

NEW ZEALAND'S PERSONAL COMPUTER MAGAZINE

BITS & BYTES

Bumper program special

- pages of programs to type and try

December/January 1984-5: \$2.00

**Buyers' Guide to
Computers \$2000-\$7000**

Sales tax slashed
- what it means in
dollars and cents

The Morrow
- the best value for
money computer
in NZ?

Zenith 150
- more than
just another
IBM compatible?

Simplot graphics package

Superbase for
Commodore 64

Turbo Pascal

Columns for 10
computer brands



New Apple computer reviewed - Ilc is to believe!



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BITS & BYTES

December, 1984 Vol. 3, No. 2

ISSN 0111-9826

FEATURES

Buyer's Guide: part two

Computers from \$2000 to \$7000 - what's around, what does it do and what does it cost? Gordon Findlay provides many of the answers.

16

Hardware reviews

It is to be believed, say the Wong brothers, Alex and Fred, after their experience with the latest from the Apple crop. Check out their tastes.

Shayne Doyle reckons Zenith's new IBM-PC compatible, the Z150PC, has a lot going for it. Find out why.

John Slane lines the Morrow MDII up against the Kaypro 10. See how they compare.

41

Zenith Z150PC.....36

36

39

Software reviews

Derham McAvan has discovered what he hopes is the first of a new breed of software houses while using Turbo Pascal. Superbase 64 is a powerful general purpose database management system for the Commodore 64 with a lot to offer, according to our reviewer Ian Douthwaite. His assessment.

44

50

Beginners

Gordon Findlay tours the peripherals of this computing business. Go along with him.

68

Program special

Our bumper Christmas holiday program special. Have we got something for you?

54

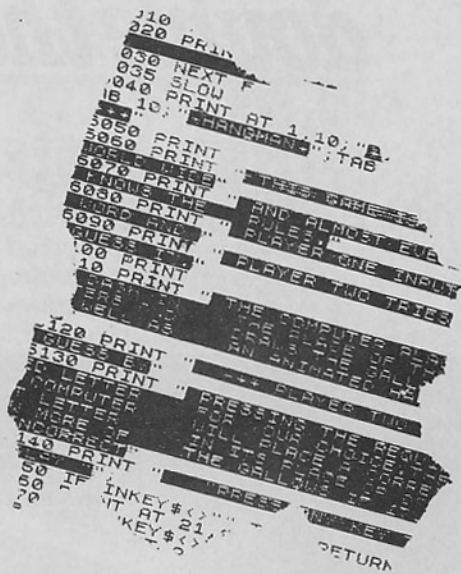
Program special.....54

COLUMNS

Atari: A taste of Pieman and a battle with the mad bomber	82	nothing	74
BBC: The long-awaited Logo and Pascal	77	Sega: Memory scanning	83
Commodore 64: Do-it-yourself Auto-run and a mixed bag of games.	69	Specta-video: Drawing and picture commands	79
Commodore: The screen merge	72	Spectrum: Half a dozen for holiday reading	85
IBM: Almost something for		TRS80 System 80: Help at hand for loading	86
		VIC: Eight out of 10 at the best	73

REGULARS

Advertiser index	92	Classified Advts	92
Book Club	45	Micro moments	7
Book Reviews	87	Micro News	6,7,8,10,12,14



Morrow MDII.....39

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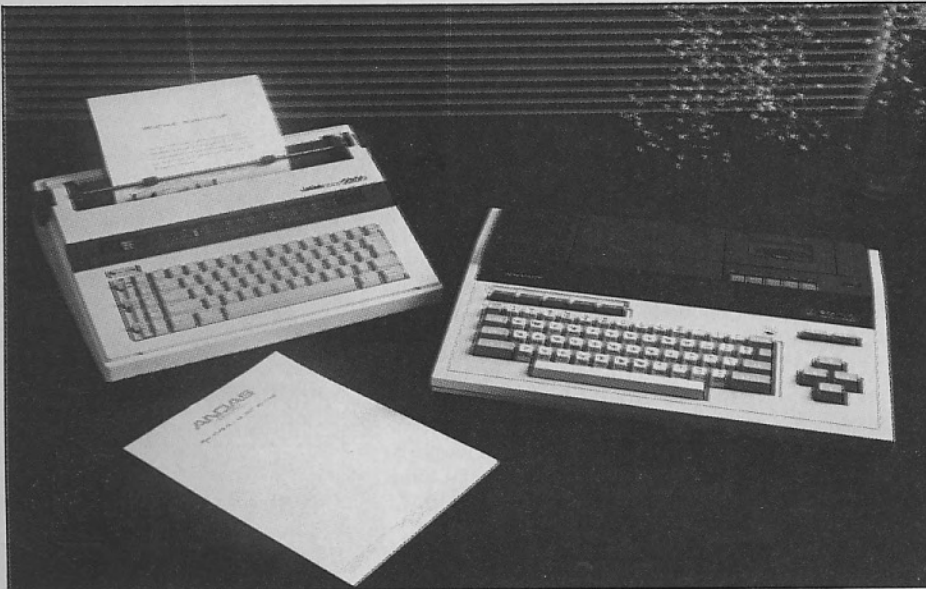
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<input type="checkbox"/> Paper Width — 12 inches	<input type="checkbox"/> Tab Set Tab Clear
<input type="checkbox"/> Printing Width — 9 inches	<input type="checkbox"/> Repeat Key (all keys) Index Key
<input type="checkbox"/> Interline Space — 1, 1.5, 2	<input type="checkbox"/> Relocate
<input type="checkbox"/> Keybuffer Memory — 12 characters	<input type="checkbox"/> Scientific signs and symbols Superscript and Subscript
<input type="checkbox"/> Correction Memory — 20 characters	<input type="checkbox"/> High Yield Ribbon Saver operation.
<input type="checkbox"/> Impression Control — 2 steps	<input type="checkbox"/> Reverse Index
<input type="checkbox"/> Number of Copy — 1 + 3	<input type="checkbox"/> Paragraph Indent
<input type="checkbox"/> Shift & Shift Lock Key	<input type="checkbox"/> Decimal Tab
<input type="checkbox"/> Tabulation	<input type="checkbox"/> Automatic Carriage Return
<input type="checkbox"/> Carriage Return	<input type="checkbox"/> Automatic Under Line
<input type="checkbox"/> Space	<input type="checkbox"/> Automatic Centering
<input type="checkbox"/> Back Space	<input type="checkbox"/> Second Key Board
<input type="checkbox"/> Correction Key	<input type="checkbox"/> "Built-in" Interface — Parallel or Serial
<input type="checkbox"/> Half Space	<input type="checkbox"/> Print Buffer — 2K
<input type="checkbox"/> Express Back Space	<input type="checkbox"/> Bi-directional
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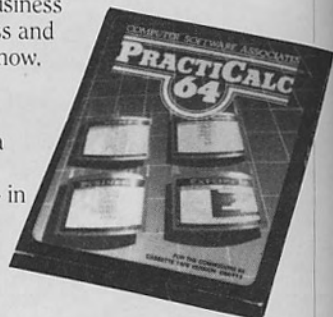
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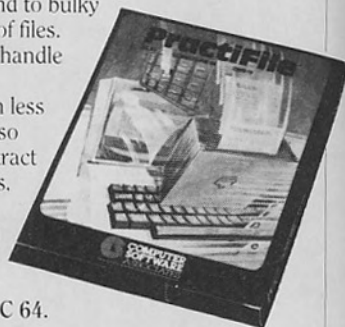
PRACTICALC 64 * Over 20 mathematical functions * all BASIC operations * row/column functions like sum, maximum, minimum etc. * Insert, delete and move commands for ease in moving data * sorts data alphabetically and numerically * converts numbers into bar graphs * seek option saves time finding entries * handles spreadsheets of up to 2000 information cells with maximum of 250 rows or 100 columns.

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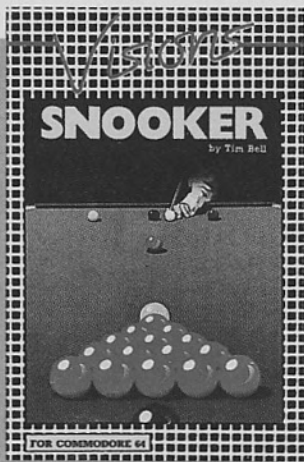


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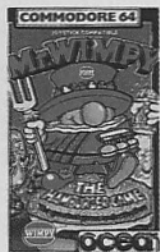
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BITS & BYTES is published monthly, except January, by Bits & Bytes, Ltd.

Head Office: First Floor, Dominion Building, 91 Cathedral Square, P.O. Box 827, Christchurch, Telephone 66-566.

Auckland Office: Daytone House, 53 Davis Cresc., P.O. Box 9870, Newmarket. Telephone 549-028 (advertising and editorial inquiries only).

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Subscription

Subscription rate: \$12 a year (11 issues) adults and \$10 a year for school pupils, subscriptions being from the issue of *Bits & Bytes* after the subscription is received.

Overseas subscriptions:

Surface mail — \$23 a year.

Airmail — Australia and South Pacific, \$45 a year; North America and Asia, \$72 a year; Europe, South America, the Middle East, \$94 a year.

Subscription addresses: When sending in subscriptions please include postal zones for the cities. If your label is incorrectly addressed please send it to us with the correction marked.

Distribution

Inquiries: Bookshops — Gordon and Gotch, Ltd.

Computer stores — direct to the publishers.

Disclaimers

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Production

Production Manager: Dion Crooks.

Assistants: Roger Browning, Graeme Patterson.

Cover and graphics: Sally Williams.

Typesetting: Focal Point.

Printed: in Dunedin by Allied Press.

Bits & Bytes to go "electronic"

In early 1985, Bits & Bytes is planning to become the first magazine in New Zealand to offer its readers electronic information as well as printed information.

Bits & Bytes intends to establish an electronic database similar to the popular Micronet 800 database in the United Kingdom.

The database will feature information and services like:

- the latest computer news from New Zealand and overseas (which will be frequently updated)
- electronic mail for database subscribers to communicate with each other
- an electronic noticeboard for subscriber advertisements, programming hints, problems and so on
- easy to access listings, including the latest prices, of software, peripherals and computers available in New Zealand.
- a shopping section where computer products including books and software can be

Computer Editor

Owing to the continued growth of Bits & Bytes and expansion into related areas, Bits & Bytes will require an editor in early 1985.

We invite applications for the above position.

The successful applicant will:

- Have at least a working knowledge of computers. A knowledge of the New Zealand computer industry would be helpful.
- Have had some experience writing articles for publications, even if only on a part-time or contributory basis. A knowledge of the mechanics of magazine production would be helpful but not essential.

- Most important, the successful applicant will have to arrange articles from different writers around New Zealand and ensure deadlines are met. The person will be involved in the setting of editorial plans, budgets, etc.
- Finally, the applicant should be prepared to work enthusiastically in a small team and should accept more responsibility as *Bits & Bytes* grows.

The position will be based in either Auckland or Christchurch (applicants should specify whether both locations are suitable, or just one).

An attractive remuneration package will be negotiated.

If you meet the above criteria or feel you have the potential to do so in a conducive environment then please apply initially in writing by December 21 to:

The Editor, Bits & Bytes, P.O. Box 827, Christchurch.

- ordered at discounted prices
- telesoftware i.e. programs that can be downloaded onto your computer and used for free

As the number of users grow so will the database and eventually it will branch out into areas outside computing such as transport timetables, share prices and so on.

Computer brands that will be supported initially will include the Commodore 64, Spectrum, Apple, IBM PC, TRS 80/System 80 and the BBC. Other brands will be added later.

Like Micronet 800, the Bits & Bytes database will use the videotex system which means to access the database readers will require a modem, which can operate at 1200/75 baud (1200 baud receive and 75 baud transmit) and terminal software for your particular brand of computer.

With the Post Office finally releasing the specifications for direct connect modems, these should become freely available over the next few months and most will include the videotex baud rate.

At present the Bits & Bytes database is subject to the successful conclusion of negotiations with a number of parties. But all going well we will be announcing the "live" data for the database in our February or March issue.

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1 Fort St, Auckland. Ph. 32-860

Surprise tax cut welcome

A very welcome surprise — that's the only way to describe the Labour Government's decision, announced in the budget, to reduce the sales tax on computers from 40 per cent to 10 per cent.

Unlike previous years, there had been no pre-budget rumours indicating a reduction in sales tax so the move came as a complete surprise to most.

And the reduction is even better than it first looks. A check with the Customs Department revealed that the sales tax drop also applies to disk drives, monitors, visual display terminals, and printers and plotters "put up solely for use with automatic data processing machines" (those intended more for use with dedicated word processors apparently aren't covered as the 40 per cent sales tax on these machines remains). In practice, this means dot matrix printers will drop in price but there may be some argument about daisy wheel printers. Sales tax on disks and modems remains at 20 per cent.

This means the total cost of a computer system will drop significantly. How significantly can be gauged by the new prices listed in the accompanying table. Other computers in a similar price range should also decrease by similar amounts but be warned that some companies were expecting to increase prices after the price freeze ended so their prices may not move

Computers	New Price	Pre-budget Price
Spectrum 16K	\$399	\$469
Spectrum 48K	\$549	\$689
Commodore 64K	\$795	\$975
SX 64	\$2995	\$3325
BBC (cassette version)	\$1695	\$1913
BBC (disk version)	\$1985	\$2300
Electron	\$789	\$877
Atari 800XL	\$699	\$899
Atari 600XL	\$469	\$599
Apple IIc	\$3760	N/A
Apple Macintosh	\$7520	\$8500 (approx)
Hewlett Packard 150	\$7745	\$9000
Hewlett Packard Portable	\$6520	\$7409
Tandy Model 100 8K	\$1495	\$1995
Tandy Portable	\$3595	\$4495
Tandy 2000	\$8585	\$10995
Spectravideo SV328	\$895	\$1095
Spectravideo SV318	\$695	\$795

in line with others.

Pre-budget stock on retailers' premises is still subject to 40 per cent sales tax. One legal way to get round this situation is for computer

distributors to buy it back, claim a sales tax rebate, and then resell the stock at the new tax rate. Physical possession of the stock must change hands however for this to be legal.



The complete portable?

A 4.5 kg IBM compatible portable computer with the first full size liquid crystal display screen on the market has been released here by Data General. (P.O. Box 9735, Wellington).

The Data General One Personal System, the company's first entry in the personal computer market, is designed to fit into a standard briefcase.

The One has a full 80 column by 25 line LCD screen, 128K of RAM (expandable to 512K), one or two built-in 3.5 in disk drives (737K of storage each) and a 300-baud

The Data General One

modem (which because it uses the American standard, will probably never be type approved here). The internal batteries give 8-10 hours of operation and take six hours to recharge.

Data General says the One can run Lotus 1-2-3 and Flight Simulator, the benchmarks of IBM compatibility, but the only software included with the system is MS-DOS.

The base model with one disk drive was expected to retail (pre-budget) for \$8754. Data General is currently seeking dealers for the One.

MICRO MOMENTS

BY MATT KILLIP



Modem specs released

Only a few weeks later than promised (see *Bits & Bytes* October Micro News), the Post Office finally released the specifications for direct connect modems.

As widely predicted, the specifications largely follow the internationally recognised CCITT standard.

Release of the specifications means importers and manufacturers now know the standard their direct connect modems must meet. But the Post Office still has to type-approve individual modem brands before they are legal to use. It is hoped this will take a lot less time than it took the Post Office to release the specifications.

So direct connect modems (which are much more reliable than the old acoustic coupled modems which you still see connected to telephone handpieces in overseas magazines) should be freely available within a few months. Then, all users will need is databases (see *Bits & Bytes'* intentions, page 2 of this issue) and bulletin boards to access.

Here, however, the Post Office still retains the whip hand as the new specifications don't apply to auto answer modems. Anyone wanting to establish a database or bulletin board service will have to lease approved auto answer modems from the Post Office to receive incoming calls.

In any event, we should be able to announce in our February issue the first type approvals for modems (ironically Commodore Computers New Zealand has already received type approval for one modem but that was given under the regulations for videotex terminals and contains a number of conditions, including the disabling of the 300 baud switch on the modem).

"Heaps" of Sanyos

Sanyo says it is selling "heaps" of its 550 series machines in New Zealand. There are now more than 500 users in the country, with two user groups.

The 550, with a single 160K drive is being sold bundled with Wordstar, CalcStar, and MS-DOS (post-Budget) for \$2395. The dual-160K drive 555 was then selling for \$3095 bundled with the same software plus Mailmerge, SpellStar and InfoStar, a database manager.

The 5550-2, with single 360K drive, was selling for \$2995, with software and the 555-2 with dual 360K, drives, for \$3795.

More software is becoming available for the range. The Meridian business software for the Commodore 64 is being adapted for the Sanyo, and the distributor says dBase II will run under the MS-DOS. More software is being adapted in America. A number of games are available, including a DC-10 flight simulator. The Kellogg unit, at Lincoln College, has adapted farm software for the machine.

Hardware is also expanding. A 10Mb hard disk will be available this month, and a RAM upgrade to 256K is available at (pre-Budget) \$372. Sanyo claims it is now No. 3 behind IBM and Apple in sales of small business machines.

ITT arrives

The giant American corporation, ITT, the world's 20th biggest company, has arrived on the microcomputer scene with the release of its Xtra Personal Computer. The Xtra is closely compatible with the IBM PC range, and comes in similar configurations. It is roughly 7.5 per cent cheaper retail than the IBM range, and is being sold through the 22 service outlets of STC Data Products in the country.

Pre-budget prices ranged from \$8000 to \$14,000. ITT, like the other huge American corporation, AT and T, which has recently

launched itself into the computer market, is expected to be particularly strong in area networks, a spin-off from its expertise in telecommunications.

The ITT Group employs nearly 400,000 people in about 100 countries. Its world sales last year topped \$US21 billion. It is rumoured the release of its personal computer and its mini-computer range, also compatible with IBM models, was delayed for two years after development for strategic marketing reasons. There is an impression the personal computer will not be marketed strongly to individual users but that it is just part of a range, from minis down, aimed at the corporate market. ITT has also released a range of printers.

Aussie double

Barson Computers has won two multi-million-dollar New South Wales government contracts in a fortnight for its UK-manufactured Apricot microcomputers.

The contracts are for a huge Apricot microcomputer network throughout the state's Department of Technical and Further Education colleges, and a similar contract for the New South Wales Department of Agriculture.

The two contracts could amount to about \$12 million over 18 months.

Most are better off

Most small companies believe they are better off under computerisation, according to a recent impact study in New Zealand.

In interviews with managers of 33 small (under 100 employees) manufacturing companies, 82 per cent rated their computerisation either very successful or successful. And four of the companies felt it was too early to judge success.

Thirteen of the 33 companies had acquired their computer during 1983 — a 65 per cent increase during the year. Many other companies without computers at the time of the survey were planning or considering buying a computer.

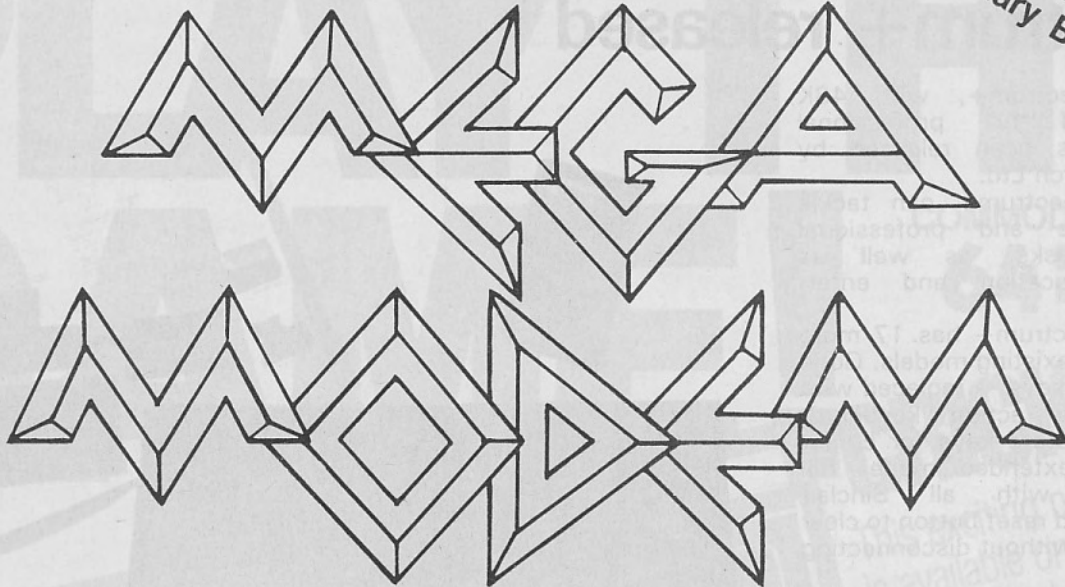
The predominant use was in the accounting/administrative area, particularly for transaction processing — typing invoices and payroll.

Less than a third of the companies suggested they could identify any appreciable decrease in any of their business costs. Some of these costs were staffing related. Though no redundancies had taken place, computerisation had reduced clerical job opportunities. However, three companies had employed extra staff to carry out computer related tasks.

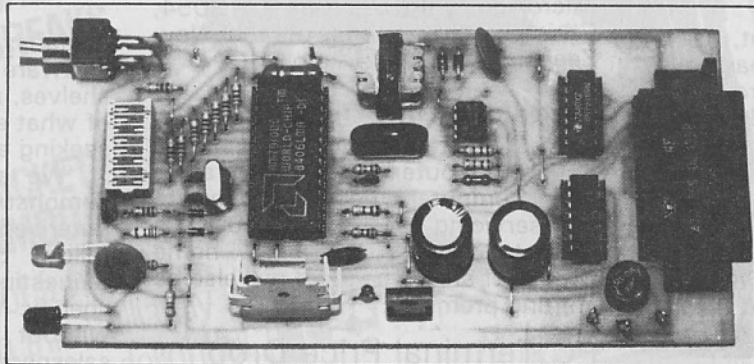
Problems had been experienced. There had been frustrations with breakdowns and software faults. However, most of the managers considered the benefits outweighed the problems and difficulties.

A booklet discussing the benefits, uses, problems, costs and advice to others from the managers, is available at \$5.60, including packing and postage, from Computer Surveys, (P.O. Box 13-050, Hamilton).

Kitset instructions
featured in
February Bits & Bytes



Data transmission at up to 1200 baud for under \$250
Introducing the MEGA MODEM!



With the MEGA MODEM and your personal computer you can send your favourite program to a friend, place an add on a bulletin board or order software – from the comfort of your own keyboard!

This New Zealand designed kitset uses the latest semiconductor technology and direct connection to private phone lines to give "error-free" data transmission. An eight-way DIP switch offers 300, 600, and 1200/75 baud rates, answer/originate and full self test in both Bell and CCIT standards (worldwide compatibility). Features include a phone/modem switch, carrier detect LED and crystal controlled oscillator. Suitable for computers with an RS232C interface and Commodore computers. Note: This modem does not have NZPO approval.

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\$100.00 or more	\$5.50

These charges are for goods sent by post in New Zealand only – NOT airmail, overseas or road freight

NZ 126/KT

Spectrum+ released

The ZX Spectrum+, with 48K memory and full professional keyboard, has been released by Sinclair Research Ltd.

The ZX Spectrum+ can tackle serious home and professional computing tasks, as well as providing education and entertainment.

The ZX Spectrum+ has 17 more keys than the existing models. Gone are the rubber keys — replaced with full typewriter action keyboard. There are separate keys for cursor control and extended mode, full compatibility with all Sinclair peripherals, and reset button to clear the computer without disconnecting power supply.

The new model retains eight-colour capability high resolution graphics and sound over 10 octaves.

A new user's guide, supplied with a cassette tape, has been written as an introduction to the computer and learning Sinclair BASIC.

The New Zealand agent, David Reid Electronics Ltd, has also announced the standard 16K Spectrum is now expandable to 48K memory.

New Wordstar version

A new version of the popular word processing program, Wordstar, was among the new products on display at the Christchurch Computer Show.

On hand to display the "all new" Wordstar 2000 was Dean Scott, Rest of the World sales manager for MicroPro, the US developer of Wordstar and other programs.

