are around \$15 to \$30. Should you buy a printer using 2in spools, make sure when you put on a replacement typewriter ribbon that the eyelets at each end of the ribbon will catch the direction change forks and trip the mechanism.

Second, feeding the beastie can be very expensive. A4 page, 10in wide fanfold paper typically costs \$25 to \$45 per 1000 sheets. Profligate listing of program sources and test print-outs can chew through 1000 sheets very quickly.

All of the printers have friction feed, and some offer roll holders as standard. A 10in wide roll of white paper is quite cheap at about \$2.50.

Be aware of the difference between "sprocket" or "pin feed" and true tractor-feed units. The former is not removable from the printer and the sprockets may interfere with single sheet feeding. Also watch out for printers with fixed-width pin feed as part of the roller. These restrict you to a single width paper and may prevent you from using any other widths of paper you may acquire. True tractor feeders are removable and are usually gear driven from the roller drive. They are usually more robust than the cheaper sprocket feeds.

## Printer jargon

Some of the other printer parameters should also be explained. "Dot matrix" refers to the construction of the actual printing head elements: a square matrix of fine wire pins each with a driving solenoid that strikes the pin against the ribbon and on to the paper to create a pattern of dots. The character-generator ROM in the printer determines the pattern of pins activated and therefore the correct character as shown in figure 1. The usual configuration is nine vertical pins and nine horizontal. Some have less, some more horizontal pins. More pins equals better formed characters, and some quite

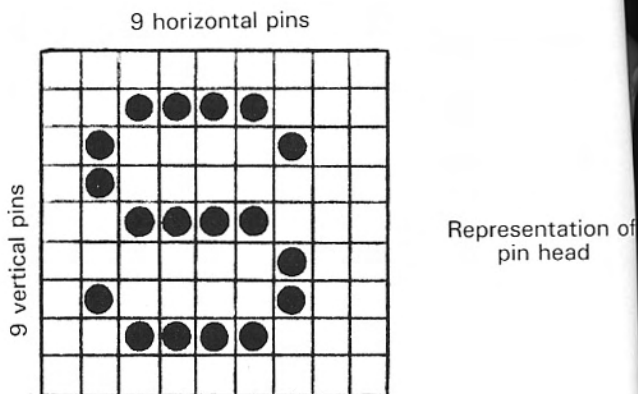
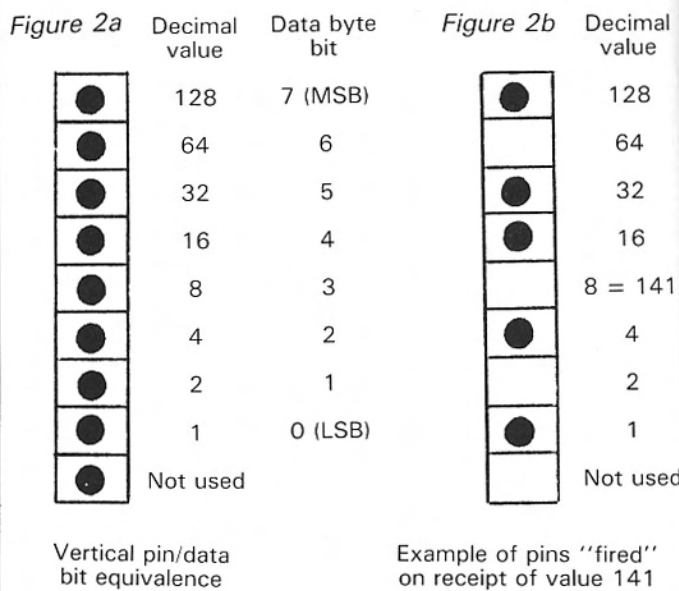


Figure 1



ingenious arrangements have been devised to produce higher dot densities with a limited pin configuration.

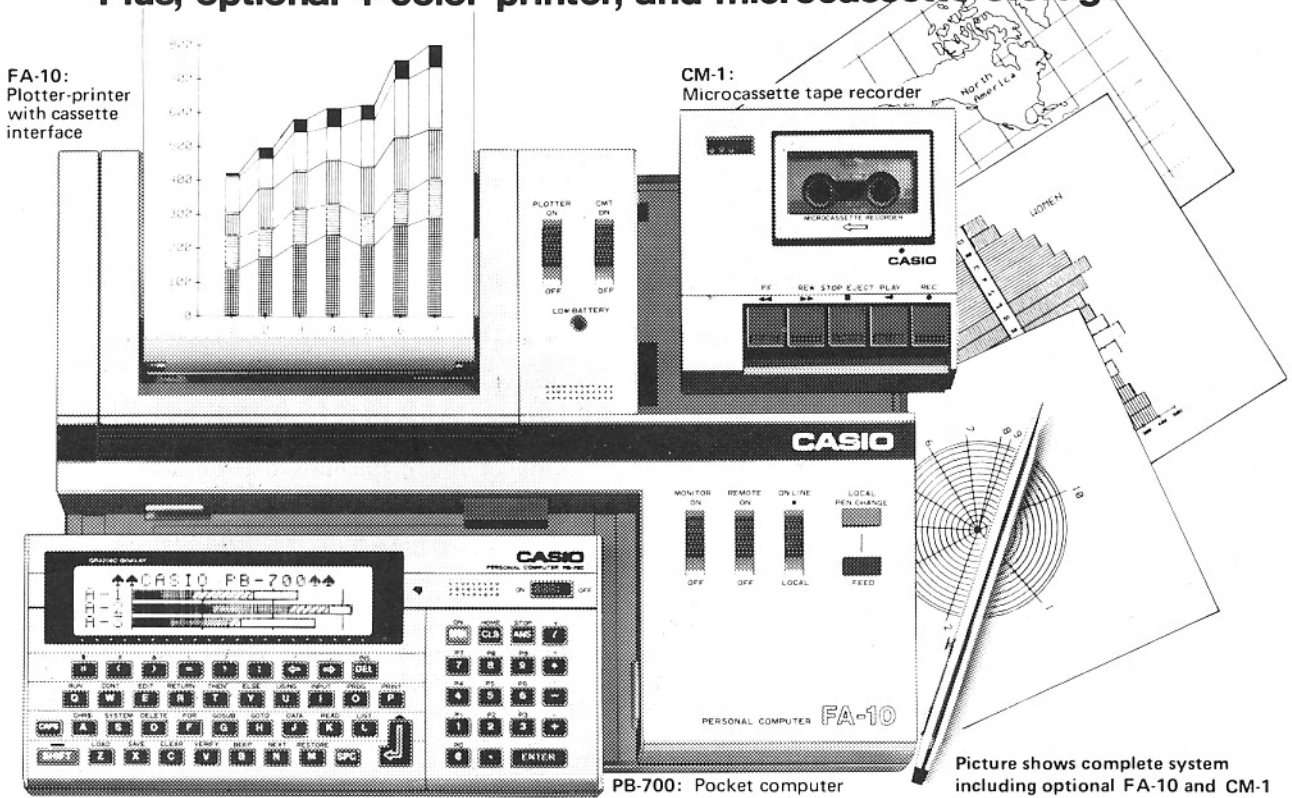
Some machines offer "correspondence" or "near letter" quality printing by two or more overpasses, offsetting the head slightly each pass. This can produce very good results — at a loss of speed of course.

"Bidirectional" means that the unit prints when the head is moving left to right or right to left and "logic seeking" means the head control microprocessor will work out the shortest distance to travel to start the next line. It is also worth remembering that the quoted speed, e.g., 120 characters per second, will only be relevant to the normal draft mode; other features such as emphasised and compressed print modes reduce this speed considerably.

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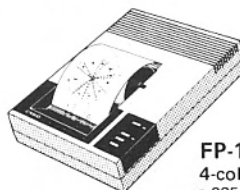


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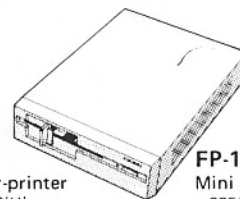
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## PRINTER ROUND-UP

### 'Bit-image' graphics

Most of these printers offer high-resolution, "bit image" graphics printing. This is where the head outputs a single vertical row of dots in response to receiving a single byte of data. Each vertical pin represents an increasing binary value as shown in figure 2a. The programmer can control which pins "fire" by sending the appropriate data bytes down. For example, to fire pins 1/3/5/6/8 we must PRINT CHR\$(181) as shown in figure 2b. As there are nine pins vertically, and we use an 8-bit byte, one pin is left out and we must decrease the line-feed spacing to generate solid block images, usually 7/72in is sufficient.

This left out pin is the cause of incompatibility between graphics on different models. Epson emulating printers omit the bottom pin while the opposite camp leaves out the top pin. You can try it on paper and see what difference it makes sending the same data byte to each configuration. This type of bit map graphics work can take an awful lot of work to set up if you don't have the software to do it for you.

Graphics densities vary widely. Commonly, 480 and 960 dots per line are termed low and high resolution. Some printers offer a choice of five or six densities up to ultra-high resolution of 1920 dots per line. Block graphics characters can still be found in the character sets of some printers and these can be most useful for certain jobs.

Standard character density is 10 characters per inch, and over an 8in head travel, this gives the familiar 80 characters per line. Printing at higher densities (compressed mode) enables more narrower characters to be printed on the same line. Printing at 13.6 c.p.i. for example, gives 136 characters. More expensive machines with wider carriages will offer 136 characters as standard and 233 in compressed mode — ideal for printing large spreadsheet models.

Interfacing can add dollars to your printer costs. Most units offer only the Centronics parallel interface as standard, and if your computer has only an RS232 printer port then the optional interface can cost up to \$350 extra. Some RS232C interfaces will also "talk" to a 20mA current loop as well. A few manufacturers offer optional IEEE 488 parallel interfaces. Two examples of computers using this are Hewlett Packard and Commodore.

Additional facilities offered by dot-matrix printers include the capability to print subscripts and superscripts, italics, expanded width characters, different fonts, double-strike mode where each character is struck twice, emphasised mode where the character is

reprinted slightly offset, proportional character spacing and continuous underlining where the bottom ninth pin is used to form the underline as the character is printed. Comprehensive line feed, forms control, horizontal and vertical tabbing, and margin control features may also be included. Not all printers have all these and you should check the specification sheet and user manual to make sure the printer you are considering offers the features you need.

One final feature needs explanation: the term, "download character set". This enables the programmer to design customised graphics or alphanumeric characters and send them from the computer to the printer, where they are stored in a RAM area. You may also have the choice of copying the standard character set into the download character RAM before overwriting specific locations with the custom characters. You may then select either the download or standard set to print with.

## PRINTER ROUND-UP

Some of these facilities can be combined to produce other effects and the bottom of figure 3 shows what I call "microprinting" from a Star Gemini 10X. This is a combination of Elite font, 7/72in line feed, and condensed mode. I consider this printer the best value for money buy around today: it offers all the previously mentioned features plus friction, tractor and roll paper feed, for a very reasonable price.

All of these features make the current dot-matrix printer a very versatile peripheral, and if you can afford to spend the time at it, they can be made to produce the most amazing results. Don't buy until you try. Unless you are a "hardware hacker," insist on seeing the printer working on your computer before you part with your hard-earned cash.

I have slipped in two or three daisywheel printers, although these will be the subject of their own article in a later issue of *Bits & Bytes*. Also included are a thermal printer and an ink-jet unit. Both are still dot-matrix, the former using heating elements in the head to colour the specially treated paper and produce visible dots, the latter firing a fine jet of ink drops on to the paper, their final positions being controlled by electrostatic spark discharge. Both are non-impact techniques and are therefore very quiet in operation.

**When you're asleep in your bed tonight, the stars will be smiling down at you.**

**Except one.**

**Death Star**

Three-dimensional terror from RABBIT SOFTWARE

For CBM-64 & ZX Spectrum 48K

**New Zealand Distributors: ALPINE COMPUTING LTD**

# PRINTER ROUND-UP

STANDARD DRAFT MODE 10 cpi PICA FONT  
 Standard draft mode 10 cpi pica font  
**ENLARGED DRAFT 10 cpi**  
 Enlarged draft 10 cpi  
 CONDENSED DRAFT MODE 17 cpi PICA FONT  
 Condensed draft mode 17 cpi pica font  
**ENLARGED CONDENSED DRAFT 17 cpi PICA**  
 Enlarged condensed draft 17 cpi pica  
 DOUBLE-STRIKE DRAFT 10 cpi  
 Double-strike draft 10 cpi  
 CONDENSED DOUBLE-STRIKE DRAFT 10 cpi  
**EMPHASISED DRAFT 10 cpi**  
 Emphasised draft 10 cpi  
 CONDENSED EMPHASISED DRAFT 10 cpi  
UNDERLINED DRAFT 10 cpi MODE

THE FOLLOWING IS PRINTED IN SUPERSCRIPIT MODE  
 THE FOLLOWING IS PRINTED IN SUBSCRIPIT MODE  
**DRAFT MODE 10 cpi IN ITALICS**  
 Draft mode 10 cpi in italics

STANDARD DRAFT MODE 12 cpi ELITE FONT  
 Standard draft mode 12 cpi elite font  
**ENLARGED DRAFT 12 cpi ELITE**  
 Enlarged draft 12 cpi elite  
 CONDENSED DRAFT MODE 17 cpi ELITE FONT  
 Condensed draft mode 17 cpi elite font  
**ENLARGED CONDENSED DRAFT 17 cpi ELITE**  
 Enlarged condensed draft 17 cpi elite  
 DOUBLE-STRIKE DRAFT 12 cpi  
 Double-strike draft 12 cpi  
 CONDENSED DOUBLE-STRIKE DRAFT 12 cpi  
 EMPHASISED DRAFT 12 cpi  
 Emphasised draft 12 cpi  
 CONDENSED EMPHASISED DRAFT 12 cpi  
UNDERLINED DRAFT 12 cpi MODE

THE FOLLOWING IS PRINTED IN SUPERSCRIPIT MODE  
 THE FOLLOWING IS PRINTED IN SUBSCRIPIT MODE  
**DRAFT MODE 12 cpi IN ITALICS**  
 Draft mode 12 cpi in italics

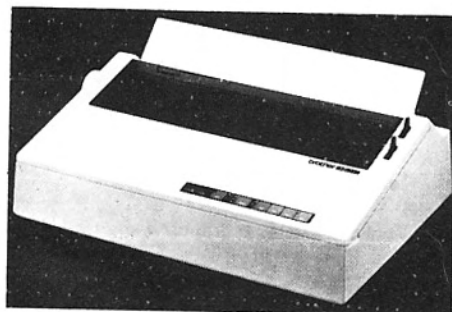
THIS IS A SAMPLE OF GEMINI 10X MICROPRINTING  
 IT IS STILL AMAZINGLY LEGIBLE EVEN AT THIS SIZE

Figure 3

A typical range of print styles from a current-model, dot-matrix printer.



Printer name: Amust 80DT  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 80 cps  
 Head format: 9x7 dots  
 Graphics modes: 640/1280 dots per line  
 Std chars/line: 80  
 Max chars/line: 136  
 Paper feed: Friction/sprocket  
 Max paper width: 10in  
 Std interface: Centronics parallel  
 Ribbon type: Cartridge  
 Options: RS232C interface \$251  
 IEEE 488 interface  
 Cost: \$800  
 Agent: AWA (NZ), Ltd



Printer name: Brother HR-15  
 Printer type: Daisywheel  
 Print speed: 13 cps  
 Head format: 96 character, exchangeable daisywheel



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 City \_\_\_\_\_ Phone \_\_\_\_\_

My cheque for \$\_\_\_\_\_ is enclosed. Please charge my  Visa  B/card  
 Signature \_\_\_\_\_ Expires \_\_\_\_\_

# PRINTER ROUND-UP

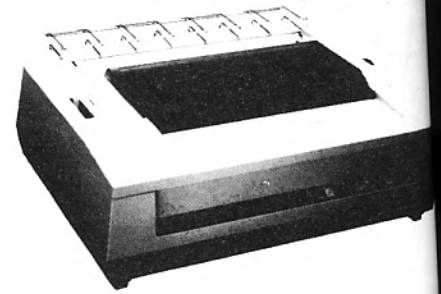
Graphics modes: No  
 Std chars/line: 110  
 Max chars/line: 165  
 Paper feed: Friction  
 Max paper width: 13.5in  
 Std interface: Centronics parallel  
 Buffer size: 2K  
 Ribbon type: Cartridge  
 Options: RS232C interface — \$325  
 Sheet feeder — \$579  
 Keyboard unit — \$420  
 Features: Superscript/subscript/underlining modes  
 Proportional spacing mode  
 Multi copy from buffer facility  
 Red and black ribbons  
 Cost: \$1895  
 Agent: Brother Distributors



Printer name: C. Itoh CX-4800  
 Printer type: Printer-plotter  
 Print speed: 8 cps  
 Head format: Auto-change pen (4 colours)

Graphics modes: X-Y axis plotting dots per line  
 Std chars/line: 80  
 Paper feed: Sprocket  
 Max paper width: 9.5in  
 Std interface: Centronics parallel  
 Features: Self-test mode  
 Cost: \$1695  
 Agent: Control Microcomputers

Cost: \$2270  
 Agent: Control Microcomputers



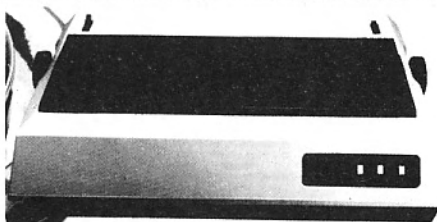
Printer name: C. Itoh 8510S  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 180 cps  
 Head format: 9x9 dots  
 Std chars/line: 80

Max chars/line: 132  
 Paper feed: Friction/tractor  
 Max paper width: 8in  
 Std interface: Centronics parallel  
 Buffer size: 3K  
 Ribbon type: Cartridge  
 Options: RS232C interface — \$100

Colour version (parallel) — \$200  
 Colour version (RS232C) — \$300

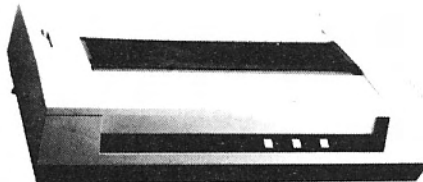
Features: 256 byte overflow buffer  
 Down loading character sets  
 Superscript/subscript/italics modes  
 Programmers hex dump mode  
 Cost: \$1695  
 Agent: Control Microcomputers

## PRINTER ROUND-UP



Printer name: C. Itoh A10  
 Printer type: Daisywheel  
 Print speed: 20 cps  
 Head format: 100 character exchangeable daisywheel

Graphics modes: No  
 Std chars/line: 115  
 Max chars/line: 138  
 Paper feed: Friction  
 Max paper width: 13in  
 Std interface: Centronics parallel or RS232C  
 Buffer size: 2K  
 Ribbon type: Cartridge  
 Options: Tractor feed unit — \$330  
 Features: Down loading character set  
 Cost: \$2150  
 Agent: Control Microcomputers



Printer name: C. Itoh 1550S  
 Printer type: Dot-matrix, bidirectional, logic seeking

Print speed: 180 cps  
 Head format: 9x9 dots  
 Graphics modes: 144/160 dots per inch  
 Std chars/line: 132

Max chars/line: 230  
 Paper feed: Friction/tractor  
 Max paper width: 13.5in  
 Std interface: Parallel/RS232C/20mA current loop  
 Buffer size: 2K  
 Ribbon type: Cartridge  
 Options: RS232C interface — \$100

Colour version (parallel) — \$200  
 Colour version (RS232C) — \$300

Features: 256 byte overflow buffer  
 Down loading character sets  
 Superscript/subscript/italics modes  
 Programmers hex dump mode



Printer name: Canon A-1200  
 Printer type: Dot-matrix, bidirectional, logic seeking

Print speed: 120 cps  
 Head format: 9x9 dots  
 Graphics modes: 480/960 dots per line



# Why should choosing your new printer be such a puzzle?

(When the only clue you need is 5 Across).

different went on... at Artattack in 12.32pm

really come home to him since he has been here. "People from small countries — like Ireland or Argentina — are amazed that a small country like New Zealand can have a film industry and have a film competition. It's real from them that I have the feeling of home is," he said. I don't want to know how have a... it

**ACROSS**

- 80 characters per second. Unidirectional printer. 80 columns or 132 columns condensed.
- 160 cps Bidirectional 136 column.
- 350 cps Bidirectional 136 column 2 colour with wide interface ability.
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- 350 cps Bidirectional 136 column. Two colour. Technology intensive.
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- High quality serial printer. Interchangeable Daisy Print Wheels. Maximum 80 cps.

MICROLINE 80  
MICROLINE 93  
OKI 2350  
AWA  
VERSAPRINT 500  
AMUST 8DT

Flags... "It puts a... the map. There is created by a film, it flagship. It's great for the other industries suddenly a count heard of and they come in behind. "I didn't realise extent of this be came here." Ward's job in C primarily to gi

**AWA KNOW PRINTERS INSIDE OUT (and across and down)**

which isn't surprising because AWA are agents for some of the most outstanding brands in the printing world; names like OKI, AMUST and LEAR SIEGLER. AWA is aware that there is no one printer for all jobs, that each situation requires a particular type of machine, so AWA are expert in assessing your needs and providing the appropriate printer to meet them. AWA guarantee their products and provide a speedy, country-wide back-up service. So don't let your choice of printer become a puzzle. Get in touch with AWA. They'll give you all the answers in print. The correct ones.

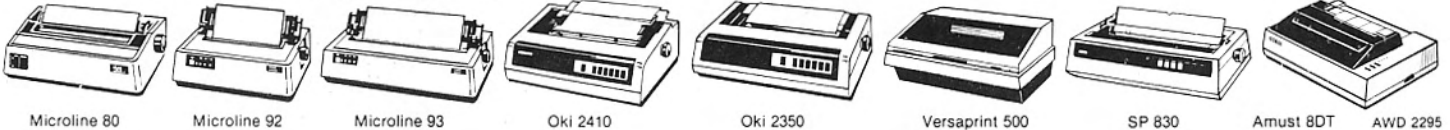
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 Data Systems Division  
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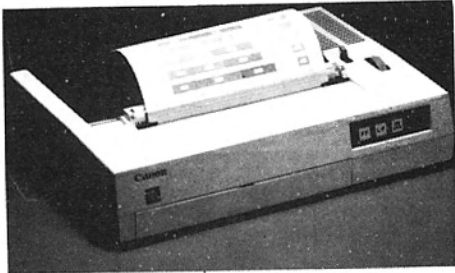
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Microline 80    Microline 92    Microline 93    Oki 2410    Oki 2350    Versaprint 500    SP 830    Amust 8DT    AWD 2295

# PRINTER ROUND-UP

Std chars/line: 80  
 Max  
 chars/line: 136  
 Paper feed: Friction/sprocket  
 Max paper  
 width: 10in  
 Std interface: Centronics parallel  
 Buffer size: 1 line  
 Ribbon type: Cartridge  
 Cost: \$1794  
 Agent: Kerridge Odeon



Printer name: Canon A-1210  
 Printer type: Drop on demand  
 ink-jet  
 Print speed: 40 cps  
 Head format: Piezoelectric — 4  
 horizontal nozzles

Graphics  
 modes: 560/640  
 dots per line

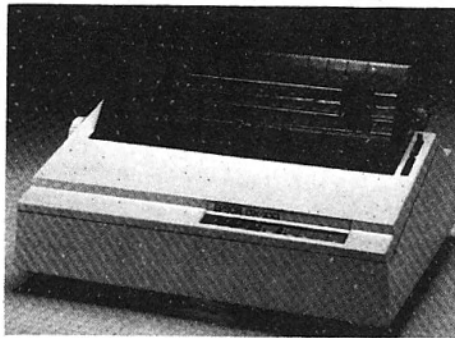
Std chars/line: 80  
 Max  
 chars/line: 80  
 Paper feed: Friction  
 Max paper  
 width: 8.5in  
 Std interface: Centronics parallel  
 Buffer size: 1 line  
 Ribbon type: Dual cassette ink —  
 black and tricolour  
 Features: 7 colour plain  
 paperprinting  
 Low noise level  
 CRT hard copy  
 function  
 Cost: \$2178  
 Agent: Kerridge Odeon



Printer name: Centronics  
 Horizon 80  
 Printer type: Dot-matrix,  
 bidirectional, logic  
 seeking  
 Print speed: 140 cps  
 Head format: 11x9 dots  
 Graphics  
 modes: Single/double/  
 quadruple density  
 dots per line

Std chars/line: 80  
 Max  
 chars/line: 132  
 Paper feed: Friction and tractor  
 Max paper  
 width: 10in  
 Std interface: Centronics parallel  
 Ribbon type: Cartridge  
 Options: RS232C interface  
 Features: Down loading  
 character set  
 27 cps near letter-  
 quality print  
 Subscript/superscript  
 /underlining modes  
 Incremental  
 (typewriter) mode

Cost: \$1600  
 Agent: STC, Ltd



Printer name: Epson DX-100  
 Printer type: Daisywheel  
 Print speed: 13 cps  
 Head format: 96 character,  
 exchangeable  
 daisywheel

Graphics  
 modes: No

Std  
 chars/line: 110  
 Max  
 chars/line: 165  
 Paper feed: Friction  
 Max. paper  
 width: 13.5in  
 Std interface: Centronics parallel  
 or RS232C  
 Buffer size: 5K  
 Ribbon type: Cartridge  
 Options: Sheet feeder unit  
 — \$722  
 Keyboard unit  
 — \$602  
 Tractor feed unit  
 — \$308

Features: Superscript/subs-  
 cript/ underlining  
 modes  
 Proportional spacing  
 mode  
 Reprint text from  
 buffer facility  
 Cost: \$1933  
 Agent: Microprocessor  
 Developments, Ltd

Comments: Epson's version of

the Brother HR-15  
 buffer increased to  
 5K bytes and ROMs  
 made Epson  
 compatible.