Wordstar 2000 is written in the programming language, C, which means it can be quickly changed for different operating systems including Unix.

MicroPro has reportedly also been able to increase the speed the program performs some operations — something which will be of interest to present Wordstar users waiting patiently for the program to get a move on.

New features in Wordstar 2000 are in-built spelling checker and mail merge facilities (no need to buy these as separate programs anymore) plus a maths package and sorting capabilities.

Also available is a Wordstar 2000+ program which has a telecommunications facility.

The programs were demonstrated on the MicroAge stand at the show,



MicroAge (P.O. Box 13054, Christchurch) is one of the New Zealand agents for MicroPro.

The Spectrum+

Retailer quits home

The Christchurch computer retail outlet, Computer Plus, has sold all its home computer stock to concentrate on servicing the small business market and the "serious" home computer area. The store will also be shifting premises.

PC Terminal Price Drop

Prices for the PC Terminal covered in last month's issue have dropped substantially following the budget and better pricing from the USA advises the New Zealand agent, Skellerup Microsystems (P.O. Box 19-648, Christchurch).

The retail price is now \$4180 (previously \$5580) and the education price \$3100 (previously \$3542).

A new image

Australasian Integrity Systems Ltd's plunge on high quality glossy four-colour packaging depicting recreational scenes for its Integrity business software represents a new approach to software marketing, according to the company's director.

Pat Menzies says Integrity has extended its packaging beyond the now-standard binder with slip-case to produce a sleeve which fits over the top of the slip-case. This has a full colour cover and on the back, features detailed product specifi-

ications. Such packaging forms a software library on the retailer's shelves, and customers have an idea of what each package can do before seeking a demonstration.

"We also provide a self-running demonstration called the computerised salesman. Customers can follow this at their own pace, requesting more information about specific features via the keyboard, without the need to involve a salesperson," said Menzies.

Tourism venture

Chase Computers Ltd and Direction Computers Ltd have formed a joint venture company, Chase-Direction, to service the computer requirements of retail and wholesale travel agents.

Software has been developed in New Zealand over a two-year period, and will be compatible with Prestel Videotex systems.

Spectravideo control

Bondwell Holdings Ltd has acquired a controlling interest in Spectravideo Inc. and moved the company's base from New York to California.

Bondwell previously owned 16 per cent of Spectravideo stock and was the major supplier of products. It has now assumed responsibility for financing Spectravideo's future operations.

The Bondwell line of business computing systems has recently been introduced in New Zealand.

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Hour after hour of fun and excitement from this brilliantly conceived, graphically delightful game. All the pleasure, frustration and abuse of a good day's cricket. The chilly decisions of the umpire - the perfect timing of a well-placed six over the long off boundary or the real dismay as a sharp fieldsman rushes in to take a superbly judged catch.



CRICKET

This exciting program is available only on cassette and requires just two joysticks for play to commence. Follow the teams and play the game soon on your Commodore 64!

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See your Commodore family computer specialist now!

Commodore Computer (NZ) Ltd., P.O. Box 33-847, Auckland 9. (09) 410-9182

Five from Morrow

Five new products have been released to complement the Morrow computers.

The new models, distributed in New Zealand by Computer Distributors Ltd, are:

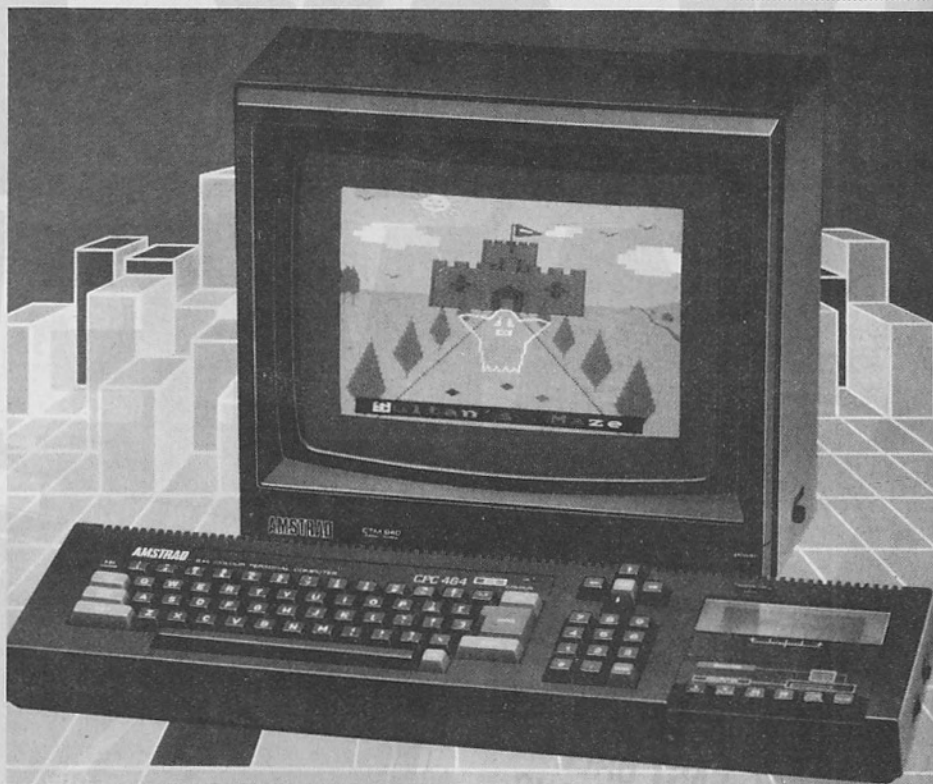
- Micro Decision MD3E: Priced at \$5640, it has two 384K 5.25in floppy disk drives, the New Word word processor and the Correct-It spelling checker. The system has a fully featured terminal with detachable keyboard. The MD3 will continue to be sold with all application software.

- Micro Decision MD5E: for \$8200, the MD5E offers 5.4Mb of formatted Winchester hard disk storage, the new CP/M Plus operating system, fully featured video display terminal with detachable keyboard, New Word and Correct-It. The single board computer includes a Z80A microprocessor running at 4Mh, 128K bytes of RAM, parallel Centronics port, three RS232 serial ports and an RS422/RS232C serial port.

- MD3P: This \$5595 portable computer system features a 5in x 9in amber phosphor display, two 384K 5.25in floppy disk drives, a Z80A CPU with 64K of RAM running the CP/M operating system, a detachable fully featured keyboard with programmable function keys and a 14-key numeric pad. Five bundled applications software packages are provided including New Word, Correct-It, SuperCalc spreadsheet, Personal Pearl database manager and the Microsoft Basic-80 programming language.

- 16-bit co-processor add-ons: These two boards are designed to allow 16-bit software to be run on MD machines. The CP88 co-processor boards include a 16-bit Intel 8088 microprocessor running at 5Mh and either 128K or 256K bytes of RAM memory. Software includes the MS-DOS Version 2 operating system and SuperCalc II. When using SuperCalc II with the 256K CP88 co-processor, 215K of RAM is available for spreadsheets. In the eight-bit CP/M mode, the extra RAM can be used as a high speed virtual disk drive. The boards retail for \$1695 (128K model) and \$2395 (256K).

A 16-bit MS-DOS machine is also due for release.



The Amstrad

Amstrad coming

A computer that has so far proved one of the few successful new home computers launched in 1984 will be released here in early 1985.

The Amstrad was released on the UK market earlier this year and immediately attracted a lot of attention because its £349 price tag included a colour monitor (compared to the £399 for the BBC without any sort of monitor).

And unlike many other new computers, the Amstrad was released with a reasonable amount of software (about 50 titles) already available and by a large company (Amstrad Consumer Electronics) that had already made a name for itself in the electronics field (mainly with stereos).

The Amstrad has reportedly sold very well, helped by favourable magazine reviews (one computer magazine predicted 200,000 Amstrads would be sold by the end of 1984).

As for the computer itself, the Amstrad has a Z80A processor (running at a brisk 4MHz), 64K of RAM (over 42K available to the user) and 32K of ROM (including a reportedly fast BASIC and the operating system).

As far as electronics go, there apparently isn't much difference between the Amstrad and the

Spectrum which will enable Spectrum software to be transferred by authors with minimal patching.

The New Zealand price for the Amstrad (pre-budget) was expected to be \$1795 with a colour monitor (and tape cassette) and \$1295 with a green screen monitor. A disk drive with CP/M was expected to cost \$995.

The New Zealand agent for the Amstrad is Grandstand Leisure (P.O. Box 2353, Auckland) which is also the agent for Sega computers.

Commodore 16 in February

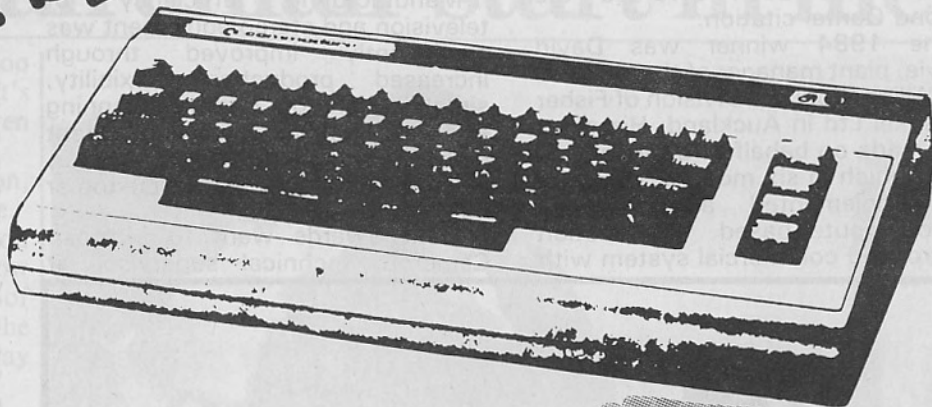
The new Commodore 16 home computer will be released in New Zealand in February with a price tag around \$500.

There is a possibility a few 16s may be seen in stores before Christmas but in any event this Christmas will be the swansong for the VIC released in New Zealand almost three years ago and reported to have sold almost 10,000 units.

A full review of the Commodore 16 will appear in the February issue of Bits & Bytes.

The 16 is just one of a number of new computers Commodore expects to release in New Zealand next year. More details in our February issue.

Save up to
\$410 on these
Computer Specials



COMMODORE 64

With 64K of memory, the Commodore 64 (which has been described as the most outstanding new product introduced since the birth of the industry) is great value for money.

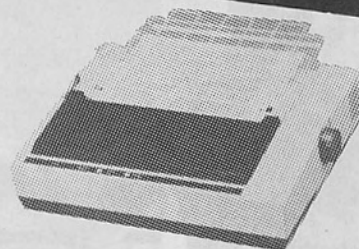
Limited stock at this price.

Offer lasts until stock runs out or 31 December.

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With Datasette	\$795	\$99
With Disk Drive	\$1,445	\$245



COMMODORE 64

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Disk Drive & Printer including Easy-Script	\$2,295	\$410 over
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Hamilton: 2nd Floor, DIC Building, Garden Place. Phone 81-969.

Christchurch: Shop 41, 1st Floor, Cashfields Mall,
Cashel St. Phone 66-442.

Award-winning system

A computerised information system which led to a 22 percent increase in an organisation's sales and paid for itself in less than eight months has been awarded the second Qantel citation.

The 1984 winner was David Cowie, plant manager of the National and Allied Products Division of Fisher & Paykel Ltd in Auckland. His entry was made on behalf of a five-strong team which in six months, designed and implemented a networked microcomputer-based production control and commercial system with

the objective of achieving "quantum improvements in the quality of service to the company's customers".

Manufacturing efficiency of television and stereo equipment was significantly improved through increased production flexibility, simplification of internal planning and amplification of management planning, elimination of human error, and substantially improved customer information services.

Merit awards went to Malcolm Cameron, technical supervisor at

Bayley Tomkins Hedges Ltd, a Dunedin leather and chamois tannery, and to Stephen Chaney, production manager of New Zealand Farmers' Fertiliser Co. Ltd, of Auckland.

Mr Cameron developed a process using a by-product of the chamois tanning process which previously could be sold only at its recovery cost. These "grains" are now converted into skiver leather, which is returning more profit per unit than chamois.

Mr Chaney achieved a profit turnaround and productivity improvements in his company's agricultural chemical plant. A micro-computer was installed to provide additional management information. Production capacity was doubled, sales were increased by 50 percent, operating expenses reduced, labour turnover reduced from 200 to 10 percent, the accident rate more than halved and customer complaints virtually eliminated.

The \$5,000 award for improvements to manufacturing productivity or efficiency is made annually by Computer Consultants Ltd and MDS Qantel Corporation in association with the New Zealand Manufacturers' Federation. The winner receives a travel scholarship.



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Sinclair Spectrum software

Sinclair ZX-Spectrum home computer owners will be aware of the range of software available to them. Unless you are a millionaire, you can't afford to buy every program you see. Even just choosing those that rate high in magazine reviews would cost a pretty penny. Following reviews is not all that wise either as reviewers' preferences play a big part in their ratings. Programs have been known to score just 2/10 in one review and then get 9/10 in another! With opinions differing so much, there's only one real answer - try them yourself.

Kiwi Computer Services (previously The Spectrum Software Club) has a large range of programs which you can try for a minimal registration fee. They range from "Space Invaders" to high level languages.

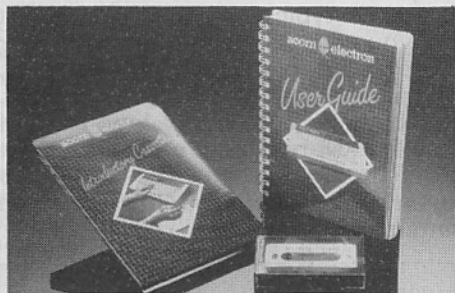
- Advertisement

Whitcoulls want to give your children an unfair start in life.

Just because you may not be too familiar with home computers, that's no reason to suppose your children aren't. Or soon won't be.

With the Acorn Electron, education really does begin at home.

And Whitcoulls can teach you almost everything you need to know to get you started. In the space of just five minutes, you'll see that the Electron is more than just a five-day wonder. Much more.



You'll receive a free comprehensive instruction manual and introductory cassette containing 15 programmes, including a number of exciting demonstration games.

It can be used with your own television set and most standard cassette tape recorders. Simple. And extremely versatile.

The Electron has been designed as a development of the original BBC technology (a very important consideration as more and more schools are changing to BBC Basic computer language). It has a total memory of 64K and can store up to 32K (32,000 characters).

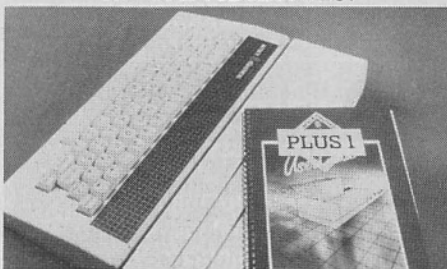
High quality, high definition graphics are also part of the Electron appeal.



Choose from one of the biggest ranges of software in New Zealand — from simple games to educational packages to small business aids. And it's growing all the time.

You can also write your own personal interest programme too.

NEW DIMENSIONS IN CAPABILITIES.



With the add-on capability of the Electron Plus 1, the sky's the limit.

The joystick input creates new game possibilities, while the printer output opens up more serious uses (word processing, financial calculations, etc).

Plus 1's cartridge slot also extends the Electron's software capabilities.

acorn  electron



If you place real value on your children's future, you certainly won't find better value than the Acorn Electron... especially at just

\$789 And at Whitcoulls, we've made it even more affordable.

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We think you'll agree that it's a very fair price to ensure your children get an unfair start in life.

Whitcoulls

Bits & Bytes buyers' guide

Part 2: Computers \$2000 – \$7000

Compiled by Gordon Findlay.

This is the second part of the *Bits & Bytes* buyers' guide, covering computers in the \$2000 to \$7000 range.

This is a very mixed bag of machines. The distinction between a home and a business computer is now totally blurred, with machines designed to be used for everything from games to taxes.

The only sensible way to draw a distinction is in the software used. An Apple running "Incredible Jack" is a business machine; the same computer running "Super Invaders" is a home machine – unless business is really slow!

As with part one, the information in this guide came from distributors and retailers. Rather than mentioning each model separately, it seems to make sense to describe the range of computers each manufacturer produces. The family similarities are deliberate. Often you can move up the range to a larger, faster or more powerful machine, taking all your programs and data files with you – an obvious advantage. Successors to some of these may be found in the final part of the guide, in February's *Bits & Bytes*.

The top price limit for this part was chosen as a natural break in the ranges of computers available. The exact

price of a system will vary of course, depending on options selected.

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

All prices quoted are approximate, giving an indication of the sort of cost involved. As this was written and compiled before the budget, all prices quoted should contain 40 per cent sales tax. What's more, many prices are still recovering from the shock of devaluation. The point at which each brand changes to reflect this and sales tax changes will depend on the exact stock situation at the time.

Prices quoted represent a typical "bundle". You must price all the software you need as well! In the computer market, machines are often bundled with software, which can change the perspective on a price remarkably.

Printers have rarely been included: Very few users of machines in this bracket will not require a printer, but they vary so much in both price and facilities, it is pointless to try to even estimate a price, although some computers have printers built in.

How to buy for business

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

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

Which comes first – hardware or software? Most often, the software is the most important consideration. The choice of a computer is a little different depending on whether the machine is for home or business use. There are three ways to get the business software you need:

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

- Buy a package, such as a spreadsheet or database management system, which allows you to interact with the computer in many different

ways, as you choose. This requires more operator skill than single-purpose software, but a good package will allow a person without much computer experience to use the machine in a variety of ways.

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

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

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

One possible trap is that not all machines use the same type ("format") of disks, and so a program

which is available for the right operating system may not be on the right disk format. This is a technical problem, and the best help you can get is from the dealer you bought from or agents for the machine.

There is a large class of machines all basically similar: Z80 processor, 64K of RAM (memory) and two disk drives, handled by a separate terminal, with RS-232 interfaces, and operating under the CP/M system. That there are a lot of systems meeting that outline specification is testimony to the power of the Z80, and CP/M. It is also a comment on how easy it is to build a computer these days!

In practice of course, even machines as similar as that have differences. Look at the number, size and capacity of disk drives, the keyboard layout and number of special function keys, the screen quality, physical size and design, bundled software, and the interfaces which are supplied. Colour and fancy graphs may seem a useless expense in a business setting. They are a waste in many applications, but can be used to enhance user interaction with the machine, and to make data instantly comprehensible.

BUYER'S GUIDE



ACT Apricot

The Apricot is one of the most stylish computers around, at least to my eyes. A slim, wide white unit containing two 3.5in disk drives, with a detachable keyboard and a swivel-mounted monitor on top, its whole appearance is very impressive. The performance is impressive too.

Special features include a micro-screen LCD display in the keyboard which can, under software control, undertake a variety of functions. It can display the time and date from the built-in clock, act as a calculator, be used to label function keys or as desired. The main unit and keyboard may be packaged together and form a neat portable package – the monitor, of course, must be carried separately.

The processor is a true 16-bit, the 8086. A separate processor takes care of the keyboard and other I/O, and a mathematics processor may be added if required.

The 3.5in disks are small, but can contain a lot of information. They are encased in a plastic jacket to prevent damage, and aren't nearly as fragile as floppies. One or two may be fitted, and may be double or single sided, giving storage capacities up to 1.4 megabytes. A mouse is standard, as are serial and parallel ports. An on-board modem is available as an option.

The monitor is a 9in green screen, and can display either 25 lines of 80 characters or 50 lines of 132 characters, although whether software uses the larger format remains to be seen. Graphics resolution is very high at 800 by 400 pixels.

The Apricot is a British machine, and may not have attracted the attention it deserves because of the American influence.

Reviewed in *Bits & Bytes* (April 1984). Prices depending on configuration: from about \$6000.

If it's micro news in
Wellington — Phone
Pat Churchill 797-193

The second round-up

Actrix Portable

The Actrix Portable is an integrated unit, with a screen, keyboard, printer, modem and more, all in one compact unit. Physically, it is two units – a detachable keyboard and a roughly cubical unit with a screen, two disk drives alongside, and a printer built in to the top.

The integrated screen is a 7in diagonal amber phosphor unit, supporting inverse and blinking video, dual intensities, single and double underline and combinations. High resolution graphics are available, with 64 special graphical characters. The detachable, low profile keyboard has 15 function keys, and a number of keys for special operation.

Two 5.25in disk drives are built-in. These are double density, and offer a choice between single sided format (360K storage in total), or double-sided (720K storage total). The usual output ports are there too: two serial (RS-232), one parallel, IEEE-bus, a video output for using a larger screen, and the possibility of using larger, 8in disk drives.

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

The Actrix Portable comes with the CP/M operating system, and the 'Perfect Software' line of application packages.

Reviewed in *Bits & Bytes* (November 1983).



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Japanese 'Know how' and strict quality control is built into every Maxell disk.

Hitachi Maxell Ltd have set up a factory at Tsukuba, just out of Tokyo, to specialise in the manufacture of Maxell floppy disks.

The critical first step in making a disk is the coating of the polyester film.

Every step of the Maxell coating process, from the blending of the computer-grade magnetic powder to the preparation of the sheets of base material, is under the strictest control.

Each magnetic particle on a disk must be within certain very strict dimensions and the particles must also coat the base material with the exact dispersion and density.

The ideal thickness of the magnetic coating is 2.5 micromillimeters. At Maxell we are very proud to achieve that dimension with plus or minus 0.1 micromillimeters on every disk.

It's the most difficult, time consuming, and at times, expensive way there is to produce a quality disk. But it's the only way we know to make floppy disks that really stand up to heavy demands.

And the quality control goes on –

- * Burnishing is done in special 'clean rooms'.
- * Unique Maxell lubricants are applied to give the least possible headwear and provide a completely stable output.
- * The rolls of magnetic material are cut and punched into precise 8", 5¼" and 3½" (Microfloppy) disks. If a hole is misaligned by even a tiny fraction of a millimeter the disk won't work perfectly.
- * The disks are carefully placed in a non-woven rayon fabric liner and a black PVC jacket. This protection 'package' receives an antistatic treatment before its permanently sealed.

That's just the beginning – then the testing starts.

At the Maxell Technical Centre we run disks under accelerated test conditions actually designed to make them fail. After 10 million passes Maxell disks show no sign of wear, no sign of dropouts; no sign of data loss. None!

Each and every disk is tested for dropout certification; light transmission and magnetic retention. We measure it every possible way. For shape, thickness and exact hole diameter. Jackets and liners are tested as well.

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The second round-up



BMC 800 Model 10

A relative newcomer which came to notice when the BMC line was included in the Education Department list of recommendations to schools. The standard configuration for the model 10 includes a keyboard, processor, monitor, printer and a single 5.25in drive. The BMC runs the CP/M operating system, which means there is a large amount of software available, and there is no language, as such, in ROM.

A lot of languages are available to run under CP/M - MBASIC and CBASIC are versions of BASIC, each with special strengths; USCD Pascal, Pascal MT+, Fortran, etc. A version of BASIC is supplied which supports the graphics capabilities of the machine with eight colours, mixing to give 32 "hues".

The graphics resolution is an impressive 640 x 200 pixels. A full screen editor, with cursor movement keys, insert and delete keys and so on is also standard. Standard interfaces are: RS232 serial, RGB video, light pen, and extra floppy disks. Accessories include all manner of interfaces, analog-digital and digital-analog converters, a plotter, a digitiser, etc. The standard package includes a 80-character dot matrix printer, which does graphics.

Reviewed in *Bits & Bytes* (July 1983). Price: around \$4800 (64K RAM, green screen monitor).



Casio FP1000

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

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

Text display is the usual 25 lines of 80 characters, or 40 characters may be selected under program control. Graphics display resolution is 640 x 200 (with three screens) and eight colours; or an interlaced mode with 640 x 400 resolution.

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

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

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

The FP1000 could have been included in the under \$2000 range, but it is commonly sold in this country as a package deal: CPU, dual disk drives, CP/M operating system, and monitor at a price around \$4780. The colour upgrade is \$300. Many other configurations are available. Reviewed in *Bits & Bytes* (October 1983).