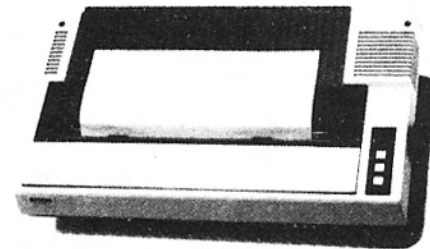
Printer name: Epson FX-80  
 Printer type: Dot-matrix,  
 bidirectional, logic  
 seeking

Print speed: 160 cps  
 Head format: 9x9 dots  
 Graphics  
 modes: 480/576/640/720/  
 960/1920  
 dots per line

Std chars/line: 80  
 Max  
 chars/line: 137  
 Paper feed: Friction/sprocket  
 Max paper  
 width: 10in

Std interface: Centronics parallel  
 Buffer size: 3K  
 Ribbon type: Cartridge  
 Options: RS232C interface  
 Features: Superscript/subscript  
 /italics modes  
 Proportional printing  
 Down loading  
 character set

Cost: \$1799  
 Agent: Microprocessor  
 Developments, Ltd



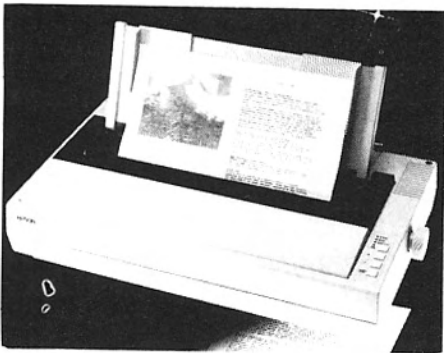
Printer name: Epson FX-100  
 Printer type: Dot matrix  
 bidirectional, logic  
 seeking

Print speed: 160 cps  
 Head format: 9x9 dots  
 Graphics  
 modes: 480/640/720/  
 960/1920  
 dots per line

Std  
 chars/line: 136

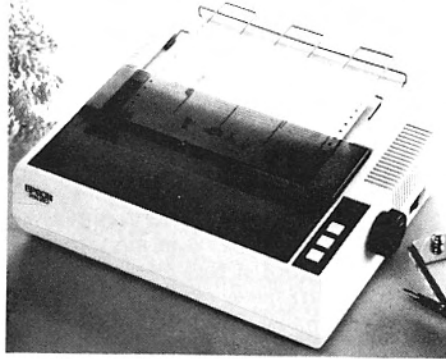
# PRINTER ROUND-UP

Max  
chars/line: 233  
Paper feed: Friction/tractor  
Max. paper  
width: 16in  
Std interface: Centronics parallel  
Buffer size: 3K  
Ribbon type: Cartridge  
Options: RS232C & IEEE 488  
interfaces  
Features: Emphasised/  
double-strike/  
italics modes  
Underline/  
superscript/  
subscript modes  
Electrical Vertical  
Feeding Unit (EVFU)  
Down loading  
character set  
Cost: \$2410  
Agent: Microprocessor  
Developments, Ltd



Printer name: Epson LQ-1500  
Printer type: Dot matrix,  
bidirectional, logic  
seeking  
Print speed: 200 cps  
Head format: 17x24 dots  
Graphics  
modes: 9 ranges from  
816x8 to 2448x24  
dots per line  
Std  
chars/line: 136  
Max  
chars/line: 272  
Paper feed: Friction  
Max. paper  
width: 16in  
Std interface: Centronics  
parallel/RS232C/  
IEEE 488/20mA  
current loop  
Buffer size: 2K  
Ribbon type: Cartridge  
Options: Tractor feed unit  
Single-bin cut sheet  
feeder  
Double-bin cut sheet  
feeder  
Features: Daisywheel quality  
print at 67 cps  
16 additional fonts  
in multifont option

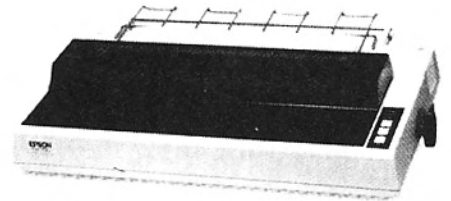
Download character  
set  
Every standard dot-  
matrix featurprint  
mode  
Pull-out  
configuration drawer  
for easy access  
Cost: \$4553  
Agent: Microprocessor  
Developments, Ltd



Printer name: Epson RX-80  
Printer type: Dot matrix  
bidirectional, logic  
seeking  
Print speed: 100 cps  
Head format: 9x9 dots  
Graphics  
modes: 480/640/720/  
960/1920  
dots per line  
Std  
chars/line: 80  
Max  
chars/line: 137  
Paper feed: Sprocket  
Max. paper  
width: 10in  
Std interface: Centronics parallel  
Buffer size: 1 line  
Ribbon type: Cartridge  
Options: RS232C & IEEE 488  
interfaces  
Features: Emphasised/  
double-strike/  
italics modes  
superscript/  
subscript modes  
Cost: \$1151  
Agent: Microprocessor  
Developments, Ltd

Printer name: Epson RX-80 F/T  
Printer type: Dot matrix,  
bidirectional, logic  
seeking  
Print speed: 100 cps  
Head format: 9x9 dots  
Graphics  
modes: 480/640/720/  
960/1920  
dots per line  
Std  
chars/line: 80  
Max  
chars/line: 137

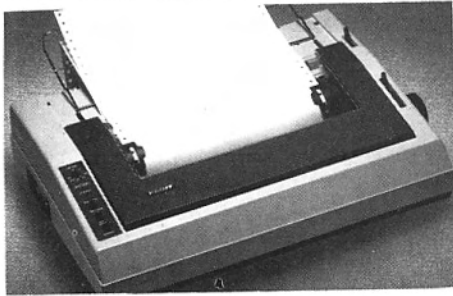
Paper feed: Friction/tractor  
Max. paper  
width: 10in  
Std interface: Centronics parallel  
Buffer size: 1 line  
Ribbon type: Cartridge  
Options: RS232C and IEEE  
488 interfaces  
Roll paper holder  
Features: Emphasised/  
double-strike/  
italics modes  
superscript/  
subscript modes  
Cost: \$1272  
Agent: Microprocessor  
Developments, Ltd



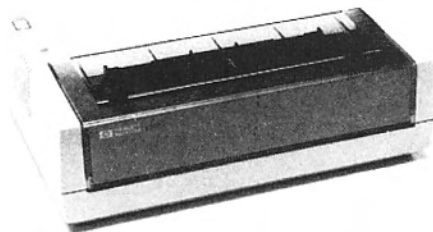
Printer name: Epson RX-100  
Printer type: Dot matrix,  
bidirectional, logic  
seeking  
Print speed: 100 cps  
Head format: 9x9 dots  
Graphics  
modes: 480/640/720/  
960/1920  
dots per line  
Std  
chars/line: 136  
Max  
chars/line: 233  
Paper feed: Friction/tractor  
Max. paper  
width: 15.5in  
Std interface: Centronics parallel  
Buffer size: 1 line  
Ribbon type: Cartridge  
Options: RS232C & IEEE 488  
interfaces  
Features: Emphasised/  
double-strike/  
italics modes  
underline/  
superscript/  
subscript modes  
Electrical Vertical  
Feeding Unit (EVFU)  
Cost: \$1895  
Agent: Microprocessor  
Developments, Ltd

Printer name: Facit 4510  
Printer type: Dot-matrix,  
bidirectional, logic  
seeking  
Print speed: 120 cps  
Head format: 9x9 dots  
Graphics  
modes: Yes; bit-image and  
block graphics  
Std  
chars/line: 80

# PRINTER ROUND-UP



Max chars/line: 80  
 Paper feed: Friction/tractor  
 Max. paper width: 10in  
 Std interface: Parallel and serial  
 Buffer size: 2K  
 Ribbon Type: Cartridge  
 Cost: \$1743  
 Agent: McLean Information Technology  
 Printer name: Facit 4512  
 Printer type: Dot matrix, bidirectional, logic seeking  
 Print speed: 140 cps  
 Head format: 9x9 dots  
 Graphics modes: Yes; bit-image and block graphics  
 Std chars/line: 132  
 Max chars/line: 132  
 Paper feed: Friction/tractor  
 Max. paper width: 15in  
 Std interface: Parallel and Serial  
 Buffer size: 2K  
 Ribbon type: Cartridge  
 Cost: \$2513  
 Agent: McLean Information Technology



Printer name: Hewlett Packard HP 2225  
 Printer type: Ink-jet printer  
 Print speed: 150 cps  
 Head format: 11x12  
 Graphics modes: 96 or 192 dots per inch  
 Std chars/line: 80  
 Max chars/line: 142  
 Paper feed: Friction and tractor  
 Max paper width: 8.5in

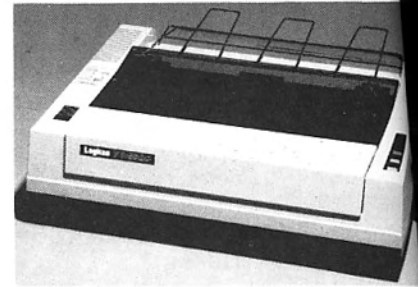
Std interface: Centronics and Hewlett Packard HPIB  
 Ribbon type: Exchangeable ink cartridge  
 Options: Acrylic printer stand  
 Battery powered portable version — HP2225B  
 Features: Quiet, non-impact printing  
 4 print pitches/printable control codes  
 Underline and bold face modes  
 Up to 200 A4 pages on 1 charge (HP2225B)  
 Disposable ink-jet print head system  
 Cost: \$900  
 Agent: Hewlett Packard (NZ), Ltd

## PRINTER ROUND-UP



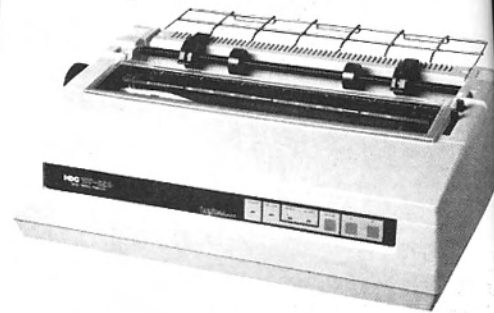
Printer name: Juki Model 6100  
 Printer type: Daisywheel  
 Print speed: 18 cps  
 Head format: 100 character drop-in daisywheel

Graphics modes: Yes  
 Std chars/line: 100  
 Max chars/line: 220 in proportional mode  
 Paper feed: Friction  
 Max paper width: 11in  
 Std interface: Centronics parallel  
 Buffer size: 2K  
 Ribbon type: IBM Selectric II ribbon cassette  
 Options: RS232C interface — \$177  
 Bidirectional tractor feed — \$347  
 8K byte buffer  
 Features: Proportional spacing mode  
 Graphics mode  
 Cost: \$1890  
 Agent: Andas Wholesale



Printer name: Logitech FT-5001  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 100 cps  
 Head format: 9x9 dots  
 Graphics modes: 480/576/960/1152 dots per line

Std chars/line: 80  
 Max chars/line: 136  
 Paper feed: Friction/sprocket  
 Max paper width: 10in  
 Std interface: Centronics parallel  
 Buffer size: 2K  
 Ribbon type: Cartridge  
 Options: RS232C interface  
 Features: Subscript/superscript modes  
 48 semi-graphics characters  
 Automatic paper loading  
 Cost: \$849  
 Agent: Warburton Franki



Printer name: Logitech WP-550  
 Printer type: Daisywheel  
 Print speed: 14 cps  
 Head format: 100 character drop-in daisywheel

Graphics modes: No  
 Std chars/line: 115  
 Max chars/line: 173  
 Paper feed: Friction/sprocket  
 Max paper width: \$3.5in  
 Std interface: Centronics parallel and RS232C  
 Ribbon type: Cartridge  
 Cost: \$1350  
 Agent: Warburton Franki

# DEALERS!

## How to improve your profit selling **star** printers!

Dear dealer,  
This is to introduce you to the new STAR range of printers now available in NZ.

These printers are extremely competitively priced and generous dealer discounts apply.

The models available are listed below with brief features and pricing details. Should you require further information please do not hesitate to contact us.

Star Radix 15". Speed 200 c.p.s, downloadable graphics, 90 c.p.s near letter-quality, standard features include: parallel and serial Interface, single sheet feeder. Price \$2287.59.  
10" version \$1962.20.

Star Delta 15". Speed 160 c.p.s, downloadable graphics, parallel and serial interface standard, tractor and friction feed. Price \$1622.02. 10" version \$1311.42.

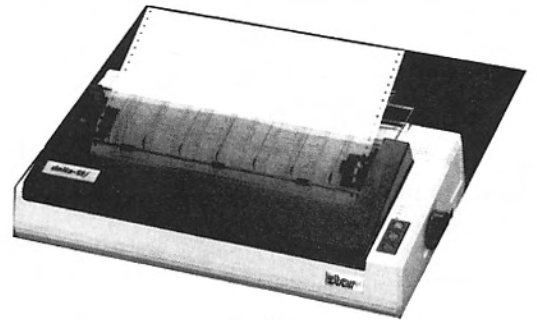
Star Gemini 15". Speed 120 c.p.s, downloadable graphics, tractor and friction feed. Price \$1212.82. 10" version \$867.71.

Star Powertype 15". Speed 22 c.p.s daisy wheel, parallel and serial interface standard, friction feed. Price \$1119.14.

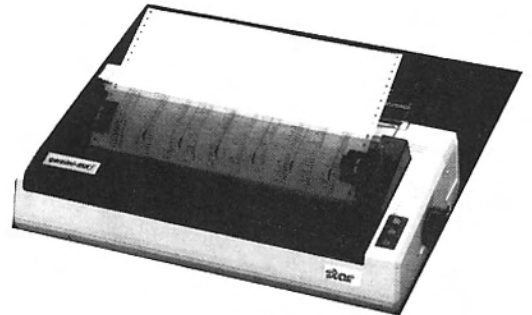
All above pricing is end user retail, including 40 per cent sales tax. A ninety day warranty applies to all star printers. Please contact us personally to arrange a demonstration and discuss dealer discounts.



Radix



Delta



Gemini



Powertype



**GEMISIS SYSTEMS LTD**

65 Huia Road, Otahuhu, Auckland 6, N.Z.  
P.O. Box 6255, Wellesley Street, Auckland 1, N.Z.  
Phone 27-67349. Telex 2814 (Rocket).

# PRINTER ROUND-UP



Printer name: Mannesmann Tally MT160L  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 160 cps  
 Head format: 7x9 dots  
 Graphics modes: 50/100 dots per inch  
 Std chars/line: 80  
 Max chars/line: 160  
 Paper feed: Friction/tractor  
 Max paper width: 10in  
 Std interface: Parallel and RS232C  
 Buffer size: 80 characters  
 Ribbon type: Cartridge  
 Features: Letter-quality uses effectively a 40x18 matrix  
 Front panel configuration by menu selection  
 Cost: \$1850  
 Agent: Anderson Digital Equipment

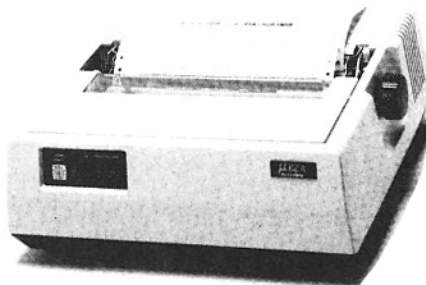


Printer name: Mannesmann Tally Spirit 80  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 80 cps  
 Head format: 9x8 dots  
 Graphics modes: 640/1280 dots per line  
 Std chars/line: 80  
 Max chars/line: 142  
 Paper feed: Friction/sprocket  
 Max paper width: 10in  
 Std interface: Centronics parallel  
 Ribbon type: Cartridge  
 Options: RS232C interface  
 Acoustic insulation kit

Features: Roll paper holder  
 Low ambient noise level  
 Cost: \$900  
 Agent: Anderson Digital Equipment



Printer name: Microline 80  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 80 cps  
 Head format: 9x7 dots  
 Graphics modes: Basic block graphics character set  
 Std chars/line: 80  
 Max chars/line: 132  
 Paper feed: Friction/sprocket  
 Max paper width: 10in  
 Std interface: Centronics parallel  
 Ribbon type: 2in spool  
 Options: Tractor feed unit  
 RS232C interface  
 Cost: \$972  
 Agent: Anderson Digital Equipment



Printer name: Microline 82A  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 120 cps  
 Head format: 9x9 dots  
 Graphics modes: 64 block graphics characters  
 Std chars/line: 80  
 Max chars/line: 132  
 Paper feed: Friction/sprocket  
 Max paper width: 9.5in  
 Std interface: Centronics parallel and RS232C 1200 baud

Buffer size: 1 line  
 Ribbon type: 2in spool  
 Options: RS232C 9600 bps interface — \$353  
 Tractor feed unit — \$141  
 IEEE 488 interface  
 Cost: \$1413  
 Agent: Anderson Digital Equipment

Printer name: Microline 84A  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 200 cps  
 Head format: 9x9 dots  
 Graphics modes: 72 dots per inch  
 Std chars/line: 136  
 Max chars/line: 230  
 Paper feed: Friction/tractor  
 Max paper width: 16in  
 Std interface: Centronics parallel  
 Buffer size: 256 bytes  
 Ribbon type: 3in spool  
 Options: RS232C interface — \$353  
 IEEE 488 interface  
 Cut sheet feeder — \$780

Features: Near letter-quality mode  
 Down loading character set  
 Proportional spacing mode  
 Cost: \$2403  
 Agent: Anderson Digital Equipment

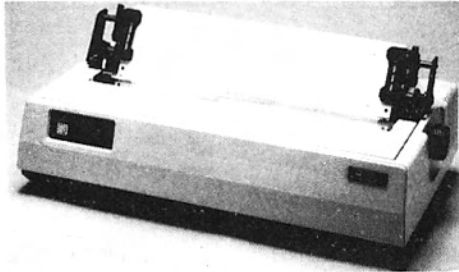
## PRINTER ROUND-UP

Printer name: Microline 92  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 160 cps  
 Head format: 9x9 dots  
 Graphics modes: 72 dots per inch  
 Std chars/line: 80  
 Max chars/line: 132  
 Paper feed: Friction  
 Max paper width: 10in  
 Std interface: Centronics parallel  
 Buffer size: 256 bytes  
 Ribbon type: 2in spool  
 Options: RS232C interface — \$276  
 Tractor feed unit — \$141

# PRINTER ROUND-UP

Features: Near letter-quality mode  
Proportional spacing mode  
Down loading character set

Cost: \$1606  
Agent: Anderson Digital Equipment



Printer name: Microline 93  
Printer type: Dot-matrix, bidirectional, logic seeking

Print speed: 160 cps  
Head format: 9x9 dots

Graphics modes: 72 dots per inch  
Std

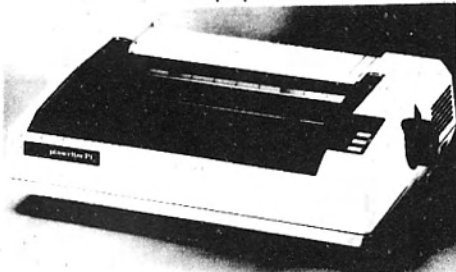
chars/line: 136  
Max

chars/line: 233  
Paper feed: Friction/tractor

Max paper width: 16in  
Std interface: Centronics parallel  
Buffer size: 256 characters  
Ribbon type: 2in spool  
Options: RS232C 9600 bps interface

20mA current loop interface  
IEEE 488 interface  
Features: Letter quality mode  
Frontpanel forms controls  
Proportional spacing mode  
Down loading character set

Cost: \$2289  
Agent: Anderson Digital Equipment



Printer name: NEC Pinwriter  
Printer type: Dot-matrix, bidirectional, logic seeking

Print speed: 180 cps  
Head format: 18x9 dots

Graphics modes: 120 dots per inch  
Std chars/line: 80  
Max  
chars/line: 136  
Paper feed: Friction  
Max paper width: 10in  
Std interface: Any interface  
Buffer size: 2K  
Ribbon type: Cartridge  
Options: Tractor feed unit — \$114  
Cut sheet guide — \$ 30

Features: 18-pin head in unique 2x9 staggered format  
Letter-quality printing at 90 cps  
Easy-access configuration switches

Cost: \$1854  
Agent: Scollay Computers

Printer name: Pacesetter Pace-80  
Printer type: Dot-matrix, bidirectional, logic seeking

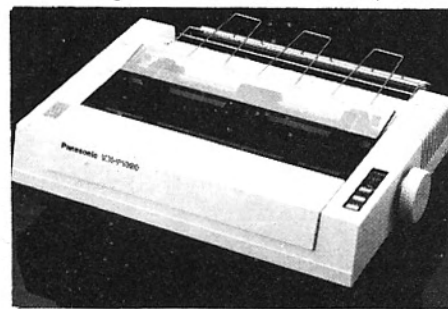
Print speed: 80 cps  
Head format: 9x7 dots

Graphics modes: Yes  
Std

chars/line: 80  
Max

chars/line: 142  
Paper feed: Friction/tractor

Max. paper width: 10in  
Std interface: Centronics parallel  
Ribbon type: Cartridge  
Options: RS232C interface  
Features: Epson compatible  
Agent: VSI Electronics, Ltd



Printer name: Panasonic KX-P1090

Printer type: Dot matrix, bi-directional

Print speed: 96 cps  
Head format: 9x9 dots

Graphics modes: 576/1152 dots per line

Std chars/line: 96  
Max  
chars/line: 136  
Paper feed: Friction and tractor  
Max paper width: 10in  
Std interface: Centronics parallel  
Buffer size: 2K  
Ribbon type: Cartridge  
Cost: \$980  
Agents: Microcomputer Electronic Company, Auckland



Printer name: Olivetti PR2300  
Printer type: Spark-directed ink-jet  
Print speed: 50-130 lines per minute

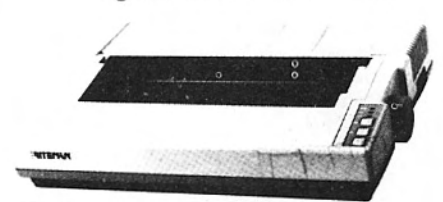
Head format: 7x7  
Graphics modes: 110 dots per inch  
Std chars/line: 80

Max chars line: 147

Paper feed: Friction/sprocket  
Max paper width: 9in

Std interface: Centronics parallel  
Options: RS232C interface  
Features: Non-impact (quiet) printing  
Double and negative image graphics

Cost: \$1134  
Agent: Andas Wholesale



Printer name: Riteman  
Printer type: Dot-matrix, bidirectional, logic seeking

Print speed: 120 cps  
Head format: 9x9 dots

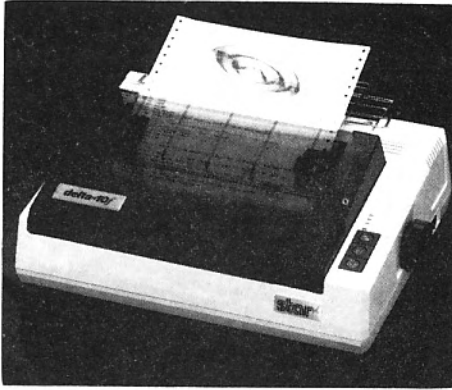
Graphics modes: 480/576/960 dots per line

Std chars/line: 80  
Max

chars/line: 132  
Paper feed: Friction/sprocket  
Max paper width: 10in

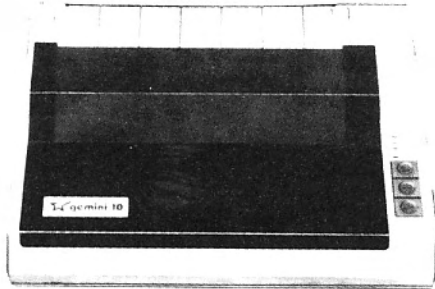
# PRINTER ROUND-UP

Std interface: Centronics parallel  
 Buffer size: 1 line  
 Ribbon type: Cartridge  
 Options: RS232C interface  
 Cost: \$995  
 Agent: Control Microcomputers

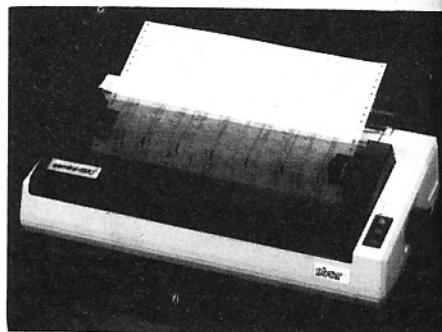


Printer name: Star Delta 10  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 160 cps  
 Head format: 9x9 dots  
 Graphics modes: Block graphics and 480/960/1920 dots per line  
 Std chars/line: 80  
 Max chars/line: 136  
 Paper feed: Friction/tractor  
 Max paper width: 10in  
 Std interface: Centronics parallel and RS232C  
 Buffer size: 8K  
 Ribbon type: 2in spool  
 Features: Superscript/subscript /italics modes Underlining mode Down loading character set Macro instructions  
 Cost: \$1311  
 Agent: Genisis Systems, Ltd, Otahuhu

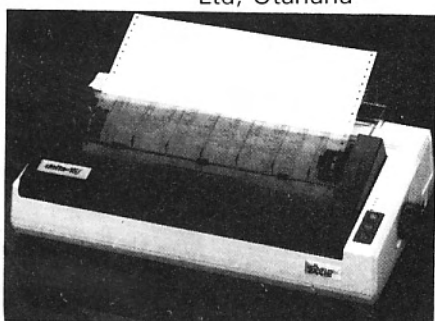
Graphics modes: Block graphics and 816/1632/3264 dots per line  
 Std chars/line: 136  
 Max chars/line: 232  
 Paper feed: Friction/tractor  
 Max paper width: 15in  
 Std interface: Centronics parallel and RS232C  
 Buffer size: 8K  
 Ribbon type: 2in spool  
 Features: Superscript/subscript /italics modes Underlining mode Down loading character set Macro instructions  
 Cost: \$1622  
 Agent: Genisis Systems, Ltd, Otahuhu



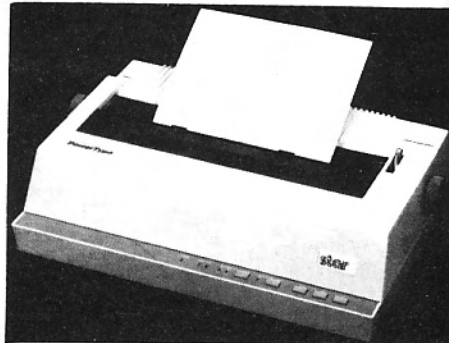
Printer name: Star Gemini 10  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 120 cps  
 Head format: 9x9 dots  
 Graphics modes: Block graphics and 480/960/1920 dots per line  
 Std chars/line: 80  
 Max chars/line: 136  
 Paper feed: Friction/tractor  
 Max paper width: 10in  
 Std interface: Centronics parallel  
 Buffer size: 1 line  
 Ribbon type: 2in spool  
 Options: 9600 bps RS232C interface 19200 bps RS232C interface  
 4K or 8K buffers  
 Features: Subscript/superscript /italics modes Underlining mode Down loading character set Macro instructions  
 Cost: \$867  
 Agent: Genisis Systems, Ltd, Otahuhu



Printer name: Star Gemini 15  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 120 cps  
 Head format: 9x9 dots  
 Graphics modes: Block graphics and 816/1632/3264 dots per line  
 Std chars/line: 136  
 Max chars/line: 232  
 Paper feed: Friction/tractor  
 Max paper width: 15in  
 Std interface: Centronics parallel  
 Buffer size: 1 line  
 Ribbon type: 2in spool  
 Options: 9600 bps RS232C interface 19200 bps RS232C interface  
 4K or 8K buffers  
 Features: Subscript/superscript /italics modes Underlining mode Down loading character set Macro instructions  
 Cost: \$1212  
 Agent: Genisis Systems, Ltd, Otahuhu



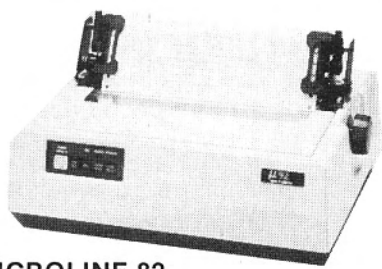
Printer name: Star Delta 15  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 160 cps  
 Head format: 9x9 dots



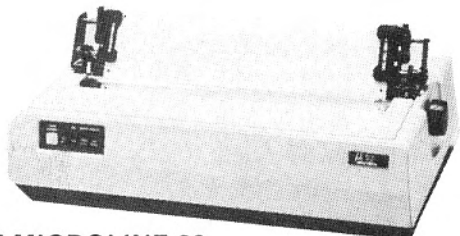
Printer name: Star Powertype  
 Printer type: Daisywheel  
 Print speed: 18 cps  
 Head format: 96 character, exchangeable daisywheel  
 Graphics modes: No  
 Std chars/line: 110  
 Max chars/line: 165



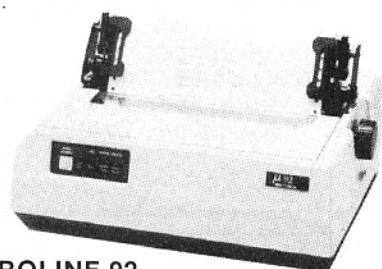
# PRINTERS — UNDER \$2,000



**OKI MICROLINE 82**  
An 80 col 120 cps dot matrix printer. Features include both parallel and serial interfaces, friction and pin feed and an optional tractor feed.



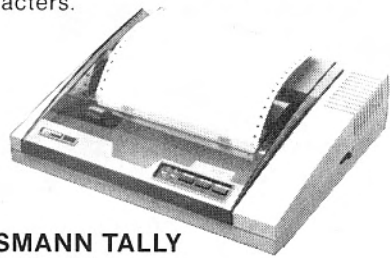
**OKI MICROLINE 83**  
A robust but cost effective business printer with all the features of the 82 but incorporating 136 column width. Tractor feed standard.



**OKI MICROLINE 92**  
Serial Dot Matrix Printer 160 cps Bidirectional 80 column. The Microline 92 is a high quality cost effective printer, with most features only incorporated in more costly printers.



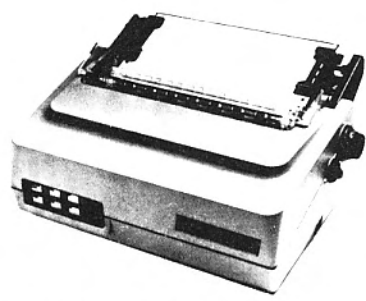
**OKI MICROLINE 93**  
Serial Dot Matrix Printer 160 cps Bidirectional 136 Column. The Microline 93 offers high quality printing and high performance. Features include — proportional spacing, dot addressable graphics, headlife up to 200,000,000 clean crisp characters.



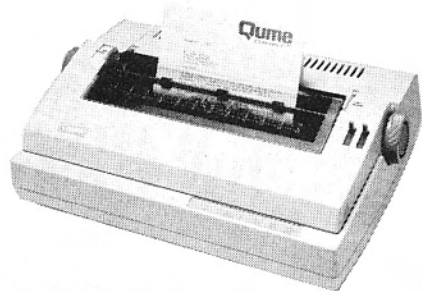
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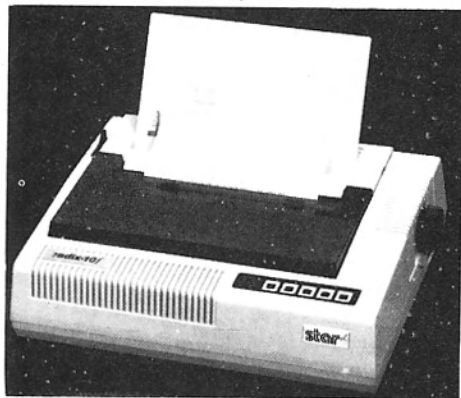
AUCKLAND:  
Ph. 590-249, P.O. Box 12-838, AK. 6.

WELLINGTON:  
Ph. 693-008, P.O. Box 30-511, L. Hutt.

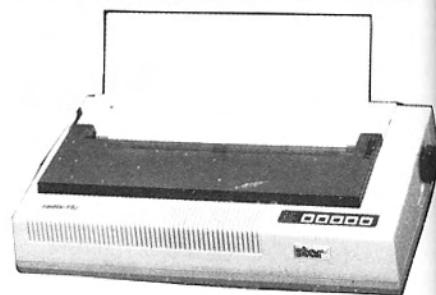
CHRISTCHURCH:  
Ph. 483-001, P.O. Box 25-104, Chch.

## PRINTER ROUND-UP

Paper feed: Friction  
 Max paper width: 13in  
 Std interface: Centronics parallel and RS232C  
 Buffer size: 1 line  
 Ribbon type: Cartridge  
 Options: Tractor feed  
 Features: Over 100 type fonts available  
 Proportional spacing mode  
 Easy access configuration switches  
 Cost: \$1119  
 Agent: Genisis Systems, Ltd, Otahuhu



Printer name: Star Radix 10  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 200 cps  
 Head format: 9x9 dots  
 Graphics modes: Block graphics and 280/960/1920 dots per line  
 Std chars/line: 80  
 Max chars/line: 136  
 Paper feed: Friction and tractor  
 Max paper width: 10in  
 Std interface: Centronics parallel and RS232C  
 Buffer size: 16K  
 Ribbon type: Cartridge  
 Features: Superscript/subscript /italics/underlining modes  
 Near letter-quality mode  
 Down loading character set  
 Macro instructions  
 Cost: \$1962  
 Agent: Genisis Systems, Ltd, Otahuhu



Printer name: Star Radix 15  
 Printer type: Dot-matrix, bidirectional, logic seeking  
 Print speed: 200 cps  
 Head format: 9x9 dots  
 Graphics modes: Block graphics and 816/1632/3264 dots per line  
 Std chars/line: 136  
 Max chars/line: 233  
 Paper feed: Friction and tractor  
 Max paper width: 15.5in  
 Std interface: Centronics parallel and RS232C  
 Buffer size: 16K  
 Ribbon type: Cartridge

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 (equivalent of the Epson RX-80  
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- Underlining, elongated characters and skipping between the characters.
- Approval of both UL and FCC, Class B.
- RS 232 Serial Option.
- Parallel 4K buffer option which allows you to do screendumps.
- Operational Handbook.
- Programming manual also available.

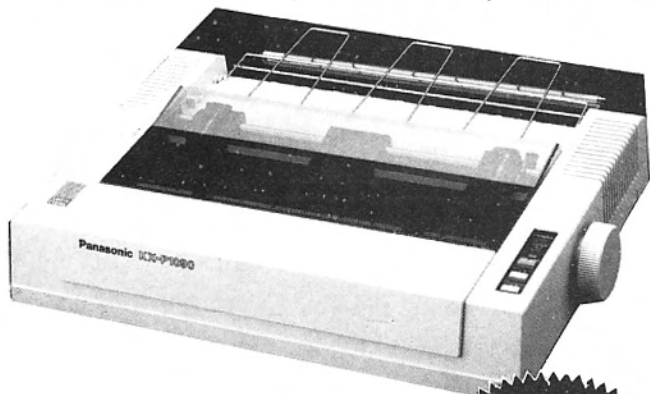
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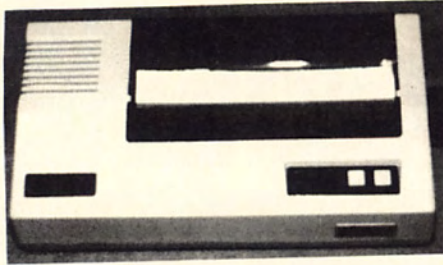
**\$980**

# PRINTER ROUND-UP

Features: Superscript/subscript  
/italics/underlining  
modes  
Near letter-quality  
mode  
Down loading  
character set  
Macro instructions  
Cost: \$2287  
Agent: Genisis Systems,  
Ltd, Otahuhu

Max  
chars/line: 80  
Paper feed: Friction  
Max paper  
width: 8.5in  
Std interface: Centronics parallel  
Features: Quiet thermal  
printing  
Roll thermal paper  
Cost: \$450  
Agent: Genisis Systems,  
Ltd, Otahuhu

Max paper  
width: 10in  
Std interface: Centronics parallel  
Ribbon type: Cartridge  
Options: Tractor feed  
4K buffer  
Features: Raster graphics  
capability  
Cost: \$1799  
Agent: VSI Electronics



Printer name: Star STX-80  
Printer type: Thermal dot-matrix  
Print speed: 60 cps  
Head format: 5x9 dots  
Graphics  
modes: Block graphics and  
480 dots per line  
Std chars/line: 80

## PRINTER ROUND-UP

Printer name: Texas Omni 850  
Printer type: Dot-matrix,  
bidirectional, logic  
seeking  
Print speed: 150 cps  
Head format: 9x9 dots  
Graphics  
modes: 480/576/960/1152  
dots per line  
Std chars/line: 80  
Max  
chars/line: 132  
Paper feed: Friction

### Distributors!

Is your printer listed here? Make sure you keep us up to date with your printer lines by putting the following on your mailing list:  
1. The Editor, Bits & Bytes, Box 827, Christchurch.  
2. Shayne Doyle, 18 Holdsworth Avenue, Upper Hutt.

### Sharp interest

Sharp's MZ700 computer is meeting a lot of interest on the local market, particularly from educational institutions using Pascal, according to the local distributor. A Pascal compiler tape is available for the machine.

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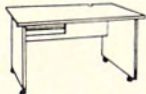
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Ergonomic copy stand



Mobile work station



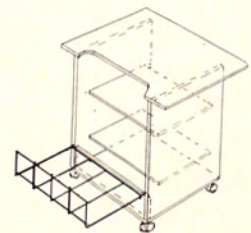
Mobile File Unit



Typical Work Station



Computer Bureau



Printer mobile



Printer stand

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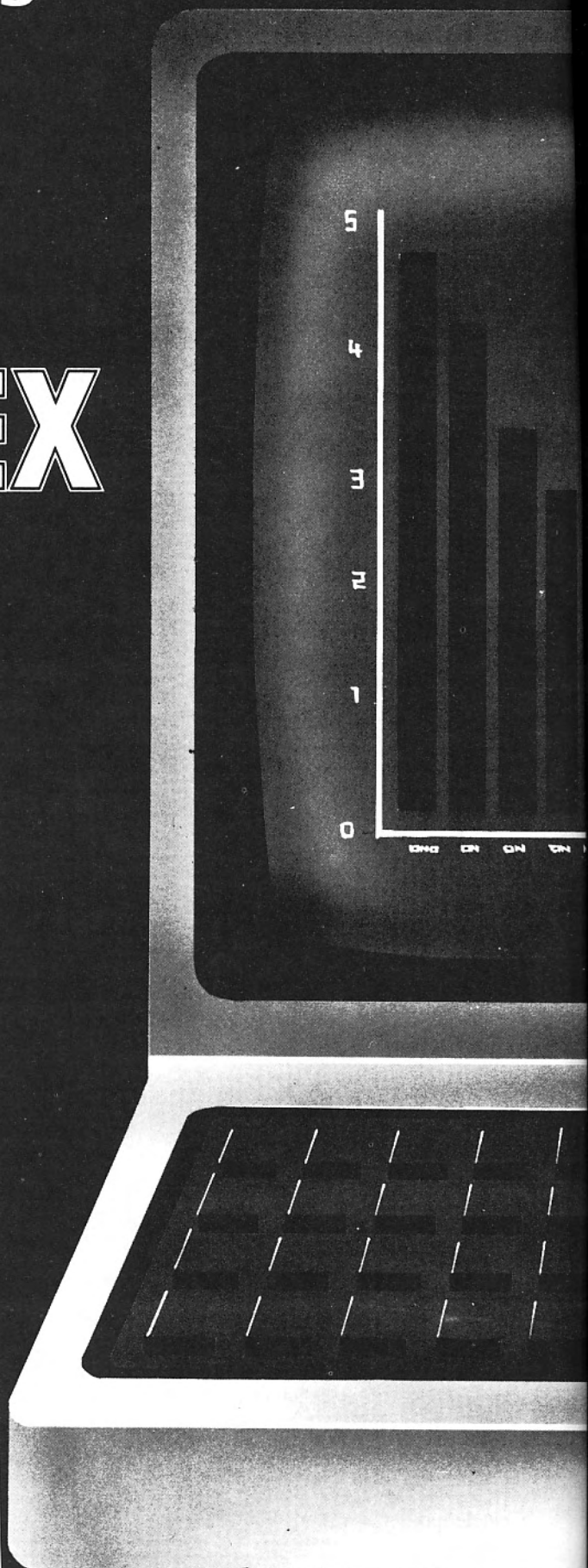
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## Atari's new XL series

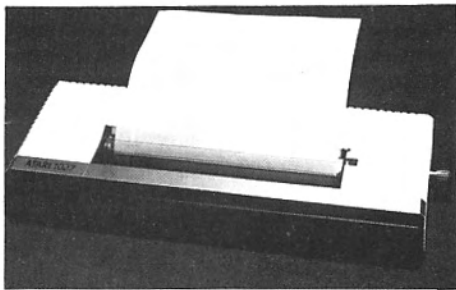
By Peter Ensor

The Atari XL series has been recently released. Following the philosophy of earlier Atari home computers, the firm has produced a range compatible with its earlier models, both in hardware and software to make best use of the software already available.

The two computers are constructed in a very light-weight modern style, with a neat use of the cooling fins to enhance the design.

The 600XL and 800XL differ only by the amount of in-built memory. This means that a 600XL can be built up, using a memory expansion pack, to equal the 800XL in performance.

One area where the machines differ strongly from the previous models is that the BASIC cartridge is now supplied as ROM already in the machines ready for use.



The Atari 1027 letter quality printer

Novel on these machines is a self-test facility. This command tests such areas as the memory, keyboard and sound channels. A rarely used novelty that would be good if the user suspected something wasn't working correctly.

Turning the machine on revealed a blue square with the word, READY, in the top left corner in white printing: very easy to read and pleasant to look at for long time spans.

As well as the usual computed subroutines call and GOTO commands, a variation had been added. This form uses a variable to contain the label rather than a pointer into a list. An example of this would be GOSUB A+30. As the manual points out, this would be very difficult to debug but much more



The Atari 600XL (front) and 800 XL computers

flexible than the label list that must usually be supplied.

Another useful command is TRAP. This enables the program to trap what could otherwise be fatal errors, such as output to the printer when it is not connected. The program would trap out to a specified line where the error could be identified by the error number and all future printer statements could be side stepped.

The graphics commands are not very abundant, but are enough to get by with. The only high-level graphic command is to draw a line. This command works quickly and produce a good line.

The machines are boasted to have 256 colours. This is true to a degree: the machine has 16 different colours with 16 different intensities for each colour. These colours were shown on the dealers' demonstration disk and produces some very good pictures.

One colour missing from the manual is white. Atari prefers to be modest with this one and calls it

grey, but at full intensity this produced an excellent white.

While the graphics may be good, the computer does not appear to have sprites. The demonstration program calls some objects that float around the screen sprites. While they have distinctive sprite-like qualities, the documentation and the list of commands soon dispel this rumour.

The sound is made up of four voices. Each voice is controlled with its intensity, frequency, and timbre or sound quality. Each voice acts independently and covers four octaves. This produces some good harmonies.

The machine is able to print both upper and lower case as well as graphic symbols on the screen at once. But for those who are into word processing, the graphics can be put to one side in favour of an extensive international character set.

The disk drive comes in a matching design case with a power supply that plugs into the wall. Now starts the trouble of finding a two-way adapter.

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- ATARI 600 XL Computer 16K \$595.00
- ATARI 800 XL Computer 64K \$895.00
- ATARI 1010 Programme recorder \$199.00
- ATARI Disc Drive \$995.00
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# HARDWARE REVIEW

I wouldn't recommend starting up the disk drive before reading the manual. The computer just sits there looking at you making a series of funny noises while thoughts of corrupted disks go through your mind.

After a while, the beeps that occur while the disk operating system (DOS) is loading become annoying, especially since they are random sounds. The keys make a noise as each key is touched but this is acceptable because some reasoning can be made of the sound. One way to beat all this of course, is to turn the TV sound off.

The DOS is excellent, though. No more of this remembering commands.

Once the DOS has been loaded in, typing the command, DOS, brings up a menu driven table for all the operations. When finished with the DOS the letter B is typed and the machine is back in the programming mode.

## PRINTER QUALITY SURPRISES

The printer comes up with surprising results. While it is called a letter-quality printer, its price looks very suspicious, but the printing it gives out is real letter-quality print.

Looking through the top perspex

## Microcomputer summary

|                           |   |
|---------------------------|---|
| <b>Name:</b>              | Atari 600XL and 800XL.  |
| <b>Microprocessor:</b>    | 6502.   |
| <b>Clock Speed:</b>       | 1.79MHz.  |
| <b>RAM:</b>               | 600XL - 16K, Expandable to 64K.<br>800XL - 64K.   |
| <b>ROM:</b>               | 12K.  |
| <b>Input/Output:</b>      | Unbuffered parallel port. 2 joystick/paddle ports, serial port, peripheral port.  |
| <b>Keyboard:</b>          | 62 keys, qwerty style with auto repeat.   |
| <b>Display:</b>           | 40 x 24 upper and lower case with graphics symbols or international character set.  |
| <b>Language:</b>          | Microsoft BASIC, Logo, Pascal, Fortran, Pilot, Assembler, Forth.  |
| <b>Graphics:</b>          | 16 colours with 16 intensities; max. resolution of 320 x 192.   |
| <b>Sound:</b>             | 4 voices with volume, frequency and timbre control.   |
| <b>Cost:</b>              | 600XL \$599 : 800XL \$899.  |
| <b>Peripherals:</b>       | 80K/160K auto-selecting disk drive \$995; cassette \$199; letter-quality printer \$795; colour printer \$595; touch tablet \$199; numeric keypad \$249; expansion RAM \$350; joystick \$19.95; paddles \$39.95 pair; trak-ball \$119; AC modem \$500; interface module (serial and Centronics) \$500. |
| <b>Reviewer's rating:</b> | (out of 5) Documentation: 1, ease of use: 5, language: 5, expansion: 5, value: 5, support: 5.   |

Review unit supplied by Monaco Distributors, Auckland.

|                 | CURRENT   | %     | YEAR-TO- |
|-----------------|-----------|-------|----------|
| E               |           |       |          |
| ES              | 26,594.33 | 100.0 | 26,59    |
| OF SALES        |           |       |          |
| T OF SALES      | 16,289.27 | 61.3  | 16,28    |
| PROFIT          | 10,305.06 | 38.7  | 10,30    |
| SES             |           |       |          |
| ARIES AND WAGES | 3,028.51  | 11.4  | 3,02     |
| T               | 1,600.00  | 6.0   | 1,60     |
| LITIES          | 453.38    | 1.7   | 45       |
| ROLL TAXES      | 242.96    | .9    | 24       |
| EREST           | 228.42    | .9    | 22       |
| URANCE          | 659.84    | 2.5   | 65       |
| AMORTISE        | 221.71    | 1.0   | 22       |

A sample report from the 1027 letter quality printer

revealed a barrel with all the letters on it similar to a barrel printer but with the barrel in front of the paper. This barrel has four rows of letter and is hit by a hammer through the paper when the correct letter comes around.

There is no ribbon. The ink is put to the barrel by a roller on the side away from the paper and works on the same principle as a rubber-stamp pad. The quality rivals that of many electric typewriters. An underline facility is available.

The speed was clocked at eight characters per second for the 80 column line including the line feeds.

I found three manuals under the computer: one dealing with how to connect the computer to the TV; a BASIC reference manual; and a manual specific to the machine.

Reading the BASIC and machine manuals was very disappointing. The manual for the machine explains what all the buttons and knobs are used for as well as all the sockets on the sides. It then presents three short programs as examples and concludes with a question and answer session. This level of documentation can be described only as skimpy. The distributor, however, is supplying fuller documentation separately.

The BASIC reference manual suffers from the same problem. A few lines are given on the command and some examples. Both of these manuals are thick, 66 pages each, but the section printed in English ends on page 11!

One thing that would be nice to see in the manuals would be some specifications on the machine: I could find nothing technical.

I would also like to see in the manual how to make use of the HELP and SELECT keys.

Two disk manuals are supplied. The first is a glossy, novice-type manual with lots of colour. The second goes into more detail, but still has nothing too technical.

**Conclusion:** These computers performed well, with a strong ability for games and charts, but do not offer much to the programmer in the way of debugging tools.

For an even cheaper entry into the Atari range, the compatible Atari 400 would still be recommended. This machine is definitely to be included on the shopping list.

## HARDWARE REVIEW

The Challenger

# Dick Smith takes on the IBM PC work-alikes

By John Slane

Back in the 1970s a little home/hobbyist computer was launched, called the TRS-80 Model I. A firm called Microsoft wrote the resident BASIC program and operating system for the Z80 processor. The mix of hardware and firmware became a computer classic. Radio Shack could hardly believe its luck. Business took off like a rocket. The bandwagon was ready for jumping on and Apple and Commodore arrived with their own very distinctive and very different machines.

Dick Smith (Electronics) decided that its way on to the bandwagon was to buy the rights to Microsoft as used in the TRS-80 and put together a Model I work-alike. So the System-80 was born and lived to prosper and even to survive a copyright suit.

Now the TRS-80 is out of production and the System 80 has gone with it.

A new star has risen:— the IBM PC. In spite of modest, conservative hardware, and in spite of an operating system that is only a little better than CP/M, the IBM PC has won a reputation as "the computer to have". Consequently, software houses are busy writing programs to sell to the thousands of PC users.



The Dick Smith Challenger

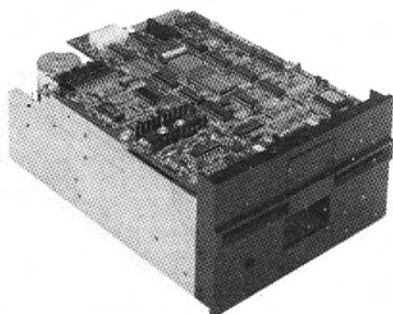
Another bandwagon to jump on? It appears so. A flurry of so-called work-alikes or clones is being reported in overseas journals, and a sprinkling of the machines themselves is starting to arrive in New Zealand.

Dick Smith is now doing a "System-80" job on the IBM PC — the Challenger. In all significant areas it has the same hardware and firmware architecture as the IBM PC — for one reason only — so that it will accept and run "most" IBM PC software. For the price, \$5000, the Challenger is not necessarily the best computer that could be devised; it is merely a cheaper clone of the IBM PC.

For that reason, a review of the Challenger is fraught with difficulties. Should one report on and praise the good features of the IBM which are shared by the Challenger? Or comment on the IBM's poor features and criticise the Challenger for having them, too? This review does inevitably touch on comparisons between the two machines, but is mainly a report on the Challenger as a computer in its own right.

Dick Smith will sell the "System" only, consisting of keyboard and processor with 128K RAM for \$2000 (no monitor). It doesn't have Disk BASIC, obviously, and no RS-232C I/O, but has just about

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## HARDWARE REVIEW

everything else the expanded version has including full graphics, sound and colour. Would you want all this power on a cassette-based system?

The expansion unit comes with some extra I/O ports, two Shugart double-density double sided 5¼ in drives for a total of 720K bytes — and comes also with three separate software packages; Perfect Writer/Speller, Perfect Filer, Perfect Calc. All have been adapted to be Challenger-specific. If you would have bought these programs anyway, the Dick Smith package represents a real discount.

The expansion unit is designed to clip on above the system unit with all three connecting cables tucked out of sight. It all goes together very neatly, once you have found the instructions in the second-to-last chapter of the *Expansion Unit Manual*.

The two boxes mostly contain fresh air, and are far larger than they need to be. When the monitor sits on top I found it too high for comfortable reading. IBM does the configuration much better, but then the IBM PC can't be split down to a basic non-disk system as the Challenger can.

Incidentally, the keyboard can be unplugged and slid into a specially designed recess in the system unit. If you don't want to do that, the two manuals fit the same space quite well.

The manuals are in small neat ring binders, typewritten with some use made of bold face. No, you won't find everything you want to know about programming a computer. For a machine at this level of sophistication the manuals quite properly presuppose a good level of knowledge by the user. Of more concern is the lack of any index and the unfortunate evidence of sloppy proof reading in general text, in command instructions and in the

listing of sample programs.

On the plus side, when you do eventually find what you want, it is generally written in outstandingly clear and economical prose.

### SELF-CHECK ON POWER-UP

On power-up, the system carries out a diagnostic check. This gives time to put in a system disk and pop the latch before disk boot-up starts. If a disk is not found, the computer automatically goes into cassette BASIC.

The disk operating system, as with the IBM PC, is basically a dressed up, somewhat friendlier, CP/M. "Pipe" commands are available as on Unix (and some 8-bit utility DOSs) and there is a comprehensive set of commands for batching, filtering, DOS editing and line editing for source programs and text files.

BASIC and DOS are quite firmly separated environments. Relatively few BASIC commands are available to access MS-DOS and then return to BASIC. However, chaining and variable passing between programs is very well provided for. Variables can be up to 40 significant characters, but disk files can only be eight characters plus a three-character extension. Ex-Apple users aren't going to be pleased with that last fact. However, strings and program lines can be up to 255 characters.

Disk BASIC is very comprehensive indeed, and should have everything you need unless you are looking for a version of structured BASIC and routines called by label.

A full screen editor is provided. The cursor keys share selected digits on the numeric pad. An IBM PC idea which is a mixed blessing.

As standard, Challenger comes

with full graphics, colour, and sound capability and a very usable set of commands to control these features. Excellent use can be made of commands such as LINE, PLACE, COLOUR, SCREEN, which require a minimum of parameters. Positioning of shapes (a sprite-like process) is provided for. Screen linearity on the review unit was excellent. Circles were perfect circles. A colour monitor was not provided, so the colour capabilities are not able to be reported.

I suspect we probably have a games machine of some potential in the Challenger. Not for nothing is provided with a joystick port.

In common with a large number of computers, Challenger is not very good at some arithmetic. It can accurately count from 0.01 to 1.00 in steps of 0.01. This, incidentally, is why fractional numbers need to be rounded before testing for equivalence.

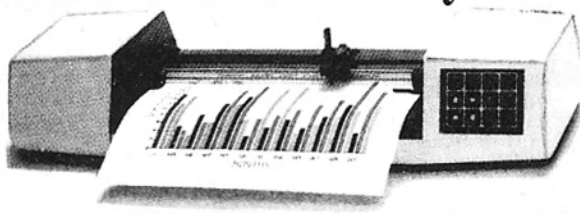
Many computers around the Challenger's specification have high resolution character generators and pleasing font styles. The Challenger has neither. Letters are coarse and undistinguished in style. In 80 character mode, the letters m and w have ugly blobs in the middle. Generally, the Americans are better at text presentation than their overseas competitors (see text of TRS-80, IBM, Hewlett-Packard, for outstanding examples.)

The review unit was unable to display the special characters said to lie between ASCII 129 and 255.

One of the more serious criticisms I have of the Challenger is the extraordinarily inept routine for scrolling. The screen first has to clear, then rewrite everything one line up starting top left. The routine is frustratingly slow such that it is impossible to use cursor-repeat to slide a window around, say, a Calc sheet. Move too fast and the screen

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# HARDWARE REVIEW

blacks out apart from a nervous flickering at the top. On informal benchmark tests between Challenger and IBM, general processing times were similar until any screen scrolling was required — then Challenger was up to 50 percent slower than the IBM PC.

The 84 keys include a separate numeric pad, 10 function keys and special keys such as INSERT, DELETE, SCROLL. Using the "ALT" key with alphabetic keys produced keywords and commands.

Although a nearly identical copy of the IBM PC keyboard, the Challenger keyboard seems flimsier, not as smooth to operate, and the keys make a disconcerting clatter under heavy use. Over all, it is a mediocre keyboard consistent with a cost — cutting exercise.

## WHAT'S SPECIAL ABOUT IT?

Although RAM looks to be substantial, and capable of being addressed by a "genuine" 16-bit processor (8086), users may be surprised to find as little as 49K available under Disk BASIC. In fact, the designers have banked the RAM into 64K blocks for "increased efficiency". This means the BASIC user has to know how to do clever things with special calls and machine language to access the full RAM. The 128K (or up to 640K) is really only expected to be used by commercial software which uses spooling and/or multiple buffers as in Calc sheets and word processing.

So what's the difference between a fast 8-bit with bank-switched memory and a Challenger 16-bit? Well, price to start with. The Challenger is still cheaper than some 8-bits feature for feature and has to be seriously considered against all the other 16-bit machines.

Some people will have identified IBM software that suits their specific requirements — business applications or whatever. These people may need programs that are complex, employ sophisticated routines, and capable of supporting large data bases and run at respectable speeds. So there will be a strong temptation to look at a cheaper alternative to run these. But will the Challenger run these programs?

Dick Smith says the Challenger "can run just about all" the IBM PC software. I was obviously unlucky. The one program I tried (a version of

## Microcomputer summary

|                        |  |
|------------------------|--|
| <b>Name:</b>           | Dick Smith Challenger  |
| <b>Manufacturer:</b>   | Ferranti Computer Systems, Ltd   |
| <b>Microprocessor:</b> | 8086 16-bit  |
| <b>Clock Speed:</b>    | 4.77 MHz   |
| <b>RAM:</b>            | 128K, expandable to 640K. 16K video RAM  |
| <b>User RAM:</b>       | 62K under standard BASIC<br>47K under Disk BASIC   |
| <b>ROM:</b>            | 64K  |
| <b>Input/output:</b>   | (with Expansion Unit): Cassette, joystick, light pen, Centronics-type parallel printer, RS-232C, 5 expansion slots, three IBM compatible, two 16-bit. Detached unit. 84 keys, typewriter style. 80cols by 25 |
| <b>Keyboard:</b>       |  |
| <b>Display:</b>        |  |
| <b>Languages:</b>      | Advance 86 operating system, Microsoft MS-DOS2.1 GW Disk BASIC   |
| <b>Graphics:</b>       | 320 x 200 with 8 colours, 640 x 200 high resolution, black and white only  |
| <b>Sound:</b>          | Built-in speaker. Sound and play commands  |
| <b>Cost:</b>           | Keyboard and processor ("System"): \$1999.95<br>Expansion unit, including 2 x 360K drives and three software packages: \$2999.95   |
| <b>Software:</b>       | Claims to run "most" IBM PC  |
| <b>Options:</b>        | 10 Mb hard disk (Price not available at present)   |

**Reviewer's ratings:** (Out of 5): Documentation 3, ease of use 4, language 4, value for money 4-5, support, not yet known. Should be OK from Smith. As good as System 80, Expansion, 5.

*Review Unit from Dick Smith Electronics, Auckland.*

IBM BASIC) came up on the directory listing but wouldn't load. However, the Challenger got its own back. A graphics program I wrote for the Challenger wouldn't run on the IBM. That particular IBM PC didn't have the graphics option installed.