Commodore CBM

Commodore Business Machines produce a range of computers, disk drives and printers which may be mixed and matched to find whatever

Apple 2e

"The Apple 2 family for ever" was the manufacturer's cry at the introduction of the latest incarnation of this venerable machine, and many new hardware and software products are keeping it up-to-date. The latest is a mouse, just like the Macintosh.

The Apple was, of course, one of the machines to start the whole thing. The first Apple produced in volume, the II, had integer BASIC only; the II+ followed with Applesoft extended BASIC, and the 2e ("e" for "enhanced") continues the refinement process. The latest development is the 2c compact version.

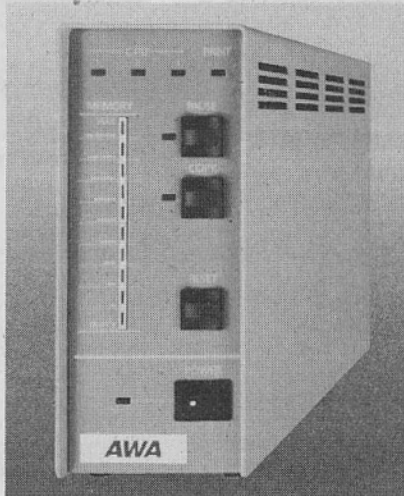
The Apples are notable for three things: first with high-resolution colour graphics; easily expandable by using the eight plug-in lots provided; and an incredibly wide variety of software and hardware produced to enhance it. Whatever you want you can have: disk drives, additional processors (6809 or Z-80), large capacity memory boards (up to 512K!). For use as pseudo-disks, modems, printers, joysticks, plug-ins to control outside devices and networking are just a start.

The latest version includes upper and lower case, four arrow keys, 64K RAM, auto-repeat keys, easy expansion to an 80 column wide display. The most important feature though is still the one which made the Apple such an overwhelming success - flexibility in both using the hardware and in programming. Naturally, all the games, utilities, business programs, word processors and so on must help!

Price for 64K system, one disk drive 80 column card and monitor: around \$4900.

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AWD 2581



The second round-up

configuration is desired.

The Commodore 8096 series is a business computer, with monitor mounted on a pedestal on top of the main unit, and detachable keyboard. The processor is a 6502, with 96K of user memory. The keyboard has a numeric pad, and cursor keys. The display tilts and swivels, and is a full 80 characters by 25 lines, with 128 graphics characters, but no dot-by-dot graphics. BASIC is in ROM.

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

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

Detailed prices were not available, but processors range from around \$2000 up, and disk drives from \$1000 up, depending on size.



Commodore SX-64

A repackaged Commodore 64, with a disk drive, room for a second, small colour screen, keyboard and interfaces etc. in a portable package. Billed as the Executive Portable, the SX-64 has interface for external monitor or TV as well, a serial port, a parallel port and lots of additional hardware can be added, such as modems, light pens, plotters and printers.

The colour screen is small, but the colours are vivid and saturated when

adjusted correctly. The keyboard is detachable, and forms the front of the case when closed. The same range of software as for the Commodore 64 is available, including the CP/M operating system if a Z80 cartridge is added.

Prices: \$3325 with one drive; \$1080 for a second drive.



Cromemco C-10

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

A disk drive is the next necessity. The mini-floppy drive has 390K byte capacity; dual units are also available. The C-10 runs a CP/M compatible operating system, giving access to a lot of Cromemco software, such as word processing, investment analysis, spreadsheet, accounting etc., and a variety of languages - BASIC, COBOL, RATFOR and Fortran, as well as Cromemco's Structured BASIC.

The operating system is a menu-driven shell around CDOS, a Cromemco operating system which is used with other machines; direct access to CDOS commands is also permitted. Four character sets are provided including graphics characters. The C-10 can also function as a terminal to a mainframe computer, emulating any of a variety of standard terminals.

Reviewed in *Bits & Bytes* (November 1983).

Dick Smith Challenger

This is one of the cheaper IBM "compatibles". It is claimed to be compatible with just about all IBM PC software, but obviously not all. The Challenger is also partly hardware-compatible with the IBM.



The system unit is a low unit, containing a 16-bit processor, 128K or RAM, which can be expanded, and BASIC in ROM. The keyboard is detachable. In this configuration, the Challenger might be used as a hobbyist computer, but for most uses the expansion unit will be needed, with its twin slimline disk drives, three IBM expansion slots, two 16-bit expansion slots, and interface.

Software included is MS-DOS, GW BASIC, and some application programs from the Perfect Software series. The system unit includes colour graphics capability at a very respectable resolution.

There are a few rough edges to the Challenger, but the price is good. Reviewed in *Bits & Bytes* (June 1984). Price, including monochrome monitor, expansion unit and software: around \$5500.

Tolley Agencies, the New Zealand Agent for Telic Alcatel, has announced the introduction of its range of Videotex equipment. The T250 has both Prestel and Teletel protocols which have been approved by New Zealand Post Office and will be marketed in New Zealand for under \$1000.

Used with an RS232C interface, the T250 can be an interactive ASCII terminal. If required, a tape or printer can be used with the unit.

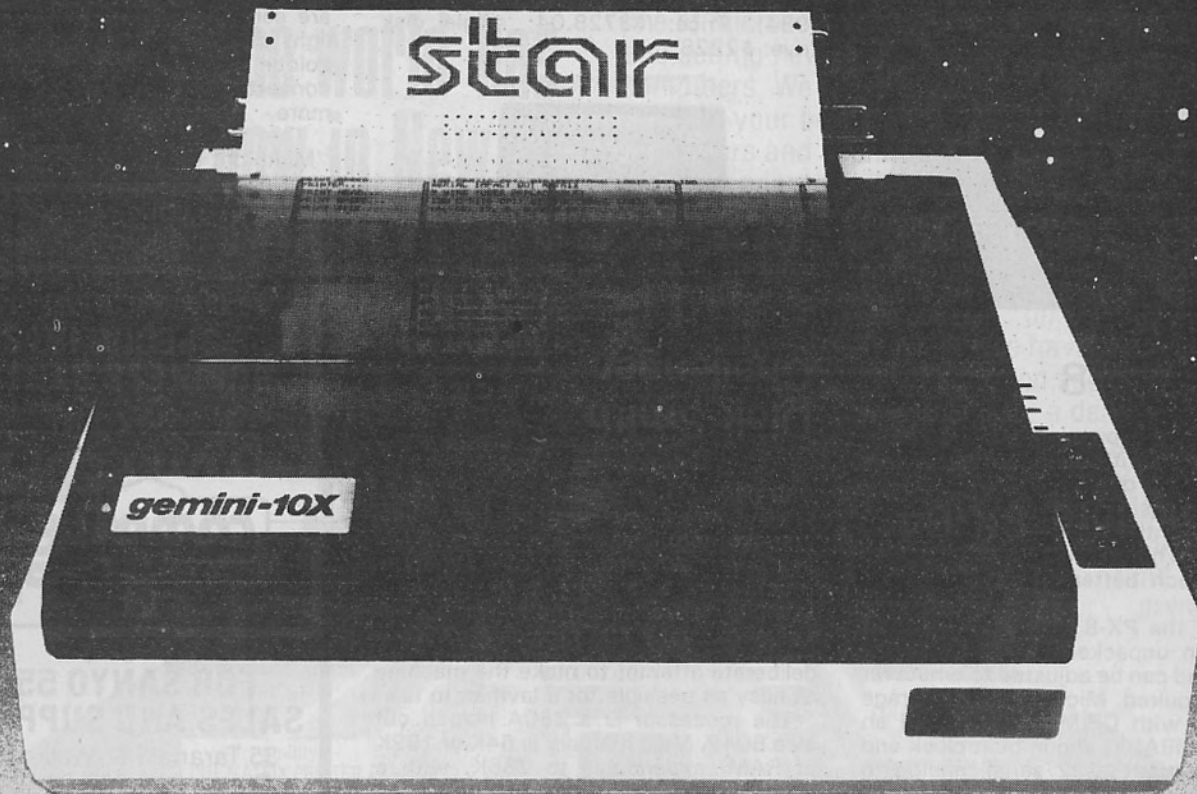


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The second round-up



Epson PX-8

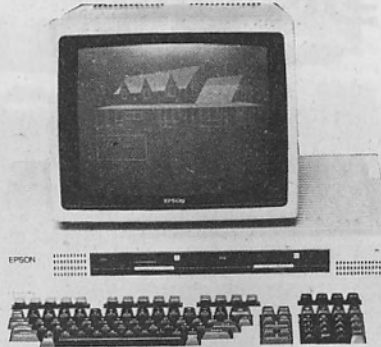
The PX-8 is Epson's latest briefcase portable, but with capabilities more in line with a desktop. In fact, the specification is better than many desktops, with the LCD screen giving portability. This display is 80 characters wide - much better than most - and eight lines.

Packed, the PX-8 is an elegant, slim unit; when unpacked, the LCD screen flips up, and can be adjusted to whatever angle is required. Microcassette storage is built-in, with CP/M in ROM, and an extended MBASIC and in-built clock and speaker, with RS-232 serial, analog to digital and barcode reader extend its functions. Naturally, RAM storage is protected even when the unit is turned off.

Without a disk drive, software operates from ROM, using RAM disks. Floppy drives are available, using the 3.5in format, with a 360 Kbyte capacity formatted. Communication with other computers is fully supported, via acoustic modem.

The usefulness of any machine depends on the software available. The PX-8 has a lot available - the CP/M library, with the added convenience of having some in portable form.

Reviewed in *Bits & Bytes* (September 1984). Price: \$3728.04; single disk drive: \$2226.



Epson QX-10

The QX-10 is a CP/M machine with a difference. Physically, it is a low profile unit containing two slim disk drives, a detachable sculptured keyboard, and a monitor which sits on the main unit. The outstanding feature of the QX-10 is the deliberate attempt to make the machine as easy as possible for a layman to use.

The processor is a Z80A helped out by a 8049. Main memory is 64K or 192K of RAM, expandable to 256K, with a further 32K dedicated to the video screen. When expanded to 256K, part (56K) of the RAM is used as a pseudo-disk, speeding operation. There is also

2K of battery backed up RAM for storing "important information" - such as set up options.

The keyboard is tiltable, and has a numeric keypad, cursor keys and 18 function keys. The text display is the usual 25 lines of 80 characters, graphics can be displayed with a 640 x 400 resolution on a 12in green screen which, in my opinion at least, is just about the best around.

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

The QX-10 may be had with a "MultiFont character generator", which allows the use of 16 different typefaces. A built-in clock and calendar are also supplied. The clock may be programmed to start specified functions at a pre-set time.

Reviewed in *Bits & Bytes* (October 1983). Prices: 64K \$6800; 192K with MultiFont \$7388.17. Also available "bundled" with various printers and software.



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BUYER'S GUIDE

The second round-up



Franklin Ace 1000

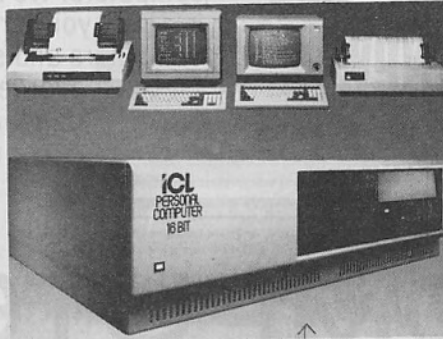
The Franklin is the most famous, and probably the most successful, of the Apple workalikes and as such, has come in for a fair amount of legal argument (which still continues). "Compatible with Apple hardware and software" is the claim. "Not a copy, a different instrument playing the same music."

Designed as an Apple II+ workalike, the Franklin added lower case, a numeric keypad, extra arrow keys, and a fan.

Removed were tape facilities (rarely used with Apple), and colour - which became an extra to "add on".

The "language card" which provided the Apple with its final 16K of RAM got built in too, giving immediate access to Pascal and other languages. A Z80 card makes CP/M a possibility. Sockets are provided for 12K of EPROM; normally, BASIC comes on a disk.

Reviewed in *Bits & Bytes* (August 1983) but the latest model loads Apple-compatible operating system in a different way, to keep on the right side of the copyright act. Price: with single disk drive and green screen, \$2995.



ICL

ICL is another major mainframe

computer manufacturer to enter the micro market.

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

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

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

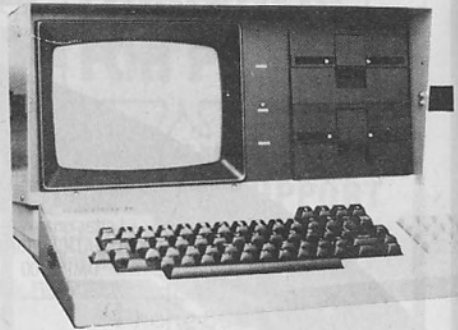
Four models are listed:
Model 15 - 64K RAM, two floppy disk drives.

Model 25 - 64K RAM, one floppy drive, 5 megabyte hard disk.

Model 26 - 256K RAM, one floppy drive, 5 megabyte hard disk.

Model 35 - 256K RAM, one floppy, and a 10 megabyte hard disk.

Any model can be expanded upwards.



Kaypro

The Kaypro is a portable computer, with a keyboard, 9in screen, two disk drives and processor in a metal case about the size of a sewing machine. The screen displays a full 24 lines by 80 characters, and has a green phosphor. The detachable keyboard includes a numeric keypad and cursor movement keys. The two drives each provide 200K bytes of storage on 5.25in disks - double that on the Kaypro 4.

Standard interfaces provided are a serial port, modem connection, and a parallel printer interface. The Kaypro comes with a lot of software: a word processing program (with spelling checker), a database system, a spreadsheet, two versions of BASIC, investment analysis, the operating system and even an unspecified number of games. Quite a number of software packages are listed, and CP/M makes a lot more available. There seems to be no graphics capability.

Reviewed in *Bits & Bytes* (November 1983).

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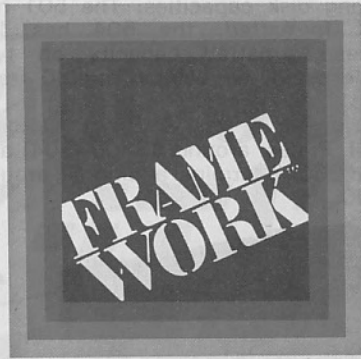
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BUYER'S GUIDE

The second round-up

Morrow

Morrow produces a line of small business computers, running the CP/M operating system and bundled with quite a bit of software. The smallest of these, the MD2, is a dual disk system, with a separate terminal and keyboard. The detachable keyboard sports a numeric keypad, with functions, editing and word processing keys, attached to the screen unit by a "curly cord". All keys automatically repeat.

The screen unit is designed to sit on top of the computer box itself, but may be placed elsewhere. Up to four drives are supported. Text on the screen may be inverse, half-intensity, blinking or underlined. Interfaces include two serial (RS-232) ports, one of which will be used for the terminal and a parallel printer port.

The MD2 comes with this software included: CP/M operating system, word processor, spelling checker, electronic spreadsheet, Microsoft BASIC, a database management system, and the Pilot language interpreter, as well as utilities. The MD2 can read Osborne, IBM and Xerox format disks, allowing for data interchange.

Price: \$5450, including software.

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

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

Prices: MD3, \$6410 including operating system, spreadsheet, word processing and spelling checking software, MBASIC, database manager, Pilot language and a slew of utilities; an economy version, with less software is \$5640.

A portable version of the MD3 is available - the MD3P naturally enough. A squat box, with detachable keyboard, which looks rather heavy but might not be, the MD3P contains two floppy drives and a 5in by 9in screen.

Price: accompanied by the same software as the MD3, \$5595.



Multitech MIC500

A CP/M machine with fairly standard specifications. Neat appearance, with two slimline drives set in a smallish metal case, usually supplied with a suitable terminal and bundled software. The most noticeable feature is the high storage capacity (for an eight-bit machine). The reviewer had some trouble because of a lack of customising of terminal, computer and software to each other.

Two models are available, with differing disk capacities. The 501 has 400K formatted, the 504 has 1.3 Mbytes formatted capacity on two double sided, double density 80 track drives.

Reviewed in *Bits & Bytes* (October 1984). Prices: around \$3800 (504) and \$2800 (501); terminal additional, around \$1500.



Osborne

Osborne has met trouble but the Osborne is still being sold and supported

in New Zealand at the time of writing. This was the first of the portable computers. It looks like a sewing machine, which opens up to reveal keyboard, small screen, two disk drives and assorted connectors.

Strictly a business machine (watches somebody prove me wrong!), the Osborne runs the CP/M operating system, which is more or less the standard for eight-bit business machines. The interfaces included are a serial (RS-232), a connector for an external display, an IEEE 488 interface for connection to test instruments etc. The small (5in) screen gives a 52 character window on a 128 character line, and this scrolls horizontally automatically. The screen is 24 lines deep. The Osborne can be run from a battery pack and can have hard disk drives fitted, up to 15 megabytes.

In view of its price, perhaps the most startling thing about this machine is the amount of "free" software bundled with it. This comprises the CP/M operating system, CBASIC and MBASIC languages, Wordstar for word processing, Mailmerge for mailing lists and form letters, and Supercalc, an electronic spreadsheet. A lot of programs are available, mostly for business use. Prices: with double density disks, \$3815; battery pack, \$600.



The Osborne Executive is an upgraded Osborne 1. The most obvious differences are the screen size (7in) colour (amber) and memory size (128K). The screen is 80 columns wide, and the operating systems are CP/M and the USCD p-system.

Price: including software, \$5950.

Japanese connection

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Panasonic

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

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

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

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

Prices: monochrome, one 5in disk, \$5610; with a second 5in disk, \$6581; with colour monitor and one disk, \$7364; with two disks \$8190.

Philips 2010

A neat portable computer with a decent 9in screen and detachable



keyboard. The CPU has 64K of RAM, expandable to 320K by adding a card which acts as a RAM disk. Screen memory is a whopping 32K, separate from this. This is used to provide high resolution graphics, 512 by 252 pixels (monochrome) or 256 by 252 in "four shades of green"! Communications interfaces, both synchronous and asynchronous are incorporated.

As befits a CP/M machine, the computer comes with bundled software - Wordstar and Calcstar. Optional business packages are available, and most of the CP/M range should be OK. The p-system is also included.

Prices: two versions, differing only in their disk capacities, are sold - P2010 (two 160K disks), \$4950; P2012 (two 640K disks) \$5950; 256K RAM disk, \$1250; 10 Mb hard disk, \$6700. A 16-bit processor for IBM compatibility will be coming soon.

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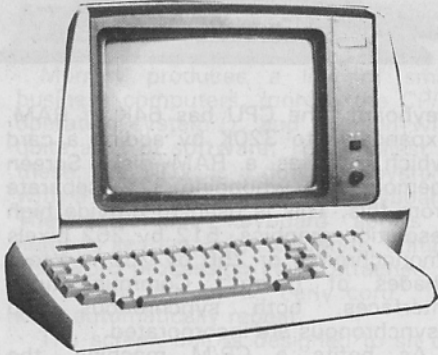
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The second round-up



Proteus

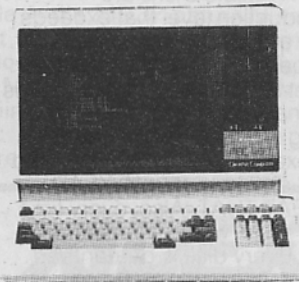
The Proteus, made in New Zealand by Progeni, is a fairly standard business system, with a few novelties. Based around the "Z80, 64K RAM, one or two 8in drives with CP/M" standard, the Proteus is a cuboid box, containing processor and disk drives, for use with a separate terminal. Each drive has a capacity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

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

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

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

Reviewed in *Bits & Bytes* (November 1983).



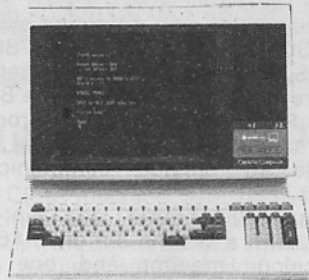
Sanyo

In this price range, Sanyo markets both eight and 16-bit machines. The MBC1160 is an eight-bit machine, with two disk drives. These are vertical units, built in to the monitor stand, which tilts

and rotates. The keyboard is detachable, with a numerical keypad, and programmable function keys. The built-in monitor is a 30cm, green type. Characters on the screen can be blinking or in reverse video. Other interfaces included are serial (RS-232) and a parallel printer port.

The unit runs under the CP/M operating system (version 2.2), which means there are, potentially anyway, lots of programs around! If you do need to write your own, BASIC, Cobol, Pascal and machine code are all supported.

Price: with Wordstar, Calcstar, Spellstar, Infostar and Mailmerge, \$6300; hard disks, 5 and 10Mb also available.



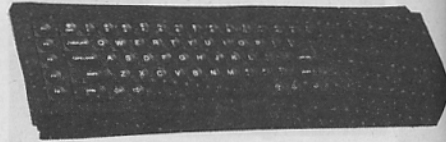
The MBC4000 series is a 16-bit range (8086 processor) with physical arrangement as the 1100 series, and 128K of RAM which may be expanded to 512K. An RS-232 interface and a parallel printer port are standard, as is the same detachable keyboard and screen display of 25 lines. This series uses CP/M 86 as the operating system. The MBC-4050 has two 640Kb disk drives.

Price: with Wordstar, Calcstar, Spellstar, Infostar and Mailmerge, \$6595.



The Sanyo MBC-550 is a lower priced 16-bit computer, running the MS-DOS operating system. It is a compact unit, with one or two slimline drives, a separate monitor and detached keyboard. RAM may be expanded to 256Kb from the standard 128Kb. Graphics resolution is high, and eight colours are obtained by using a suitable monitor (RBG interface supplied). This is a very high performance unit in its price range.

Prices: range from \$2698 to \$4313, depending on monitors and drives etc chosen. Software included is MS-DOS, Sanyo BASIC, Wordstar and Calcstar.



Sinclair QL

Apparently on the point of being released in New Zealand as this is written. Will it succeed is the obvious question? The QL, for Quantum Leap, is Sir Clive Sinclair's latest and, in many ways, his most novel attempt to mass market computing power. The QL is a peculiar mixture of advanced and primitive features. The keyboard is not liked, the only mass storage available is microdrives, which is Sinclair-speak for fast (well, less slow) tape cartridges. Yet the processor is the fabulous 68000! A 32-bit processor, the 68000 is the powerhouse of the Lisa and Macintosh, but handicapped in the QL by provision of only an eight-bit data bus which results in slow performance.

SuperBASIC is in ROM - an advanced version of BASIC which many people have commented on favourably, and which others don't like. Initial reaction to the QL has been mixed, possibly because of the initial manufacturing and marketing difficulties which lead to supply being months after order.

Price: intended price on release in New Zealand, \$2495.



Sord IS-11

The IS-11 is a briefcase portable or lap computer, with in-built (small) LCD screen and tape recorder. A numerical keypad and a thermal printer may be attached to the sides. The display is eight lines of 40 characters, which may be split into separate "windows". The small recorder - microcassette size - operates quite quickly. Serial, modem and parallel interfaces are included among others, and there is a socket for ROM cartridges.

No programming language is built in, but spreadsheet, database and word processing applications are. The powerful PIPS spreadsheet allows sorting and graphical display as well as the more usual facilities associated with this class of software. Options include, or will soon include, microfloppy drives, bar code

The second round-up

reader, CRT monitor interface and acoustic coupler.

Reviewed in *Bits & Bytes* (June 1984). Price: around \$2200.

Tandy Model 100

The 8K version could have been included in the under \$2000 range, but this machine is much more likely to be used in its larger, 24K version. A briefcase machine, with built-in software, eight-line display, with graphics capability. A good looking keyboard, with a group of keys acting as a numeric keypad, and special function keys, most linked with the built in software. Clock and calendar support is there too, and hardware for a direct-connection modem. Other interfaces include printer, RS-232 and cassette.

The software in ROM comprises a text editor, telecommunications program, an appointments diary, and BASIC. Once entered, programs and data stay put, even when the computer is turned off, until deliberately deleted. When the unit is turned on, a selection is offered of all that is in ROM or RAM. The BASIC version provided is extended Microsoft, with lots of facilities for using the hardware. As one example, a BASIC program can contain an instruction to perform a certain group of actions at a particular time, or at regular intervals. The text processor is also used for editing BASIC programs. Disk drives and external 24 line display are released in the U.S.A.