On the question of compatability, users would be wise not to assume that an IBM PC program will run on the Challenger. Each case will need to be tried and proved.

### Summary

I would find some aspects of the Challenger continually irritating: its physical size, difficulty of finding a good position for the monitor, poor text presentation and scrolling, mediocre keyboard. And I'm not all that excited about MS-DOS as an operating system. But I might just manage to live with those shortcomings if the Challenger is finally found to be the best machine around for its price.

### "Atari" printer

The printer being sold with the new Atari 600 and 800 models is also available for other computers.

Viscount Electronics (P.O. Box 513, Palmerston North) is selling the LTR-1 with a standard Centronics parallel interface for \$759.

An example of the excellent print quality of this printer is included in our Atari review.

*[A spokesman for Dick Smith in Australia says that the manuals are interim ones; the final versions are now in production. John Slane's problem in displaying special characters between ASCII 129 and 255 has not been found on any production models tested in Australia. — Editor]*

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# HARDWARE REVIEW

## SORD IS-11

Exciting,  
but not  
yet  
perfect

By Shayne Doyle



The Sord IS-11

One of the hot areas for development in micros at the moment is in the portable "lap" computer market. These are exciting machines, truly portable and with a lot of useful software included. They are not yet perfect, however, and I consider the current generation of such computers an intermediate and

necessary development step in their design evolution. The Sord IS-11 is such a computer, the first lap portable from this company, which has produced excellent business micros for a considerable time now.

The basic IS-11 is the customary A4 size, finished in cream and grey. It may be extended by the addition of

the 40-column thermal printer which attaches on the left side, and by the numeric keypad, which is fastened on the right side. Both these extras are sized and styled to match the computer and increase its width about 70 per cent.

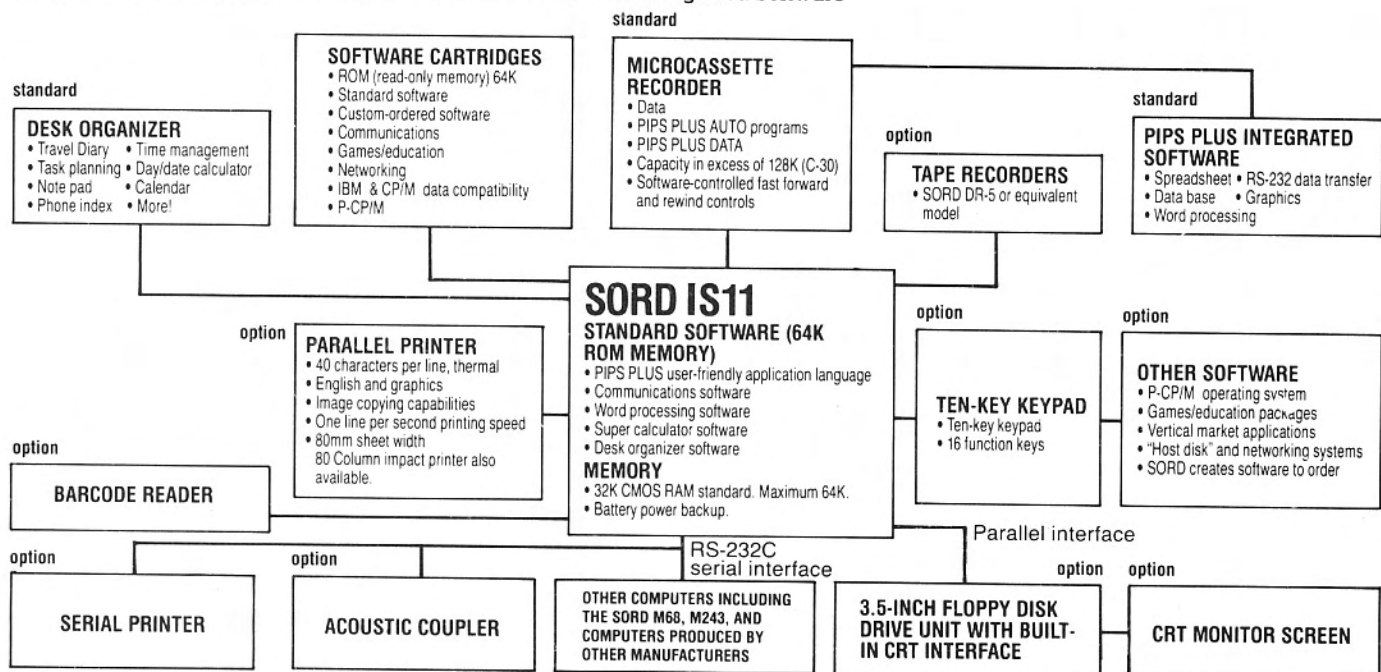
Above the keyboard is the large LCD display which has an associated

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- Communications ■ SORD makes software to order for OEMs.
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■ 32K CMOS RAM (max. 64K) ■ 8 Multi-windows ■ PIPS PLUS Integrated Software



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# HARDWARE REVIEW

viewing angle adjustment on the rear of the computer. I found that even with this control, the display was not easy to read, particularly in low light situations. The display has reference marks inscribed to the left and below, corresponding to lines and characters. I found the display very slow, but cannot say whether this is software or hardware (I suspect the latter). The display may be split up into eight defined windows, several of which can be viewed at once.

To the right of the display is the removable microcassette drive, fully software controlled. These little drives are magnificent examples of Japanese electronics prowess. It is a pity they are not available as a universal micro peripheral with parallel interface. This one operates at 2000 baud, and stores 128K bytes of data on a C30 microcassette. The keyboard is a full sized, fully featured unit, with a good feel to it. I did find that each keypress produced a faint "spring ring" sound which began to annoy me after a while. Along the top of the main keyboard are the escape and reset buttons, six function buttons, and four cursor keys.

The rear of the computer holds most of the input/output connectors: power and reset switches, AC adapter/battery charger socket, bar-code reader socket, serial and RS232C interfaces, and parallel system interface. On the bottom surface are two indented connectors for the Centronics printer and numeric keypad. Under the cassette drive is a deep slot which takes the ROM cartridges.

Similar to most other lap portables, the IS-11 has low-power, CMOS memory supplied by rechargeable batteries. Switching the computer off stops only the processor and powers down the display and support systems. Beneath the

## Microcomputer summary

|                        |   |
|------------------------|---|
| <b>Name:</b>           | Sord IS11.  |
| <b>Manufacturer:</b>   | Sord Computer Corporation, Japan.   |
| <b>Microprocessor:</b> | CMOS Z80A, 3.4MHz clock speed.  |
| <b>RAM:</b>            | 32K, expandable to 64K.   |
| <b>ROM:</b>            | 64K.  |
| <b>Keyboard:</b>       | 72-key standard, full travel ASC11, plus six function keys, upper/lower case, auto repeat on all keys.  |
| <b>Display:</b>        | LCD display, 8 x 40 character lines, 256 x 64 graphics dots.  |
| <b>Input/Output:</b>   | Built-in software-controlled FSK 2000 baud microcassette drive. Standard interfaces provided for: parallel and RS232C, second audio cassette port, parallel I/O port, Centronics printer port, numeric keypad port, ROM cartridge slot, bar-code reader port. |
| <b>Languages:</b>      | PIPS spreadsheet software, database software, word processor.   |
| <b>Options:</b>        | 3.5 inch microfloppy disk drive (under development); CRT monitor interface (under development); 64K ROM software cartridges; add-on numeric keypad with 16 function keys; add-on 40 character 10 cps thermal printer; bar-code reader; acoustic coupler.      |
| <b>Cost:</b>           | \$2200.   |

*Review machine supplied by Sord Computers, Ltd, Wellington.*

machine is a switch labelled BACKUP, which controls the memory power supply. The batteries are good for about eight hours average use, but this depends on how much the cassette drive is used. An "L" appears on the screen and the supplied battery charger must be connected up overnight.

The memory is partitioned into files; the number and sizes are specified by the user. These files may be either data files, edit files, or calculator files, produced by the relevant software. Should the user run out of memory for a new file, older ones resident in memory may be transferred to tape to free up the memory.

The Sord IS-11 does not have any programming language built in. I think this detracts from it. However, for a businessman intending to use this computer, it probably will not matter. I understand a version of Microsoft BASIC is to be released shortly on a plug-in ROM cartridge.

PIPS is probably the major software tool in the IS-11, and this is a very powerful spreadsheet program. Like all spreadsheets, the data is organised in tables, and these may be manipulated in a variety of ways. Multi-key sorting is provided, data may be graphed and displayed in either pie or bar graph formats — amazing to see on a small LCD screen!



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## HARDWARE REVIEW

The bottom line of the display nearly always has a menu selection which coincides with the function keys below. The user may navigate the system by merely pressing the appropriate function key to register his or her choice on any screen. The software is set up in a tree structure each selection leading the user to the next lower level along that branch. Pressing ESCAPE will always pop the user out of the level he is in, back to the previous one.

I-EDIT is a simple, cut-down text editor which allows the user to create, edit, print, and save short documents or notes. It offers automatic screen wrap-around and is compatible with the main word processor.

I-CAL provides a programmable printing calculator with the capability of saving calculations to tape. The computer actually draws a sort of calculator on the LCD screen.

I-COMM gives the user extensive control over the serial and RS232 interfaces. The two are different in this machine. The serial interface is really intended for connecting to a modem, an option in the United States. The I-Comm software may be used to connect the IS-11 to other computers. In America the I-TSS timesharing package allows terminal emulation for Infonet, The Source, and Dow Jones.

I-TRANS is an optional data conversion software program which provides compatibility with MS-DOS and CP/M programs such as Lotus 1 2 3, WordStar, Supercalc and Visicalc, dBase II. Another optional ROM cartridge features a word processor with full cut-and-paste and word-search facilities.

I found it a welcome change in the week I had the computer, to be freed of the normal ties of a computer system. To pop the IS-11 into my briefcase and bring it out for use at any time, anywhere, is at first a novel freedom. However, I fairly quickly found myself wishing for a better display, more speed, and a built-in language. The machine I had was a sample unit, and unfortunately no other options are available at the time of writing, so I am unable to report on the thermal printer and other software.

The manuals were also preliminary versions, lacking detail in some important areas, notably in the I-Comm section. The PIPS manual was reasonably detailed however, and featured lots of "frinstance" pictures of screen displays to help understanding the text.

# No-longer secret schools report evaluated

By Nick Smythe

Thanks to the efforts of the Coalition for Open Government (COG) and a Christchurch computer programmer, Mr Bill Rosenberg, the official 1982 report on "Micro-Computer Equipment for Secondary Education" has suddenly been released (if you want a copy for yourself it is a document with the CDS Reference number 1982/03). The reason for this about-face by the Minister of Education, Mr Wellington, who authorised the release, appears to be COG's willingness to go to court to challenge the original grounds of suppression.

What does the report tell us? Certainly its age means that it tells us nothing about what is currently the best buy for education. However, it does say a great deal about how the committee that produced the document worked. It also suggests that the evaluation exercise was flawed in certain areas and worked rather loosely within the specifications originally circulated for school microcomputers. In some cases, relevant areas of the specifications have been overlooked, in other cases areas not mentioned in the published specifications have been taken as significant factors. It certainly tells us no commercial secrets.

The document itself is a frail item to have attracted so much attention. It runs to 25 pages, a mere eight pages of report plus five appendices. Appendix 1 is a single page detailing interest in proposing systems (20 firms replied with five of these declining to offer proposals). Appendix 2, of eight pages, reviews the characteristics of eight machines placed on an original short list. The treatment is brief (about that found in a summary box in a good hardware review in *Bits & Bytes*), and marred by errors of both inclusion and omission. Appendix 3 is a

summary of hardware already in schools in July, 1982 (four pages, some irrelevant). Appendix 4 is a stab at defining a standard Pascal for school use. Appendix 5 spends 4 pages speculating on optional bulk-buying strategies. In terms of comparative machine evaluations the last appendix is hardly relevant and the Pascal definition is unconvincing.

The main body of the report summarises the progression by which the original 15 proposals were filtered down to just five machines. For a start, machines were divided into "possible" (8), "unsatisfactory" (3), "alternative" (1) and "deferred" (3). The alternative proposal was for a CDC mega-computer running Plato to school terminals from a central site. More interesting was the inclusion of Commodore, IBM, and Northstar as proposals "deferred" on the grounds of unavailability of sample equipment. Deferral implies ongoing assessment and reassessment, and an acknowledgement of rapid change. Just what happened to this ongoing reassessment?

The eight "possibles" were extracted from the 15 originals by comparing each machine's specifications with the department's requirements. This yielded the final five machines plus the Monroe EC8800, the TRS80 Model III and the Hitachi MB6890. Suppliers were then asked to provide example equipment for benchmarking and testing. Considerable problems appear to have been experienced in obtaining all necessary items. The tests were conducted with a network of just two microcomputers: enough to assess whether, for instance, a Pascal and BASIC program could be running and assessing data at the same time. Not enough, though, to assess classroom practicality with a larger set of machines where network speed is crucial and contention between users becomes an issue. The machines were reportedly tested using "standard benchmarks" to assess the individual and network capabilities. Unfortunately, the benchmarks are not documented in the report nor, curiously, any information on speed of performance. Rather the machines either pass or fail. On top of this the experience of different committee members was pooled to create a "3-star" table evaluating specific features of the machines (of which more shortly).

## COMMON LANGUAGE FOR COURSEWARE

The technical findings were then placed in perspective by a set of comments detailing school ownership, discussing hardware needs for specific end uses and noting possible New Zealand contents of the machines. At this point the spectre of a common language for courseware raises itself. The idea is put forward that Pascal could provide the basis for software standardisation independent of machine type (with the "minor" exceptions of graphics and sound) and that standard Pascal should be a high level of priority. Programs would be portable through simple "translators" that produced equivalent graphics code for any different machine types.

There is much of interest in this shift. First, it betrays a mathematician/programmer's view of the world. Pascal is a very nice language for the initiated but it is a hard starter language. BASIC, on the other hand, is an easy starter (important given the computer experience of most teachers in 1982) and in a structured form is equally conducive to good programming habits. The idea of standardised programs under Pascal also betrays a concern with traditional, text-based computing applications. However, most courseware units would make intensive use of graphics. The truth is that few software translators work here. How can a single-screen machine, for instance, emulate a unit that employs the Poly's five simultaneous screens? How, in any workable way, could a Poly emulate the BBC's colour registers and

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# EDUCATION

flashing colours. Even two years ago these issues were clear. What is disturbing is that the fallacy of a standard courseware language still lingers on in 1984, even as the width of available special-purpose languages increases.

Of course, the most significant point about the comments on Pascal is that they represent a shift from hardware standardisation to software standardisation. . . and in the report this shift is never overtly recognised or argued. Yet it is at the heart of the failure of the report to provide a standardised hardware environment for educational computing. If software compatibility was the new catchword then there is a lack here of discussion of one trend to (non-graphics) standardisation in the form of 16-bit operating systems such as MS-DOS, which might have counselled delay in choosing a machine.

If inter-machine software compatibility were a concern it should have been:

- A dominant requirement in the specifications, and
- Discussed in detail in the report.

As it is it is inadequately discussed, although its adoption as a viable criterion for standardisation undermines the entire original thrust of the committee. The over-all impression is that there was a singular lack of expertise in the report.

## DISCUSSION FULL OF ANOMALIES

The software/courseware discussion is full of anomalies.

It is, for instance, also interesting that while the Pascal debate switches the evaluation towards software considerations other important software ramifications, most notably the importance of the availability of authoring languages and software development utilities are ignored.

Apple suffers particularly here, where its Apple II graphics are (in hardware terms) poor but in practice are effective due to the number of software enhancers, animation editors, et cetera, available.

An insight into the view of courseware held at the time is given by this quote: "The choice of language should be restricted to either BASIC or Pascal to enable teachers to tune the issued courseware to reflect their teaching styles. This would be similar to how they alter or leave out a page in a

series of standard overhead transparencies."

Has whoever wrote that ever edited a teaching unit? Does this suggest the sort of software one would hope to see? "Skeleton" programs tailored to local needs are one thing, and well worth while. The transparency analogy is a little unfortunate, though, and conjures up images of the most banal form of computer education (which in any case are best handled by author languages).

There are also anomalies in the technical reports and ratings for specific machines. These range from the small to incredible. Of the many minor points at question one can note Poly whose graphics are criticised as having poor colour definition and non-individually addressable pixels. The first is arguably unfair. The latter is true. . . but the Apple II is positively noted as having 'each pixel addressable' when in fact it uses an almost identical screen mapping technique to the Poly, i.e. some of its pixels, too, are non-independent. Significant factors such as number of simultaneous screens available or the link between graphics hardware capabilities and the language drivers appear to have been ignored.

The comments on networking are even more idiosyncratic. The NEC network is described as "too business oriented" and gets two-star rating, while the excellent business network, Nestar, on the Apple gets three stars (irrespective of cost). The outstandingly conceived Econet on the BBC gets two stars for its inexpensive 400 kilobaud network. The BMC gets three stars for what by comparison is an exceedingly slow and inflexible system.

The BMC figure is even more puzzling if one delves into the technical comments on each machine. Here we find that in fact the BMCs were not demonstrated as a network. Rather, two stand-alone machines were evaluated. This was augmented by looking at a larger minicomputer that was to be the driving machine for the network. The network was assessed on the basis of this driver with two dumb terminals attached. The comment on the network was: "Excellent, so long as the modified BMCs attach as well as the screen did."

It is hard to credit an evaluation was made on such an assumption. Will my ZX81s work like an IBM terminal if I network them through an IBM mainframe? Yet at the same

time that BMC gets a top rating on a product under development Poly again gets the short straw by having its forthcoming network release largely discounted.

Another inconsistency: Apple was noted as having no sound except by PEEKs and POKEs while BMC is distinguished as "having a music macro-language available". If additional fixes are relevant why then are the numerous Apple sound options ignored.

## 'CHOP LOGIC' IN CONCLUSION

The report's final conclusion is characteristic in its chop logic: "No supplier has a system which is clearly superior to the others in all respects but five come close." Just think about that sentence a little.

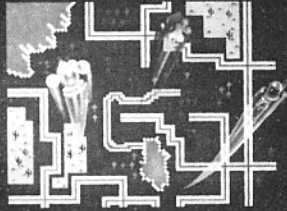
There is a lack of consistency in the report's comments and an insubstantial air to the document. A fair comparison might be with an evaluation circulated by Poly computers after the original suppression of the report. This document sought to evaluate the five chosen machines rigidly against the criteria of the original machine specifications. Not surprisingly, the Poly came out top! Notwithstanding the errors in this evaluation, too, Poly's attempt was longer, better argued and significantly, better documented than the original. All this time from a small firm without the resources of the Department of Education and the State Services Computer Services Division behind it.

The report is a disappointment. The motive for its suppression is probably nothing more than the lack of quality in the document. Once this committee decided to or was directed to avoid hardware standardisation it had to confront new issues that it really made little progress with. Its one worth-while suggestion is that requirements for computing equipment should be refined and a list of suitable equipment established and updated from time to time.

A final comment with thanks to COG. There was never any real grounds for suppressing this report except its quality. If you cost the six committee members' time over several weeks plus that of other parties involved the expenditure of public money in producing this document is not small. COG's persistence has let me, and you, judge whether we got our money's worth.

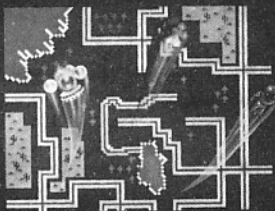
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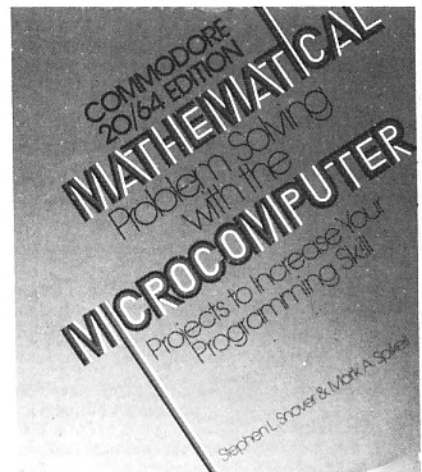
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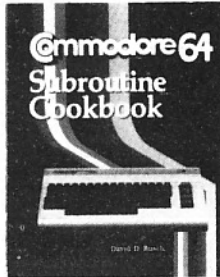
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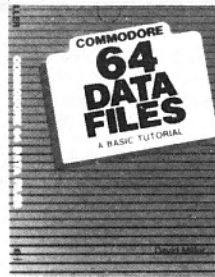


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Interface

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TAB

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## Background to the secrecy

By Nick Smythe

In 1982, at great expense and amid feverish interest, the Department of Education in conjunction with the State Services Computer Services Division set out to provide the evaluation of computers in schools. This followed earlier, abortive moves to provide funding for school computing using the Poly computer produced in New Zealand. Involvement in Poly included the Development Finance Corporation, Wellington Polytechnic, and the software house, Progeni.

Pressures from other interests in the computing field led to calls for an evaluation exercise for school computer equipment at the same

time as expenditure cuts removed all likelihood of actual Government funding. The resulting evaluation exercise was confidently expected to yield a recommendation for a single computer, many observers expecting that the conclusion would earmark the Poly as the chosen machine (the specifications for the exercise were extremely close to those on which Poly was designed). After a Herculean labour the final outcome was a single, A4 sheet sent out to schools and naming five approved micros. The full report was suppressed for a variety of reasons.

The Official Information Act has been passed to regulate the conditions under which public (i.e. State) information should be made public (i.e. generally accessible). Under its terms individuals and organisations may seek the release of public documents.

Because of the considerable preference for anonymity in many Government departments the progress of this act in operation has been keenly watched. Full of enterprise, several individuals and organisations (including the Post-Primary Teachers' Association)

sought to uncover the mystery of the computers-in-school reports and requested copies under the Official Information Act. The Department of Education blocked release, for reasons discussed below. The parties seeking the report appealed to the Ombudsman, who upheld their appeal and requested release of the report. The Minister of Education, Mr Wellington, exercised his Ministerial veto, over-ruling the Ombudsman.

Among the material released just before the report was finally made public last month were several files and letters relating to Cabinet decisions and departmental correspondence with interested firms. These yield some interesting insights into behind-the-scenes lobbying and manoeuvring. They also yield some interesting sidelights on the attitude of the Department of Education to releasing the report and the reasons it gave for withholding information.

The complete evaluation report was withheld on three grounds:-

1: That the information contained in the report was supplied in confidence to the Department of Education. This appears to draw

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## EDUCATION

upon concepts related to confidential tendering and partly on related issues of the sensitivity of technological information.

2: That the protection of the information was otherwise in the public interest. The argument here was that by the time the request for release was answered (late 1983) the information was so dated as to be worthless, and in fact would confuse the schools, who might read into the report conclusions that passing time had outdated. This does not only imply schools (and particularly the highly motivated teachers fund-raising for computer purchase) are incapable of evaluating evidence and appreciating the pace of change, it also makes reason one, on confidentiality, virtually untenable.

3: That similar information might not be provided by firms in future if the report were released. (Can anyone give me the name of a company that would exclude itself from evaluation from such a strategic market in a re-run of this exercise?)

There are other reasons why the confidentiality clause is inappropriate. The most significant is that in several places in released documents it is made plain that the evaluation

exercise was just that: a call for technical information. A letter to CED specifically states that this was the case. It was **not** a confidential tender. Only a single supplier (MDL, dealing with the BMC) sought any assurance of confidentiality. This was out of 13 tenderers (eight apparently did not make it to the short list). In spite of departmental assertions that several firms requested confidentiality this single request is the only documentary evidence produced.

These reasons for suppression do not stand scrutiny, as the Ombudsman's decision that the report should be released clearly agrees. Why was the report suppressed? Some pointers to some odd practices now follow.

### POLY BUT NOT THE PUBLIC

Confidentiality is a key concern to the Department of Education. Yet confidentiality arguments take another blow when it is realised that **two** reports were produced. Apart from the full report, a draft summary for widespread circulation was drawn up. This document never saw the light of day . . . except it **did** get sent to Polycorp, the manufacturer of Poly computers.

Here we have a document which, in spite of MDL's requests for confidentiality, was sent to a commercial rival for appraisal, but was still not considered suitable for public circulation.

This inconsistency is magnified when we realise that the MDL letter requesting confidentiality specifically named Polycorp as a serious concern: a reason for requesting confidentiality was specifically stated as being to guard against Polycorp getting access to its submission.

It is interesting that of the five early applications for release of the full report under the Official Information Act the only participant company seeking release was Polycorp.

Poly itself was, incidentally, hardly happy that while on loan to the Department of Education one of its confidential development systems was proudly exhibited to the Pacific sales manager of one of its expected rivals: Digital Equipment. It is plain that Poly and the Development Finance Corporation also felt that contacts during 1981 with the Department of Education (along with

the 1978 National Party election manifesto) gave it hope for preferment, an attitude the Department of Education distanced itself from in a letter from the Minister to Progeni in 1982. The Cabinet committee on expenditure felt that school purchase of equipment was running ahead of actual policy on the role and cost-effectiveness of computers in school. Notwithstanding this it clearly later (during the evaluation period) sought (quite properly from a trade standpoint) to assist Poly in its export markets by seeking to communicate its acceptance as "a" (if not "the") recommended school machine at an early a date as possible.

### STANDARDISATION OUTCOME

The outcome was that software standardisation, rather than hardware standardisation, would be used as a means of providing unity to the educational system. This was the most severe blow to Poly, the firm most requiring an unfragmented hardware market. Given the diverse operating systems and languages of the machines in the exercise this is a stunning (not to say irrational and, with 8-bit machines, uninformed) shift in emphasis. The legacy of the confusion caused by that shift will endure for some time.

The Official Information Act also has its lighter sides. One document returned, dealt with a legal opinion (suppressable under the act) on the evaluation exercise. As released it consists virtually of a greeting, a large pasted-out middle, and a "yours sincerely". More revealing is a departmental memo to Mr Wellington outlining the background to the requests for release of the report. A single sentence highlights the barriers to the effective access to information: "The Department has been giving careful consideration to whether the report **can** be withheld or whether it **must** be released". How much the two highlighted words reveal, and how nice it would be if the **must** and **can** were swapped, showing that the desire was to release unless constrained rather than to withhold.

[Bits & Bytes thanks Mr W.J. Rosenberg, of Christchurch, for his efforts in obtaining release of this information, and for making the documents available to this magazine. — Editor.]

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Figure 1 COMPARISON CHART

| Apple   | BBC Micro | BMC 800 | Hitachi | Monroe  | NEC                | Poly    | TRS 80                     |  |
|---------|-----------|---------|---------|---------|--------------------|---------|----------------------------|--|
| ***     | **        | ***     |         |         | **                 | **      |                            | Networking                                     |
| *       | **        | ***     | ***     | **      | ***                | ***     | *                          | BASIC - Editor                                 |
| *       | **        | ***     | ***     | **      | ***                | **      | ***                        | - Language                                     |
| ***     |           | ***     |         |         | ***                | *       |                            | PASCAL - Editor                                |
| ***     |           | ***     |         |         | ***                | *       |                            | - Language                                     |
| *       | ***       | ***     | **      | ***     | **                 | **      | -                          | Colour   |
| *       | **        | ***     | **      | ***     | **                 | **      | -                          | Graphics                                       |
| *       | ***       | ***     | !       | **      | !                  | **      | -                          | Sound  |
| *       | **        | ***     | ***     | ***     | **                 | **      | **                         | Keyboard                                       |
| ∅       | ∅         | ∅       |         |         | ∅                  | ∅       | ∅                          | Mix 1 - all Basic                              |
| ∅       |           | ∅       |         |         | ∅                  | x       | ∅                          | 2 - all Pascal                                 |
| ∅       |           | ∅       |         |         | ∅                  | ∅       | ∅                          | 3 - mix Basic/Pascal                           |
| ∅       | ∅         | ∅       |         |         | ∅                  | ∅       | ∅                          | 4 - loading same                               |
| ∅       | ∅         | ∅       |         |         | ∅                  | x       | ∅                          | 5 - loading different                          |
| ∅       | ∅         | ∅       |         |         | ∅                  | x       | ∅                          | 6 - writing disk                               |
| ∅       |           | ∅       |         |         | x                  | x       | ∅                          | 7 - writing printer                            |
| ∅       |           | ∅       |         |         | x                  | x       | ∅                          | 8 - any -                                      |
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1982 REPRODUCED FROM THE EVALUATION

# A first look at graphics

By Gordon Findlay

Once upon a time, a long time ago, there was no such topic as 'Computer Graphics'. Graphics were things made with a silk screen and ink, and were the domain of artists and advertising writers. Computers were number-oriented machines, although a few could cope with names and addresses.

But that was in the bad old days (say the late '50s). Today, the word, 'graphics', conjures images of games: arcade games, adventure games, even pornographic games, so help us. But many beginners, and even some old hands that I have spoken to, have trouble with the jargon of graphics. Advertisers, especially in the glossies, have done a lot to blur distinctions. Let's look at the graphics field this month, and see what really is what.

Almost all home computers have some sort of facility for pictorial displays. These range in quality, sophistication, and practicality, varying in several important parameters from machine to machine. But why? Surely it isn't just game playing? Of course not. Even three years ago a graphic capability was regarded as frivolous in a business machine. The situation is a little different today! Users have appreciated that the use of graphs, charts, and pictures can make information more comprehensible and much quicker to grasp. A graph makes trends obvious, a pie chart is easier to understand than a table of percentages. In education, a diagram is worth many more than a thousand words of explanation. The operation of the computer itself can be made almost transparently obvious by means of a graphical simulation of a desk, as carried out with wondrous effect in Apple's Lisa and Macintosh, and not quite so well in a host of imitations.

The most obvious first parameter when considering a graphics display is the number of colours which can be displayed. Black and white are two! Of course having a colour-

generating computer is one thing and having a colour-showing screen is another. Using the TV set is sometimes a possibility, although Pacman does tend to make Coronation Street difficult to see. A separate colour monitor will cost \$600 to \$900, which is perhaps more than the computer itself. The colour or black and white decision won't cause concern anyway - there are few B & W only machines left.

Eight or 16 colours seem to be the most common choices. Associated with colour is "shade" or "luminance" within a colour; different machines use different words to describe these variations. Some computers generate much better colour than others - much deeper and purer colour, not washed out like some.

The resolution of a display is a measure of the size of the lumps which can be displayed. The higher the resolution, the more "block" the screen is divided into. The System 80 has a resolution of 128 by 48, which means that the screen is divided into 128 pieces horizontally, and 48 vertically. This is a relatively low resolution these days, leading to coarse, lumpy displays, with obvious

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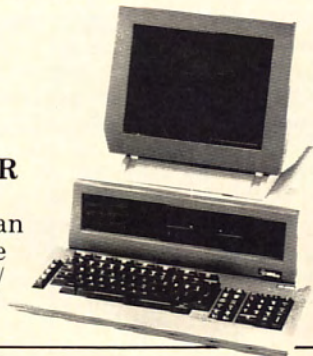
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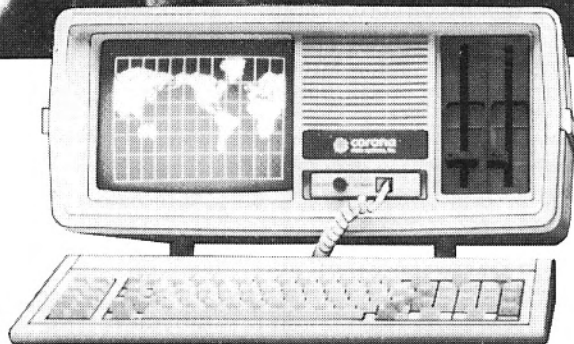
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## BEGINNERS

steps in place of lines. A resolution of 640 by 240, which is commonly found, is much finer. The steps are still there, but much smaller and less obvious.

There are many ways of designing a computer. Some require much more hardware than others: the 640 by 240 display with 16 colours might need an extra 48K of RAM just for video. There are several sorts of graphics, too.

A computer with character graphics has the ability to display certain fixed shapes. These shapes are treated just like letters of the alphabet, but might be a diamond, a short diagonal line, or whatever. The Commodore machines were among the first to show a range of graphics characters on the keyboard. More recently provision has been made in many computers for the user (or programmer really) to define or alter these characters.

"Pixel graphics" refers to the ability to turn individual blocks on the screen on or off. The word, "pixel", comes as a contraction of "picture element", and means the smallest element of the screen which can be manipulated. The higher the resolution, the smaller the pixel.

Usually, but not always, the pixel is square.

Some machines have a number of "modes", or different resolutions. Generally speaking, the higher resolution modes have fewer colours, or a different shaped pixel, or some combination of trade-offs.

"Shape table" graphics was invented, I presume, by the designers of the Apple. A shape is a collection of pixels, which may be drawn all at once. The shape might be a collection of pixels which looks like a space invader, say. Shapes must be defined (described) and may then be drawn as whole, rather than pixel by pixel. This is usually much faster, and is always much easier programming. Some programming languages will allow the shape to be rotated differently as it is drawn, or changed in size.

### SPRITES - SHAPES THAT MOVE

Give a shape a speed and direction and of course it will move. It will also change its name - it becomes a sprite. A sprite is basically a shape which is moving against some

background. Sprites should always have a priority, so that when two meet it is clear which one takes precedence and is displayed. This gives an illusion of one sprite moving behind or in front of another. Some very complex animations have been done this way.

The original meaning of the word "sprite", and still I think the only legitimate one, required sprites to have a shape, to be able to be set in motion, and to have priority as described in the last paragraph. Beware! There are machines which claim sprites, but with a loose definition - usually without the priority attribute, or without the ability to move.

One of the earliest implementations of sprite graphics was in the Atari 400 and 800 series, under the name "player-missile graphics". This was obviously intended for game programmers, and great things have been done with them.

Programming for graphics may be a pleasure or agony, depending on the support given by your programming language. Assuming that your machine has some form of pixel graphics at least, you will find a PLOT or SET statement to turn on an

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## BEGINNERS

individual pixel. You may also have statements for drawing lines, such as VLIN and HLIN in Applesoft. If you are lucky you may have more powerful statements, for drawing triangles, rectangles, polygons, or even circles. If you are really lucky you may have the ability to FILL or PAINT a whole region on the screen with just one line of code. These facilities may be provided through BASIC extensions, or perhaps by PEEKing and POKEing. This is a matter of personal preference, but some versions of BASIC certainly make things easier than others.

A more recent acquisition to the programmer's armoury has been the idea of Turtlegraphics, where commands are given to an imaginary Turtle, which draws your picture for you. This is the idea used in the graphics portion of Logo, which has become so famous. Other languages also use the idea - some versions of Pascal, and some of BASIC even . . .

Don't think as so many do that Turtlegraphics, and the more common pixel and line oriented commands are necessarily separate. A language might support a mixture as the BASIC for the BMC machines does. This gives the best of both worlds.

If you are going to program using graphics, find out what utilities are available for the machine you are using. There are lots of them around, and they often give you much more power by letting you use the clever ideas of somebody else, or by speeding up your programming. I have only once made up an Apple shape table by hand. "Been there, done that, didn't like it." This involved plotting a series of vectors to describe each shape, assembling them into bytes, indexing the table and so on, remembering a lot of important, but petty, restrictions about what can follow something else and so on. A terrible task, but one which can be automated by a program which allows you to move a dot around the screen, drawing as you go, and constructing the shape-table as you move. Without it I doubt whether I would ever again have used shape tables.

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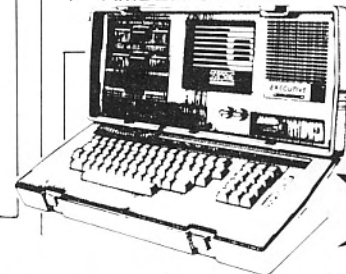
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## DISKS

### DISKS 3

# Operating Systems

By Gerrit Bahlman

Every piece of machinery (hardware) associated with a computer system is so stupid that it needs a human being to turn it on. What is more to the point that turn on has to be so specific that it takes expert programmers hundreds of hours to decide how everything is to be turned on. The special software needed to drive a computer system must instruct the central processing unit what is available, how it is all to be treated, what is to be done when, etc, etc.

The general name for this organisational software is the operating system. This is a huge piece of software that can take a substantial proportion of a machine's capability. In one commercial machine, the PDP 11/03, which has 64K of addressable memory, the operating system takes about 70 per cent of the available space, depending on the number of peripheral devices and the high-level language being supported.

In the micro machines the operating system can be relatively simple. Often the only peripheral devices being supported are a disk unit and visual display unit. These have their own attached hardware cards designed to carry the burden of their operating instructions.

As always, different machines, different set of instructions. There are a few brave souls who have recognised that having the same apparent operating system running on different machines ought to allow the same application program to run on different machines. By far the

most popular operating system is CP/M, from Digital Research. CP/M stands for "Control Program for Microcomputers" and is available for both 8-bit and 16-bit machines. CP/M is a single-user operating system, which means that it is able to control only one machine to be used by one person. There are multi-user systems also, for example, MP/M, which is the specific version developed from CP/M. UNIX and Oasis are examples of other operating systems.

One of the functions of these programs is to control the disk unit, to allow information to be written to and read from the disk surface. The disk operating system is also found separate from the operating system. The Apple II and IIe are examples of this. Their disk operating system, called DOS, actually resides on the disk and is loaded into the computer's memory when the machine is turned on. The operating system to control the rest of the computer is present in ROM memory and is effectively invisible.

The bug-bear for all commercial programmers is the theft of software. If you have spent 600 hours writing a wordprocessor program and you then market it there is nothing to stop someone coming along and copying it. This is especially true where a general operating system like CP/M is concerned. Because the operating system is common the program can be made to operate on different machines relatively easily. Consequently programmers write parts of their program so that it is machine specific. In other words the program uses some physical characteristic of a machine type which makes the transfer to another machine difficult.

Usually, a simple adaption program can be run to alter the program so that it becomes specific

to another machine type. Not surprisingly, the software marketers tend to retain that program. Licence numbers and the incorporation of the purchaser's name in the software is another way in which software is guarded. If you are prepared to fiddle with a piece of such software you can get some ugly surprises when you change so much as a single letter in the purchaser's name. The software can be made to check that it hasn't been fiddled with and if it has it just will not work. In the case of the Apple II, IIe computers the DOS is often altered on the disk with the program being sold to prevent it being copied.

Let us look at the disk operating part of the operating system and examine in general terms what that software must do.

The programmer or program user simply wants to give the computer a name of a file that is stored on the disk to allow reading or writing to occur. One thing is for sure: no way do you want to get involved in remembering where, in terms of tracks and sectors, the file is. You probably do not want to get involved in turning on electric motors for the correct length of time to position the read/write head and to spin the disk. In the broadest terms that is the function of the disk operating system. You give it a file name and order access to the disk and then the disk operating software does the nitty gritty work with read/write heads and file location.

In the next article I will look in detail at some of the strategies used to access information stored on disk; how the disk operating system finds where a file is regardless of its size; how the disk operating system copes with files that don't fit on to the gap left for them and what it can do to allow a file to be split into parts with the parts stored in different places.

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# PROGRAMS

## Colour Genie

```

10 This program will compute a sports draw where each team will play every other team. Written by DAVID JOHN
20 CLEAR500:CLS:PRINT"TEAM DRAW"
30 PRINT:INPUT"NUMBER OF TEAMS";N
40 DIMT$(N+1),G$(N+2)/2:IFN/2=INT(N/2)THEN0=1:E=1:ELSE0=2:E=0
50 PRINT:FORI=1TON
60 PRINT"TEAM NAME";I;:INPUT$(I)
70 IFLEN(T$(I))>16THENPRINT"NAME TOO LONG":GOTO60
80 T$(I)=T$(I)+STRING$(16-LEN(T$(I))," "):NEXT:T$(N+1)="THE BYE"
90 FORK=1TON-E:CLS:PRINT"ROUND";R:PRINT:PRINT
100 FORI=1TO(N+1)/2:G$(I)=T$(I)+" Vs "+T$(N+1-I):NEXT
110 IFO=2THEN140
120 S=INT(RND(N/2)):IFS=0THEN120
130 TEMP$=G$(1):G$(1)=G$(S):G$(S)=TEMP$
140 FORI=1TO(N+1)/2:PRINTG$(I):NEXT
150 TEMP$=T$(1):FORI=1TON-I-E:T$(I)=T$(I+1):NEXT:T$(N-E)=TEMP$
160 PRINT:PRINT"Press ANY KEY to continue"
170 K$=INKEY$:IFK$=""THEN170
180 NEXT:RUN
    
```

compute a sports draw where each team will play every other team.

It can be readily adapted for other microcomputers.

## ZX81

# Art Work

Our Sinclair editor, Steven Baker describes this program by Alistair Matthew, aged 13, of Wellington, as an excellent effort. "It's a great change to see people writing games other than Space Invader types," says Steven.

Alistair says this art program, which requires 16K uses Key 0 for clearing the screen and leaving cursor where it was. Other keys work thus

|   |   |   |
|---|---|---|
| 1 | 7 | 4 |
| 5 |   | 8 |
| 2 | 6 | 3 |

That is, to go to the top right of the screen, key 3; to go to the bottom left, key 2; etc.

Lines 10 and 20 set up the variables.

Lines 30, 40, 140 and 150 check whether you want the screen cleared to go in or out of rub-out mode.

Lines 50-60 and 110 and 120 check which way you want to draw.

Line 70 draws.


Lines 128 and 130 make the cursor flash while in rub-out mode.

You cannot rub-out diagonally, although by editing lines 51-58 and changing them to lines 131-148 and leaving lines 51-58, this could be done.

```

10 LET X=20
20 LET Y=20
30 IF INKEY$="0" THEN CLS
40 IF INKEY$="9" THEN GOTO 110
50 LET X=X+(INKEY$="6")-(INKEY$="5")
51 IF INKEY$="2" THEN LET Y=Y-1
52 IF INKEY$="2" THEN LET X=X-1
53 IF INKEY$="3" THEN LET X=X+1
54 IF INKEY$="3" THEN LET Y=Y-1
55 IF INKEY$="4" THEN LET X=X+1
56 IF INKEY$="4" THEN LET Y=Y+1
57 IF INKEY$="1" THEN LET X=X-1
58 IF INKEY$="1" THEN LET Y=Y+1
60 LET Y=Y-(INKEY$="6")-(INKEY$="7")
70 PLOT X,Y
100 GOTO 30
110 LET X=X+(INKEY$="8")-(INKEY$="5")
120 LET Y=Y+(INKEY$="6")-(INKEY$="7")
128 PLOT X,Y
130 UNPLOT X,Y
140 IF INKEY$="0" THEN CLS
150 IF INKEY$="9" THEN GOTO 30
160 GOTO 110
    
```

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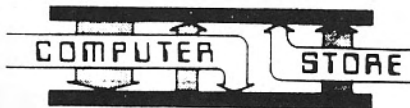
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# PROGRAMS

```

650 GOTO 575
660 PRINT AT 7,10; " "
670 GOTO 575
680 PRINT AT 7,13; " "; TAB 12; " "
690 GOTO 575
700 PRINT AT 11,15; " "
710 PRINT AT 11,15; " "
720 PRINT AT 11,15; " "
730 PRINT AT 11,15; " "
740 PRINT AT 11,15; " "
750 PRINT AT 11,15; " "
760 PRINT AT 11,15; " "
770 PRINT AT 11,15; " "
780 PRINT AT 11,15; " "
790 PRINT AT 11,15; " "
800 PRINT AT 11,15; " "
810 PRINT AT 11,15; " "
1000 REM **CORRECT LETTER**
1010 PRINT AT 6,N+2;Z$
1020 LET Q$(CODE Z$-37)=Z$
1030 LET C$(N)=Z$
1032 IF A$=B$ THEN GOTO 3000
1040 NEXT A$
1041 FOR F=1 TO 40
1042 NEXT F
1050 GOTO 205
2000 PRINT AT 14,15; " "
2010 PRINT AT 14,15; " "
2020 PRINT AT 14,15; " "
2030 PRINT AT 14,15; " "
2500 LET S=1
3000 FOR F=1 TO LEN A$
3010 LET C$(F)=CHR$(CODE A#+128)
3020 NEXT F
3030 FOR F=1 TO 20
3040 PRINT AT 6,3;C$
3045 PRINT AT 6,3;A$
3050 NEXT F
3060 IF S=1 THEN GOTO 4000
3070 PRINT AT 3,9; " "
3080 PRINT AT 3,9; " "
4000 FOR F=1 TO 50
4010 NEXT F
4020 PRINT AT 21,0; **PRESS ANY
4030 IF INKEY$="" THEN GOTO 4020
4040 CLS
4050 GOTO 30
4060 REM **INTRODUCTION**
5005 DIM M$(3,3)
5010 LET M$(1,1)=" O "
5020 LET M$(2,2)=" ^ "
5030 LET M$(3,3)=" A "
5040 FOR F=1 TO 3
5050 FOR N=1 TO 30 STEP 3
5060 PRINT AT F,N;M$(F)
5070 NEXT N
5080 NEXT F
5090 PRINT
5100 PRINT TAB 1; " HANG
5110 FOR F=1 TO 3
5120 FOR N=28 TO 1 STEP -3
5130 PRINT AT F+10,N;M$(F)
5140 NEXT N
5150 NEXT F
5160 PRINT
5170 PRINT " PRESS ""P"" TO PLA
5180 PRINT " ""I"" FOR INSTRU
5190 FOR F=1 TO 3
5200 FOR N=1 TO 30 STEP 3
5210 PRINT AT F+17,N;M$(F)
5220 NEXT N
5230 NEXT F
5250 IF A$=INKEY$
5260 IF A$="" THEN GOTO 5250
5270 IF A$="I" THEN GOTO 6000

```

# HANGMAN

```

5280 IF A$("<"P" THEN GOTO 5250
5300 IF INKEY$="" THEN GOTO 5300
5310 CLS
5320 RETURN
6000 REM **RULES**
6005 FAST
6010 OR F=0 TO 21
6020 PRINT "
6030 NEXT F
6035 SLOW
6040 PRINT AT 1,10; "*****"
6050 PRINT AT 1,10; "HANGMAN"; TAB 10; "*****"
6060 PRINT "THIS GAME IS KNOWN
6070 PRINT "AND ALMOST EVERYONE
6080 PRINT "KNOWS THE
6090 PRINT "RULES. ONE INPUTS A
6100 PRINT "LETTER.
6110 PRINT "THE
6120 PRINT "
6130 PRINT "
6140 PRINT "
6150 IF INKEY$="" THEN RETURN
6160 PRINT AT 21,27; "
6170 IF INKEY$="" THEN RETURN
6180 PRINT AT 21,27; "L"
6190 GOTO 6150
9970 CLEAR
9980 CLS
9990 SAVE "HANGMAN"
9999 RUN

```

## ZX81 Business helper

Jason Bradley, of Waipu, supplies this program which may help small businesses with revenue statements.

The program asks for certain data and then arranges it in to the form of a revenue statement showing gross profit, trading profit, and net profit. The program runs on a 16K.

A very good effort by Jason, says our Sinclair editor.

```

1 REM "REVENUE"
10 PRINT " INPUT NAME OF BUSIN
ESS..
20 INPUT B$ " INPUT DATE (DD/MM/YY
30 PRINT "
40 INPUT D$ " INPUT NON-OPERATING
INCOME"

```

```

60 INPUT Q
67 CLS
68 PRINT " INPUT SUNDRY OPERA
ING INCOME"
69 INPUT SUN
70 CLS
71 PRINT " INPUT NET SALES O
COMMISSION"
80 INPUT SALES
83 PRINT " INPUT COST OF SALE
100 PRINT " IF COMMISSION ENTER
0"
110 INPUT CSALES
120 CLS
130 PRINT "IS THIS INFORMATION
CORRECT Y/N"
140 PRINT "NAME: ";B$
150 PRINT "DATE: ";D$
160 PRINT "SALES: ";SALES
170 PRINT "COST OF SALES: ";CSA
L
171 PRINT "SUNDRY OPERATING INC
OME: ";SUN
180 IF INKEY$="N" THEN RUN
190 IF INKEY$="Y" THEN GOTO 200
195 GOTO 180
200 CLS
210 PRINT "HOW MANY EXPENSES DO
YOU WANT?"
220 INPUT EXPENSET
230 DIM E$(EXPENSET,12)
240 DIM C$(EXPENSET,10)
241 FOR N=1 TO EXPENSET
242 PRINT " INPUT NAME OF EXPEN
SE: ";N; "(MAX 12 LETTERS)"
243 INPUT E$(N)
244 PRINT E$(N)
247 FOR X=1 TO 50
248 NEXT X
249 CLS
250 NEXT N
2510 FOR N=1 TO EXPENSET
2520 PRINT " INPUT COST OF ";E$(
N)
2530 INPUT C$(N)
2540 PRINT E$(N);"=";"C$(N)
2550 FOR X=1 TO 50
2560 NEXT X
2570 CLS
2580 NEXT N
2590 PRINT "IS THIS INFORMATION
CORRECT Y/N?"
2591 FOR N=1 TO EXPENSET
2592 PRINT E$(N);"=";"C$(N)
2600 NEXT N
2610 IF INKEY$="N" THEN GOTO 210
2620 IF INKEY$="Y" THEN GOTO 450
440 GOTO 420
450 GOTO 6000
6000 STOP
6000 CLS
6001 PRINT "REVENUE STATEMENT FO
R ";AT 1,0;B$;"AS AT ";D$
6020 PRINT "SALES: ";(COMMISSION
AND CSALES=0);TAB 23;";SALE
$
6024 PRINT "COST OF SALES";TAB 2
7;";CSALES
6025 PRINT "GROSS PROFIT";TAB 23
;SALES-CSALES
6026 PRINT "+SUNDRY INCOME";TAB
23;SUN
6027 PRINT TAB 23;"-----"
6028 PRINT "GROSS PROFIT";TAB 23
;SALES-CSALES+SUN
6030 FOR N=1 TO EXPENSET
6040 PRINT E$(N);TAB 23;C$(N)
6050 NEXT N
6060 DIM T(EXPENSET)
6070 LET T(1)=VAL C$(1)
6080 FOR U=2 TO EXPENSET
6090 LET T(U)=T(U-1)+VAL C$(U)
6100 NEXT U
6110 PRINT "TOTAL EXPENSES";TAB
23;T(EXPENSET)
6120 LET TOTAL=(SALES-CSALES)-T(
EXPENSET)
6130 PRINT "NON-OPERATING INCOM
E";TAB 23;D$
6140 PRINT "NET PROFIT";TAB 23;T
OTAL+SUN
6150 STOP

```

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you arrhhhhh.

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# PROGRAMS

## VIC 20

This program by M. Vickers, of Howick, will be useful for those VIC-20 owners who make use of user-defined graphics facility. The author writes:

"The program will run on the unexpanded machine and remedies the laborious task of planning characters, and then converting it to decimal, using pen and paper.

"The program accepts binary strings and converts them to their decimal equivalent. An enlarged version of the character is displayed in red and white blocks on the left of the screen. Below this the binary and decimal is shown.

"Three options are then open to the user:

1. He may wish to invert the character and the computer will display the inverted character and the appropriate decimal values, i.e. 255-original number.
2. The computer will poke the data into the locations 7168 to 7175 and display the final character in its normal size.
3. The program will re-run and the character previously held in location 0 will be deleted.

Program notes:

1-150: Set variables, accept 8 binary inputs, breaks string down, checks if 'I' is in string and adds appropriate value.

160-320: POKE large scale version of character to screen in red and white blocks. Prints binary and its decimal equivalent. Prints options available to user and jumps to appropriate routine.

1000-1090: POKE inverted character and its decimal values.

2000-2060: Routine for determining which elements of string contain a 'I' or 'O'. If 'I' a red block will be poked to the screen else a white block will be poked to screen.

2990-3050: Routine for POKEing data to locations 7168 to 7175 and displays the final character in its normal size.

3060: Holds data for string slicing in lines 70-150.

```
1 REM CHARACTER GENERATOR
2 REM M.VICKERS 1984
3 A=1:T=1
4 DIM T%(8),A$(8)
10 POKE36879,8
20 PRINT"(clr home)"
25PRINT"(ctrl white)"
30 PRINT"CHARACTER GENERATOR"
50PRINT"      12345678"
60 INPUT"  BIN. ";A$(A)
70 READ X
80 IF MID$(A$(A),X,1)="1" THEN READ B:T%(T)=T%(T)+B
90 IF MID$(A$(A),X,1)<>"1" THEN READ C
95 IF X<8 THEN X=X+1:GOTO70
150 IF T<8 THEN T=T+1:A=A+1:RESTORE:GOTO60
160 PRINT"(clr home)":FOR Y=1TO8:PRINTA$(Y):NEXT
170 PRINT:PRINT"  BINARY      DECIMAL"
180 FOR Y=1TO8:PRINTA$(Y);"      ";T%(Y):NEXT
185 GOSUB2000
190PRINT"1: INVERT CHARACTER":PRINT"2: SEE CHARACTER":PRINT"3:
  CREATE NEW CHARACTER"
200 INPUT" 1,2,3 ";C$
210 IFC$="1" THENPRINT"(clr home)":GOSUB1000:GOTO320
220 IFC$="2" THENPRINT"(clr home)":GOSUB2990
230 IFC$="3" THENCLR:GOTO3
320 IFC$<"1" OR C$<>"2" OR C$<>"3" THENGOTO160
1000 SP=0
1001 FOR T=1TO8:PRINTA$(T):NEXT
1010 FOR Y=7702+SP TO 7856+SP STEP22:IF PEEK(Y)=48 THENPOKEY,160:
  POKEY+30720,2
1020 IFFPEEK(Y)=49 THENPOKEY,160:POKEY+30720,1
1030 IFFPEEK(Y)=32 THENPOKEY,160:POKEY+30720,2
1032 NEXT
1035 IF SP<7 THENSP=SP+1:GOTO1010
1040 PRINT:PRINT"DECIMAL"
1050FORT=1TO8
1060PRINT"      ";255-T%(T):NEXT
1070 PRINT"RETURN TO MENU ?"
1080 GETW$:IFW$="Y" THENRETURN
1090 GOTO1080
2000 SP=0
2010 FORY=7702+SP TO 7856+SP STEP22
2020 IFFPEEK(Y)=48 THENPOKEY,160:POKEY+30720,1
2030 IFFPEEK(Y)=49 THENPOKEY,160:POKEY+30720,2
2040 IFFPEEK(Y)=32 THENPOKEY,160:POKEY+30720,1
2050 NEXT:IF SP<7 THENSP=SP+1:GOTO2010
2060 RETURN
2990 PRINT"(home) PLEASE WAIT"
3000 POKE52,28:POKE56,28:FORI=7168to7679:POKEI,PEEK(I+25600):NEXT
3001 POKE36869,255
3005 FORT=1TO8
3020POKE7167+T,T%(T):NEXT:PRINT"(home) IT LOOKS LIKE THIS":PRINT:
  PRINT" @ @ @ @ @ @ "
3030PRINT:PRINT:PRINT"RETURN TO MENU ?"
3040GETW$:IFW$="Y" THENPOKE36869,240:RETURN
3050goto3040
```

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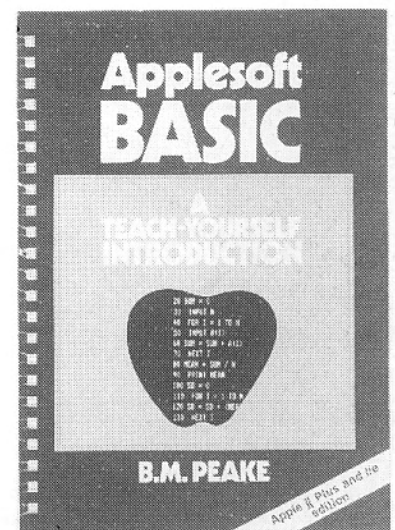
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```