Reviewed in *Bits & Bytes* (July 1984). Price: 8K RAM version, \$1995; 24K version, \$2995.



Tandy Model 4

The Model 4 is the latest in the TRS eight-bit line. It is the successor to the

pioneering Model 1, with the same 64K, Z80 base. Unlike the earlier models, RAM may be expanded to 128K; BASIC is still in ROM. Two disk drives, each storing around 368K are built-in (diskless models don't appear to be around in New Zealand any more).

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

Interfaces to cassette and parallel printer are standard, these can be augmented as desired. The Model 4 runs both TRSDOS and CP/M Plus for a wider software base. The Model 4 may also be used in Model 3 mode to run earlier software, including many Model 1 programs. The extra memory may be used as a RAM disk. Hard drives, modems, high resolution graphics and so on are only some of the add-ons available.

Price: \$5995.

The Model 4P is a portable version of the Model 4, and identical except in physical packaging.

Reviewed in *Bits & Bytes* (October 1984). Price: normally \$5595.



Televideo

This TS-803 has common enough basic specifications. It is another in the well-known "Z80, CP/M, two disk" family. RAM is expandable to 128K if desired; 32K of screen memory is additional. Two serial interfaces are standard - one for printer, once for modem or "mouse". The graphics resolution is 640 x 240.

The 803 is very stylish in its physical appearance - the keyboard is separate, with the monitor mounted in a U-shaped frame, and the drives mounted vertically on the end of the frame. This allows the 14in high resolution screen to tilt. The 803 can be used in a network, by adding an interface card.

Price: \$6973, with dual floppy drives. A hard disk version, the TS-803H, is also available.



The Televideo Portable TPC1 is a full featured computer, very similar to the Televideo 803, but in portable form. Judge portability for yourself: dimensions 46 x 38 x 20cm, weight 11.3kg.

It is a business machine, running CP/M as operating system, with specialised software also available for business-type things. The standard package for a 9in green screen, and two mini-floppy drives, both double-sided, double density, with a capacity (formatted) of 368.6 Kbytes per drive. Addition of an RS-422 interface board allows communication to other computers.

User RAM is 64K - 128K, with 32K of screen ram in addition. With this much screen RAM, graphics support is obviously there, and it comes through a GSX-80 extension to CP/M to allow the use of "business graphics". Text characters may be half or full intensity, reverse video, blinking, underlined, or any combination.

The keyboard is detachable, with 10 dual-purpose programmable function keys, numeric keypad, cursor movement keys etc. A serial modem port, a parallel printer port and a port for a "mouse" controller complete the picture.

Reviewed in *Bits & Bytes* (May 1984). Price: with two drives and bundled software, \$5782.

The second Televideo portable, the TPCII is similar to the TPC1 in appearance, but is a 16-bit machine, claiming extensive IBM PC compatibility. It has, as standard, a number of the options commonly found with the IBM PC (see the next part of the guide in February's issue for an extensive discussion of IBM compatibility). Graphics display, RS-232 and parallel ports are included.

This machine features extensive use of custom very large scale integrated circuits to keep the number of chips required, and hence the heat generated and power consumed down.

Price: including software, \$6999.

Subscribe today

Computers \$2000 — 7000

NAME	ACT Apricot	Actrix Portable	Apple IIe	BMC Model 10	Casio FP1000	Commodore 700 Series
Type	Desktop	Portable	Desktop	Desktop	Desktop	Desktop
Processor	8086A	Z80A @ 4MHz	6502 @ 1MHz	Z80A @ 4MHz	Z80A @ 4MHz	6509 @ 2MHz
Standard RAM	256K	64K	64K	64K	64K	128K
Maximum RAM	768K	310K	256K	64K	64K	896K
Standard ROM	8K	8	16K	20K	32K	24K
No. of keys	90	76	63	99	96	94
Function keys	6	10	No	10	10	10
Numeric keys	Yes	Yes	No	Yes	Yes	Yes
Screen lines	50	24	24	25	25	25
Columns	132	80	40 (80 opt)	80	80	80
Resolution	800 x 400	560 x 216	280 x 192	640 x 200	640 x 400	640 x 200
Colours	No	No	16	8	No	No
Disk drives	1 x 3.5in (315K)	2 x 5.25in (360k)	Optional	1 x 5.25in (380K)	2 x 5.25in (640K)	Optional
Interfaces	RS-232, Centronics	RS-232(2), Centronic, IEEE-488	None standard	Built-in Printer	Centronics	RS-232, Commodore Parallel
Languages	BASIC, Pascal, COBOL	BASIC	Most available	BASIC, Fortran, COBOL, Pascal	BASIC, Pascal, COBOL	BASIC
Operating systems	CP/M, MS-DOS, Concurrent CPM	CP/M 2.2	DOS, CP/M with Z80 option (Pro-DOS)	CP/M	C82, CP/M	CBM, CP/M optional
NAME	Commodore 8096	Commodore SX 64	Cromenco C 10 SP	Dick Smith Challenger	Epson PX8	Epson QX10
Type	Desktop	Portable	Desktop	Desktop	Briefcase	Desktop
Processor	6502 (2)	6510 @ 2MHz	Z80A @ 4MHz	8088 @ 4.8MHz	Z84 @ 2.5MHz	Z80A @ 4MHz
Standard RAM	96K	64K	64K	128K	64K	192K
Maximum RAM	96K	64K	64K	640K	184K	256K
Standard ROM	24K	20K	24K	64K	32K	2K
No. of keys	73	66	61	84	73	103
Function keys	No	8	No	10	9	18
Numeric Keys	Yes	No	No	Yes	No	Yes
Screen lines	25	25	25	25	8	25

BUYER'S GUIDE

NAME	Commodore 8096	Commodore SX 64	Cromenco C 10 SP	Dick Smith Challenger	Epson PX8	Epson QX10
Columns	80	40	80	80	80	80
Resolution	640 x 200	320 x 200	754 x 482	640 x 200	480 x 64	640 x 400
Colours	No	16	No	8	No	No
Disk drives	Optional	1 x 5.25in (170K)	1 x 5.25in (390K)	2 x 5.25in (720K)	Optional	2 x 5.25in (640K)
Interfaces	RS-232, IEEE-488	Commodore Parallel	RS-232 Centronics	3 IBM slots, RS-232, Centronics	RS-232, bus, bar code	Centronics, RS-232 DB 25
Languages	BASIC, Pascal, COMAL	BASIC, Pascal, Pilot, Logo	BASIC, Fortran, COBOL, RATFOR	BASIC	BASIC	BASIC
Operating systems	DOS or CP/M	CBM or CP/M	CDOS (CP/M super-set)	MS-DOS 2.1	CP/M	CP/M 2.2
NAME	Franklin Ace 1000	ICL Model 15	ICL Model 16	Kaypro Model 2 & 4	MORROW MD 2 & 3	Morrow MD3P
Type	Desktop	Desktop	Desktop	Portable	Desktop	Portable
Processor	6502 @ 1MHz	8085 @ 5MHz	8088 @ 5MHz	Z80A	Z80A @ 4MHz	Z80A @ 4MHz
Standard RAM	64K	64K	256K	64K	64K	64K
Maximum RAM	64K	512K	10.24MB	64K	64K	64K
Standard ROM	12K	2K	2K	None	4K	4K
No. of keys	72	100	100	77	92	91
Function keys	No	11	11	No	No	9
Numeric keys	Yes	Yes	Yes	Yes	Yes	Yes
Screen lines	24	25	25	24	25	24
Columns	40	80	80	80	80	80
Resolution	280 x 194	800 x 288	800 x 288	400 x 216	720 x 300	720 x 280
Colours	Optional	Optional	Optional	No	No	No
Disk drives	Optional	2 x 5.25in (1.5MB)	2 x 5.25in (1.5MB)	2, 400 & 800 K	2, 372 & 720K	2 x 5.25in (768K)
Interfaces	8 peripheral connectors	RS-232 (4)	RS-232 (6), Comms port	RS-232 (2), Centronics	RS-232 (2) Centronics	RS-232, Centronics
Languages	BASIC, Pascal	BASIC, most others	BASIC, most others	BASIC	BASIC, Pilot	BASIC, Pilot
Operating systems	Apple DOS 3.3, CP/M	CP/M	MUCCP/M	CP/M	CP/M	CP/M

Computers \$2000 — 7000

NAME	Multitech MIC500	Osborne Executive	Osborne Model 1	Panasonic JB3000A	Philips P2010	Proteus
Type	Desktop	Portable	Portable	Desktop	Portable	Desktop
Processor	Z80A @ 4MHz	Z80A @ 4MHz	Z80a	8088 @ 4.8MHz	Z80A @ 4MHz	Z80A 6809
Standard RAM	64K	128K	64K	96K	64K	64K
Maximum RAM	64K	128K	64K	224K	320K	64K
Standard ROM	4K	4K	4K	16K	12K	4K
No. of keys	92	63	69	95	93	87
Function keys	7	No	No	8	15	14
Numeric keys	Yes	Yes	Yes	Yes	Yes	Yes
Screen lines	24	24	54 x 24 window	25	24	24
Columns	80	80	on 128 x 32 chs	80	80	80
Resolution	560 x 264	416 x 240	416 x 240	640 x 400	512 x 252	480 x 400
Colours	No	No	No	8	No	No
Disk drives	2 x 5.25in (500K)	2 x 5.25in (370K)	2 x 5.25in (370K)	1 x 5.25in (144K)	2 x 5.25in (360K)	Optional
Interfaces	RS-232, Parallel	RS-232 (2), Monitor, IEEE-488	RS-232 (2), IEEE-488	Centronics	RS-232, SASI	RS-232 (3), Network, Centronic
Languages	BASIC	BASIC, Forth	BASIC, FORTH	BASIC, Fortran, Pascal COBOL, C	BASIC, Pascal, most others	BASIC, Fortran, COBOL, Pascal
Operating systems	CP/M	CP/M, UCSD P-System	CP/M	CP/M-86, MS-DOS, BOS/5	CP/M, UCSD P-System MS-DOS	Polynet, CP/M, Flex
NAME	Sanyo 1110	Sanyo 550	Sanyo Model 4000	Sinclair QL	Sord IS11	TRS80 Model IV
Type	Desktop	Desktop	Desktop	Desktop	Briefcase	Desktop
Processor	Z80A @ 4MHz	8088 @ 3.6MHz	8086 @ 5MHz	68000	Z80A @ 3.4MHz	Z80A @ 4MHz
Standard RAM	64K	128K	128K	512K	32K	64K
Maximum RAM	64K	256K	384K	32K	64K	128K
Standard ROM	4K	8K	4K	4K	64K	14K
No. of keys	92	81	92	65	78	71
Function keys	15	5	15	5	6	3
Numeric keys	Yes	Yes	Yes	No	Yes	Yes

BUYER'S GUIDE

NAME	Sanyo 1110	Sanyo 550	Sanyo Model 4000	Sinclair QL	Sord IS11	TRS80 Model IV
Screen lines	25	24	25	24	8	24
Columns	80	80	80	80	40	80
Resolution	640 x 200	640 x 200	640 x 300		256 x 64	640 x 240
Colours	No	8	No		No	No
Disk drives	1 x 5.25in (640K)	1 x 5.25in (160K)	2 x 5.25in (1.3MB)	See text	Optional	2 x 5.25in (368K)
Interfaces	RS-232, Centronics	Centronics	RS-232, Centronics	RS-232	RS-232, barcode, Centronics etc	Modem, Centronics
Languages	BASIC, Fortran, COBOL, Pascal	BASIC and others	BASIC and others	BASIC	Pre-programmed	BASIC, Fortran, COBOL, Pascal
Operating systems	CP/M 2.2	MS-DOS	CP/M-86	Q-DOS	Sord-IS, CP/M, MS-DOS	TRS-DOS, CP/M
NAME	TRS80 Model IV P	Tandy 100	Televideo TPC1	Televideo TPC11	Televideo TS803	
Type	Portable	Briefcase	Portable	Portable	Desktop	
Processor	Z80A @ 4MHz	80C85	Z80A @ 4MHz	8088 @ 5MHz	Z80A @ 4MHz	
Standard RAM	64K	8K	64K	256K	64K	
Maximum RAM	128K	24K	128K	256K	128K	
Standard ROM	1K	32K	8K	8K	8K	
No. of keys	70	72	83	84	107	
Function keys	3	8	10	10	16	
Numeric keys	Yes	No	Yes	Yes	Yes	
Screen lines	24	8	25	24	24	
Columns	80	40	80	80	80	
Resolution	640 x 240	None	640 x 240	640 x 200	640 x 240	
Colours	No	No	No	Optional	No	
Disk drives	2 x 5.25in (368K)		2 x 5.25in (256K)	1 x 5.25in (360K)	2 x 5.25in (768K)	
Interfaces	Centronics, modem	RS-232, Centronics, modem, bar code	Parallel, mouse, RS-232	RS-232, IBM PC slot, Centronic	RS-232, mouse, RS-422	
Languages	BASIC, Pascal, Fortran, FORTH	BASIC	BASIC	BASIC	BASIC	
Operating system	TRS-DOS, CP/M		CP/M 2.2	TELE-DOS, MS-DOS	TELE-DOS, CPM 2.2	

ZENITH Z150PC

A versatile IBM PC compatible

By Shayne Doyle

Zenith Data Systems (USA) is the assembled business data products division of Varitechnology Electronics Corp, best known for its Heathkit DIY computers and other electronic products. The Zenith Z-100 16-bit machine has gained a large following and reputation, particularly in the USA, and Zenith now offers two totally IBM-PC-compatible products — the Z-150 desktop computer and the Z-160 transportable computer.

My initial interest in this machine stemmed from a requirement to source a well built, reasonably priced, versatile 16-bit micro-computer capable of successfully running Handshake Plus — a very sophisticated terminal emulation software product written for the IBM PC.

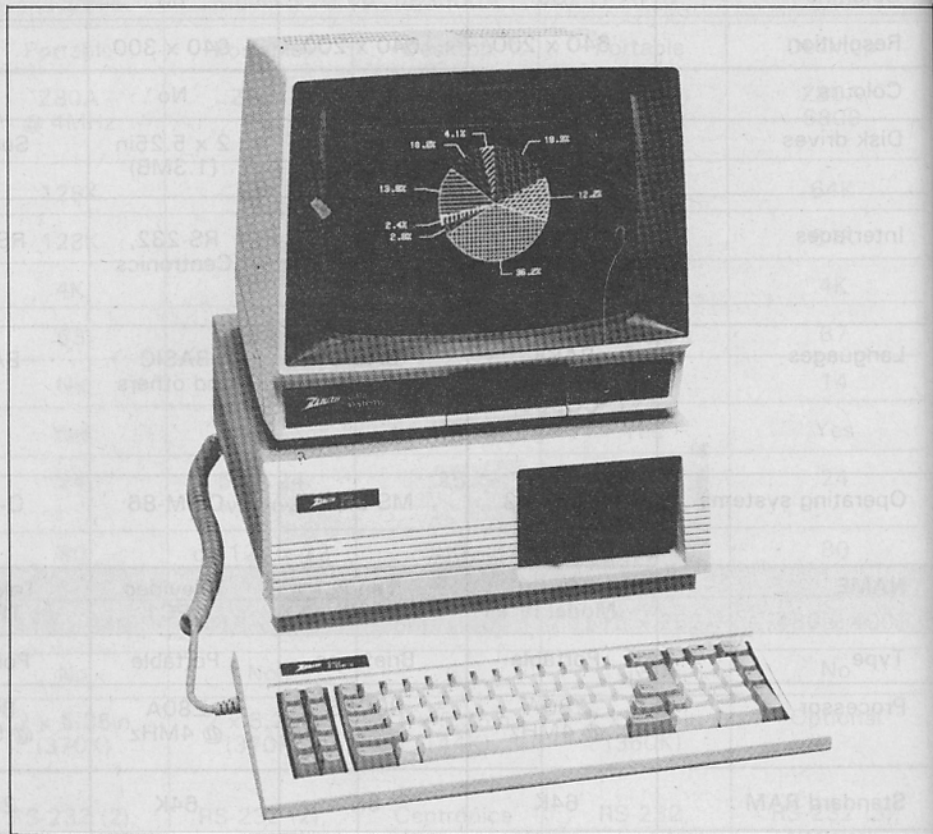
Handshake is used to connect the Zenith to a Burroughs B2900 mainframe TDI local network — no easy task for a microcomputer. It allows the Zenith micro to function either as a standalone computer or as a group of terminals. I say group, as it may function as four independently addressable terminals each operating in its own window.

Data files may be uploaded and downloaded between micro and mainframe either in character mode or using a highly efficient algorithm for binary file transfer, which packs the data and does not transmit redundant characters. Imported data files may be converted to spreadsheet DIF files, read into Lotus 1-2-3 or Symphony, and manipulated in normal spreadsheet fashion. The resultant spreadsheet files may then be reconverted and sent back to the B2900 host program.

Handshake can also be used to connect the Zenith to the Post Office X25 packet switching network, albeit in teletype conversational mode only.

Compatibility claim well justified

All the advertising states the Z-150 is totally IBM PC-compatible. I believe this as I have seen it running IBM PC software using IBM PC-DOS and it runs Handshake — also written for IBM PC-DOS — unmodified.



The Zenith Z150 PC

Robustly built with metal chassis and keyboard enclosure, it is finished in cream and tan colours.

The computer itself contains an eight-slot IBM PC XT-compatible backplane, with four slots free. The four in use hold: CPU card; memory and parallel port card with 320K bytes of dynamic RAM on board; IBM PC colour graphics compatible video card with RGB colour and monochrome composite outputs; disk and input/output card handling up to four 5.25in minifloppy drives and providing two asynchronous full or half duplex RS232 ports operating up to 9600 baud.

Nothing is optional — it is all there as standard. To the right of the card cage are the disk storage devices — single DSDD 48-track soft sectored 360K byte (formatted) minifloppy drive, dual minifloppies, or single minifloppy with 10.6Mbyte (formatted) 5.25in Winchester hard disk drive. Behind the disks is the 168-watt switch mode power supply. It is worth pointing out that the Z-150 has a socket fitted to take the 8087 math processor. All you have to do is buy it and plug it in.

Most of the system configuration defaults may be set by on-board DIP switches, and both the backplane board and CPU card feature a row of power-up diagnostic LEDs. On the latter, six red LEDs turn off in sequence as the machine runs through a system diagnostic program at switch-on. They monitor CPU, ROM, RAM, INTERRUPT (timer, keyboard), DISK, and the last one, RDY, goes off when the operating system is booted. The five green LEDs on the backplane should all remain lit while the machine is running. Should your Z-150 go dead on you, a quick check of these LEDs can isolate the offending card(s).

The monitor ROM contains the power-up diagnostic program, bootstrap loader, video and scroll mode setting commands, and a machine code monitor providing these facilities: help function, display/examine/fill/move/search memory, goto (execute), hex math, input from/output to port, examine registers, a disassembler, and a useful single step trace option that displays the registers at each step.

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WF936/81

Seven modes of video output

Video output may be set to one of seven modes: four text modes — 25 lines of either 40 or 80 characters in colour or monochrome; three graphics modes — medium resolution (320 x 200) graphics with 25 x 40 characters colour or monochrome text, high resolution (640 x 200) graphics with 25 x 80 characters monochrome text. The text font may be selected from four display type styles, and flashing/inverse/highlighted characters are supported.

The 16K video RAM can store four 25 x 80 pages. Any video monitor with standard input connectors may be used, and Zenith offers medium or high resolution green or amber screen units as well as a high res, RGB colour monitor.

Similarly with printers — any standard parallel or serial interface unit may be used, although Riteman 10in and 15in or other printers will be offered with the computers.

I was most impressed by the keyboard. Both the feel and layout are very good. As one who spends about nine hours a day on various keyboards, I think I know when I get a good one. I have only two comments on it — the placement of the ALT key to the immediate left of the space bar leads to it being struck as SHIFT too often, and, as a personal preference, I would have liked the 10 programmable function keys to be in a row across the top.

The disk drives are quiet and reliable in operation (after six weeks), but the partitioned Winchester makes an alarming noise when stepping between partitions until you get used to it. I initially had a Winchester/minifloppy version, and that hard disk makes things really hum along when using some of today's sophisticated software

Microcomputer summary

Name:	Zenith Z-150 PC.
Manufacturer:	Zenith Data Systems, USA.
Processors:	8088 CPU; optional 8087 math processor.
Clock speed:	8MHz.
RAM:	320K bytes, expandable to 640K.
Operating system:	MS-DOS Versions 1.25 and 2.11.
Inpt/Output:	Two serial RS232 ports; one Centronics parallel port; RGB colour and monochrome composite video; single or dual 360K 48-track DSDD 5.25in disk drives.
Keyboard:	Detachable, low profile, sculptured keys with audible click; numeric keypad and 10 programmable function keys.
Display:	25 lines x 40 chars or 25 lines x 80 chars in text modes; 320 x 200 (colour) or 640 x 200 (black and white) graphics.
Sound:	Built-in speaker responding to several sound commands.
Languages:	Microsoft GW-Basic, Fortran 86, Cobol, Pascal.
Software:	Resident machine code monitor program, Lotus 1-2-3-, Lotus Symphony, or any other MS-DOS/PC-DOS software.
Cost:	\$8229 for base single drive model.
Options:	Second minifloppy disk drive \$756; 13in Hires RGB colour monitor \$1628; 10.6 Mbyte hard disk drive \$5261; 8087 math co-processor chip \$549; Z-100 PC video emulator card \$1225,
Reviewer's ratings (5 of the highest):	Documentation 5; expansion 5; ease of use 4; languages 5; value for money 4.

(Review unit supplied by Warburton Franki Ltd, Lower Hutt).

comprising several programs normally held on several floppy disks. MS-DOS version 2.0 is of course a dream to use. I always enjoy working on an MS-DOS machine, and I do not intend to take up space extolling its virtues — others have done that.

I had a loan of Zenith's version of Microsoft's GW-BASIC for this evaluation. Having used a variety of BASICS over the years, this one stands out head and shoulders over all of them. My thought after using it for several days was "Gee whizz, there's not much you can't do with it". I suggest that's how it got its common name of "Gee Whizz BASIC". The Z-150 does not come with a resident language, but there is

a choice of GW-BASIC, Fortran 86, Cobol and Pascal, all by Microsoft. Applications software includes Lotus 1-2-3, Lotus Symphony (which I am using for the evaluation), or in fact anything written for MS-DOS or PC-DOS.

Documentation of both the hardware and the standard Zenith/Microsoft software products is absolutely superb. I cannot fault it in any way. I must however take a dig at the licensing agreement included as part of the Z-100 PC Series Operating Manual. This is a typical American "no responsibility, all threats" document all too prevalent with today's software — a most intimidating example of legalese if you read it thoroughly.

Summing up, if you are in the market for a totally IBM PC compatible machine at a price which is not going to break the bank, but will stand up to a lot of use without falling apart, I recommend you arrange for an evaluation of this computer. The fact it can successfully connect up to a variety of mainframes and double as an extremely versatile terminal (with the right software) can only increase its value to any business.

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MORROW MD11

Comparisons are inevitable

By John Slane

The Morrow MD11 is a nice package. It looks good, feels robust, and is provided with a range of basic software and a very impressive terminal. Maybe I've been seduced by the novelty of a high quality, amber phosphor screen (tilt and swivel) coupled with an excellent character generator and professional keyboard. Well, it was a nice terminal to sit in front of and use, even though the text was on a slant — the yoke needed twisting to straighten the image.

The processor unit has one 384K floppy mounted horizontally in the front, together with indicator lights and reset. All connections and the power switch are on the back panel. Ports there are plenty of — Centronics parallel, monitor, two for RS232C. Really, all you're likely to need. The hard disk formats to 10.75M.

Becoming popular now is extra RAM beyond the directly



The Morrow MD11

addressable 64K for the eight-bit. Several manufacturers offer this as an optional extra and the RAM acts as a virtual disk for fast access. Morrow has an extra 64K of RAM supplied as standard with the MD11 and it acts as a large disk buffer. Well substantiated claims are made that

for certain operations, this provision makes for a dramatic increase in speed. This won't come as any surprise to the people already using additional RAM on other eight-bit machines.