10 REM *** CHOPPER STRIKE ***
20 REM *** BY D.MOORE ***
30 POKE53280,0:POKE53281,5:PRINTCHR$(149)
40 PRINTCHR$(147);" *** CHOPPER STRIKE ***":PRINTCHR$(17);CHR$(17)
50 PRINT" POSITION SIGHT ON HELICOPTER";PRINTCHR$(17);CHR$(17);CHR$(17)
60 PRINT" AND FIRE,USE JOYSTICK PORT #2"
70 PRINTCHR$(17);CHR$(17);" SPEED (1-3)BEGINNERS"
80 PRINTCHR$(17);CHR$(17);" SPEED (4-8)INTERMEDIATE"
90 PRINTCHR$(17);CHR$(17);" SPEED (9-11)EXPERT"
100 PRINTCHR$(17);CHR$(17):INPUT" SPEED ";SP:SP=SP+10
101 IFSP<10ORSP>21THENPRINTCHR$(145);CHR$(145);CHR$(145):GOTO100
110 PRINTCHR$(17);CHR$(17):INPUT" SHOTS ";SH
111 IFSH<1THENPRINTCHR$(145);CHR$(145);CHR$(145):GOTO110
120 CO=0:HI=0:VP=100:HP=100
130 FORN=1TO10:READS1(N):READS2(N):NEXT
140 :
150 :
200 REM *** SET UP SPRITES ***
210 PRINTCHR$(147):V=53248:POKEV+21,3:POKE2040,13:POKE2041,14:POKEV+40,5:POKE532
81,6
220 FORN=0TO62:READQ:POKE832+N,Q:NEXT
230 FORN=0TO27:READQ:POKE896+N,Q:NEXT
240 FORN=1TO35:POKE923+N,0:NEXT
250 POKEV+23,2:VP=POKEV+0,100:POKEV+1,100:PRINTCHR$(154)
300 REM *** GET SPRITE POSITIONS ***
310 VE=INT(RND(1)*(240-48)+48)
320 FORH0=23TO255:STEPSP:POKEV+2,H0:POKEV+3,VE
330 :
340 :
400 REM *** JOYSTICK ROUTINE ***
410 JV=PEEK(56320):FR=JVAND16:JV=15-(JVAND15):POKEV+30,0
430 IF FR<>16THEN600
440 IFJV=1THENVP=VP-SP
450 IFJV=2THENVP=VP+SP
460 IFJV=4THENHP=HP-SP
470 IFJV=5THENVP=VP-SP:HP=HP-SP
480 IFJV=6THENVP=VP+SP:HP=HP-SP
490 IFJV=8THENHP=HP+SP
500 IFJV=9THENVP=VP-SP:HP=HP+SP
510 IFJV=10THENVP=VP+SP:HP=HP+SP
520 IFH0>235THENC0=CO+1:GOSUB540:GOSUB560:GOTO310
530 GOSUB560:POKEV+0,HP:POKEV+1,VP:NEXT:GOTO440
540 PRINTCHR$(147);CHR$(18);"SCORE";CHR$(146);HI;CHR$(18);"SHOTS";CHR$(146);CO
541 IFCO=5HTHEN900
550 RETURN
560 IFHP<24THENHP=HP+SP
570 IFHP>254THENHP=HP-SP
580 IFVP<48THENVP=VP+SP
590 IFVP>240THENVP=VP-SP
595 RETURN
600 REM *** ANTI-AIRCRAFT GUNS ***
610 FORI=0TO24:POKE54272+I,0:NEXT:CT=0
620 POKE54278,5
630 POKE54277,5:CT=CT+1
640 POKE54276,129
650 POKE54295,241
660 POKE54293,54:POKE54294,28
670 IF$1(CT)<0THEN750
700 POKE54273,$1(CT):POKE54272,$2(CT)
710 POKE54296,79
720 POKE54276,128
730 GOTO630
740 IFCT+1<6THENFORT=1TO100*CT:NEXT
750 POKE54296,0
760 :
770 :
800 REM ** CHECK FOR HIT ***
810 IF PEEK(V+30)AND1=1THENHI=HI+1:CO=CO+1:GOTO830
820 CO=CO+1:GOSUB540:NEXT
830 FORN=1TO4:FORJ=1TO20:POKEV+40,J:NEXT:NEXT:POKEV+40,5
840 GOSUB540
850 GOTO310
860 :
870 :
900 REM ** END OF GAME ***
910 PRINT"YOU GOT ";HI;" OUT OF ";SH
920 PRINT"Z";(HI/SH)*100
930 PRINT"PRESS FIRE TO RESET "
940 JV=PEEK(56320):FR=JVAND16
950 IFR<>16THENPOKEV+21,0:CLR:RESTORE:GOTO10
960 GOTO940
1000 REM *** DATA ***
1010 REM *** SOUND ***
1020 DATA17,37,19,63,21,154,22,227,25,177,28,214,32,94,34,175,34,255,-1,-1
1030 REM *** SIGHT ***
1040 DATA255,255,255,136,24,17,144,24,9,160,24,5
1050 DATA192,24,3,128,24,1,128,24,1,128,24,1
1060 DATA255,255,255,255,255,255,128,24,1,128,24,1,128,24,1,128
1070 DATA24,1,128,24,1,192,24,3,160,24,5,144,24,9,136,24,17,255,255,255
1080 REM *** HELICOPTER ***
1090 DATA0,255,254,32,1,0,112,3,192,32,7,160,48,15,144
1100 DATA31,255,252,0,63,192,0,18,64,0,63,240,0

```

## TRS80/System 80

# Pdriver 48K

By B.N. Briggs

Users of Electric Pencil v2 frustrated at not being able to output control codes to their printer (and who haven't got a working copy of Pencil Plus) might find this patch useful. It permits control and graphic codes to be passed to the printer, allowing your letters and manuscripts to be "prettied" up.

It requires no patches to "Electric Pencil" itself (it patches into the printer DCB at 4026H) and may be loaded using the PLOAD command of Pencil. While it allows control and graphic codes to be passed to the printer, you must remember that when a code is entered, it is the patch that is controlling the printer not Pencil, this means that considerable problems could arise when justifying lines, indeed the program's use should be restricted to headings and graphics etc.

PDRIVER also contains its own printer driver (to permit ALL codes to go to the printer). When PDRIVER is loaded Pencil uses this driver and will work on both the TRS-80 and System 80 without any further modification.

There are six commands that can be used:

(1) = '<nnn'

When 'nnn' equals the required code, either a printer code or a graphic character.

(2) = '<a'

Where 'a' equals any character other than numeric or the following control codes. This is perhaps the most useful of the 6, it outputs 2 codes, the first is the escape code (27) followed by the ASCII value of 'a', eg '<@' will send 27 and 64 to the printer, '<<001' will send 27, 45 and 1, the code for underline on the Star Gemini and most other Epson compatible printers.

(3) = '<&nnnxxx'

Where 'nnn' equals the code to be printed and 'xxx' equals the number of times to print it. eg '<&065080' will print 'A' 80 times. Useful for printing a line of graphic blocks across the page. (The same as the BASIC 'STRING\$' function).

(4) = '</'

Will disable PDRIVER allowing the '<' to be used normally. When '<' & '/' is entered, PDRIVER is deactivated until condition (5) is encountered.

(5) = '<?'

Will enable PDRIVER again, allowing control codes to be passed once more to the Printer.

(6) = '<(nnn'

This is a USER CALL, in the listing shown. The call is to a RET, (to prevent any harm should the command be

# PROGRAMS

entered) however, by replacing 'BLANK' with the address of your own routine, you can call that address, (REG 'A' will contain the decimal value entered) eg. a M/L routine to print dot addressable graphics. The original of this program does just that. The decimal value entered points to one of a number of blocks of data that can be output to the printer.

Some points to remember. In (1), (3) and (6), 'nnn' and 'xxx' must be three digits, e.g. '1' must be entered as '001', and be between 0-255. If by mistake, numeric and other characters are mixed, e.g. '<2h9', the patch will accept this

but the results may not be what you want. A string of code must be entered with no spaces or page wrap-around (a space or carriage return could be mistaken for a code), e.g. '<-<001' not '<-<001'. While the patch as listed will operate with Pencil, it could also work with other word processors that use the printer vector at 4026H and 4027H. However, you will have to check the manual to be sure and perhaps change the method of protecting the top of memory (Pencil used with DOS uses the HIMEN address at 4049H and 404AH).

```

0001 ;
0002 ;
0003 ; PDRIVER ;
0004 ; B. N. Briggs
0005 ; 14 Allan Berry Avenue
0006 ; Napier
0007 ;
0008 ; This Program will allow Codes to
0009 ; be passed to a Printer by ELECTRIC
0010 ; PENCIL
0011 ;
0012 ;
4026 00130 ORG 4026H ;Patch into
;Printer
4026 00FF 00140 DEFW BEGIN ;Vector
00150
00160 ;
00170 ;
4049 00180 ORG 4049H ;Set DOS Mem,
;PENCIL
4049 FEFE 00200 DEFW BEGIN-2 ;uses this
;Vector
00210 ;
00220 ;
FF00 00230 ;
00240 ORG OFF00H
00250 ;
00260 ;Change these Codes to ones that are
00270 ;not used by your Printer
00280 ;
003C 00290 CTRL EQU '?' ;Control Char
00300 ;
003F 00310 QM EQU '?' ;Turns
;PDRIVER on
00320 ;
00330 ;
002F 00340 SL EQU '/' ;Turns it off
00350 ;
002B 00360 USR EQU '(' ;Calls a M/L
;Routine
00370 ;
00380 ;
0026 00390 APS EQU '&' ;Code to out-
;put a string
00400 ;
00410 ;
001B 00420 PCTRL EQU 27 ;Printer
;Control char
00430 ;
00440 ;
FF00 21FF 00450 BEGIN LD HL,FLAG ;Flag decides
;where to go
00460 ;
FF07 7E 00470 LD A,(HL) ;Check value
FF04 B7 00480 OR A
FF05 2009 00490 JR NZ,PRTDRV ;Not Zero
00500 ;
;then CTRL
FF07 79 00510 LD A,C ;has been.
FF08 FE3C 00520 CP CTRL ;Control Char
FF0A C293FF 00530 JP NZ,OUT ;no, so PRINT
FF0D 3601 00540 LD (HL),1 ;Yes,set Flag
FF0F C9 00550 RET ;and back
FF10 21FOFF 00560 PRTDRV LD HL,DEC ;DEC=No of
;chars in
; 'cnnn'
00580 ;
FF13 FE05 00590 CP 5 ;5=turned off
FF15 304A 00600 JR NC,OFFON ;& want QM
FF17 FE04 00610 CP 4 ;4=Call to M/L
FF19 286C 00620 JR Z,USRCAL;Routine
FF1B FE03 00630 CP 3 ;3=Waiting
FF1D CAD1FF 00640 JP Z,STRNG3 ;for xxx of
; <nnnxxx
00650 ;
FF20 FE02 00660 CP 2 ;2='nnn' of
FF22 CABEFF 00670 JP Z,STRNG2 ;'<nnnxxx'
FF25 79 00680 LD A,C ;None so far
FF26 FE28 00690 CP USR ;so compare
FF28 2004 00700 JR NZ,CHKOFF ;Chars
FF2A 3E04 00710 LD A,4
FF2C 1812 00720 JR SLASH
FF2E FE3F 00730 CHKOFF CP QM ;QM turn
FF30 2822 00740 JR Z,FIN2 ;PDRIVER On
FF32 FE2F 00750 CP SL ;SL then OFF
FF34 2004 00760 JR NZ,STRING;No? then
;what else?
00770 ;
FF36 3E05 00780 LD A,5 ;Set Flag
FF38 1806 00790 JR SLASH ;for OFF
FF3A FE26 00800 STRING CP APS ;If APS then
FF3C 2006 00810 JR NZ,NOTSTR ;a String

```

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# PROGRAMS

```

FF3E 3E02 00820 LD A,2 ;so set Flag
FF40 32F1FF 00830 SLASH LD (FLAG),A ;& back to
FF43 C9 00840 RET ;PENCIL
FF44 FE30 00850 NOTSTR CP '0' ;None of the
FF46 3B37 00860 JR C,LETTER ;above, see
FF4B FE3A 00870 CP '9'+1 ;if it's No.
FF4A 3033 00880 JR NC,LETTER ;or Letter
FF4C CDADFF 00890 CALL CONVER ;No. so Con-
FF4F 35 00900 DEC (HL) ;vert & dec-
FF50 C0 00910 RET NZ ;crease DEC
00920 ;
00930 ;FINISH sends a Byte to the Printer
00940 ;and resets Flags
00950 ;
FF51 CD93FF 00960 FINISH CALL OUT ;Send Code to
FF54 3603 00970 FIN2 LD (HL),3 ;Printer &
FF56 AF 00980 XDR A ;Reset Flags
FF57 32EEFF 00990 LD (STORE),A ;ready for
FF5A 32EFFF 01000 LD (STORE2),A ;another
FF5D 32F1FF 01010 LD (FLAG),A ;Code etc.
FF60 C9 01020 RET
01030 ;
01040 ;OFFDN is used when 'CTRL' & 'SL'
01050 ;has been sent to turn PDRIVER off
01060 ;& we're waiting for 'CTRL' & 'QM'
01070 ;to turn it on
01080 ;
FF61 FE06 01090 OFFDN CP 6 ;We're OFF &
01100 ; ;want QM to
01110 ; ;turn me ON
01120 ; ;6= Ctrl has
01130 ; ;been entered
FF63 79 01140 LD A,C ;Check char.
FF64 2808 01150 JR Z,GUEST
FF66 FE3C 01160 CP CTRL ;Is it CTRL
FF6B 2029 01170 JR NZ,OUT ;NO, Back to
01180 ; ;Driver *
FF6A 3E06 01190 LD A,6 ;YES, change
FF6C 18D2 01200 JR SLASH ;5 to 6
FF6E FE3F 01210 GUEST CP QM ;Check if QM
01220 ; ;follows CTRL
FF70 2BE2 01230 JR Z,FIN2 ;Reset all
01240 ; ;flags if so
FF72 3E3C 01250 LD A,CTRL ;No so output
01260 ; ;CTRL & the
FF74 CD93FF 01270 CALL OUT ;Char that
FF77 79 01280 LD A,C ;followed it.
FF7B CD93FF 01290 CALL OUT
FF7D 3E05 01300 LD A,5 ;& reset the
FF7D 18C1 01310 JR SLASH ;6 to 5
01320 ;
01330 ;LETTER sends 'PCTRL' and the Byte
01340 ;that followed to the Printer
01350 ;
FF7F 3E1B 01360 LETTER LD A,PCTRL ;If here then
FF81 CD93FF 01370 CALL OUT ;a letter was
01380 ; ;entered so
FF84 79 01390 LD A,C ;send PCTRL
01400 ; ;plus what
01410 ; ;came after
FF85 18CA 01420 JR FINISH ;it
01430 ;
01440 ;USRCAL enables you to call a separate
01450 ;M/L routine and pass the value in
01460 ;Reg 'A' to that routine
01470 ;NOTE-The call is blanked off at the
01480 ;moment, it has been left in just to
01490 ;show what can be done.
01500 ;
FFB7 CDADFF 01510 USRCAL CALL CONVER ;The usual
FFBA 35 01520 DEC (HL) ;stuff
FFBB C0 01530 RET NZ
FFBC E5 01540 PUSH HL ;All done
FFBD CDACFF 01550 CALL BLANK ;so call
FF90 E1 01560 POP HL ;your
FF91 18C1 01570 JR FIN2 ;routine
01580 ;
01590 ;OUT sends any Code to the PRINTER
01600 ;(the ROM driver won't accept a '0')
01610 ;
FF93 47 01620 OUT LD B,A ;Save char
FF94 3A403B 01630 OUT1 LD A,(3840H) ;Check if
01640 ; ;BREAK down
FF97 C857 01650 BIT 2,A ;and return
FF99 C0 01660 RET NZ ;if so
FF9A CDD105 01670 CALL SD1H ;Printer OK?
FF9D 20F5 01680 JR NZ,OUT1 ;if not then
01690 ; ;keep waiting
FF9F 3AD105 01700 LD A,(SD1H) ;If Zero
FFA2 B7 01710 OR A ;then System
01720 ; ;80
FFA3 78 01730 LD A,B ;Char to be
FFA4 2003 01740 JR NZ,TRS ;Printed in A
FFA6 D3FD 01750 OUT (OPDH),A ;System 80
FFA8 C9 01760 RET
FFA9 32EB37 01770 TRS LD (37EBH),A ;or TRS 80
FFAC C9 01780 BLANK RET
01790 ;
01800 ;CONVERT changes 3 decimal # to HEX
01810 ;
FFAD 3AEFFF 01820 CONVERT LD A,(STORE) ;get any
FFB0 47 01830 LD B,A ;previous #.
FFB1 80 01840 ADD A,B ;x 2
FFB2 87 01850 ADD A,A ;x 4
FFB3 80 01860 ADD A,B ;x 5
FFB4 87 01870 ADD A,A ;x 10
FFB5 47 01880 LD B,A ;& strip 4B
FFB6 79 01890 LD A,C ;off the new
FFB7 D630 01900 SUB 30H ;# just
FFB9 80 01910 ADD A,B ;entered &
FFBA 32EEFF 01920 LD (STORE),A ;add it in
FFBD C9 01930 RET ;& save it
01940 ;
01950 ;STRN62 is used when <nnnnxx is

```



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# PROGRAMS

```

01960 ;entered & we want 'nnn' part of
01970 ;&nnnxxx
01980 ;
FFBE CDADFF 01990 STRN62 CALL CONVER ;Get the Hex
FFC1 35 02000 DEC (HL) ;
FFC2 C0 02010 RET NZ ;& save the
FFC3 32EFFF 02020 LD (STORE2),A ;Value
FFC6 3E03 02030 LD A,3 ;and reset
FFC8 77 02040 LD (HL),A ;SOME flags
FFC9 32F1FF 02050 LD (FLAG),A
FFCC AF 02060 XOR A
FFCD 32EFFF 02070 LD (STORE),A ;& back to
FFD0 C9 02080 RET ;PENCIL
02090 ;
02100 ;STRN63 gets 2nd part of <nnnxxx
02110 ;
FFD1 CDADFF 02120 STRN63 CALL CONVER ;Got the 1st
FFD4 35 02130 DEC (HL) ;so we want
FFD5 C0 02140 RET NZ ;the 2nd
FFD6 B7 02150 OR A ;Got it, is
FFD7 CA54FF 02160 JP Z,FIN2 ;Zero? Do
02170 ; ;nothing
FFDA 3D 02180 DEC A ;else check
FFDB 47 02190 LD B,A ;if a '1'
FFDC 3AEFFF 02200 LD A,(STORE2);Yes then
FFDF CA51FF 02210 JP Z,FINISH ;do it once
FFE2 F5 02220 LOOP PUSH AF ;Else send
FFE3 C5 02230 PUSH BC ;'nnn'
FFE4 CD93FF 02240 CALL OUT ;'xxx' times
FFE7 C1 02250 POP BC
FFEB F1 02260 POP AF
FFE9 10F7 02270 DJNZ LOOP
FFEB C351FF 02280 JP FINISH
FFEE 00 02290 STORE DEFB 0 ;Various
FFEF 00 02300 STORE2 DEFB 0 ;Buffers etc
FFF0 03 02310 DEC DEFB 3 ;used by
FFF1 00 02320 FLAG DEFB 0 ;the Program
FFF2 00 02330 DEFB 0
FF00 02340 END BEGIN ;END & START
00000 TOTAL ERRORS
30092 TEXT AREA BYTES LEFT

```

```

APS 0026 00390 00800
BEGIN FF00 00450 00150 00200 02340
BLANK FFAC 01780 01550
CHKOFF FF2E 00730 00700
CONVER FFAD 01820 00890 01510 01990 02120
CTRL 003C 00290 00520 01160 01250
DEC FFF0 02310 00560
FIN2 FF5A 00970 00740 01230 01570 02160
FINISH FF51 00960 01420 02210 02280
FLAG FFF1 02320 00450 00830 01010 02050
LETTER FF7F 01360 00860 00880
LOOP FFE2 02220 02270
NOTSTR FF44 00850 00810
OFFON FF61 01090 00600

```

## Pocket BBC

Acorn has been floating the idea of its pocket-sized, LCD screened, hand-held BBC variant, code-named the Neutrino. With just black and white graphics but the standard BBC BASIC the product looks set to roll with a solid initial software base, unlike the QL.

## Text processor

IBM has introduced text processing programs for IBM Personal Computers: the DisplayWrite Series and PCWriter. The PC DisplayWrite Series includes text processing programs similar to those available for the widely used IBM DisplayWriter.

```

OUT FF93 01620 00530 00960 01170 01270 01290 01370 02240
OUT1 FF94 01630 01680
CTRL 001B 00420 01360
PRDRV FF10 00560 00490
DM 003F 00310 00730 01210
QUEST FF6E 01210 01150
SL 002F 00340 00750
SLASH FF40 00830 00720 00790 01200 01310
STORE FFEE 02290 00990 01820 01920 02070
STORE2 FFEF 02300 01000 02020 02200
STRING FF3A 00800 00760
STRN62 FFB6 01990 00670
STRN63 FFD1 02120 00640
TRS FFA9 01770 01740
USR 0028 00360 00690
USRCAL FF87 01510 00620

```

## DAREDEVIL