Disappointingly, I couldn't find a way of dedicating any of this extra

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NZ Computer Reviews Autumn 1984



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RAM as a printer spooling buffer. Certainly, the word processing program supplied didn't provide for this. What a waste.

George shops around

Like Clive Sinclair, George Morrow apparently shops around for the best deals in hardware components in putting together his own particular configuration. I had an unplanned opportunity to use two different units since the first suffered a disk control failure after a few hours use and I was supplied with a replacement.

The first had a quiet fan and a very noisy floppy disk drive. The second had a noisier fan and hard disk drive, but a floppy drive with normal operating characteristics. I suppose you have to take what you can get.

Eight major programs are supplied on floppy disks and can be installed on the hard disk in a semi-automatic way. The process takes about half an hour. About three million bytes are shifted across in this time:

Some specific observations:

• Keyboard

Alternate set is available on the 14-key numeric keypad for single key entry of special commands. All keys repeat — slow then faster. An excellent feature. Keys squeak when depressed but this annoying habit can be cancelled by command. Suitable indicator lights signal status of settings, eg, capitals lock.

• Screen

Pleasing amber phosphor and highly legible. Potentially useful graphics characters are available, but not used by any of the supplied software. DIM and BRIGHT commands work well (although opposite to the operation as described in the manual) and are excellent for improving screen readability. Monitor is also capable of reverse video and underline, and this is used well by some of the software.

After 15 minutes without use, the screen blanks out, but can be called back by depressing any key or by any printable data being received from the computer. Screen scrolling is fast.

• Processor unit

It's a relief not to have a computer demanding date and time input or power-up, although the system accepts this information if you choose to. On the other hand, the MD11 has no clock, so the time/data

Microcomputer summary

Name:	Micro Decision MD11.
Manufacturer:	Morrow, San Leandro, California.
Microprocessor:	Z-80A eight bit.
Clock speed:	4.0MHz.
RAM:	128K.
ROM:	8K.
Input/output:	Parallel Centronics for printer; two RS-232C serial for serial printer and modem; monitor.
Keyboard:	Detached unit; 91 keys, typewriter style; the 14-key numeric pad can be redefined into user programmable keys; function keys also programmable.
Display:	24 x 80 on a 12in amber screen.
Languages:	Everything that is available for CP/M 3.0; comes with BASIC-80 and PILOT.
Graphics:	100 x 160 pixel resolution.
Sound:	Inbuilt speaker; beep only.
Cost:	With terminal and software; \$8495
Software:	Word processing, spelling checker, SuperCalc, database manager (Personal Pearl).
Reviewer's ratings:	Ease of 3; documentation 4; languages 5; support 5; expansion 5; value for money 4.
(5 the highest)	

(Review machine supplied by Computer Distributors Ltd, P.O. Box 31355, Milford, Auckland).

is not updated automatically. However, elsewhere in the Morrow range a real-time clock (with battery backup) is available.

In a previous review (Eagle Portable, *Bits & Bytes*, August 1984), I have stressed the importance of a failsafe reset where a hard disk is being operated — so that the head parking routine can be called before power-down. On the MD11, I found an occasion where the system locked up and the reset button was inoperative (during the saving of a short file under New World). This is clearly a design inadequacy and should be attended to.

Suitable information is given about the operation of the system through the user's guide, written in a light-hearted fashion, and easy and intelligible reading.

• Supplied software

CP/M 3.0 has enhanced commands and messages, and is thankfully a little better than basic CP/M. Microsoft BASIC-80 is a familiar developed version but still without on-screen editing.

As with the Kaypro 10, the system provides an opening menu generated by a program written in PILOT — a very easy, but severely limited, programming language. But whereas the Kaypro 10 menu is brilliant, the Morrow is functional but ordinary. However, the availability of PILOT means it's easy for the user to customise any menus and commands without having to use the more complicated BUILD and DO files. Altogether, I found the

availability of PILOT pleasing and worthwhile. Users will appreciate the very simple way of using curly braces under PILOT to control text intensity for enhanced screen presentations.

Again, like Kaypro 10, Morrow provides a utility to read disks created on different computers. However, on the MD11, the formats are very limited and don't reflect recent developments. For example, I couldn't read a disk formatted for the latest Kaypro even though the make was one of the options provided.

New Word, word processor is a copy, with some additional features, of WordStar.

Correct-It, spelling checker is very mediocre. There's even one spelling error (at least) ("gague" for "gauge") in the Correct-It manual (typewritten). The authors either didn't use the spelling checker on their own manuscript, or the checker didn't work on it! The program thinks all abbreviations are errors. Compared with The Word spelling checker supplied with the Kaypro, Correct-It isn't in the same race.

Personal Pearl Database is a reasonably good program for formatting data input and preparing reports. It allows exceptional flexibility in changing input forms and even the database without major re-entering of data. However, the version supplied is not customised to the Morrow terminal (won't recognise cursor keys) and has relatively poor facility for computation such as producing averages and ranges. File

HARDWARE REVIEW

maintenance requires manual operation.

SuperCalc Spreadsheet is as expected.

Reference is also made to a bookkeeping programme called QUEST. But this is not supplied as it is claimed to be too American-specific for our system.

Those inevitable comparisons

Since I recently reviewed the Kaypro 10 which has similar specifications to the Micro Decision MD11, comparisons are inevitable. The Morrow has extra RAM and a full-sized excellent quality VDU terminal. Its bundled software would, in my opinion, be slightly inferior to the Kaypro. And the Kaypro is about \$2700 cheaper than the MD11 on the post-devaluation figures with which I have been supplied.

If CP/M and MS-DOS are what you need, the Morrow option to add a 16-bit processor board (plus a further 128K of RAM) may interest you for around an extra \$1700. However, unless you have some unique Z80 programs, the need to access both CP/M and MS-DOS puzzles me since all the major CP/M programs have already been re-written for 16-bit.

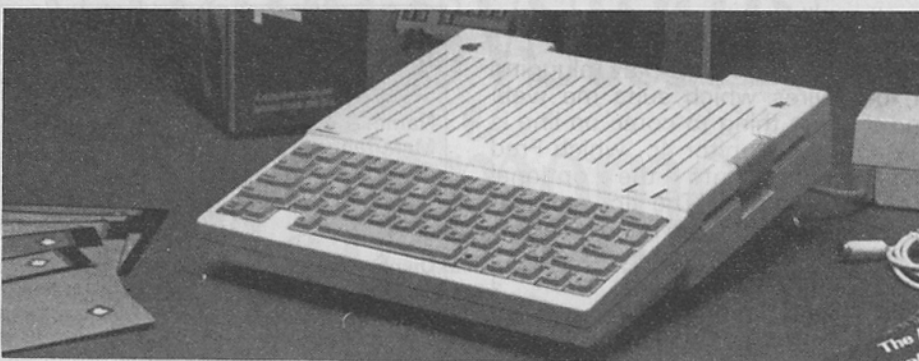
Comparing the cost-effectiveness of the latest CP/M offerings with the IBM 16-bit work-alikes has been an interesting exercise. As a person who likes to write his own programs when the necessity arises, I find I would still rather work with MS-DOS than CP/M. Because of the potentially larger addressable memory with the 16-bit, the need for a hard disk is rather less than with an eight-bit unit for many applications. However, if you are to work exclusively with dedicated software, and what you want is available on CP/M and works efficiently on the CP/M configuration, why look for anything else?

A point to note if you are looking at choosing from among the Micro Decision range:

If you think an additional 5.5M of hard disk storage, plus three major and one minor software programmes, are good value for \$1800, you won't think the MD5E ('Economy') model is good economy compared with the MD11. It has none of these for a price reduction of only \$1800.

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HARDWARE REVIEW



The Apple IIc

APPLE IIc

IIc is to believe

by Alex & Fred Wong

We have seen it, and now we believe! The II family has been graced with a new addition, the IIc portable computer, which is not only more powerful and better produced than the three previous models but also 95 per cent IIe compatible.

The bright red box contains the IIc (motherboard, I/O ports, disk drive and keyboard), separate power supply, manuals and five introductory disks, all in very trendy, high quality packaging.

In a separate box comes the optional 9in, green screen Monitor IIc and then the matching metal Monitor IIc stand.

Everything we need to get started!

The ultra-modern, European designed, slimline case (which Fred happily puts on his lap) weighs 3.4kg (7.5lb) and has a footprint of just 31 x 29cm (12 x 11.5in). The fullsize keyboard (which, unlike the American model, does not have the Dvorak key configuration option) has 63 examples of responsive, tactile, positive click, repeating keys in exactly the IIe layout (except for the seemingly inevitable reset key change) and Apple's special design has resulted in professional solidity.

At the back of the case (its colour is named 'Apple Fog'!), are the I/O ports. There are D-type connectors for a mouse or joystick, an RS-232C for a modem, a video expansion port for external sound and RGB output, the monitor jack, the external disk drive connector, another RS-232C for a printer and the 12-volt DC power input.

These ports are not sourced from slots, as traditional in older Apple II's, but from LSI chips on the actual motherboard. All the IIc's expansion options are built-in and though this

may lead to less versatility, most IIc owners will never need more than its ample provisions. The advantages gained in terms of economy and portability are significant.

Large scale Integration has been used extensively in the IIc and the 41 chips inside it are well packed. The microprocessor is a variant of the original (a 65C02) — a CMOS (complimentary metal oxide semiconductor) processor which not only provides 27 new instruction codes but more importantly, reduces power consumption (and therefore heat generation) considerably. Sixteen 64K-bit RAM chips give 128K (bank switched a 64K RAM each). The 16K of ROM which, as well as Applesoft, includes Mousetext (a special set of 32 graphics characters for use with the mouse), not to mention the I/O unit, the MMU, the IWM (Integrated Woz Machine), two serial RS-232 chips, the TMG and the GLU, as well as the video and audio generators!

The built-in, slimline disk drive is Apple's usual single sided 143K unit which, in keeping with policy, is fully compatible with existing software, although word has it that the drive posed the largest challenge in terms of heat, weight, size and electromagnetic interference.

The internal speaker, I am happy to say, has improved with the addition of an external volume control as well as a stereo headphone jack, especially since Fred is trying to set a new 'Crossfire' points record.

The internal power supply unit accepts only DC rated at 12 volts, although Apple's design allows it to accept as low as seven or as high as 24 volts. With an appropriate plug,

the IIc will be seen in many, many cars.

Installation is child's play (plugging in four wires which suits me well) and the last thing to come on-line is the optional Monitor IIc, which Fred just screws onto the optional Monitor IIc stand. The IIc, propped up on its dual purpose handle to give a better typing position, tucks handily underneath to form a beautifully integrated set.

Well, all fired up and rarin' to go!

Software comes with the IIc in the form of five introductory tutorial disks which, when used in conjunction with the Interactive Owners Guide (I have to confess we didn't on the pretext of being pressed for time), provide an interesting (sometimes amazing), informative 10 to 12 hours.

"An Introduction" looks at the keyboard and "The Apple At Play" (on the other side of the disk) includes a game from Broderbund Software. "The Apple At Work" epitomises business software as its AppleWorks package. "Exploring Apple Logo" and "The Inside Story" (which explains the rudiments of disk to RAM data transfer) take up a disk and "Getting Down To BASIC" (a tutorial on Applesoft) reside on a single sided disk. The System Utilities disk is an expanded ProDOS Users Disk which runs only on a IIc and does various chores such as disk backup, file transfer and DOS maintenance. It also has programs that can configure the two serial ports via software control instead of hardware adjustments.

However, the IIc must depend to a large extent on the viability of the tremendous base of over 20,000 third-party software packages for the II family. The high level of compatibility (95 per cent) is then, good news with only a few notable points of difference. The set of Mousetext characters in the ROM has replaced the IIe's inverse capitals and this causes peculiarities when running a program such as Multiplan, although this in no way actually harms it, the data or the IIc. A few other incompatible programs probably use strange protection methods or illegal memory addresses.

Undocumented 6502 instructions (which have been deleted from the 65C02), will also present problems. Applesoft, while completely compatible with earlier versions, has a few improvements too. Among other things, it will now accept lower case commands and the ESCAPE key provides a special cursor.

The standard extra features of the

Microcomputer summary

Name:	Apple IIc.
Manufacturer:	Apple Computer Inc.
CPU:	65c02 eight-bit CMOS @ 1MHz.
RAM:	128K bytes.
ROM:	16K bytes (Applesoft BASIC, Mousetext icons & routines, 80-column routines, self-test).
Display:	24 lines by 40 or 80 characters, upper and lower case in 7 x 8 matrix.
Graphics:	Low resolution 16 colours — 40 x 48 blocks; high resolution 6 colours — 280 x 192 pixels; double resolution 16 colours — 560 x 192 pixels.
Languages:	Applesoft BASIC in ROM; machine code monitor in ROM; optional languages — Pascal, Logo, Forth, Pilot, Assembly, Modula-2.
Keyboard:	Full typewriter style, 63 auto repeat keys, with tactile and auditory feedback.
Audio:	Built-in speaker with volume control, headphones jack.
Mass storage:	Built-in half-height 5 25in floppy disk drive, fully compatible with Apple Disk II.
Input/output:	Connector for joystick(s)/mouse; two RS-232C serial ports; video expansion port (RGB/RF); composite video; connector for second disk drive; 9-15V DC power input; headphones jack; external power transformer and RF modulator included.
Price:	N/A.
Options:	Monitor IIc — 9in high resolution green screen, stand for Monitor IIc.
Reviewer's ratings:	Documentation 4; ease of use 5; language(s) 5; expansion 4; support 5.

(Review machine supplied by CED Apple Computers).

IIc (128K RAM, 80 columns, mouse interface), make it a tempting target for software specialisation and to that end, Apple earlier seeded 100 software companies with IIcs and developers' toolkits to redesign their programs. These companies include Apple itself, Microsoft, Software Publishing and Broderbund Software. This has already resulted in some programs being re-released for the IIc and top-end IIes, notably Dollars And Sense, Bank Street Writer, the Home Accountant and the Complete Graphics System, with more being announced almost daily.

All this we have witnessed on the Monitor IIc, which rivals the Monitor II both in performance and style and we have decided a 9in display as sharp as this one is definitely no hindrance. The IIc also comes with a separate RF modulator to allow connection to a television and Apple has thoughtfully provided a specially longer cord for this. The display on 40 columns (and for games) is good but at 80 columns is only usable.

Four manuals come with the IIc. The user-oriented "Setting Up Your Apple IIc" has clear, numbered instructions for most occasions. The Interactive Owner's Manual explains and expands on the tutorial disks to provide an excellent introduction to all the features of the IIc as well as BASIC programming, Logo priming

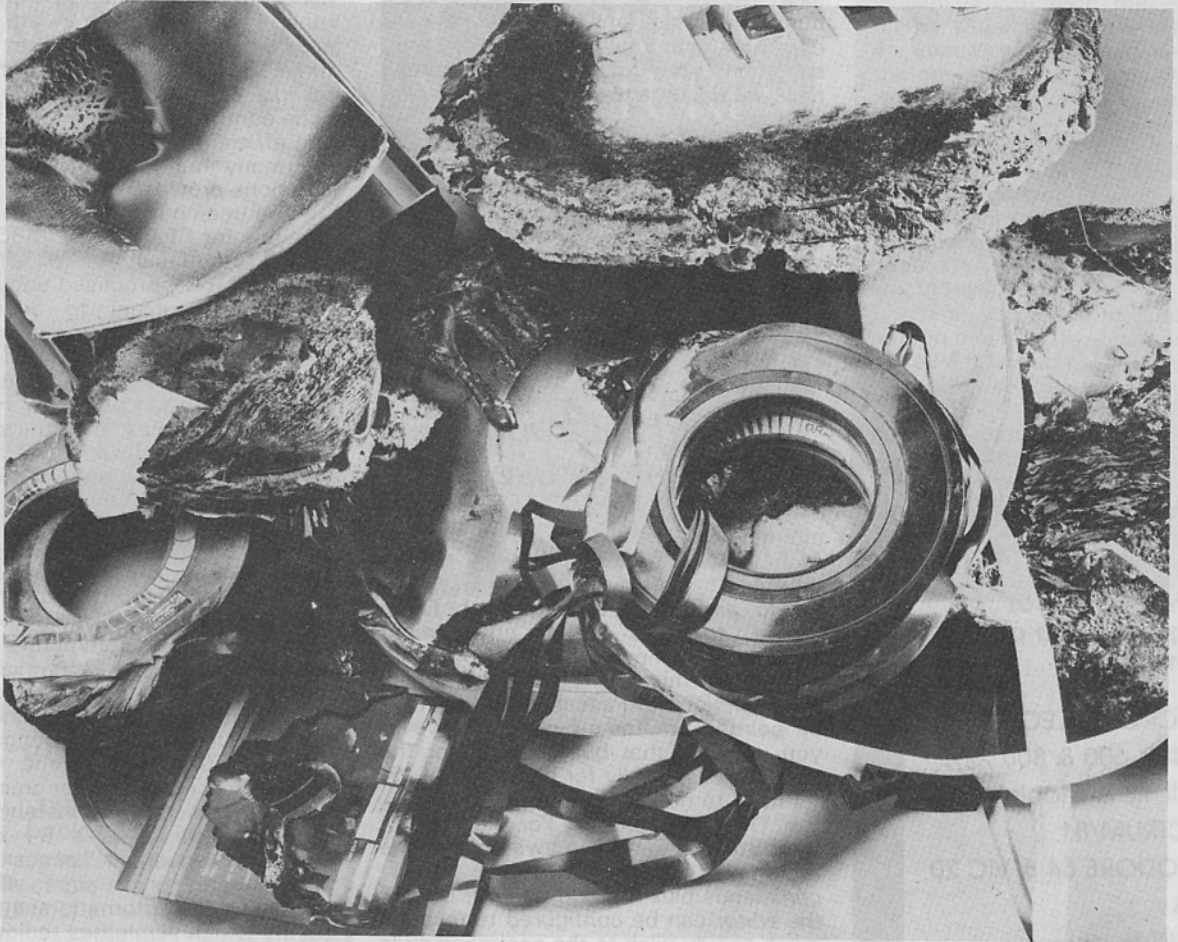
and expansion options. The System Utilities book deals with the disk of the same name to provide a rudimentary ProDOS and serial port configuration manual, and the last booklet details the difference between the American and international IIc models.

All the illustrations are clear and beautifully presented but once the initial stages of computer use have been learnt, I suspect the optional Reference Manual would come in more than handy.

The future looks very bright indeed for the Apple IIc, with its trend-setting design and high quality performance, and it's sure to be a winner with the educational and professional, as well as the home market. A large range of peripherals is due to be released shortly — such as an external disk drive, the Scribe printer and the revolutionary LCD, fullsize (80 characters x 25 lines) flat screen monitor that will make the IIc even more portable.

It is an excellent end-user computer and (provided the price, which was not determined for our pre-release IIc, is reasonable) will satisfy many people's longings. For something so potentially productive and definitely valuable, it's also irresistibly cute! Fred doesn't want to take the IIc off his lap . . . but it's my turn now!

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First of a new breed?

By Derham McAven

I'm hopeful the maker of Turbo Pascal, Borland International, is just the first of a new wave of software houses. I am confident the market will support high quality products which are really inexpensive. I am tired of the heavily promoted \$1000-plus packages which are ordinary in performance, heavy on frills, and three or four levels of ignorant middlemen away from real technical support.

Turbo Pascal, bought direct from the US maker, cost \$120 (NZ\$!!) and arrived within three weeks of posting the order.

Open the packaging, and inside there is a good manual with paperback binding, a system disk and a second work disk with model programs illustrating most of the fancy features. Make your own copy of each and put the originals safely away (none of the Lotus-style, no-copy nonsense here). Pop your disks in and away you go.

In fact, "go" is the operative term and "go" is the main impression this Pascal

gives — it really is turbo-charged. We ran a 1200-line file of source code (not lightweight code and perhaps 10 per cent comments) which compiled in just under 28 seconds! We had to rerun the exercise several times to convince ourselves. This, on a 192Kb IBM PC compares favourably with a 2Mb, 32-bit supermini with just one user (I keep resisting the urge to sprinkle exclamation marks).

Rather than merely repeat a list of performance statistics, I refer readers to a technical review in the July 1984 issue of *Byte* which presents benchmarks for both the CP/M and MSDOS/PCDOS versions. The rest of that review, while generally favourable, appears to adopt the viewpoint of a software house stressing compatibility with other Pascals and highlights some minor faults.

Efficient and easy to use

My assessment relates mainly to intermittent demand for creating new tool software rather than regular development of application suites. But I would argue the suitability of Turbo Pascal for the latter environment anyway. I compare this package with four other micro and two mainframe scale versions of Pascal and find it tops on points both for efficiency (however you measure that but allowing for the host) and especially for ease of use.

I have to note a few major features:

- The native editor. For old fans of WordStar, this is home away home, the essential functions with the familiar commands plus the odd frill. For others, the editor can be configured to respond much as you wish to the command style you specify. You have to be fussy to find fault.

- In-memory-compile. For the development phases, this is the best alternative I have found to an interpreted language (eg, BASIC). Compilation is so fast it hardly matters (the tumbling digits of the line meter just counter the done-with-mirrors feeling) and when an error is detected, including execution errors, you pop back into the editor at the relevant point in the source code with meaningful diagnostic.

- Standard .COM (or .CMD as appropriate) files are created with just a few extra disk accesses. If a program would exceed the normal 64Kb of object code, a chaining facility provides for tidy linked overlays allowing modular development of very large programs. An option in running a .COM enables a jump back to the relevant line of code if an execution error occurs. Dynamic data structures allow the user to take

advantage of all the working memory available.

- General goodies. In-line assembly code is supported, as is full access to memory management, interrupt handling, I/O mechanisms and all the other bit-twiddling that real programmers (who don't eat quiche!) thrive on. An instructive example in the manual of how to use in-line assembly code contrasts ironically with the simple and efficient alternative of using one of the many really worthwhile additional functions provided.

- Source-code portability. There are versions for CP/M80, CP/M86, PC DOS, MSDOS (for a host of IBM PC lookalikes) with CP/M68K promised soon. (This is, of course, subject to avoidance of machine specific bit-manipulation).

- Object code. The compiler is smaller than its rivals, produces more compact object code and that code runs faster than any other Pascal on the same gear. On an IBM PC, it compares favourably with most versions of "C" on the same terms.

- For those with a foot in the 16-bit door. The IBM PC version has, as standard, extra goodies: graphics control, sound control and windowing. I envisage an application, say for international commodity price monitoring, with four windows each with a clock face showing times in real time at different locations, New Zealand, London, New York and Hong Kong, for example. Support for the 8087 co-processor for real number crunchers, ex-Fortran addicts for instance, is an optional extra as is a B+ tree-based indexed sequential access method (ISAM). This gives super-efficient file handling with automatic sequencing on the fly which eliminates tedious sorting. Supplied with this is source code for a model data-base handler and a module which supports a standard terminal installation facility so that a package can be automatically tailored to a user's screen. The developer can cater for a range of devices — ADDS, VT100, TELEVIDEO and so on — with minimal effort. (\$NZ120 compared with \$NZ1000-plus for Access Manager and Display Manager from Digital Research).

The product is not perfect, as the *Byte* review points out, but I am unashamedly enthusiastic about it. I know the pricing (and other practices) of some software dealers is a rip-off and I look forward to more software from this company and for others to follow its lead in value for money.

Bits & Bytes readers, in or passing through Christchurch, are welcome to contact me at the Polytechnic (call first please on (03) 798-150) for a brief demo.