```

0 X=255
10 REM *** DAREDEVIL ***
20 REM *** BY T.HENDERSON AND D.MOORE ***
30 PRINTCHR$(147); INPUT "DO YOU WANT INSTRUCTIONS [Y/N]";A#
40 IFA#="Y" THEN110
50 PRINTCHR$(147); " ***** DAREDEVIL ***** "
60 PRINT " USE THE SPACE BAR TO JUMP ONCOMING CARS"
70 PRINTCHR$(17);CHR$(17);" THE GAME SLOWLY GETS HARDER"
80 PRINTCHR$(17);CHR$(17);" AS CARS SPEED UP"
90 PRINTCHR$(17);CHR$(17);" YOU ONLY HAVE ONE LIFE"
100 PRINTCHR$(17);CHR$(17);" TIME DISPLAYED WHEN GAME OVER"
110 PRINTCHR$(17);CHR$(17);" HIT ANY KEY TO START"
120 GETA#; IFA#="" THEN120
130 PRINTCHR$(147)
140 FORN=832T01022:POKEN,0:NEXT
150 REM *** SETUP SPRITE MAN ***
160 FORN=832T0894:READA:POKEN,A:NEXT
170 DATA1,80,0,5,112,0,5,224,0
180 DATA5,240,0,5,192,0,7,240,0
190 DATA0,192,0,21,80,0,85,80,0
200 DATA81,117,64,81,85,112,49,112,60
210 DATA241,80,0,2,160,0,2,160,0
220 DATA10,40,0,8,8,0,40,10,0
230 DATA32,2,0,60,3,192,63,3,240
240 FORN=896T0958:READA:POKEN,A:NEXT
250 DATA1,80,0,5,112,0,5,224,0
260 DATA5,240,0,5,192,0,7,240,0
270 DATA0,192,0,1,80,0,1,80,0
280 DATA1,112,0,1,80,0,1,112,0
290 DATA3,208,0,2,224,0,2,160,0
300 DATA2,128,0,2,128,0,2,128,0
310 DATA2,128,0,3,192,0,3,240,0
320 FORN=960T0980:READA:POKEN,A:NEXT
330 DATA0,0,85,0,40,4,5,169,84
340 DATA21,85,84,127,87,244,119,87,116
350 DATA127,3,240
360 V=53248:POKEV+21,0:POKE2040,13:POKE2041,14:POKE2042,15
370 POKEV,100:POKEV+1,200:POKEV+2,100:POKEV+3,200:POKEV+4,200:POKEV+5,200
380 POKEV+37,2:POKEV+38,15:POKEV+39,14:POKEV+40,14
390 POKEV+23,4:POKEV+29,4:POKEV+28,7
400 FORN=49152T049152+140:READA
410 POKEN,A:NEXT
420 DATA48,25,174,0,192,172,0,192,136,192,0,208,251,202,224,0,208,243
430 DATA96,174,30,208,224,5,208,1,96,162,6,142,21,208,32,2,192,206,4
440 DATA208,162,5,142,21,208,32,2,192,206,4,208,165,203,201,64,208,3
450 DATA76,140,192,32,112,192,206,4,208,32,2,192,206,3,208,174,30,208,224
460 DATA6,208,1,96,172,3,208,192,99,208,232,206,4,208,32,2,192,238
470 DATA3,208,174,30,208,228,6,208,1,96,172,3,208,192,200,208,232,76
480 DATA19,192,169,6,141,21,208,206,1,192,201,0,208,1,96,174,0,192,206
490 DATA0,192,228,46,240,1,96,238,0,192,96,0
500 FORN=49292T049292+69:READA:POKEN,A:NEXT
510 DATA173,207,192,201,0
520 DATA208,31,169,1,141,207,192,169,15,141,24,212
530 DATA169,32,141,18,212,169,55,141,1,212,141,0,212,169,0,141
540 DATA24,212,76,19,192,169,15,141,24,212,169,32,141
550 DATA18,212,169,255,141,1,212,141,0,212,169,0,141,24,212
560 DATA141,207,192,76,19,192,0,0,0
570 GOT0600
580 TI#="000000":POKEV+30,0:SYS49152+19
590 POKEV+21,0:PRINT"YOUR TIME IS ";TI#:GOT0620
600 INPUT "JUMPING HEIGHT (1-150) ";JU
610 JU=200-JU:POKE49234,JU:PRINTCHR$(147):GOT0580
620 FORN=1T01000:NEXT:PRINT"HIT ANY KEY TO START AGAIN"
630 GETA#; IFA#="" THEN630
640 RESTORE:GOT00

```

## Commodore 64

# Daredevil

In this game by Daniel Moore, aged 14, the space bar is used to jump. Multi-coloured sprites, sound and machine language are used. The game gets slowly harder. For those who haven't time to key the game in send a blank cassette and \$7 or just \$10 (no disks, please) to Daniel Moore, C/- Bits & Bytes, Box 827, Christchurch.

# Commodore rules bottom of U.S. market

By Steven Darnold

Last year Commodore had 38 per cent of the American market in computers selling for under \$US1000. This put it in first place by a large margin. In second place was Texas Instruments, with 21 per cent. Then came Timex (the American manufacturer of the Sinclair range) with 20 per cent, and Atari with 10 per cent.

Most of the activity in the under-\$1000 category was at the bottom end of the range. The top four firms each had computers selling for under \$100 and this is where most of the turnover occurred. This year, however, there have been a lot of changes. Texas Instruments and Timex have pulled out of the market entirely, and Atari has discontinued the 400. This leaves the VIC-20 as the only major computer selling for under \$US100.

The VIC's monopoly of the under-\$100 range is nicely complemented by the Commodore 64's popularity among the more expensive computers. Atari is having to work just to keep its share, and newcomers, such as Coleco and Spectravideo, are struggling to make an impact. Most of the 21 per cent Texas Instruments share and Timex's 20 per cent share is likely to go to Commodore, leaving it with about two-thirds of the American market (under \$US1000).

The picture is not quite so rosy for Commodore in Britain. Although the 64 is performing very well, the VIC-20 is fading fast. In Britain, the VIC has plenty of competition. Several British computers are selling for about the same price, with more memory, better graphics and fancier BASICs. The

VIC-20 just can't keep up. On the other hand, the 64 is very popular in Britain. It lies in second place, behind the cheaper Spectrum, and well ahead of the BBC.

In New Zealand, Commodore appears to be firmly in the number 1 position. Last Christmas the VIC-20 was the biggest selling home computer, but sales have declined sharply since then. Now the Commodore 64 is in first place, and it looks like holding that position for a considerable time to come.

### IEEE interfaces

Last November, in *Bits & Bytes* I discussed using IEEE peripherals and examined the three IEEE interfaces available in New Zealand. I concluded that there were substantial advantages in using such interfaces, but that there were compatibility problems with some software.

Since writing that article, I have spent many months using the DAMS interface with an IEEE disk drive, and I am very happy with its performance. It loads programs three times faster than a 1541 and there's no flickering of the red light. It is definitely good value for money.

As the months went by, however, I began to amass a collection of disks which clashed with the interface. Zork II and Zork III didn't work, although Zork I did. Starcross didn't work. The DTL compiler didn't work, even though the manual said it could be used with IEEE drives. Blue Max didn't work. It was frustrating. The disks sat on the shelf gathering dust because I couldn't load them.

Two months ago, I solved all my problems by getting a better IEEE interface. I ordered a Buscard II direct from America. It cost me \$350, but it is worth every penny. Unlike the three interfaces I reviewed in November, it does not clash with software; it works with 100 per cent of the programs I have tried. In addition it includes the BASIC 4.0 disk commands, a machine-language monitor (with assembler and disassembler), and a Centronics printer port. On the top of the Buscard cartridge are lots of little switches to select various configurations of serial and parallel peripherals, including one which

automatically sends true ASCII out the Centronics port. On the side of the Buscard is an extension of the cartridge port so that other cartridges can be plugged in.

In total the Buscard II is a superb product. It enhances the 64's hardware capabilities by giving it ready access to the wide selection of parallel printers and to the faster/higher capacity IEEE drives. These capabilities are well integrated into the 64 and are totally transparent to the user. In addition, the BASIC 4.0 disk commands and monitor plug the two most serious gaps in the 64's firmware.

I hope the Buscard II will someday be available in New Zealand. However, if you can't wait, A B Computers in America gives good service and accepts VISA.

### DTL Compiler

This compiler is available in three versions: tape, 1541 disk, and IEEE disk. Each version uses the same manual and dongle (security key); the only difference between them is the tape or disk. Each version sells for \$150 in New Zealand.

The tape version is not recommended. It can compile only short programs, up to 12.5K, and it lacks several of the options available on the disk versions. This severely limits the utility of the compiler. In addition, the tape compiler is dangerous. It requires the dongle to be pushed on to the cassette port while the power is on — this can blow a chip in the computer! Users are advised to avoid this version of the compiler. Dealers with a tape version in stock should consider turning it into a disk version by copying the programs from a disk version. The dongle works fine with either version.

The 1541 version is much better than the tape version. It can handle any size of program, and it allows you to attach the dongle before the computer is turned on. The only serious limitation with this version is that it has only an 8.5K buffer for storing DATA statements, and it stops compiling when the buffer is full. So far I have had two Adventure games fail to compile because they had too many DATA items.

The IEEE version comes on the same disk with the 1541 version. It does everything the 1541 version does, plus it estimates the problem with DATA statements. Instead of storing DATA statements in a RAM buffer, it stores them on the disk. This requires an extra disk channel so it doesn't work with the 2031 single drive, which has no more channels than a 1541. However, it might work with the single Super Drive from Viscount Electronics.

I have compiled about a dozen programs so far and I'm reasonably happy with the results. The DTL compiler isn't fussy; it happily accepts an ordinary BASIC program, even one with machine-language subroutines. No special modifications or editing are required, although such modifications can be made if desired to speed up execution.

One benefit of using the compiler is speed. Although the DTL promotional

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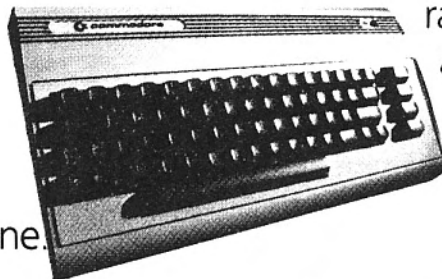
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literature claims that compiled programs run up to 25 times faster, most programs in fact run only about twice as fast. This is not a huge increase, but it is a useful improvement. Moreover, compiled programs are not subject to "garbage collection" delays. In uncompiled programs which do a lot of string handling, such delays can last five seconds or longer. The compiler plays a very useful role in eliminating these delays.

A second benefit of using the compiler is accuracy. As a program is processed, the compiler checks all the lines and reports any errors. This is an excellent way for ensuring that a program is free from hidden bugs. For example, when I compiled one of my Adventures, I discovered a GOTO to a non-existent line. At least 20 people had previously played that Adventure and not one had hit that mistake. Thanks to the compiler, that mistake has now been eliminated.

A third benefit of the compiler is security. A compiled program is impossible to list and is much harder to decipher than machine language. If you want to hide your listing from curious eyes, the compiler will do the job nicely. Also, if you have some method of protecting your program from copying, the compiler will make it more difficult for pirates to figure out what you've done.

## Games

In the March *Bits & Bytes*, I had a look at Beach-Head and noted that some copies had a line of flickering garbage in the middle of the screen. Alpine Computing now informs me that all copies now being sold are free from this flickering. Moreover, Alpine has kindly offered to re-record the earlier copies free of charge. So, if you have a flickering version of Beach-Head, send the original tape to Alpine and it will fix it.

Last month I remarked that an important part of Hexpert's instructions was missing on the cassette card. Alpine has now corrected this, and all current copies of Hexpert have the full instructions.

This month I will take a look at five new games released by Alpine. Four of them are from Anirog, and one of them is from Romik. They all come on cassette tape, and they all cost \$24.95.

### Galaxy

Until this month I had played four Anirog games, and three had serious problems. I was beginning to wonder if Anirog knew what it was doing. Now, however, Anirog is back in my good books. Galaxy is its best game yet.

Galaxy is a good copy of the popular arcade game, Galaga. Little beasties swirl around the screen in intricate formations, and your job is to blast them to smithereens. Occasionally a mother ship will capture one of your fighters in a traction beam. Then, if you shoot the mother ship at the right moment, the

captured fighter is released to join your other fighter, and you can blast away with both of them.

The graphics and sound in Galaxy are good, but not spectacular. Movement is very smooth and the controls are responsive. There is, however, a noticeable limitation to the rate of fire: only two shots can appear on the screen at one time.

A lot of thought has gone into the design of Galaxy, and it is by far the most polished Anirog game I have seen. For example, players have the choice of using a joystick or the keyboard, and there are alternate keys for left-handed and right-handed players. Even in a two-player game, each person gets to choose his own controls. Such attention to detail makes the game a real pleasure.

The Galaxy tape uses a Turbo routine to load the program as fast as a 1541 disk drive. This is similar to the routines in the Arrow and Rabbit cartridges, except it is built into the program and requires no special hardware. Commodore 64 users who do not have disk drives will welcome the high speed of the Turbo loader. Keep in mind, however, that the faster the tape loads, the more susceptible it is to errors. To work reliably with the Turbo, cassette heads must be in correct alignment and they must be kept clean.

### Skramble

Although not quite as good as Galaxy, Skramble is another worth-while game from Anirog. As in the arcade game, you pilot your ship through six stages: rockets, cavern, fireballs, city, maze, and base. If you succeed in destroying the enemy base, you are taken back to the first stage for another run, but this time there are more obstacles and you consume fuel at a faster rate.

Dedicated games players will probably find the first run of Skramble too easy. There is a generous allocation of fuel and there is plenty of time to avoid most of the obstacles. Good players will have to advance to the second or third runs to find a real challenge. Beginners, however, will appreciate the relative ease of the first run. It gives them a real opportunity to figure out what's going on and what strategies to adopt.

The graphics in Skramble are quite good, but the sound is disappointing. Muffled explosions and monotonous throbs simply don't do justice to the game. When you push the fire button, a bomb is dropped and a rocket is fired, but no sound whatsoever is produced. It's almost as if the game were being played underwater.

Like Galaxy, Skramble uses the Turbo loader. Thus, instead of taking 10 minutes for its 32K to load, the program is ready to run in about one minute.

### The Dungeons

So far, every Anirog program I've seen has been a copy of an arcade game. This one, however, is something different. It is a computerised version of a Dungeon & Dragons adventure.

The beginning is fairly standard. On the basis of your attributes, you choose whether to be a magician or a fighter. Then, after buying suitable weapons and equipment, you enter the dungeons. Each dungeon is represented on the screen by a 3-D perspective of three walls. Exits are shown by door-shaped holes in the walls. Against this background, sprites are used to display the monsters and objects present in the dungeon.

The graphics are simple, but they work well. Unfortunately, the rest of the game doesn't. The main problem is that the game is tediously simple-minded. You wander from dungeon to dungeon, killing monsters and picking up treasure. There are only a few types of monsters, so you meet the same ones over and over. Most of them die at a single blow, and after a while it's no fun killing them.

Occasionally the tedium is broken by sudden death. Without warning you can starve to death, or suffocate, or fall into a pit. Or a monster which never hurt you before may suddenly find hidden stores of viciousness and kill you. This is frustrating and infuriating. For example, on numerous occasions I died of starvation without warning when I had plenty of food in my pack.

Frustrations also arise from the mechanics of the game. Single-key commands are used and misunderstandings often occur. For example sometimes E means EAT and sometimes it means EAST. As a result, it is easy to accidentally consume your scarce food supplies. In addition there is a serious problem when you hit D for DROP: you are forced to choose something to drop, and dropped items always disappear. On several occasions I accidentally hit D and had to decide which item to sacrifice.

The Dungeons seems to have been rushed to market without adequate testing. The input structure is poorly designed and needs to be much more user-friendly. Moreover, the game itself is short of good ideas and really needs further development.

### Dark Dungeons

The Dungeons was bad enough all by itself, but in fact it is the first instalment of a four-part series. Oh, dear. Dark Dungeons is the second part.

I must give credit where credit is due: Dark Dungeons does correct the problem with DROP. It is now possible to exist without being forced to drop something. Otherwise, however, Dark Dungeons is no better than The Dungeons.

Dark Dungeons is very similar to its predecessor. There are a few new monsters and a few new treasures, but otherwise the surroundings are pretty much the same. One innovation is that the dungeons are dark until you find a source of light; another is that you have to bid for supplies instead of just buying them. And of course there are some new ways of suddenly dropping dead. You can play Dark Dungeons without having first played The Dungeons. In fact, if you

Turn to page 76



## Debugging and error messages

By Tony Graham

Commodore computers when encountering a program error they recognise, display a short error message to indicate the nature of the error. For example:

```
SYNTAX ERROR IN 50
```

Knowing the type of error is one thing, actually finding it is another. Some errors are easily found, and for those that are not, using a logical system of debugging will save much frustration. The SYNTAX error is probably the most common, this message being displayed when the computer does not understand a command.

If GOSUB is entered as GOSOB, or PRINT entered as PPRINT, or if any other key word is mis-spelt a SYNTAX error will result. These are the most obvious errors and easily corrected.

Harder to spot are missing parentheses (brackets) in complex operations. Any operation must have the same number of lefthand parentheses as righthand parentheses.

The most subtle SYNTAX error occurs with the READ statement. The following short program will crash with SYNTAX ERROR IN 10.

```
10 READ D
20 PRINT D
30 DATA HELLO
```

The variable D is a numeric variable and the computer is expecting to receive a number; the DATA statement contains string data. The program will run if in lines 10 and 20 D is changed to D\$.

Let us assume you have a program which comes up with SYNTAX ERROR IN 140. LISTING 140 displays a line with multiple statements and no obvious error. With Commodore's editing features it is easy to insert a STOP:

immediately after a colon, but before where you suspect the error may be. Again RUN the program. If the STOP: is before the error the program will STOP with BREAK IN LINE 140. If, on the other hand, the SYNTAX error is reached before the STOP, the SYNTAX error will again be displayed. By moving the STOP to different positions on the line the offending statement can be located, making correction of the error much easier. Note that 5 bytes is required to insert a STOP: be sure to re-enter any characters pushed off the end of the line while editing.

The OUT OF DATA ERROR occurs when a READ statement is encountered and there is no DATA left to READ. If the READ is in a FOR - NEXT loop it is possible to ask the computer to print the value of the variable used in the loop, as soon as the OUT OF DATA message is displayed.

```
70 FOR X=1 TO 50:READ A
80 POKE Y+X,A:NEXT X
```

In the above example X is the variable used in the loop. If PRINT X is entered via the keyboard immediately the program crashes. The number of DATA statements read, less 1, will be displayed. That is, if X=50, 49 DATA elements will have been read. The OUT OF DATA ERROR occurs when an attempt is made to READ the fiftieth, there, is therefore, 1 DATA element missing. A common error is to use something like - FOR X=0 TO 50. This attempts to READ 51 elements of DATA, not 50 as many may suppose.

An alternative to find the number of DATA elements missing is to add a line of dummy DATA to the end of the existing DATA, i.e. 50000 DATA 1,2,3,4,5,6,7,8,9.

Now edit the line that READs the DATA, to PRINT it, i.e. READ A:PRINT A. The number of dummy DATA elements read will reveal the number of elements missing.

OUT OF DATA errors may also occur when due to other program errors DATA is not RESTORED before an attempt is made to READ for a second time.

THE OUT OF MEMORY error: unless a programmer has some knowledge of

how BASIC is stored it is difficult to explain how to avoid this problem. There is the possibility that the program is too large and nothing can be done, although it is much more likely for the programmer to be having difficulty with a program which should fit the machine.

One common cause of this error is failing to end a GOSUB routine with a RETURN, and then using a GOTO, which results in the re-use of the GOSUB.

Try this two-line program which ends with an OUT OF MEMORY error.

```
10 GOSUB 20
20 GOTO 10
```

After RUNNING these two-lines try PRINT FRE(0). You will find the free memory only about 20 bytes less than when you first turned on your computer. So why the OUT OF MEMORY error?

The answer is your computer has no free memory in an area known as the STACK. This is a temporary storage area the computer uses to hold the address to which it must RETURN after a GOSUB. If too many addresses are STACKED by GOSUBs without any RETURNS, the STACK becomes overloaded, the OUT OF MEMORY error being displayed. Only 24 GOSUBs are permitted, without any corresponding RETURNS as this two-line program will show.

```
10 X=X+1:GOSUB 20
20 PRINT X:GOTO 10
```

Another possible cause for the OUT OF MEMORY error is that a previously run program altered the pointers that keep track of BASIC's operation. These pointers are not reset with NEW but are reset with SYS64802 on the VIC. It is wise to exit from any program that manipulates these pointers with SYS64802 so as to leave the computer clear for further use, without the need to first switch off. An incorrect POKE into the pointer memory locations may also cause an OUT OF MEMORY error.

Avoiding wastage of memory by efficient programming is about the only other way of preventing the OUT OF MEMORY error, but that is a subject in itself.

If its micro news in Wellington — telephone Pat Churchill, 797-193.

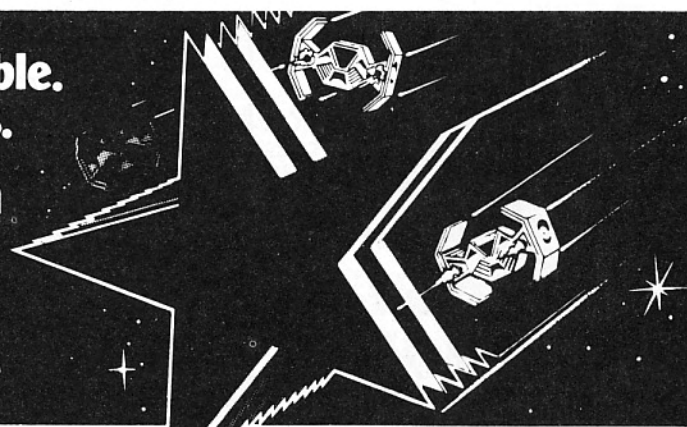
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## Picture tops

By Peter Archer

The VIC, with its unique video interface chip (from which the VIC takes its name), is capable of producing a very high quality picture on most televisions and monitors.

It is, therefore, a pity that some VIC owners are not achieving this potential high quality.

A common complaint often voiced by owners of earlier model VICs goes like this: "My picture has an interference type pattern which is worse when I play cartridge games". The cause of this complaint can almost always be traced to the modulator rather than the computer itself.

Early model VICs (those sold in N.Z. until about the end of 1982) had modulators which were not as good as those supplied more recently, although the more recent ones still do not approach the extremely high quality of the modulators fitted to the Commodore-64s. However, any VIC modulator can perform well if it is correctly tuned and well shielded.

Older-style VIC modulators can be recognised by their colour (matt black) and by the one small Phillips screw holding the two halves of the case together. Newer ones have a black-brown stippled finish and a small "made in Japan" label on one end.

If you carefully remove the screw (on the newer type the largest of the three screws on one end only), you will see a silver coloured box containing the actual modulator.

### Older type modulator

One of the reasons for poor picture performance is poor earthing of the outer case. This can be improved by scraping

the paint from around the screw to allow the screw to touch bare metal. Commodore (NZ) recommends to all its dealers that this be done by the dealers before sale, but some dealers may not have bothered.

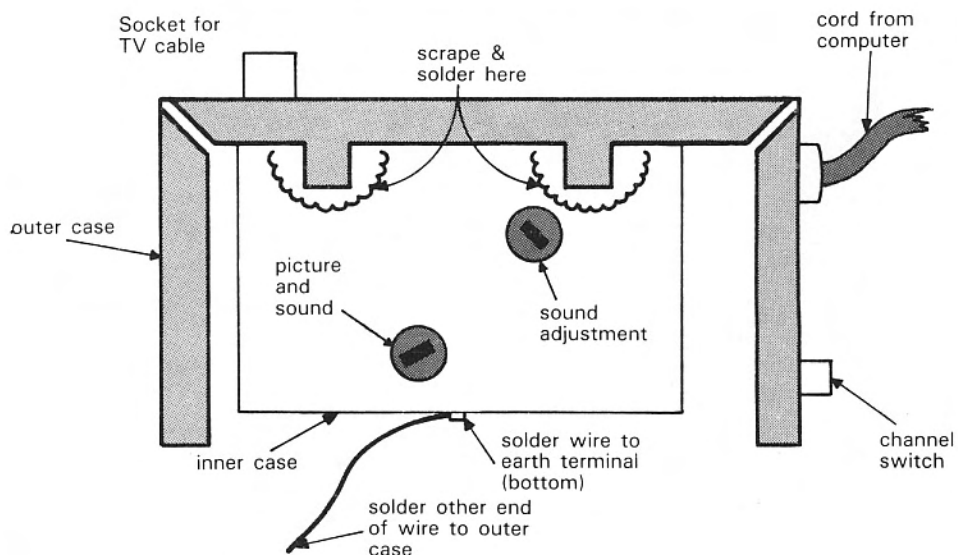
In some cases it may be necessary to go even further and solidly connect the two halves of the case together. To do this requires some skill with a soldering iron, so if you do not have this skill ask a friend who has the skill or take your modulator back to your dealer and show him this magazine article.

If you have the necessary tools and skill, cut a piece of multi-strand wire to about 4in long, and strip about half an inch from each end. Solder one end to one of the earth lugs on the inner (silver) case. To solder the other end to the inside of the detached part of the outer case, you will have to scrape some paint from a suitable spot on the inside of the case. Carefully work out the position that the wire will take prior to scraping the paint off. (There is not a lot of spare room). Tin both the wire and the case with solder and then solder the wire to the case. You will need a soldering iron of about 25 watts (no smaller and not too much larger.)

It may also be advisable to solder the inner case to the part of the outer case which stays attached to the inner case. To do this, refer to Fig. 1, and scrape the black paint off the outer case lugs and the chrome plating off the inner case from around the lugs. Tin both these areas and then solder them together. A fair amount of heat is required, but not an excessive amount.

I can confirm that the above does have a considerable effect, because some time ago a VIC owner for whom I had done this complained of a sudden deterioration in picture quality which had been perfect. On opening the case, I found that the solder connecting the outer and inner cases had somehow parted company. A one minute re-solder job restored the picture to its previous top quality.

FIG. 1 - Older type VIC modulator



## Modulator tuning

Some VIC modulators may be mistuned, or have drifted out of tune. Retuning should not really be attempted by anyone unless they know what they are doing, so if in doubt find a technically qualified friend or ask your Commodore dealer.

Older-type modulators have two tuning slugs visible through holes in the inner case (see Fig. 1), one affects picture and sound and the other sound only. To tune these requires a suitable small non-magnetic alignment tool. Never attempt to use a screwdriver. Other stop-gap tools pressed into service can be risky. I have seen more than one broken tuning slug resulting from the efforts of over-ambitious VIC owners.

If you have the necessary tool and expertise tune the picture first followed by the sound. I usually fit a cartridge game such as "Avengers" or "Star Battle" and have someone play the game while I tune both picture and sound. A program which provides a black screen background provides a more stringent test than the normal VIC power-up colours.

## Newer modulators

The newer VIC modulators can be treated similarly to the older ones, with the following exceptions:

- There are two screws holding the inner and outer cases together. These are located on the outside adjacent to the TV aerial lead socket. You can remove these and scrape the paint off from around them.

- The tuning slugs are hidden inside the inner case with no holes to allow access to them. Most modulators seem to have the earth wire from the aerial lead soldered on to the edge of the lid; this would have to be unsoldered. Also the inner case has to be unscrewed from the outer to remove this lid.

## Further tips

Try placing your modulator on top of the power supply case, especially the older style black metal type power supplies. This often improves picture quality as the magnetic field from the transformer seems to provide a shielding effect for the modulator.

Alternatively, rest the modulator on a metal plate. Or place it inside a metal box. Or even wrap it up in aluminium foil. All of these tricks have been known to work for some VIC owners.

Another trick is to form the lead between the modulator and the TV into a loop and wrap a length of aluminium foil around the doubled up cable. Now change the size and position of the loop for optimum picture quality.

If none of the above cure your problems, you should refer back to your Commodore dealer. There are several internal adjustments of picture signal strength and colour level inside the VIC case which can sometimes dramatically improve your picture. But these should only be done by a qualified person. Besides, if your computer is still under warranty, fiddling about inside the case may void the warranty.

## Vic fans!

This month we have started a regular VIC column - after numerous requests from VIC-20 users.

We hope you will support the column by reading it and sending any contributions or queries to our column co-ordinator, Peter Archer, P.O. Box 860, Nelson.

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# Gold, maze, and mine

By Paul Graham

I have just received a copy of the game, Gold Rush, by Craig Saunders. This game runs on an unexpanded VIC and is in 100 per cent machine code.

The object of the game: you are on a remote island in the South Pacific. You must go around a maze in a cave and collect gold left by pirates. The gold is in a pile at the top of the screen. You must carry your gold around the maze and place it in a cargo hatch, but an alien is in the maze and he shoots on sight.

Your only protection from the alien is to turn invisible until he has gone. Unfortunately your invisibility is short lived, so only use it when you need to. There is also a mine creeping towards your cargo hatch, which is at the bottom of the screen. The mine must be constantly pushed back to your starting position before it blows up your cargo. Sometimes you find gold coins at the position the mine starts from; try to collect them before pushing back the mine.

The maze you are in uses cleverly designed graphics, giving a 3-D effect. There are eight speeds at which the game can be played, from just bearable through to impossible. The game also has programmable screen and border colour with 16 possible combinations.

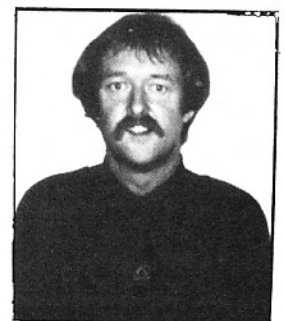
In general, Gold Rush is a good game considering the limited memory it requires. The game was written in New Zealand and compares well with imported software. Gold Rush is distributed by Viscount Electronics Ltd, P.O. Box 513, Palmerston North.

Price not supplied. — Editor.

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# APPLE

## Repeaterrr beefs up word processing

By John MacGibbon

As I use my Apple mainly for word processing, I have long felt a need for auto repeat on the keyboard. I had

considered doing a keyboard mod I'd read about in a magazine, but, not being much of a hardware hacker, I decided not to risk it.

Eventually I sent away for a device called the "Repeaterrr", which I saw advertised in the American Softalk magazine. I'm more than satisfied with the results.

The Repeaterrr, which costs \$US25, contains a couple of chips and a few other components, on a six centimetre long printed circuit board. It can be installed on any Revision 7 or above Apple which has a separate encoder board under the keyboard. I don't know whether it can be used on the IIe.

First step in installing it is to remove the keyboard encoder board. This is a fairly simple operation, made easier by a special tool supplied with the kit. The encoder board has 25 pins which connect it to the keyboard. The Repeaterrr has 25 holes that match and slide over these pins. Then a jumper wire is clipped on to a resistor on the encoder board, which is then clipped back under the keyboard.

The unit is pre-set to make all keys automatically repeat after they've been held down for 0.6 seconds. However, a variable resistor with a large knurled knob allows this to be easily adjusted between 0.3 and 1.3 seconds.

Adjusting the delay to zero turns the Repeaterrr off. The manual suggests this may be necessary for some keyboard controlled games. However, in practice we haven't needed to. The control can be easily reached with the cover of the computer off, but of course this is a hassle if you have a monitor sitting on top.

Being able to turn the repeat function on and off from the keyboard would be better, and I have since seen an American advertisement for a different unit that allows this.

One good feature of the Repeaterrr is that it uses the keyboard repeat key to double the repeat rate. In this mode the double-rate repeat begins immediately, rather than after the present delay. We've found this to be particularly useful for word processing, as it greatly speeds up cursor movement. It would also be useful for users of spreadsheets like Visicalc or Multiplan.

This auto repeat works for all keys, including those for cursor movement. Using it in conjunction with the control key enables very fast scrolling, deletion and other editing functions.

For an additional \$10 an optional shift key modification is supplied with the unit. This gives a shift-key to game I/O connection while supplying a plug-in connector to keep the game I/O open for the paddle plug. I did not need this as I already had a shift key modification.

Our humble Apple has now become quite a supercharged wordprocessor. First a lower case chip let us see writing as it was meant to be writ, then we bought a Vision 80 card to see the full page width, and now with the Repeaterrr we can zip around the screen at a great rate. What beats me, though, is why Apple Computer Inc didn't include these things in the first place. Apart from lower case, it doesn't even put them on the newer IIe.

The Repeaterrr is available from High Order Micro Electronics Corporation, 17 River Street, Chagrin Falls, Ohio OH 44022, USA. The price is \$US24.95, or \$US34.95 with the optional shift key modification.

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# Exciting challenges in Econet

By Pip Forer

The 6502 second processor is finally here. In spite of the temptation to rush out comments on it, however, I will take time to savour its capabilities and report next month. This month we will discuss Econet generally and review some user-group software from Britain.

As most readers will know, Econet is a proprietary Local Area Network (LAN) for the BBC microcomputer. Any BBC can have an Econet capability through the insertion of an Econet ROM and some associated hardware. This then allows the machine to plug in to an Econet LAN. The LAN itself comprises other BBC machines (or other Acorn marques) connected by twisted-pair wiring and with a system clock to give everyone a common timing signal. Data and files can be transferred through the wire at a maximum speed of 400,000 bits per second (or 5000 bytes per second). This is slow by certain mainframe standards and expensive office LANs but outpaces most micro networks and certainly those utilising the RS-232 protocol.

Econet has three distinct purposes. One is to allow several users to share expensive peripherals. A group of machines can share a printer and disk drives (of course, there is no reason why individual machines on the network can't have their own peripherals, too). A second purpose is co-ordination and common access. By sharing the same physical resource common files or programs can be downloaded and a group of users can integrate their activities. A final purpose is interaction between users. Independent of any files or peripherals different users can communicate with each other. Although these three aspects often get confused they are in fact quite separate functions of a network. The first is simple


economics but the latter two functions expand the general capabilities and potential ways of using the computer.

The network often has at least three sorts of stations on it. Apart from standard user stations there is a disk file server and a printer server. In fact, there may be more than one of each of these. What is often overlooked is just how much more a network is than just links to a printer or disks.

The Econet software, for instance, consists of at least four components. One or all of these can be active or present at any time. One is the network filing system. There are two levels to this and in Econet III the options include directory hierarchies and various network access controls such as

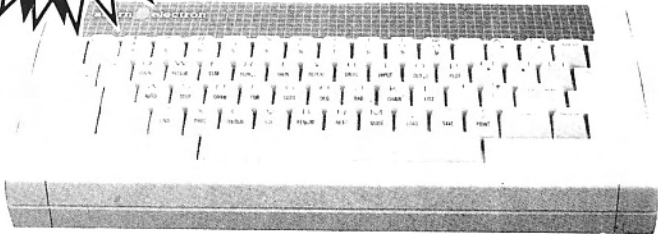
passwords. People tend to see the file server as the heart and reason for the network, which rather overstates its importance. A second is the printer-server software, which in Econet is ROM based and sits very satisfactorily as a background task in any machine running it. The third set of commands are routines to pass messages, screen contents or control between one station and another. It is possible, for instance, to look at other users' screens or take over another user's machine by usurping the keyboard. However, these are in fact just routines which use a final and extremely flexible level of the software. These are the network primitives.

Network primitives allow the user to define blocks of memory to move




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## Speeding up tape storage

By Gordon Findlay

In the April issue I wrote a little about saving data on tape. By coincidence I received a tape from Alistair Symes with a program which used a machine-code routine to speed tape storage. Alistair's program is used to store screens of information on tape. What follows is Alistair Symes's explanation of his routine, and a BASIC program which uses it.

Alistair also has a hardware interface and BASIC program which he uses to send and receive Morse code using a System 80. If you are interested in this you could write to him at 5 Gilwell Street, Christchurch 6.

Here is his article:

"If you have a 'tape-based System 80' and wish to save screen loads of information on tape, you probably realise only too well how slow and boring this can be. Wouldn't it be more interesting if the text scrolled on to the screen while the tape is loading? Also, wouldn't it be nice to shorten the loooooongggg leader?

"Being a novice at assembly language I decided to make this my first task and have learnt a lot about assembly language in the process. Anyway why these computers have such a long leader I'll never know. After experimenting with different leader lengths, I found 50 bytes was adequate to give time for the tape motor to start and stabilise. This is the absolute minimum. Any less and synchronisation would be difficult to establish.

"The tape read routine in ROM at 0296H reads the tape until an A5 byte is found and synchronises with the tape ready to read the text. If this isn't done sync. is lost and all sorts of interesting things appear on the screen. But I wasn't interested in random graphic displays. I have remarked the assembly listing fairly thoroughly. To the pro's this is probably fairly basic stuff. But as for me, by the time I had got the bugs out of it, my brain was running a temperature.

### ICL Videotex

The ICL Bulletin videotex system will carry a Bank of New Zealand foreign-exchange information service, which is expected to have more than 250 corporate customers. Financial directors of the customer firms will be able to access current exchange-rate information round the clock from terminals on their desks. It will also carry commentary and forecasts.

"I then assembled it into memory (after filling high memory with zeros to find where it started and stopped), peeked at it and listed the result. I can't seem to find a way of doing this with 'EDTASM'.

"Machine language is very fast. To give an example of how fast, there is a subroutine in ROM (235H) that calls another routine (241H) eight times to read just one byte from tape! [Each call reads one bit, and the eight bits are assembled into one byte — Ed.]

"The resulting program in 'BASIC' lets you get out a screen full of text in upper case and lower case using the keyboard like a regular typewriter (i.e. the shift key is used for capitals). The flashing cursor block is positioned with the arrow keys and large graphic blocks (CHR\$(191))

can be inserted using the shifted arrow keys. When the screen is ready for recording, 'NEWLINE' is pressed, providing the tape is set to record. If all is well the screen will be dumped to tape with only a 50 byte leader and no stops. It is amazing just how much text you can store on a C10 cassette.

"To read from tape the selected number is pressed and the text will scroll on to the screen almost immediately. It is very important that the tape is positioned correctly because of the small leader.

"I hope to write another small machine-language routine to give a printed copy of text in the near future.

"I hope you find this utility as useful as I have. If you have any problems with the program write to me and I will try to help you out."

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# TRS80/SYSTEM 80