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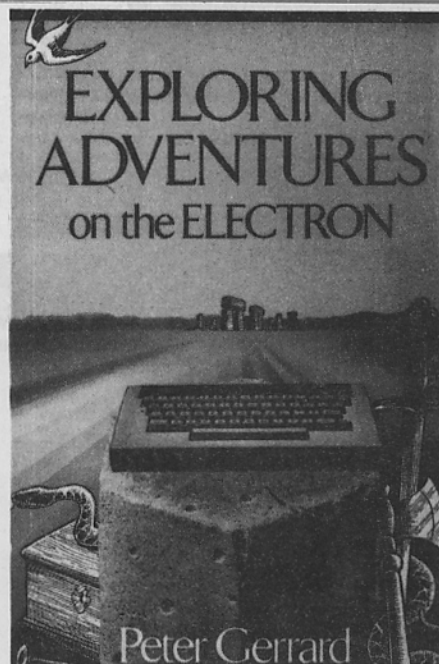
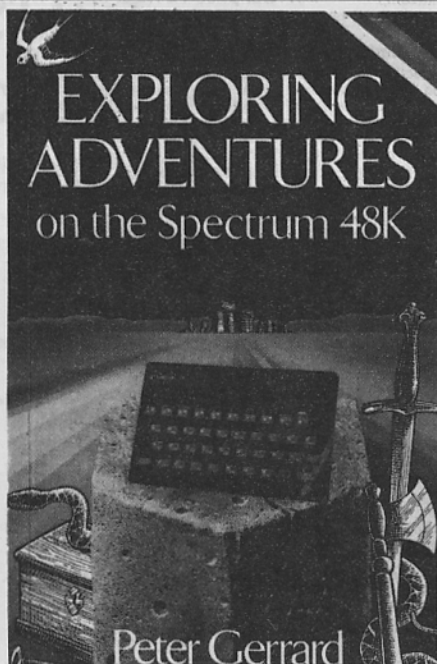
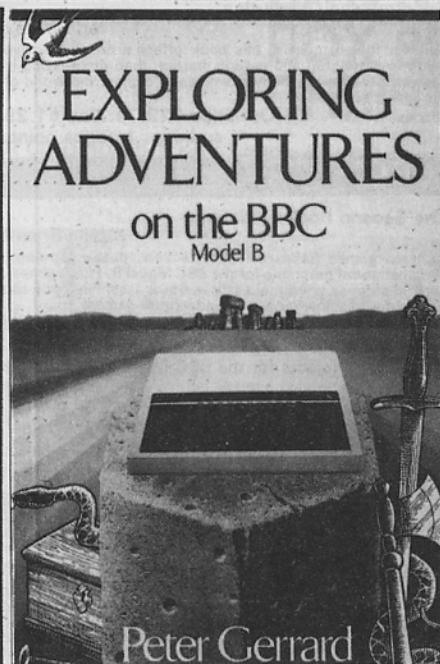
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Gerrard, the former editor of Commodore Computing International, has written two top-selling adventure games for the Commodore 64 and is a regular contributor to several computer publications. Each book starts with an introduction to adventures and their early history, then takes you gently through the basic programming needed before you can start writing your own games. Everything is explored in detail and you are given a number of adventure scenarios to get you started. And to finish, these are three complete listings (all available on one cassette).

Language/programming

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Sams

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Dissects data and file management, focussing on how you can effectively use modern database systems and how to get the best from them. Thorough overview of databases, practical examples and exercises, discussion of widely used databases, the "how tos" of report writing, indexing and cataloguing; database design for protecting data.

Addison-Wesley

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Choosing Your First Computer System: A Guide for the Growing Business

K. Ian Mitchell & Bevan J. Clarke

Written to help the manager with no computer experience to decide whether the business needs a computer and if so, which one; what sort of computer services will be best; and how to manage selection and installation. Straightforward style helps remove the complexity from these problems.

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Clear, concise text and eye-catching graphics help you master the basics, then guide you through programming techniques for useful applications such as mailing label systems, graphics, bookkeeping, printing and formatting reports. You also learn to interface dBase II with other software systems to expand its capabilities.

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Advanced dBASE II User's Guide

Adam B. Green

Collection of tips, techniques and practical programs tested and refined over two years of seminars around the USA. Practical advice on software tools; controlling program flow; macros; strings numbers; dates; relational data model, other data models, repairing damaged data files; debugging; writing an add-on; hacking; benchmarks.

Prentice-Hall

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Business Program Portfolio for your Apple II; An Integrated Office System

George H. Hildebrand

Collection of 61 BASIC programs covering such office tasks as interest calculation, financial analysis, depreciation, property management and real estate, cash receipts and disbursements, job cost, payroll. All programs documented for implementation and modification. There is also guide to printing out business forms, creating a menu system, and securing business records with password programs.

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IBM

Using Your IBM Personal Computer

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After previous popular books on the Apple II, BASIC and the Atari, Lon Poole has now turned to the IBM PC. This comprehensive book is in two parts — for those who want to use only packaged programs; and for those who have never programmed a computer but want to learn BASIC programming. Also includes familiarity chapters with the hardware, sections of graphics and sound, and summaries of BASIC, PC DOS, error messages and characters, codes and keystrokes.

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Richard Allen King

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

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The IBM PC Connection

James W. Coffron

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

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The IBM Personal Computer Handbook: a User's Guide

Dennis Jarrett

Pragmatic introduction which sets out to put the IBM PC into perspective for the average buyer and user. Investigates the innards of the computer, looks at its various business uses,

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The Super Computer Snooper

Isaac Malitz

Traces the path of a character from the keyboard to areas of memory, to the disk and onto the screen and printer, discussing what is happening along the way. You find out how to restore a program which has been accidentally erased, how to listen to the inner workings of the IBM PC, how to identify deleted or hidden files on disk, how to write a program which rewrites itself.

Reston

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Spectravideo Computing

Ian Sinclair

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BBC

The Second Book of Listings

Martin Bryant

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Interfacing Projects for the BBC Micro

Bruce Smith

Describes how to plug into the outside world and operate a variety of devices connected to and controlled by the BBC. Projects include: burglar alarm; rain detector; light pen; EPROM programmer; X-Y plotter; joystick controller. Construction details provided, plus circuit diagrams, veroboard layouts and component lists. Tested and debugged programs to get projects running.

Addison-Wesley

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BBC Micro Assembly Language

Bruce Smith

Covers hexadecimal and binary; the registers; the mnemonic assembler; absolute and indirect addressing; stacks and flags; MOS routines. Full uncensored description of CALL and USR, showing how strings and variables can be passed into machine code programs. Appendices include description of 6502 chip's 56 instructions, machine code graphics and sound, including PLOT, SOUND and ENVELOPE.

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Alan Thomas

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40 Educational Games

Vince Apps

Editions for the Commodore 64 and the Electron. Developed with the help of educationalists and a professional programmer, programs have been designed to help younger family members handle the machine and increase their general knowledge. Subjects include languages, geography, mathematics and science. Hints show how program contents can be changed to suit the family as skills develop.

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Our new selection

The Commodore 64 Connection James W. Coffron
Shows how easily you can use the 64 with household devices. Offers simple techniques to control a home security system, a home temperature control system, as a voice synthesiser to make the computer talk. The 64 is well suited to such purposes and a combination of this straightforward guide and a little imagination should open up many possibilities.
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Basic Computer Programming for Kids Pat Cassidy & Jim Close
"Pied piper" approach designed to lead kids through the world of computing. Uses everyday examples to educate and entertain — programming steps include brushing teeth and putting on socks, for example. Written for the Apple II and TRS-80, the book contains chapter quizzes to check progress through the skill levels.
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Advanced Programming Microsoft BASIC Gabriel Cuellar
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Programming in C for the Microcomputer User Robert J. Traister
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The Master Memory Map for the VIC-20 Robin Sherer & Craig Patchett
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The Apple II Basic Handbook for the new Apple IIe and Apple II-Plus Douglas Hergert
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Commodore 64 Assembly Language Bruce Smith
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Practical Spectrum Machine Code Programming Steve Webb
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The Big Fat Book of Computer Games Tim Hartnell
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Hackerbook for Your Atari Computer: Tips & Tricks H.C. Wagner
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Using the 64 Peter Gerrard
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88 Apple Logo Programs Mitchell Waite, Don & Jennifer Martin
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IBM BASIC: An Introduction to Programming in BASIC on the IBM PC. Donald T. Payne & William R. Beck
Each chapter opens with a problem-solving situation encouraging you to think on your own and experiment for a deeper understanding of the principles involved. Simple problems in early chapters teach you how to use, understand and modify programs. Gradually, the emphasis changes to creation of your own programs for business, home and entertainment.
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Commodore 64

Basic Subroutines for Commodore Computers Eddie Adams

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

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How to Use The Commodore 64 Jerry & Deborah Willis

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

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Commodore 64 Machine Language Tutorial Paul Blair

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

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Illustrated Guide to the Commodore 64 Ken Uston

No-nonsense instructions designed to allow you to master one application without reading the whole book. Covers all major applications — including word processing and spreadsheet calculations.

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Data Handling on the Commodore 64 Made Easy James Gatenby

Data processing — sorting raw facts to produce useful information — can be just as rewarding as playing games. Explains how to use the Commodore 64 to process information for the home and small business. Uses straightforward examples to demonstrate storage of large quantities of data, attractive and readable on-screen display, and searching and print-outs.

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The Commodore 64 Program Book Vince Apps

Collection of adventures, games and utilities to exploit the C64's colour and graphics. Adventures test logic and deduction; wide range of arcade-style games; utilities include versatile assembler/disassembler program.

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Advanced Machine Code Programming for the Commodore 64 A.P. & D.J. Stephenson

Details the 6502/6510 microprocessor with particular attention to the multiple-byte handling and high-resolution graphics. Number of fast sorting routines are described and methods outlined for using machine code to improve the speed and smoothness of animation and sound. Many examples as illustrations and for practical use.

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Commodore 64: Basic Programs in Minutes Stanley R. Trust

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

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Apple

Introducing the Apple IIc Phillip Lieberman

Goes over the Apple IIc's features and looks at accessories needed to tailor it to specific needs. Covers compatibility with other Apples, setting up and expanding your system, using packaged software, communications, built-in Applesoft, adding other languages, and the operating system.

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Getting Started With ProDOS

B.M. Peake & D. Rorke

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

Bluewater Press Our price \$6.65. Save 30 cents and earn 1 bonus point.

Assembly Cookbook for the Apple II/IIe Don Lancaster

Guide to using assembly language for writing your own programs. Dissects assemblers and provides list of essential tools for assembly language programming; covers source code details; lets you find out the "new way" to do source code entry and editing, and how to upgrade your editor/assembler; demonstrates how to assemble source code into working object code; includes nine ready-to-go modules as examples of Apple programming essentials.

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Applesoft Basic: A Teach-Yourself Introduction B. M. Peake

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

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BASIC Business Subroutines for the Apple II & IIe Ian G. Porter & Martin G. Reznor

Takes frequent business programming problems, works out how to solve them and gives the solutions in Applesoft BASIC. Solutions provided in subroutines (program modules) which are easy to transport between programs and easy to modify to your specific problem. Each solution builds on techniques previously explained, and all are brought together in a single program at the end.

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An Apple for Kids Sharon Boren

Written by a teacher, it uses an individualised, self-paced approach to computer operation and programming in BASIC. Encourages creativity as well as good programming techniques. Full of illustrations and activities to make learning fun. Focuses on problem solving, higher order thinking skills and creativity. Around 80 activity worksheets.

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Intermediate Apple Bill Parker

Ideal for the BASIC programmer ready to move on to more complicated challenges. Shows you how to structure programs "one step at a time" by reducing big problems to smaller, more manageable proportions. Also covers flow diagrams, algorithms, text files, enhanced graphics, special printer techniques.

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Your Apple II Needs You: 30 Programming Projects Frank Wattenberg

Demonstrates how to create new programs. Includes 30 programming projects — some serious, some fun. They include programming your own computer games; experimenting with the laws of chance; three-dimensional graphics; biorhythms; breaking codes and an unbreakable code; space flight; ecology.

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Spectrum

Tim Hartnell's Giant Book of Spectrum Games

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

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An Expert Guide to the Spectrum Mike James

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

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Spectrum Graphics Nick Hampshire

Introduction to programming techniques for generating graphics displays. Covers use of colour; shape plotting; two and three-dimensional shape plotting; shape scaling and stretching; shape movement; shape rotation; plotting using matrix manipulation.

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Further Programming for the ZX Spectrum Ian Stewart & Robin Jones

Designed to allow you to enhance your Spectrum through cassette files, data management, crashproof graphics and flexible line renumbering; exploit it through user-definable functions, system variables, attribute and display files and new character sets; employ it for star charts, code breaking, psychology and statistics.

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VIC

The VIC-20 for Kids of All Ages Tony Noble

Gradual introduction to the VIC-20 through 29 practical programming steps leading you from switching on to PEEKs and POKEs. Explains basic features of hardware, software, programs and memory. Includes 14 complete program listings for music, graphics, word games, arithmetic practice, spelling and adventure games.

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VIC GAMES Kevin Bergin

Twenty programs, most of which will run on an unexpanded VIC. Games include Golf, Air Attack, Snake, Punter, Defence and two adventures. Utilities include Tape Search, Code Creator, Block Graph and a complete listing and BASIC loader for Tinymon.

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

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SOFTWARE REVIEW

SUPERBASE 64

A powerful competitor

By Ian Douthwaite

Superbase 64 is a powerful, general purpose database management system (DBMS) for the Commodore 64. It is produced by Precision Software which was also responsible for EasyScript.

I doubt that Superbase truly qualifies as a DBMS — a characteristic it shares with many similarly labelled products. The debate over what defines a DBMS is rather like that of the economists over what defines a monetarist; inconclusive and rather pointless.

The two factors which make such a product a valuable piece of software for personal computer users are:

- it provides a way of easily storing and retrieving a variety of information;
- it liberates programmers from the massive burden of producing code to do file handling for each application they work on.

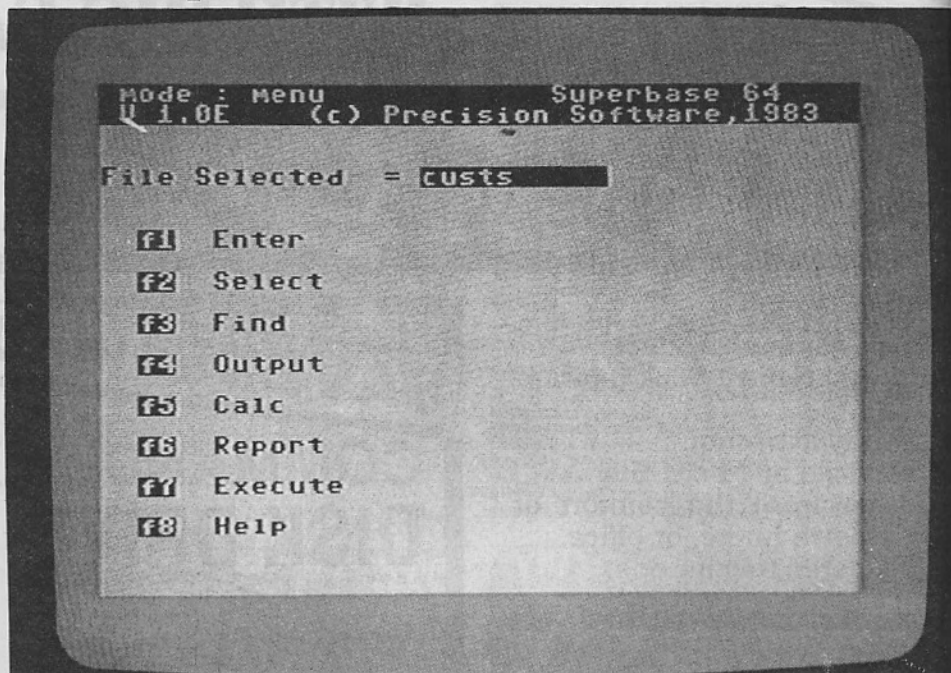
On these counts, Superbase certainly has a lot to offer. It allows you to set up databases containing up to 15 files. The records in each file are of a common format designed by the user.

Formats are set up by drawing the record layout on the screen and where necessary, specifying the types and sizes of fields. Record formats may use up to four screens and may contain up to 127 fields or 1108 bytes of storage. You can also include a large amount of "descriptive" text at no cost.

Fields may be key (only one per record), numeric, date, constant, result, text, or calendar. Result fields do not have values entered by the user but are calculated on the basis of the values of other fields in the same record according to a formula defined by the user as part of the record format.

Very natural & easy to use

All data entry, retrieval and updating is done by the "forms" these formats



A sample menu of Superbase 64

represent. This makes the basic data entry and editing functions very natural and easy to use. A useful feature is the ability to alter the record format independently of the date in the file. There are some restrictions on this but it is far superior to systems which require all data to be deleted before changes are made, and then re-entered.

Precision has really hedged its bets when it comes to the user command interface for Superbase — it allows the use of both menus and commands.

At the main menu level (see illustration), there are in fact two menus which you move between by pressing RETURN. The options on these menus are selected by the function keys. The dual menu, plus Commodore's bizarre use of four keys for eight functions,

makes selecting the wrong function all too easy and a knowledge of the "escape" procedures (mercifully consistent from option to option) is essential. Experienced Commodore users and concert pianists should not have too much trouble though.

Despite this, the package gives the impression of being very reliable and well-engineered. You do not live in constant fear of a crash.

Superbase permits very flexible retrieval of information. You can access records quickly by specifying a value for the key field or you can browse backwards and forwards through the records in a file. On top of that, there is a powerful "match" facility which allows you to select records on the basis of values in any field or combination of



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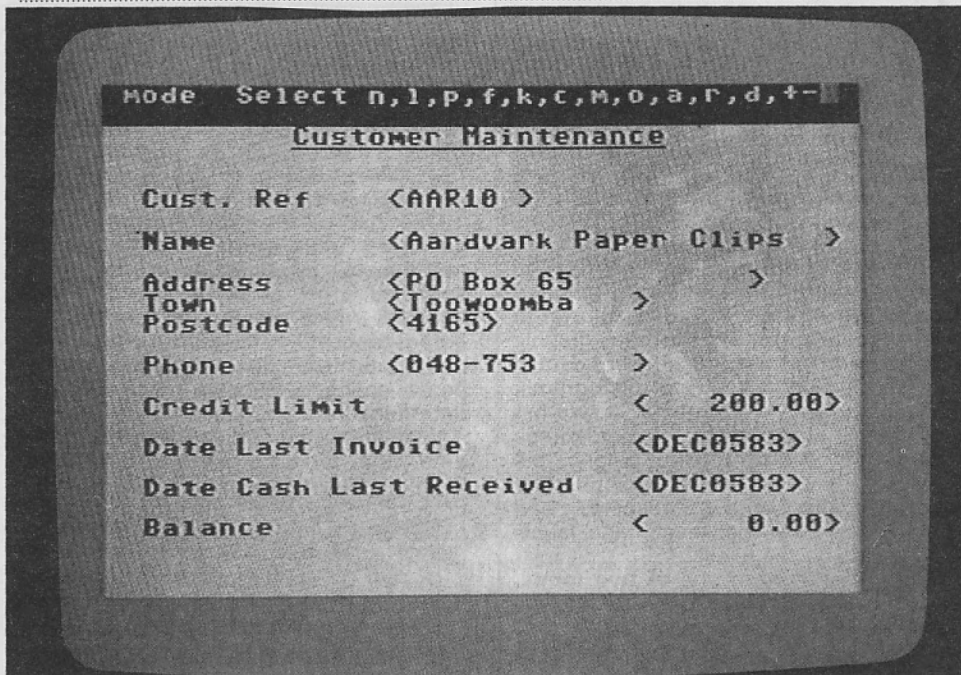
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SPECIFIC SOFTWARE

SOFTWARE REVIEW



A sample menu of Superbase 64

fields. Partial matching of any of the fields is also possible.

This is an extremely powerful feature but it must be used cautiously as it can be quite slow because it involves sequential scanning through the records.

Individual updating

Records may be updated individually by selecting them and altering the data. However, Superbase also provides facilities for batch updating of some or all of the records in a file. The set of records to be updated can be chosen using the same method as in the match facility.

There is also a report generator facility which, by prompting the user, generates a program which when run produces a customised report on some or all of the records in a file with sub-totals and totals as specified by the user. In all these facilities, only one file can be operated on at a time. There is though, an ability to set up a link to another file so that you can switch quickly between the two.

The problem with a tool such as this is that as soon as it becomes general enough to be useful to a variety of people, it becomes more complex than any of them needs or desires. Superbase is no exception.

This, and the fact that users often want to do quite complex series of operations regularly, makes the ability to write programs incorporating database commands very desirable. Superbase caters for this by allowing you to write programs in BASIC which contain Superbase commands. Unfortunately, it is in this area that Superbase suffers from some weaknesses.

The most serious is the woeful inadequacy of the programming section of the manual. It's a shame, since the failure lies in not describing everything

the database can do. You are frustrated, therefore, either by its inability to perform some feat of magic or by the suspicion that it could if only you knew the magic words.

A further drawback is that only 4K of memory is available for programs (about 200 lines). This is alleviated slightly by the ability to chain programs together and share data to a certain extent.

The program writer facility works like most BASIC interpreters/editors — primitively. This makes program development tedious and often frustrating. However, good results can be achieved for the expenditure of some effort.

Besides these facilities, Superbase also has a help and memo facility (with help screens provided for Superbase commands), support for output to printers, sorting facilities, support for output to other Superbase databases, as well as disk files and EasyScript. It also has full back up and disk management facilities, so you don't need to leave Superbase to do such things.

Documentation is generally well-prepared. The manual contains three tutorials — a reference section, programming section, and technical appendices. The first two tutorials are accompanied by an audio cassette which I have not had the chance to try but seems to pose as many questions as it answers.

Although the manual is well suited to showing new users how to use the package properly, it lacks the overall explanatory framework necessary to enable more experienced users to get the best out of the software easily.

A note of caution

Finally, a note of caution. People

selling software such as this will tell you you don't need to be a computer expert to use it. That's true, but there are two "technicalities" you must be aware of — capacity and speed.

Although Superbase can retrieve information in an enormous number of ways, only access by key will be fast. The omission of the ability to define secondary indices (to permit direct access by fields other than the key field) is significant in this regard. And unless you are very patient, a parallel disk-to-computer connection is a must.

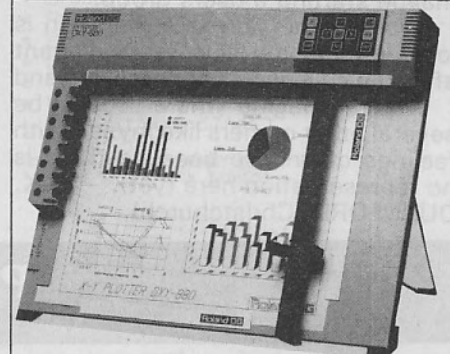
Superbase allocates records in 128-byte chunks (the smallest size is 128 bytes, the next smallest 256 and so on). Doing a few simple sums will tell you how much disk space you will need for your application. Remember to leave some over for programs and other bits and pieces.

For people with modest data handling needs and budgets to match, a database package priced at \$258 for the competitively priced Commodore 64 must merit consideration.

(Computer and copy of software used for this review were supplied by GT Computing).

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The right reference

Sir — In my modem article (*Bits & Bytes*, April 1984), I inadvertently gave the wrong issue of *Byte* for the XR2211 home-brew modem. You will find the design on pages 484-487 of *Byte* (August 1983) but don't waste time looking in the table of contents for it.

Some readers asked why I said the MC14412 digital modem chip was not really in the race. I was thinking mainly of the Motorola specifications that it is optimised for 200 baud at New Zealand (CCITT) frequencies. However, I recently found the Exar version of the 14412 is specified for 300 baud.

In either case, good filtering and switching is needed. I know of one home-brew with a 14412 that runs well, and two that are rather unreliable.

A digital 300-baud modem chip, the AMI S3530, is supposed to be available from David Reid Electronics Ltd, soon. Since I have seen three entirely different prices for this, readers had best check directly with the retail shops when it arrives. — JAY D. MANN (Christchurch).

Actrix group?

Sir — I am interested in trying to contact users of the Access (Actrix) portable computer, with the aim of maybe starting a users group.

I believe the Actrix Corporation is looking for a new New Zealand agent after the collapse of Access Data and I would imagine there could be several other owners like myself with feelings of unease because there is no representation here (yet). — D.K. DURNFORD (Christchurch).

Do-it-yourself plotting

By Kerry Coppett

SIMPLOT and PRINT-A-PLOT are two separate but related products produced by the Auckland firm, Sirius Systems Ltd.