```

15 DIMN(64)
20 CLS:PRINT@145,"FAST STORAGE FOR TAPE
SYSTEMS":PRINT@209,STRING$(28,131)::PRINT@277,"BY A.C.O. SYMES (C)"
30 PRINT@448,"PRESS 'NEW LINE' WHEN SCREEN HAS BEEN SET OUT READY TO
RECORD":
50
FORX=32500TO32526:READD:POKE X,D:NEXT:FORX=32530TO32567:READD:POKE X,D:
EXT
60
DATA38,0,60,1,192,3,205,18,2,205,150,2,205,53,2,119,35,11,120,177,194
0,127,205,248,1,201
70
DATA205,18,2,62,0,6,50,205,100,2,16,251,62,165,205,100,2,33,0,60,1,19
,3,126,205,100,2,35,11,120,177,194,41,127,205,248,1,201
80 GOTO610
90 IFINKEY#=""THEN90:ELSECLS:S=15360
100
C=PEEK(S):IFS>16320THENS=16320ELSEPOKES,143:FORX=1T05:NEXT:POKES,C
105 A#=#INKEY#:IFA#=""THEN100ELSEA=ASC(A#)
110 IFA>64ANDA<91A=A+32ELSEIFA>96A=A-32
115 IFA<32ORA=91THENS300
120 POKES,A:S=S+1:GOTO100
300 IFA=8ANDS>15360THENS=S-1:GOTO500
310 IFA=9ANDS<16383THENS=S+1:GOTO500
320 IFA=91ANDS>15423THENS=S-64:GOTO500
330 IFA=10ANDS<16256THENS=S+64:GOTO500
335 IFA=31THEN90
340 IFA=25A=191:GOTO120
350 IFA=24ANDS>15360POKES,191:S=S-1:GOTO100
360 IFA=27ANDS>15423POKES,191:S=S-64:GOTO100
370 IFA=26ANDS<16319POKES,191:S=S+64:GOTO100
380 IFA=13THENS600
400 GOTO100
500 C=PEEK(S):IFS>16320THENS=16320
502 IFFEEK(15359)=0THEN100
505 POKES,143:FORX=1T03:NEXT:POKES,C
510 GOTO115
600
610 PRINT@960,"1. TYPE TO SCREEN --- 2. LOAD FROM TAPE --- 3. LOAD TO
TAPE":
700 A#=#INKEY#:IFA#=""THEN700ELSEA=ASC(A#)
710 IFA=51THENPOKE16526,18:POKE16527,127:X=USR(0):GOTO610
720 IFA=49THEN90
800 IFA=50THENPRINT@960,"PREPARE TAPE AND PRESS 1. TO LOAD --- OR ---
2. TO CANCEL "
810
A#=#INKEY#:IFA#=""THEN810ELSEIFA#="1"THENCLS:POKE16526,244:POKE16527,1
6:X=USR(0):GOTO610
820 IFA#="2"THEN610ELSE900
Basic program for storing information by screen.

```

```

00090 ;-----
00091 :: TAPE READ / WRITE ROUTINE BY A. SYMES :
00092 :: FOR BASIC POKE 16526,244:POKE16527,126 :
00093 :: TO ACCESS THE READ ROUTINE AND :
00094 :: POKE16526,18:POKE16527,127 FOR THE :
00095 :: WRITE ROUTINE. MEM SIZE? 32500 :
00096 ;-----
00097 ;
00098 ;
00099 ;
00100 GETBYT EQU 0235H:ROUTINE TO READ BYTE FROM TAPE
00120 RDRON EQU 0212H:TURN ON RECORDER MOTOR
00130 RDROFF EQU 01F8H:TURN OFF RECORDER MOTOR
00140 RDTAPE EQU 0296H:READ TAPE UNTIL A5 BYTE FOUND
00150 CLS EQU 01C9H:CLEAR SCREEN
00170 WRTBYT EQU 0264H:ROUTINE TO WRITE 'A' TO TAPE
00220 ORG 32500
00230 READ LD HL,3C00H ;START OF SCREEN
00231 LD BC,960:NUMBER OF BYTES TO READ
00235 CALL RDRON:TURN ON RECORDER
00240 CALL RDTAPE:READ UNTIL 'A5' FOUND
00250 LOOP2 CALL GETBYT:READ BYTE FROM TAPE
00260 LD (HL),A:PUT BYTE TO SCREEN
00270 INC HL:BUMP SCREEN POS
00280 DEC BC:UNBUMP COUNT
00290 LD A,B:CHECK - IS BC
00300 OR C:ZERO YET?
00310 JP NZ,LOOP2 ;IF NOT ZERO GO BACK
00320 CALL RDROFF:ALL DONE, TURN OFF RECORDER
00330 RET ;RETURN TO BASIC
00640 ORG 32530
00650 WRITE CALL RDRON:TURN ON RECORDER
00660 LD A,00H:LOAD 'A' WITH ZERO
00670 LD B,50:LEADER OR 50 BYTES
00680 WB CALL WRTBYT:WRITE 'A' TO TAPE
00690 DJNZ WB:DEC B UNTIL DONE
00700 LD A,0ASH:LOAD A WITH A5 SYNC BYTE
00710 CALL WRTBYT:WRITE IT
00720 LD HL,3C00H ;START AT BEGINNING OF SCREEN
00730 LD BC,960:NO. OF SCREEN POSITIONS TO WRITE
00740 RITE1 LD A,(HL):LOAD A WITH CONTENT OF SCREEN
00750 CALL WRTBYT:WRITE 'A' TO TAPE
00760 INC HL:BUMP HL
00770 DEC BC:UNBUMP COUNTER
00780 LD A,B:CHECK - IS BC
00790 OR C:ZERO YET?
00800 JP NZ,RITE1 ;OF NOT ZERO GO BACK
00810 CALL RDROFF:TURN OFF RECORDER
00820 RET ;RETURN TO BASIC
00830 END

```



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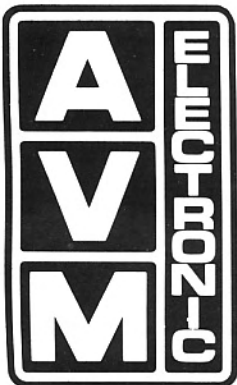
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## BOOKS

### Good stuff, good shape

*"Get More from the VIC 20"* by Owen Bishop, Granada, 185pp, \$19.95. Reviewed by Steven Darnold.

Owen Bishop knows a lot about the VIC, and he writes very well. He provides a wealth of useful information in a lively, lucid style in a book which would be a worthwhile acquisition for anyone wanting to delve deeply into the mysteries of the VIC.

The first two chapters start right at the beginning with a description of how to set up the computer. This is followed by a thorough tour of the keyboard. Although most users will not require such a detailed explanation of the basics, this does make the book suitable for even the most rank beginner.

The third chapter plunges swiftly into programming by introducing the POKE statement and using it to build some simple, colourful programs. Thereafter, new statements and commands are introduced gradually and used in simple programs, many of which involve some interesting graphics or sound.

The latter half of the book deals with advanced techniques of graphics and sound. This includes animation and sound envelopes. Even fairly experienced VIC users will find much to learn from this section.

"Get More from the VIC 20" is a very demanding book and will not suit the more pedestrian user. However, for those who want to fully explore the capabilities of the VIC, it is ideal.

### Not to be missed

*"How to use the Timex-Sinclair Computer"* by Jerry Willis and Deborah Willis, Dilithium Press, 124pp, \$9.50. Reviewed by Euan J. Davidson.

Jerry and Deborah Willis, who have a long association with the Timex-Sinclair computer (as the Sinclair ZX-81 is known as in U.S.A.), have written a book that is a must for anyone who has just obtained a ZX-81.

They take the reader through from the bits and pieces that come with the unit to add-on accessories which are unfortunately available in U.S.A.

but not here.

In a very easy-to-follow style, they clearly explain how to set up the ZX-81 as you unpack it, and how to LOAD and SAVE programs using an audio-cassette recorder. They go to great lengths to cover all the likely problems.

Excellent details of the Sinclair Basic are covered in chapters entitled "Basic" and "More Basic" where related keywords and functions have been gathered together (e.g. PRINT, AT, the comma, semi-colon and Tab) for discussion and comparison.

Many short programs are used to illustrate the text throughout the 124 pages. Some of the programs later in the book are described in great detail for the benefit of the beginner.

This simply written, easily understandable and logically planned book should be the very first for the new, inexperienced ZX-81 owner. And at only \$9.50, it is most affordable.

### Right on target

*"The IBM PC-DOS Handbook"* by Richard Allen King - Sybex, 296pp, \$21.95. Reviewed by Paul Cull.

This book is divided into two main parts. The first, chapters one to eight shows how the assembly language programmer can use the DOS functions available. The second section covers PC-DOS from the advanced user's point of view, discussing the less often used commands and utilities. A chapter of tables and maps, and an appendix comparing PC-DOS with MS-DOS,

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## BOOKS

completes the book.

Section one describes in detail the various DOS and BIOS functions available to the programmer. Versions 1.0, 1.1, and 2.0, are discussed and compared throughout. Function calls covered include file, screen, and keyboard handling, from DOS and BIOS. Handling the parallel printer and serial ACA (RS.232) ports, is also described in detail. Other topics include disk organisation, graphics handling, and the new DOS 2.0 features.

The second section describes the less common DOS commands, and is intended for the advanced user. Topics covered include EDLIN (described as a "funny little editor"), DEBUG — and batch files. The serial port is discussed in a separate chapter, as is DOS 2.0.

Other interesting "bits and pieces" covered, include editing DOS command lines, finding your way around IBM's PC-DOS manuals, and responding to disk errors. The "tables and maps" chapter summarises such things as DOS, EDLIN, and DEBUG commands, DOS function calls and memory maps, to name a few.

This book fulfils its intended purpose as an information reference manual. It is well presented and useful, and I recommend it to anyone writing assembler programs for the PC as well as to those users who want to know more about the features of PC-DOS.

## Don't let the title fool you

*"Troubleshooting and Repairing Personal Computers" by Art Margolis. TAB Books, 312pp, \$31.95. Reviewed by Ted Brown.*

This weighty book of 21 chapters, has a misleading title. It would be better described as an overview of the chips and circuitry of small personal computers. It gives a very good account of each chip and its internal workings, then shows how it ties in with the other chips in the computer.

The book has been slanted at television and general electronic servicemen — and with the type of

knowledge they have acquired over the years, would be very useful for them. For ordinary home computer owners, its value is in describing fairly thoroughly how everything works.

I take marked exception to the blurb on the back cover that says it will show you how to repair all computers from ZX81 to IBM PC; from TS1000 to Commodore 64. The only example used throughout the whole book is the TRS-80 Colour Computer and right at the very end, the Zenith Monitor. For owners of the Tandy Colour Computer it would be very useful — indeed, a wise investment.

The author has a very good knowledge of servicing and assumes others have the same intuitive feel for fault finding. I'm afraid the average computer owner doesn't have so much of this and needs more guidance than given in this book.

In the book reviewed, pages 217 to 248 were duplicated — after coming to page 248 one comes across 217 to 248 again. This apart, the book is very informative, but not from the viewpoint of the title.

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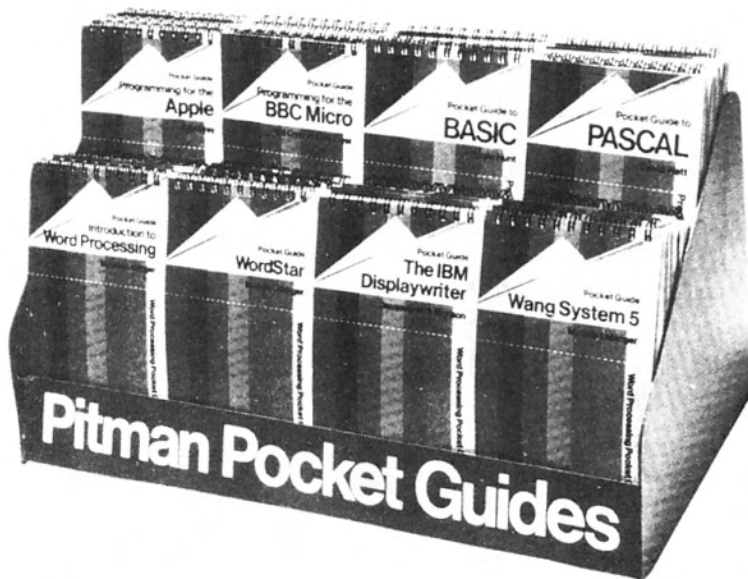
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## A low key approach to music

By Gary Parker

The Spectrum has an inbuilt speaker which can produce musical notes, but it is seldom used to its full potential. This is probably because the volume is poor, and tunes are not easy to program.

Why is the Spectrum's speaker so quiet? I think the Oric computer may provide the answer. The Oric has an inbuilt speaker like the Spectrum, except that the volume is much higher. It sounds much better when the computer is playing music, but when other computations are going on, the speaker buzzes and squeaks. This is because the speaker picks up interference from the rest of the computer. So perhaps Sinclair

decided to avoid this problem by reducing the volume.

To appreciate Spectrum sound more fully, you should plug the mic lead from the computer into the ear lead of your cassette recorder. With most recorders, the sound will be amplified if you start the recorder playing, but make sure that you don't leave a tape in it.

If you want to hear some really impressive sound from your Spectrum, you should connect it to a stereo. The larger speakers will give a far better base response, changing tinny pings into throaty booms. Try it, the improvement really is amazing.

Tunes are not particularly easy to program because notes must be represented as numbers, and this involves some tedious conversions. The Spectrum uses a system whereby each of the 12 semi-tones in an octave is represented by an integer number, with 0 being middle C. Written music is not easy to convert to this system, especially when more than a few notes are involved.

Here are some examples:

- a will play the A which is two notes below middle C.
- d will play the D which is one note above middle C.
- c+1 will play the C which is one octave higher than middle C.
- d#-2 will play the D sharp which is two octaves below middle C.

Do not worry too much about which octave you enter the tune in, since it is easy to change the scale of the whole tune later.

The note may also be a p, in which case there will be silence for the duration specified.

Once you have entered your tune, press q instead of a number for the duration, and the tune will begin to play. While it is playing, you can press t to change the tempo (the length of the notes), or g to change the length of the gaps between the notes, or s to change the scale of the tune, (for instance, -1 will lower the tune an octave), or a to add more notes to the end of the tune.

The notes are stored in a three-dimensional string array, and you can save the tune with the program, by breaking into the program and using SAVE "tune" LINE 100. Then you can continue with GOTO 100.

The program is set to allow up to 500 notes to be stored, but on a 48K Spectrum you can store over 4000 notes by changing the DIM statement in line 290 from 500 to 4000 or so. However, the bigger the array, the longer it takes to save, so don't declare a huge array which you will never fill.

```

107 IF IN 65022=175 THEN INPUT
"Change gaps from ";(gap); " to ?
:gap
109 FOR k=1 TO gap: NEXT k
110 LET length=VAL a$(c,1,1 TO
) #met
120 LET c#=n$(1)
140 LET note=-3*(c#="a")-(c#="b
")+2*(c#="d")+4*(c#="e")+5*(c#="
f")+7*(c#="g")
200 IF c#="p" THEN FOR k=1 TO l
length#150: NEXT k: GO TO 100
210 IF n$(2)="#" THEN LET note=
note+1
220 IF n$(2)="#" THEN LET note=
note+(VAL n$(3)#12)
230 IF n$(3)="#" THEN LET note=
note+(VAL n$(4)#12)
240 IF n$(2)="-" THEN LET note=
note-(VAL n$(3)#12)
250 IF n$(3)="-" THEN LET note=
note-(VAL n$(4)#12)
260 LET note=note+ofs
270 GOTO 100
290 DIM c$(1): DIM b$(3): DIM a
$(500,2,4): LET c=0
300 LET c=c+1
310 INPUT "Duration: ";b$
312 IF b$(1)="#" THEN LET a$(c,
1)="q": GO TO 320
315 LET a$(c,1)=STR$(VAL b$/10
0)
320 PRINT b$(1 TO 3)
330 IF b$(1)="#" THEN GO TO 60
340 INPUT "Note: ";a$(c,2)
350 PRINT a$(c,2,1 TO )
360 INPUT INKEY$;"y"
365 IF a$(c,2,1)="#" THEN GO TO
60
370 GO TO 300
    
```

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```

1 REM SPECTRUM MUSIC-MAKER
10 GO TO 290
80 LET lim=c: LET c=0: LET met
=#: LET gap=0: LET sc=0: LET ofs
=#
90 CLS
100 LET c=c+1: IF c=lim THEN L
ET c=1: PRINT "PAPER RND#5+1)";
:POKE I 23692,255
102 IF IN 65022=189 THEN INPUT
"Change scale from ";(sc); " to ?
:sc: LET ofs=12*sc
103 IF IN 65022=190 THEN LET c=
lim-1: CLS: GO TO 300
105 IF IN 64510=175 THEN INPUT
"Change tempo from ";(met); " to
?";met
    
```

## SOFTWARE

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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.

**Boot:** To load the operating system into the computer from a disk or tape. Usually one of the first steps in preparing the computer for use.

**Bubble memory:** A non-volatile memory (i.e., it is not erased when the power is turned off). The information is stored as microscopic pieces of magnetic polarisation.

**Buffer:** An area of memory used for temporary storage while transferring data to or from a peripheral such as a printer or a disk drive.

**Bug:** An error in a program.

**Byte:** Eight bits. A letter or number is usually represented in a computer by a series of eight bits called a byte and the computer handles these as one unit or "word".

**CAL:** Computer Aided Learning CAL programs are written to take different actions on different student answers.

**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.

**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).

**LAN:** Local area network. A communications network linking a number of stations in the same "local" area — usually a building or the area within a radius of a kilometre.

**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.

**Logic seeking:** In such a printer, the head-control microprocessor works out the shortest distance to travel to the start of the next line.

**Machine language:** The binary code language that a computer can directly "understand".

**Mainframe:** The very large computers that banks and other large businesses use are called mainframes. Also in microcomputers the term is sometimes used to describe the core of the machine, i.e. the CPU plus memory.

**Mass storage:** A place in which large amounts of information are stored, such as a cassette tape or floppy disk.

**Megabyte (or Mb):** Represents a million bytes.

**Memory:** The part of the microcomputer that stores information and instructions. Each piece of information or instruction has a unique location assigned to it within a memory. There is internal memory inside the microcomputer itself, and external memory stored on a peripheral device such as disks or tape.

**Memory capacity:** Amount of available storage space, in Kbytes.

**Menu:** List of options within a program that allows the operator to choose which part to interact with (see Interactive). The options are displayed on a screen and the operator chooses one. Menus allow user to easily and quickly set into programs without knowing any technical methods.

**Microcomputer:** A small computer based on a microprocessor.

**Microprocessor:** The central processing unit or "intelligent" part of a microcomputer. It is contained on a single chip of silicon and controls all the functions and calculations.

**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.

**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.

**PIPS:** Pan Information Processing System. An information-processing package that runs on Sord computers.

**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.

**Raster graphics:** In this method, images are built up by a succession of parallel movements of the spot on the terminal, in a similar manner to a television picture. That is, each line is not traced as a continuous movement.

**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.

**Spooling:** This is when a microcomputer can proceed with other tasks while output is printed from a buffer in the printer. An acronym for simultaneous peripheral output on line.

**Sprocket feed:** See pin feed.

**Structured programming:** An approach to program writing that puts emphasis on over-all program design, readability, and other features.

**System:** A collection of hardware and software where the whole is greater than the sum of the parts.

**Tractor feed:** A type of paper feeding system for printers. Special computer paper with holes along both sides is fed by the tractors gripping these holes.

**VDU:** Visual display unit. A device that shows computer output on a television screen.

**Word:** A group of bits that are processed together by the computer. Most microcomputers use eight or 16 bit words.

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## Advertiser Index

|                              |            |
|------------------------------|------------|
| Alpine Computing             | 12, 52, 63 |
| ANZ Books                    | 72         |
| Anderson Digital Equipment   | 23         |
| AVM Electronics              | 33, 71     |
| A.W.A.                       | 15, 45     |
| Auckland Microcomputer Show  | 58         |
| Auckland University Bookshop | 72         |
| Barr Bros                    | 4          |
| Barson Computers             | 44         |
| Beechey and Underwood        | 34         |
| Bits & Bytes                 | 46, 56, 70 |
| Byte Shop                    | 31         |
| Bulk Distributors            | 64         |
| Casio Modular Systems        | 54, 71     |
| Century 21 Computers         | 57         |
| Commodore Computers          | 5, 61      |
| Computer Games Rentals       | 64         |
| Computer Plus                | 51         |
| Computer Store               | 29, 50     |
| Delairco Electronics         | 8          |
| Dick Smith Electronics       | 7          |
| D.R. Britton                 | IFC        |
| Einstein Scientific          | 68         |
| Electric Apple               | 71         |
| Genesis Systems              | 19         |
| Harris Electronics           | 66         |
| Hauraki Computers            | 60         |
| K'Rd Computers               | 49         |
| James Electronics            | 71         |

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|---------------------------|--------|
| John Gilbert Electronics  | 67     |
| John McIndoe              | 53     |
| Living in Electronics     | 26     |
| Manawatu Polytechnic      | 42     |
| Manuakau Computers        | 35, 74 |
| MDL                       | 3      |
| MEC                       | 24     |
| Micro Business            | 71     |
| Microcomputer Specialists | 56     |
| Molymerx                  | 69     |
| Monaco                    | 11     |
| Moonshine Computers       | 41     |
| NZ Computer Games         | 66     |
| Penguin Books             | 9      |
| P.C. Power                | 6, 13  |
| Pitmans Publishing        | 73     |
| Polyprocessor Products    | 74     |
| Raytronics                | 71     |
| S.D. Mandeno              | 30     |
| Skellerup Microsystems    | IBC    |
| Silkwood                  | 25     |
| Sirius Systems            | 47     |
| Software Shop             | 48     |
| Software Supplies         | 74     |
| Solstat Industries        | OBC    |
| Sord                      | 32     |
| Spacific Software         | 50     |
| Supatech Electronics      | 65     |
| Tower Computing           | 67     |
| West City Computers       | 27, 71 |

# COMMODORE 64

## From page 62

are interested in this sort of game, I suggest you start with Dark Dungeons. It is slightly less tedious.

## Dicky's Diamonds

I liked this game right from the beginning. It has marvellous theme music, good graphics, and several playing options. Not only is there a place for nine names on the high score table, the table can be saved on tape and reloaded later. A lot of thought has gone into the presentation of Dicky's Diamonds.

So much for the good news. The bad news is that the average person will find it almost impossible to succeed at Dicky's Diamonds. The main problem is that the goal of the game is very hard to understand. The written rules do their best to explain the game, but until you actually win for the first time, you don't really understand what's going on.

To make matters worse, the game's default options produce a rather difficult game. Beginners haven't a hope unless they choose the "unlimited flights" option. The author really should have used "unlimited flights" as his default. Moreover, he should have designed his demo game to show a winning move; that way beginners would have a better idea of what to do.

A further problem arises because of the nature of joysticks. Dicky's Diamonds is played on a spider's web, and there is a lot of movement along the diagonals. Unfortunately, diagonals do not register as reliably on a joystick as the four cardinal directions.

Joysticks have only four switches (for the cardinal directions), and the diagonals depend on two switches being set. If the joystick does not hit both switches at precisely the same instant, the diagonal may be missed. This is very important in Dicky's Diamonds because once you start down a particular strand of the web, you can't turn back. It is very easy to miss a diagonal and end up moving a considerable distance down the wrong track.

Fortunately you can avoid this problem by using the keyboard option instead of the joystick. However, I found the keys awkward to use and soon switched back to the joystick.

Dicky's Diamonds is a nicely polished program, but most people will find it difficult to learn and awkward to play.

The winner of April's competition was Linton Miller of Thames. Linton has been sent a copy of Kong (donated by Alpine Computing).

The prize for this month's competition is a cassette tape of Galaxy (donated by Alpine Computing). Entries close on June 25. The winner will be selected randomly from among the correct entries. Only one entry per person.

Your task this month is to write a program which uses two multi-colour sprites, side-by-side to display the New Zealand flag in the middle of the screen. Send the program with your name and address to Galaxy Contest, P.O. Box 201, Alexandra.

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# IBM

## Personal Computer



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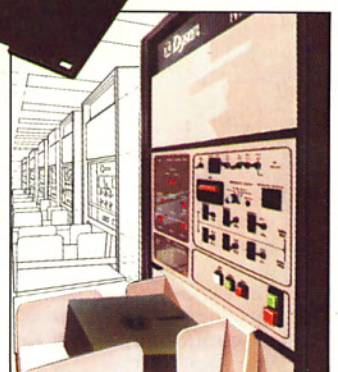
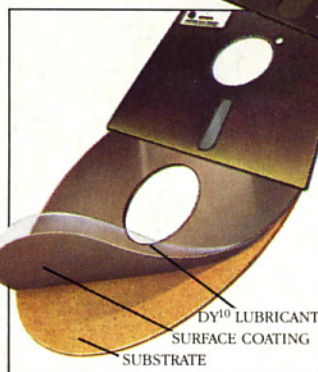
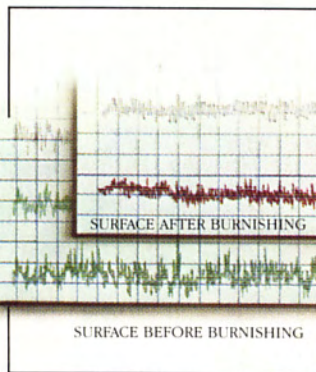
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## 1. 100% Surface Tested

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