The intended purpose of SIMPLOT is to enable a user, with little knowledge of computers or plotters, to use a plotter to present data in some of the many graphic forms used. The user can present data in the form of stacked bar histograms, grouped bar histograms, two-bar mirrored histograms, percentage histograms, histogram-line graphs, pie charts or line or scatter graphs. The package also allows headings and footings of two lines each, and labels and scales on the axes.

Data is entered in one of two forms. For the histograms and pie charts, the program will accept up to 12 by 12 entries, for instance, 12 months sales of 12 groups of merchandise.

For scatter diagrams, the program will accept up to 64 points for 12 items. Data entry is very simple via menus, and the data can be saved to disk. There is also an option to allow the entry of data from a SuperCalc spreadsheet.

Once the data is entered, it can be saved to disk, added to or edited using the same screens as the data entry. When all the data is entered, the data can be plotted on any of the common plotters in any of the forms. There is, however, a restriction that all but one type of presentation requires the data in one of the two forms and will not accept data in the other form.

The request to plot data is again menu-driven and very simple. Scales on the axes are automatically calculated and the user can use these as defaults or modify them to suit their own needs. The

user can also choose the shading and colour for each section.

One particularly nice feature of the colour selection is that if the plotter is not capable of selecting all the pens specified, the program will plot all sections which are in any given colour before requesting the user to change the pen, thus cutting down on the number of pen changes. Lettering size is determined automatically.

In addition to graphical presentation of data, the program also allows some limited freehand drawing and the drawing of some supplied mathematical patterns. I found both these of limited use.

Overall, I found the product easy to use, very well designed and well implemented. The manual was adequate if a little repetitive and any shortcoming attributable to the fact I had a pre-release version. For anyone with a suitable microcomputer and a plotter who has to present data in graphical form, I would recommend it highly. The version I tested was designed to run on a CP/M machine but I presume an MS-DOS version will become available.

I did find some things I did not like. Some of these have been fixed in the release version, some are features not supported by all plotters and some are the lack of features found in products like SAS/GRAPH which runs on large IBM mainframe computers. The problems that have been fixed in the release version are a lack of worked examples in the documentation and the inability to enter or append more than one entry at a time.

The lettering was very restrictive with no sloping characters and no lower case.

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SOFTWARE

I am assured this is because not all plotters support these. The other problems are a general lack of flexibility and features compared to some other products. However, these products cost many thousands of dollars and require computers costing hundreds of thousands of dollars to run on, so the comparisons are unfair.

PRINT-A-PLOT's intended use is to allow any of the common printers to emulate a graph plotter. It is mainly intended to be used with SIMPLOT but could be used standalone. The concept is really interesting and I am sure the product will be a real winner. It was easy to use and worked well.

Chart for Mac

A specially developed version of Microsoft Chart for the Apple Macintosh is now available in New Zealand.

The Macintosh version has a range of more than 40 different chart formats and presents the user with graphic examples of available chart formats on-screen in a visual gallery. The user then selects a format and data is displayed in graphic form.

Users can change or edit individual components of any chart; re-position any object on the screen; change its size; alter the axis scaling; overlay other charts for comparison of information; or draw arrows to highlight points.

Users can also design their own charts which can be saved and overlaid on data. Microsoft Chart has the capacity to open windows for editing and formatting data while it draws up a graph in another window on-screen.

Microsoft Chart for the Macintosh retails at \$310.

The Microsoft Chart business graphics program for the IBM PC is also now available New Zealand.

It allows users to prepare presentation quality charts from data generated by popular software programs such as Microsoft Multiplan, Lotus 1-2-3, VisiCalc and dBase II and any program that outputs DIF or ASCII files.

Variations on eight basic chart types provide a choice of 45 different chart forms.

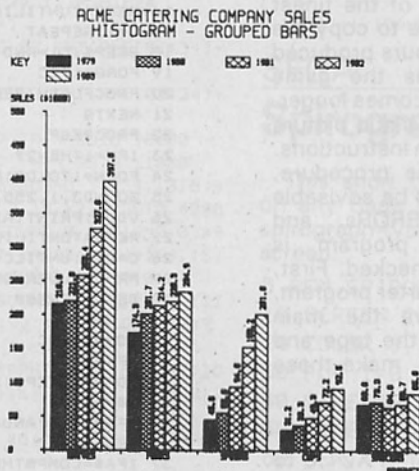
Microsoft Chart reads data files created from most popular application software programs and shares many common features of Multiplan and Word. It is compatible with MS-DOS 1.1, 2.0 and 2.1 and runs on the IBM PC, IBM PC XT, IBM Portable PC and Compaq.

Hardware requirements include 128K bytes of memory, a disk drive, an IBM colour graphics card, and any graphics monitor. Microsoft chart retails at \$645.

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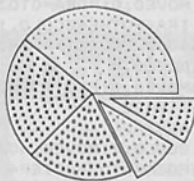


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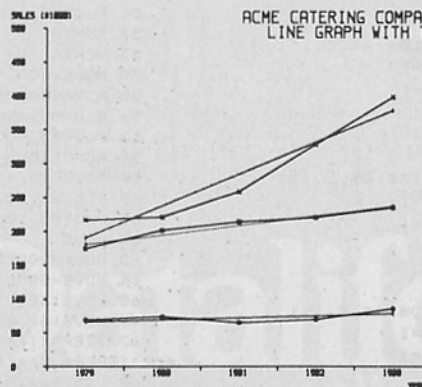


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BBC

Simon

By A. Jenks

This is a version of one of the finest electronic games. You have to copy the sequence of notes and colours produced by the computer, and as the game proceeds, the sequence becomes longer. This program features a realistic picture of Simon, and full on-screen instructions.

It is "protected" by the procedure, PROCLEAN, until it would be advisable to leave out ON ERRORS and PROCLEAN until the program is completely typed in and checked. First, enter and save the short starter program, and then enter and save the main program. To play, rewind the tape and CH."". To use on a 0.1S, make these changes:

```
1 ONERRORGOSUB 1500
1500 RETURN
```

Change all occurrences of *FX21,0 to *FX15,0.

Starter program

```
1*FX229,1
2*KEY10 IOREM ANTI-COPY:M
3MODE1
4VDU19,0,4,0,0,0:CLS
5A$="SIMON":C=1:S=1
6FORX=0TO39
7COLOURS
8PRINTTAB(X,0);MID$(A$,C,1);
9C=C+1:IFC=6THENC=1
10S=S+1:IFS=4THENS=1
11NEXTX
12FORY=1TO30
13COLOURS
14PRINTTAB(39,Y);MID$(A$,C,1);
15C=C+1:IFC=6THENC=1
16S=S+1:IFS=4THENS=1
17NEXTY
18FORX=39TO1STEP-1
19COLOURS
20PRINTTAB(X,30);MID$(A$,C,1);
21C=C+1:IFC=6THENC=1
22S=S+1:IFS=4THENS=1
23NEXTX
24FORY=30TO1STEP-1
25COLOURS
26PRINTTAB(0,Y);MID$(A$,C,1);
27C=C+1:IFC=6THENC=1
28S=S+1:IFS=4THENS=1
29NEXTY
30S=S+1:COLOURS
31PRINTTAB(14,15)"S I M O N"
32VDU28,12,23,27,21:COLOUR130:CLS:COL
OURO
33S%=19:I%=9:M%=13:O%=15:N%=14
34CHAIN"Simon2"
```

Main program

```
1 *KEY10 IOREM ANTI-COPY:M
2 *FX229,1
3 IFS%<>19OR I%<>9ORM%<>13OR O%<>15ORN%<>14
THEN PROCLEAN
4 REM" S I M O N ! "
5 REM" S I M O N ! "
6 REM
7 REM By A. Jenks."
8 REM By A. Jenks."
```

```
9 MODE7:INPUT" SOUND VOLUME (0-15) "V
OL%:IFVOL%<0ORVOL%>15THEN9
10 ENVELOPE1,1,0,0,0,0,0,0,126,-1,0,-
3,INT(VOL%*8.4),INT(VOL%*8.4)
11 VOL%=VOL%*-1
12 DIMBEEP%(50),BEEP%(4):INST=1
13 MODE2:VDU23,1,0,0,0,0,0:PROCTITLE:I
FINST=1THENPROCINSTRUCT:MODE2:VDU23,1,0,
0,0,0,0:W=0:C_HF=1:WR=0ELSEMODE2:VDU23,1,
0,0,0,0,0:W=0:C_HF=1:WR=0
14 INST=0
15 PROCSETUP
16 REPEATUNTILINKEY(-99)
17 C=1:REPEAT
18 BEEP%(C)=RND(4)
19 FORG=1TOC
20 PROCFLASH(BEEP%(G))
21 NEXTG
22 PROCRESP
23 IFW=1THEN29
24 FORN=1TO100:NEXTN
25 SOUND3,1,255,2
26 VDU4:PRINTTAB(0,0);"ROUND "I:VDU5
27 REPEATUNTILINKEY(-99)
28 C=C+1:UNTILC=21
29 PROCNUVVER:GOTO13
30 DEFPROCRESP
31 C_HF=2
32 FORR=1TOC
33 *FX21,0
34 COMP$=BEEP%(BEEP%(R))
35 A$=GET$
36 IFA$<>"Z"ANDA$<>"A"ANDA$<>"/"ANDA$
<>":THEN35
37 IFA$=COMP$THEN39
38 SOUND1,0,120,1:SOUND0,VOL%,3,5:W=1
:WR=1:GOTO41
39 PROCFLASH(BEEP%(R)):NEXTR
40 C_HF=1
41 ENDPROC
42 DEFPROCSETUP
43 VDU29,640,512;
44 MOVE0,0:FORA=0TO360STEP2
45 IFA<90THENGCOLO,1ELSEIFA>90ANDA<18
0THENGCOLO,3ELSEIFA>180ANDA<270THENGCOLO
,2ELSEGCOLO,4
46 MOVE0,0:PLOT85,SIN(RAD(A))*425,COS
(RAD(A))*425
47 NEXTA
48 GCOLO,7:MOVE0,400
49 FORA=0TO360STEP4
50 FORR=400TO450STEP50
51 PLOT85,SIN(RAD(A))*R,COS(RAD(A))*R
52 NEXTR
53 NEXTA
54 MOVE-400,-10
55 MOVE400,-10
56 PLOT85,-400,10
57 PLOT85,400,10
58 MOVE-10,-400
59 MOVE10,400
60 PLOT85,10,-400
61 PLOT85,10,400
62 VDU5
63 MOVE-200,200:PRINT"B"
64 MOVE-200,-168:PRINT"G"
65 MOVE168,-168:PRINT"Y"
66 MOVE168,200:PRINT"R"
67 BEEP%(1)="":BEEP%(2)="Z":BEEP%(3)
="/:BEEP%(4)="A"
68 VDU19,1,0,0,0,0,19,2,0,0,0,19,3,
0,0,0,0,19,4,0,0,0,0
69 FORN=1TO100:NEXTN
70 ENDPROC
71 DEFPROCFLASH(COL%)
72 IFC_HF=1THENQQ=500ELSEQQ=250
73 VDU19,COL%,COL%,0,0,0
74 SOUND1,VOL%,COL%*20,3
75 FORN=1TOQQ:NEXTN
76 VDU19,COL%,0,0,0,0
77 IFC_HF=1THENFORN=1TO500:NEXTN
78 ENDPROC
79 DEFPROCTITLE
80 FORN=1TO4:VDU19,N,0,0,0,0:NEXTN
81 GCOLO,2:MOVE0,0:MOVE0,512:PLOT85,6
40,0:PLOT85,640,512
82 GCOLO,3:MOVE640,0:PLOT85,1279,512:
PLOT85,1279,0
83 GCOLO,4:MOVE0,512:MOVE0,1023:PLOT8
5,640,512:PLOT85,640,1023
84 GCOLO,1:PLOT85,1279,512:PLOT85,12
79,1023
85 FORN=1TO15:C=RND(4):VDU19,C,C,0,0,
0:SOUND1,VOL%,C*20,3:FORM=1TO500:NEXTM:
VDU19,C,0,0,0,0:NEXTN
86 FORN=1TO1000:NEXTN:VDU20
87 VDU28,7,15,13,13
88 COLOUR128:CLS
89 COLOUR11:PRINT:PRINT" SIMON"
90 FORN=1TO5:FORC=1TO4:SOUND1,VOL%,C
20,1:NEXTC,N
91 FORL=1TO5000:NEXTL
92 VDU26
93 VDU31,0,31:FORN=1TO32:PRINT:NEXTN
94 COLOUR128:COLOUR7
95 ENDPROC
96 DEFPROCNUVVER
97 VDU22,7
98 IFWR=1THENPRINTTAB(8,9);"You compl
eted "I:C;" rounds."
99 IFWR=0THENPRINTTAB(8,9);"You won a
gainst SIMON!!!!"
100 WR=0
101 PRINTTAB(11,11)"Want another game
?"
102 PRINTTAB(16,13)"Y / N"
103 A$=GET$
104 IFA$="Y"OR A$="y"THEN107
105 IFA$="N"OR A$="n"THENPROCLEAN
106 GOTO103
107 ENDPROC
108 DEFPROCINSTRUCT
109 VDU22,1
110 PRINTTAB(17)"SIMON"
111 PRINTTAB(17)"-----"
112 PRINT
113 PRINT" 'SIMON' is a memory testing
game."
114 PRINT"SIMON is in the form of a ci
rcle,"
115 PRINT"divided into four different
coloured"
116 PRINT"sectors. When you say so, SI
MON will"
117 PRINT"light up one of his sectors
and sound"
118 PRINT"an accompanying 'beep'. (Eac
h sector"
119 PRINT"has its own 'beep') "
120 PRINT" What you have to do is to m
ock SIMON."
121 PRINT"When you have successfully c
opied "
122 PRINT"SIMON, he will proceed, when
you say,"
123 PRINT"to sound the same 'beep' and
light"
124 PRINT"the same light. But this tim
e he will"
125 PRINT"add another light/beep. Each
time you "
126 PRINT"must copy the whole sequence
."
127 PRINT"When you successfully comple
te "
128 PRINT"twenty lights/beeps you have
won."
129 PRINT
130 PRINT" You use the 'A','Z',':' and
'/' keys"
131 PRINT" You will see which sector ea
ch"
132 PRINT"represents. Finally, use 'SP
ACE-BAR'"
133 PRINT"to prompt SIMON."
134 PRINT
135 PRINT" PUSH ANY KEY TO START GA
ME"
136 *FX21,0
137 A$=GET$
138 CLS
139 ENDPROC
140 DEFPROCLEAN
141 ON ERROR *FX15
142 *KEY0 NEW:IOREM ANTI-COPY:M
143 *FX138,0,128
144 CLS
145 *FX229,0
146 S%=0:I%=0:M%=0:O%=0:N%=0:END
147 ENDPROC
```


PROGRAMS

ATARI

Asteroid Field

By Stephen Botha

This is a two-player game for all Atari computers, with two joysticks. The left player controls a Cylon starship, and the right player controls a Martian Space Eek. The winner is the player who can survive longest in the deadly field of asteroids hurtling up the screen. Pressing the fire button will cause the player to enter hyperspace, which causes the ship to be transported to a random position.

```
800 POKE 53278,200:GRAPHICS 17:POSITION
3,0:? #6;"ASTERIOD FIELD":POSITION 4,1:?
#6;"(C) 1984 by"
801 POSITION 3,2:? #6;"stephen botha":PO
SITION 0,4:? #6;"PRESS START TO BEGIN"
803 IF PEEK(53279)=6 THEN FOR KJ=0 TO 3:
SOUND KJ,0,0,0:NEXT KJ:GOTO 815
804 SOUND 0,12,INT(RND(0)*60)+1,8:SOUND
1,10,INT(RND(0)*120)+1,8
805 SOUND 2,12,INT(RND(0)*180)+1,8:SOUND
3,10,INT(RND(0)*240)+1,8:SETCOLOR 2,INT
(RND(0)*254)+1,10:GOTO 803
815 DIM A$(20),B$(20):POKE 82,0:GRAPHICS
1:SETCOLOR 2,0,0:POSITION 0,0:? #6;"WHO
IS THE ALIEN?":INPUT A$
816 GRAPHICS 1:SETCOLOR 2,0,0:POSITION 0
,0:? #6;"WHO COMMANDS THE SPACESHIP?":IN
PUT B$
850 N=0:MEMTOP=PEEK(106)*256:CHBASE=MEMT
OP-4096:FOR I=CHBASE TO CHBASE+2048:POKE
I,0:READ A:IF A=999 THEN 900
856 POKE CHBASE+N,A
857 N=N+1:NEXT I
890 DATA 0,0,0,0,0,0,0,0,6,20,30,62,62,1
26,224,0,0,0,0,0,0,0,56,124,248,252,12
6,192,51,1,0,68,92,94,43,126,10,0
899 DATA 999
900 GRAPHICS 0:DL=PEEK(560)+256*PEEK(561
):POKE DL+3,4+64:FOR I=0 TO 22:POKE DL+6
+I,4:NEXT I
901 POKE 756,CHBASE/256:POKE 82,0:? "" :P
OKE 82,0:? "" :POKE 82,0:? ""
981 DIM PM1$(128),PM2$(128),SHIP1$(16),S
HIP2$(16),CLEAR$(128)
984 FOR R=1 TO 16:READ D:SHIP1$(R,R)=CHR
$(D):NEXT R
985 DATA 0,0,0,0,0,0,0,0,40,84,186,16,40,0
,0,0,0,0,0
1200 FOR R=1 TO 16:READ D:SHIP2$(R,R)=CH
R$(D):NEXT R
1201 DATA 0,0,0,0,0,0,0,0,60,255,90,255,60
,0,0,0,0,0,0
1700 FOR R=1 TO 128:CLEAR$(R,R)=CHR$(0):
NEXT R
2000 A=4*(INT(PEEK(742)/4)-1):POKE 54279
,A:USA=256*PEEK(135)+PEEK(134):BOA=256*P
EEK(141)+PEEK(140):PM=256*A+512
2700 DISP=PM-BOA:ADD=2:FOR T=1 TO 2
2800 PMHIGH=INT(DISP/256):PMLOW=DISP-256
*PMHIGH:POKE USA+ADD,PMLOW:POKE USA+ADD+
1,PMHIGH:DISP=DISP+128:ADD=ADD+8
3300 NEXT T
3400 PM1$=CLEAR$:PM2$=CLEAR$:POKE 559,46
:POKE 53277,3:X1=101:X2=177:POKE 53248,X
1:POKE 53249,X2:Y1=20:Y2=18
4100 PM1$(Y1)=SHIP1$:PM2$(Y2)=SHIP2$:POK
E 704,217:POKE 705,135
4200 IF STICK(0)=7 THEN X1=X1+3:IF X1>19
0 THEN X1=190
4300 IF STICK(0)=11 THEN X1=X1-3:IF X1<5
4 THEN X1=54
```

```
4400 IF STRIG(0)=0 THEN X1=INT(RND(0)*60
)+120:PM1$(Y1)=CLEAR$:Y1=Y1+15:PM1$(Y1)=
SHIP1$
4600 POKE 53248,X1:PM1$(Y1)=SHIP1$
4601 IF STICK(1)=7 THEN X2=X2+3:IF X2>19
0 THEN X2=190
4602 IF STICK(1)=11 THEN X2=X2-3:IF X2<5
4 THEN X2=54
4603 IF STRIG(1)=0 THEN X2=INT(RND(0)*60
)+120:PM2$(Y2)=CLEAR$:Y2=Y2+15:PM2$(Y2)=
SHIP2$
4605 POKE 53249,X2:PM2$(Y2)=SHIP2$
5000 K=INT(RND(0)*2)+1
5001 IF K=1 THEN POKE 82,INT(RND(0)*34)+
1:? "I #"  
5002 IF K=2 THEN POKE 82,INT(RND(0)*34)+
1:? "S x"  
5100 IF PEEK(53252)=7 THEN GOTO 10000
5200 IF PEEK(53253)=7 THEN GOTO 11000
5230 SOUND 0,255,10,6:SOUND 1,254,10,6:S
OUND 2,12,X1,6:SOUND 3,10,X2,6:GOTO 4200
10000 FOR I=1 TO 40:SOUND 0,INT(RND(0)*9
0)+1,12,8:SOUND 1,INT(RND(0)*30)+1,4,15:
NEXT I:SOUND 0,0,0,0:SOUND 1,0,0,0
10001 SOUND 2,0,0,0:SOUND 3,0,0,0:POSITI
ON 0,2:? #6;"by ";B$;"," :POSITION 0,3:?
#6;"won"  
10002 POKE 53277,0:GRAPHICS 1+16:POSITIO
N 0,0:? #6;"the spaceship":POSITION 0,1
:? #6;"commanded "  
10003 POSITION 0,2:? #6;"by ";B$;"," :POS
ITION 0,3:? #6;"won"  
10004 FOR J=1 TO 200:SETCOLOR 0,INT(RND(
```

```
0)*254)+1,10:NEXT J:CLR :GOTO 800
11000 FOR I=1 TO 40:SOUND 0,INT(RND(0)*9
0)+1,10,8:SOUND 1,INT(RND(0)*30)+1,10,15
:NEXT I:SOUND 0,0,0,0
11001 SOUND 1,0,0,0:POKE 53277,0:GRAPHIC
S 1+16:POSITION 0,0:? #6;"the alien(";A$
;)" :POSITION 0,1:? #6;"won"  
11002 SOUND 2,0,0,0:SOUND 3,0,0,0
11003 POKE 53277,0:GRAPHICS 1+16:POSITIO
N 0,0:? #6;"the alien(";A$;)" :POSITION
0,1:? #6;"won"  
11004 FOR J=1 TO 200:SETCOLOR 0,INT(RND(
0)*254)+1,10:NEXT J:CLR :GOTO 800
```

SEGA

Spirograph pattern

This short program, which will work on any Sega computer, draws a green spirograph-type pattern on a white screen.

```
5 REM SPIROGRAPH PATTERN
10 SCREEN 2,2:CLS
20 COLOR 3,15,(0,0)-(255,191),15
30 FOR I=0 TO 180 STEP 5
40 LINE(38,6+I)-(38+I,186-I)
50 LINE-(218,I+6)
60 NEXT
70 GOTO 70
```

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PROGRAMS

SEGA

Video graffiti

This is a simple drawing program for any Sega, with a joystick in port one. You can draw a red line in any of the joystick's eight positions.

```

10 SCREEN 2,2:CLS
20 XX=127:YY=96
30 COLOR 4,15,(0,0)-(255,191),15
40 LINE (7,18)-(249,189),,B
50 COLOR 6,0:PRINT CHR$(17):PRINT "DOO
DLE"
60 ST=STICK (1)
70 ON ST GOTO 90,100,110,120,130,140,1
50,160
80 GOTO 60
90 X=0:Y=-1:GOTO 170
100 X=1:Y=-1:GOTO 170
110 X=1:Y=0:GOTO 170
120 X=1:Y=1:GOTO 170
130 X=0:Y=1:GOTO 170
140 X=-1:Y=1:GOTO 170
150 X=-1:Y=0:GOTO 170
160 X=-1:Y=-1
170 IF XX+X<9 OR XX+X>247 OR YY+Y<20 O
R YY+Y>187 THEN 60
180 PSET (XX+X,YY+Y),6
190 XX=XX+X:YY=YY+Y
200 GOTO 60
    
```

ZX81

Supersketch

By A. Luton

Supersketch, for the 16K ZX81, allows you to draw pictures on the screen and save them on tape. A line can be drawn in all eight directions, using keys Q,W,E,A,D,Z,C,X. Full instructions are given in the program. To SAVE the picture, press S and the picture will be shifted above RAMTOP. When the dot resumes flashing, BREAK into the program and NEW it. The picture will remain stored above RAMTOP. Then type in this retrieving program:

```

5 LET A$=""
10 FOR A=25602 TO 25601+PEEK
25600+256*PEEK 25601
15 LET A$=A$+CHR$(PEEK A)
20 NEXT A
25 FOR A=1 TO LEN A$ STEP 2
30 PLOT CODE A$(A),CODE A$(A+1)
35 NEXT A
    
```

RUN this, delete 5 to 20, and enter 10 SAVE "PICTURE" and as a direct command enter GOTO 1 to SAVE it.

```

5 LET A$=INKEY$
10 PLOT X,Y
15 UNPLOT X,Y
    
```

```

2000 IF A$(X)="" THEN RETURN
2010 GOTO 5
2020 LET X=X+(A$="E" OR A$="D" O
A$="C")-(A$="Q" OR A$="A" OR
A$="Z")
2030 LET Y=Y+(A$="E" OR A$="U" O
A$="O")-(A$="X" OR A$="C" OR
A$="Z")
2040 RETURN
2050 GOSUB 5
2060 PLOT X,Y
2070 LET D$=D$+CHR$(X)+CHR$(Y)
2080 IF A$="S" OR A$="0" OR A$=
5" THEN RETURN
2090 GOSUB 30
2100 GOTO 45
2110 GOSUB 55
2120 GOSUB 30
2130 IF A$="P" OR A$="0" OR A$=
5" THEN RETURN
2140 GOTO 75
2150 GOSUB 5
2160 IF A$="P" OR A$="L" OR A$=
5" THEN RETURN
2170 LET X=CODE D$(LEN D$-1)
2180 LET Y=CODE D$(LEN D$)
2190 LET D$=D$( TO LEN D$-2)
2200 GOTO 100
2210 POKE 25600,LEN D$-256*INT (
LEN D$/256)
2220 POKE 25601,INT (LEN D$/256)
2230 FOR A=1 TO LEN D$
2240 POKE 25601+A,CODE D$(A)
2250 NEXT A
2260 GOSUB 5
2270 RETURN
2280 GOSUB (50 AND A$="P")+ (75 A
ND A$="L")+ (100 AND A$="0")+ (130
AND A$="S")
2290 PRINT AT 22,0;"P" AND A$
="P";"L" AND A$="L";"0" AND
A$="0";"S" AND A$="S" AND
2300 GOTO 160
2310 SAVE "SUPERSKETCH"
2320 FOR A=0 TO 63
2330 PLOT A,0
2340 PLOT A,43
2350 NEXT A
2360 FOR A=0 TO 43
2370 PLOT 0,A
2380 PLOT 63,A
2390 NEXT A
2400 POKE 16416,0
2410 PRINT AT 23,0;"USE QWEADZXC
TO MOVE,MODES,PLAS"
2420 POKE 16389,100
2430 LET A$=""
2440 LET D$=""
2450 LET X=10
2460 LET Y=X
2470 GOTO 165
    
```

ZX81

Humanoid

By Chris Breeze

In this 1K game, you have to save a humanoid which has been captured by an evil alien. You move with 6 and 7, and fire with 0. When hit, the alien will release the humanoid, and you must catch him before he hits the ground. To see your score, you can BREAK into the program and enter PRINT SC. To continue the game, enter CONT.

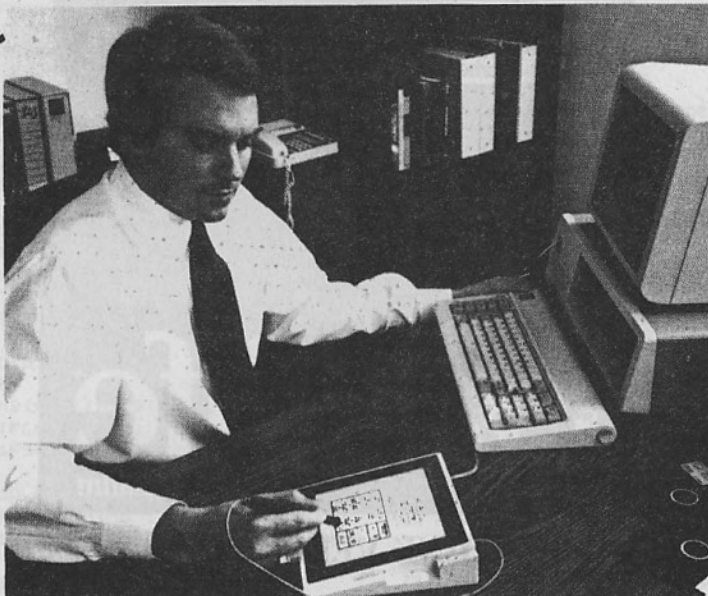
```

4 PRINT "=-.YOU=-.HUMANOID(
<-.ALIEN"
5 PAUSE 200
6 CLS
7 LET SC=0
8 LET N=0
9 LET M=10
10 LET SC=SC+N
11 LET B$=""
12 LET N=INT (RND*14)+2
13 LET B$="0"
14 LET B$="7"
15 PRINT AT M,5;"=-"
16 PRINT AT N,B$
17 LET M=M+(INKEY$="6")-(INKEY
$="7")
18 LET B=B-1
19 IF INKEY$="0" THEN GOTO 100
20 IF B=0 THEN GOTO 202
21 IF INKEY$="0" THEN GOTO 100
22 IF B$="0" THEN LET N=N+1
23 IF M=N AND B=5 THEN GOTO 10
24 IF B$="6" AND N=20 THEN GOT
0
25 CLS
26 GOTO 20
27 FOR C=8 TO 8 STEP 2
28 PRINT AT M,C;"-"
29 NEXT C
30 IF M=N THEN LET B$=""
31 GOTO 20
32 PRINT AT 19,B-1;"="
33 LET SC=SC-5
34 GOTO 11
    
```

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PROGRAMS

SHARP MZ700

Anagrams

By W.J.S. Barnes

This program will help solve the anagrams given in crossword puzzles. You are asked to enter the letters with known positions in the correct order, and the unplaced letters. Random anagrams are then generated and printed on the screen each time you press the space bar, until you press F to finish.

Dr Barnes notes the program does not avoid patterns already generated, so the same anagram may appear more than once. However, the program would have to be considerably enlarged to avoid this and it would seem best to allow the occasional repetition.

```

10 REM "ANAGRAMS"
20 PRINT" "
30 INPUT"TOTAL NO. OF LETTERS ";N
40 DIMA$(N):C=0
50 PRINT:PRINT"ENTER THE KNOWN LETTERS I
N THE CORRECT PLACE AND ENTER '?' IN TH
E BLANK SPACES":PRINT
60 FORI=1TON:INPUT"LETTER ";A$(I)
70 IFA$(I)="?":THENC=C+1
80 NEXTI
90 PRINT
100 DIMB$(N),U(N),W$(20)
110 PRINT:PRINT"ENTER UNPLACED LETTERS I
N ANY ORDER":PRINT
    
```

```

120 FORJ=1TOC
130 INPUT"? LETTER ";B$(J)
140 NEXTJ
150 PRINT" "
160 FORJ=1TO20
170 REM GENERATES UNIQUE RANDOM NUMBERS
180 K=1
190 FORI=1TON
200 IFA$(I)<>B$(I)? THENCURSORI+I,J:PRINTA$(
I):GOTO200
210 U(K)=1+INT(C*RND(1))
220 FORX=0TOK-1
230 IFU(K)=U(X)GOTO210
240 NEXTX
250 CURSORI+1,J
260 PRINT B$(U(K))
270 K=K+1
280 NEXTI
290 NEXTJ
300 PRINT:PRINT"PRESS SPACE BAR FOR ANO
THER RUN, OR 'F' TO FINISH "
310 GETY$
320 IFY$=" " THENI=50
330 IF Y$="F" THENEND
340 GOTO310
    
```

SPECTRUM

Lunar entry module

BY Grant King

This short program for the 16K or 48K Spectrum simulates landing a craft on

the moon. You must control the retro-rockets' thrust so that the craft's speed is less than 5m/s on touchdown.

The program will also work on most other computers with hardly any modification. The POKEs on lines 5 and 135 simply control the keyboard beep on the Spectrum, and can be left out.

```

5 READ t,fuel,m,v,alt: POKE 2
360,100
10 LET t=t+1
15 INPUT "Thrust: ";f: IF f>500
00 THEN GO TO 15
16 CLS
20 LET u=f/50000*50
25 LET fuel=fuel-u
30 LET m=m-u
35 LET a=INT ((f/m)*10)/10
40 LET v=v-a
45 LET alt=alt-v
50 PRINT "Time:",t
55 PRINT "Thrust:",f;"N"
60 PRINT "Fuel used:",u;"kg"
65 PRINT "Fuel left:",fuel;"kg"
"
70 PRINT "LEM mass:",m;"kg"
75 PRINT "Deceleration:",a;"m/
s/s"
80 PRINT "Speed:",v;"m/s"
85 PRINT "Altitude:",alt;"m"
90 IF alt<1 THEN GO TO 105
95 GO TO 10
100 DATA 0,500,2500,100,1000
105 IF v<5 THEN GO TO 120
110 PRINT " FLASH !:"The LEM h
as crashed."
115 GO TO 125
120 PRINT " FLASH !:"Successfu
l Landing."
125 INPUT "Do you want to play
again?"; LINE p$
130 IF p$="y" OR p$="Y" THEN R
UN
135 POKE 23609,0
    
```

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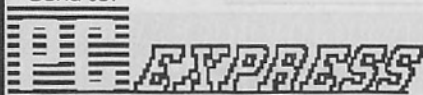
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PROGRAMS

VIC-20

Space War

By A. Gordon

In this shoot-em-up for the unexpanded VIC, you have to destroy a huge space ship which is firing missiles at you. Each time you succeed, a new ship appears with faster missiles. You move up and down with Q and A, and fire with F7. The program is available on cassette for \$5 plus a 30c stamp from: A. Gordon, R.D.2. Waipu, Northland.

```

5 C=30720:POKE36878,15:POKE650,255:S1=36
877:S2=S1-1:S3=S2-1:S4=S3-1:A=7929
10 T(1)=7854:T(2)=7898:T(3)=7942:T(4)=79
86:T(5)=8030:LU=1:U=1:PRINT"CHR$(8)
15 POKE36879,8:POKE36869,255:POKE55,0:PO
KE56,28
20 FORW=1716707287:READB:POKEW,B:NEXT:FO
RW=7424707431:POKEW,0:NEXT
25 PRINT"§"
30 DATA0,0,0,0,56,188,244,255,252,244,18
8,184,0,0,0,0
35 DATA0,0,219,146,210,82,219,0,0,0,179,
170,179,170,171,0
40 DATA0,0,85,85,117,85,85,0,0,0,212,20,
28,84,212,0
45 DATA1,3,7,15,31,63,127,255,255,255,25
5,255,255,255,255,255
50 DATA8,42,28,127,24,60,74,136,3,7,15,1
27,127,15,7,3
55 DATA252,248,240,0,0,240,248,252,0,0,0
,255,0,0,0,0
65 DATA0,0,154,146,154,146,217,0,0,0,180
,164,180,164,54,0
100 POKE36864,200:FORW=7680707745:POKEW,
8:POKEW+C,LU+3:NEXT
102 PRINT"§]]]]]]]RESPACE WAR"
103 PRINT"§"SPC(22)"CDR"SC"§"SPC(31)"LEF
R"HS"§"SPC(40)"LMNR"U:G=0
104 FORW=77877080955STEP22:POKEW,8:POKEW+
C,LU+3:POKEW+1,8:POKEW+1+C,LU+3:POKEW+2,
8
105 POKEW+2+C,LU+3:NEXT:POKE7787,7:POKE7
787+C,LU+3:POKE8095,223:POKE8095+C,LU+3
110 FORW=1705:POKET(W)+1,10:POKET(W)+1+C
,LU+3:POKET(W),32:POKET(W)-1,11
115 POKET(W)-1+C,LU+3:NEXT:FORW=81207081
85:POKEW,8:POKEW+C,LU+3:NEXT:POKE36864,1
2
120 GOTO300
200 J=PEEK(197)
210 IFJ=48BANDA>7774THENPOKEA,32:POKEA+22
,32:A=A-22
220 IFJ=17ANDA<8082THENPOKEA+22,32:POKEA
,32:A=A+22
230 IFJ=63THENF=A+2:GOTO500
240 POKEA,1:POKEA+C,3:POKEA+22,2:POKEA+2
2+C,3:RETURN
300 FORW=1705:A(W)=T(W)-LU:IFLU=1THEN(A(W)
)=A(W)-2
305 NEXT:NE=1
310 GOSUB200:IFNN=1THENNN=0:PRINT"§":GOT
O100
320 IFNE=1THENNE=0:R=INT(RND(1)*5)+1
330 POKEA(R),12:POKEA(R)+LU,32:POKEA(R)+
C,1
340 IFPEEK(A(R)-1)=20RPEEK(A(R)-1)=1THEN
500
350 A(R)=A(R)-LU:IFT(R)-A(R)>20THENPOKEA
(R)+LU,32:A(R)=T(R)-LU:NE=1:IFLU=1THEN(A
R)=A(R)-2
360 GOTO310
500 POKES4,140
505 POKEF,228:POKEF+C,2:POKEF-1,32
510 IFPEEK(F+1)<>32ANDPEEK(F+1)<>120RF=A
14THENPOKEF,32:POKEF+1,32:GOTO530
520 F=F+1:GOTO505
530 IFF-A=14THENPOKES4,0:RETURN
540 POKES4,0:GOSUB700:RETURN
580 FORW=17020:POKEA,9:POKEA+C,2:POKEA+2
2,9:POKEA+22+C,2:FORT=17010:NEXT:POKEA,1
585 POKES1,240-W
590 POKEA+C,3:POKEA+22,2:POKEA+22+C,3:FO
RT=17010:NEXTT,W
595 POKEA,32:POKEA+1,32:POKEA+22,32:POKE
A+23,32:POKES1,0

```

```

600 PRINT"§"SPC(93)"RGAME OVER"
605 FORN=20070140STEP-2:POKES3,N:FORT=
0100:NEXTT,N:FORT=170500:NEXT:POKES3,
610 IFSC<=HSTHEN620
615 PRINT"RQA NEW HI SCORE I":HS=SC
620 PRINTSPC(69)"RANOTHER GAME...":PO
98,0:SC=0:LU=1:U=1:A=7929
630 GETA$
635 IFA$="Y"THENPRINT"§":GOTO100
640 IFA$<>"N"THEN630
650 PRINT"§":POKES1+2,27:POKES1+1,0
KE650,0:POKE36869,240:CLR:END
700 SC=SC+10*U:PRINT"§"SPC(22)"CDR"SC
=G+1:IFG=40THENSC=SC+100*U:GOTO720
710 RETURN
720 PRINT"§"SPC(110)"RYOU CLEARED THE
GREEN":U=U+1:IFU>2THENLU=2
725 IFU>4THENLU=3
730 IFU>7THENLU=4
735 A=7929:FORN=15070200:POKES1,N:FORT=
T030:NEXTT,N:POKES1,0:NN=1:RETURN

```

COMMODORE 64

Spider

by Byron Smith

In Spider, you take the form of a green circle which you must manoeuvre over a brown box to earn points, while avoiding stars and walls. Use Q for up, A for down, K for left, and L for right. The game can be paused with the colon key, and ended with F1.

```

0 REM SPIDER
1 REM=====
2 REM BY BYRON SMITH
3 REM=====
5 POKES280,0:POKES3281,0
10 Y=54272:PRINTCHR$(147):CHR$(158)
20 FORT=17030
30 R=(900*RND(1))+1024
40 POKER,42:POKER+Y,7
50 NEXT
60 FORN=1023701062:POKEN,64:POKEN+Y,3
70 NEXT
80 POKE1063,110:POKE1063+Y,3
90 FORN=1103701903STEP40:POKEN,66:POKEN+
Y,3
100 NEXT
110 POKE1943,125:POKE1943,3
120 FORN=1942701905STEP-1:POKEN,64:POKEN
+Y,3
130 NEXT
140 POKE1904,109:POKE1904+Y,3
150 FORN=1864701064STEP-40:POKEN,66:POKE
N+Y,3
160 NEXT
170 POKE1024,112:POKE1024+Y,3
180 X=1434
190 IFA=0THENR=INT(RND(1)*900)+1024:IFPE
EK(R)<>32THENGOTO190
200 POKER,160:POKER+Y,9:A=1
210 POKEK,81:POKEK+Y,5
220 GETA$:IFM$<>A$ANDM$<>"THENM$=A$
230 IFM$="L"THENX=X+1:CL=-1
240 IFM$="K"THENX=X-1:CL=+1
250 IFM$="Q"THENX=X-40:CL=40
260 IFM$="A"THENX=X+40:CL=-40
265 IFM$=CHR$(133)THENGOTO1010
270 IFPEEK(X)=42THEN1000
280 IFPEEK(X)=64THEN1000
290 IFPEEK(X)=66THEN1000
300 IFPEEK(X)=160THENS=SC+5:A=0
310 POKEW+CL,32:GOTO190
1000 POKE211,123:POKE214,10:SYS58732:PRI
NT:CHR$(18):"YOU CRASHED"
1010 IFSC<10THENS=CHR$(157)+""
1020 IFSC=>10THENS=CHR$(157)+""
1030 IFSC>100THENS=CHR$(157)+""
1040 POKE211,13:POKE214,11:SYS58732:PRIN
TCHR$(18):"SCORE:":CHR$(157):SC:SC$
1050 PRINTTAB(13):CHR$(18):"PLAY AGAIN (
Y,N)"
1060 GETAN$:IFAN$=""THENGOTO1060
1070 IFAN$="Y"THEN R
1080 IFAN$="N"THENSYS49152
1090 GOTO1060

```

PROGRAMS

APPLE

Death Duel

By S. Shearman

Death Duel is a hi-res arcade game for the Apple II, II+, and IIe. Two players control trail-laying cycles, and must try to force their opponent into a trail. After a random number of levels, obstacles appear in the playing field.

Player One uses keys W,A,S,Z, and Player Two uses keys I,J,K,M. When the game begins, the players are asked to enter the number of rounds they wish to play. The winner is the person who wins the most rounds.

```

0 REM BY S.SHEARMAN
1 REM SHAPE TABLE SETUP
2 POKE 232,0: POKE 233,3: POKE 7
  68,1: POKE 770,4: POKE 771,0
  : POKE 772,4: POKE 773,0: POKE
  774,0
5 TEXT : HOME
6 VTAB 12: HTAB 10: INPUT "PLAY
  TO LEVEL? ";NN
7 IF NN < = 0 THEN RUN
8 HGR
10 ROT= 0: SCALE= 1: HCOLOR= 3
16 LL = 0
999 REM MAIN LOOP
1000 HGR : IF LL = > NN THEN GOTO
  20000
1001 E = 100:D = 100:F = 150:G =
  100
1002 MX = 1:NX = - 1:NY = 0:MY =
  0
1005 GOSUB 15000
1010 XDRAW 1 AT E,D: XDRAW 1 AT
  F,G
1500 HPLLOT 0,0 TO 279,0: HPLLOT 0
  ,1 TO 279,1: HPLLOT 0,2 TO 27
  9,2
1510 HPLLOT 0,159 TO 279,159: HPLLOT
  0,158 TO 279,158: HPLLOT 0,15
  7 TO 279,157
1520 HPLLOT 0,0 TO 0,159: HPLLOT 1
  ,0 TO 1,159: HPLLOT 2,0 TO 2,
  159
1530 HPLLOT 279,0 TO 279,159 TO 2
  78,159 TO 278,0: HPLLOT 277,0
  TO 277,159
1900 IF LL > = 5 THEN GOSUB 30
  000
2000 A = PEEK (49152)
2010 POKE 49168,0
2015 IF A = < 128 THEN GOTO 30
  00
2020 A = A - 128
2030 IF A = 87 THEN MY = - 1:MX
  = 0
2040 IF A = 65 THEN MX = - 1:MY
  = 0
2050 IF A = 83 THEN MX = 1:MY =
  0
2060 IF A = 90 THEN MY = 1:MX =
  0
2070 IF A = 73 THEN NY = - 1:NX
  = 0
2080 IF A = 74 THEN NX = - 1:NY
  = 0
2090 IF A = 75 THEN NX = 1:NY =
  0
2100 IF A = 77 THEN NY = 1:NX =
  0
3000 :
3005 DRAW 1 AT E,D: DRAW 1 AT F,
  G
  
```

```

3010 E = E + MX:D = D + MY:F = F +
  NX:G = G + NY
3020 XDRAW 1 AT E,D: IF PEEK (2
  34) = 0 THEN Q = 1: GOTO 100
  00
3030 XDRAW 1 AT F,G: IF PEEK (2
  34) = 0 THEN Q = 2: GOTO 100
  00
5000 GOTO 2000
10000 :
10009 FOR S = 1 TO 5: PRINT CHR#
  (7);: NEXT
10010 IF Q = 1 THEN SB = SB + 1
10020 IF Q = 2 THEN SA = SA + 1
10021 LL = LL + 1
10025 GOSUB 15000
10030 HOME : GOTO 1000
15000 HOME : VTAB 21: PRINT "PLA
  YER 1";: HTAB 10: PRINT "PLA
  YER 2";: HTAB 20: PRINT "LEV
  EL"
15010 VTAB 22: PRINT "SCORE=";SA
  :: HTAB 10: PRINT "SCORE=";S
  B:: HTAB 21: PRINT LL
15020 RETURN
20000 TEXT : HOME
20015 WW = 1
  
```

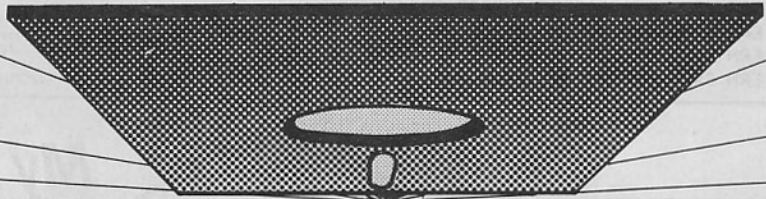
```

20016 IF SA < SB THEN LET WW =
  2
20019 HOME : VTAB 12: HTAB 5
20020 PRINT "THE WINNER IS PLAYE
  R ";WW
20030 VTAB 20: PRINT "HIT ANY KE
  Y TO START AGAIN";: GET A#: CLEAR
  : RUN
30000 FOR I = 1 TO (LL / 5) + 1
30010 T = INT ( RND (5) * 279) +
  1:R = INT ( RND (5) * 159) +
  1
30020 TR = INT ( RND (5) * 279) +
  1:RT = INT ( RND (5) * 159)
  + 1
30030 HPLLOT T,R TO TR,RT
30040 NEXT
30050 RETURN

J?
?SYNTAX ERROR
J?"
J
  
```

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PROGRAMS

SEGA

Aeroplane

This program, which works on a level 3A or 3B Sega, draws an impressive picture of a grid and an aeroplane, complete with shadow, all in 3-D.

```
10 SCREEN 2,2:CLS
20 COLOR ,1,(0,0)-(255,191),1
30 FOR Y=0 TO 13
40 LINE (0,Y*Y)-(255,Y*Y),4:NEXT Y
50 FOR X=1 TO 13
60 LINE (X*10,0)-(0,X*X),4:NEXT X
70 FOR X=14 TO 20
80 LINE (X*10,0)-(X*X-185,191),4:NEXT X
```

```
90 LINE (210,0)-(254,191),4
100 X=220
110 FOR Y=20 TO 18 STEP -1
120 LINE (X,0)-(255,Y*Y-300),4:X=X+10:
NEXT Y
130 MAG 1
140 PATTERN S#0,"0000000000000001"
150 PATTERN S#1,"03070F0F06000000"
160 PATTERN S#2,"0000001E2E6CF8F0"
170 PATTERN S#3,"E0C0800000000000"
180 PATTERN S#4,"0000000000003F7F"
190 PATTERN S#5,"3E1C080000000000"
200 PATTERN S#6,"0000000818188000"
210 PATTERN S#7,"0000000000000000"
220 PATTERN S#8,"0000000000000000"
230 PATTERN S#9,"0F0E000303010000"
240 PATTERN S#10,"0000000000000020"
```

```
250 PATTERN S#11,"60E0E0E0E0E060"
260 PATTERN S#12,"000000000007F7F"
270 PATTERN S#13,"3F1F0F0F07010000"
280 PATTERN S#14,"0000001E3E7CF8F0"
290 PATTERN S#15,"E0E0E0E0E0E060"
300 P=190:SOUND 4,2,15
310 FOR Q=0 TO 255 STEP 2
320 SPRITE 1,(Q,P),0,7
330 SPRITE 0,(Q,P),8,5
340 SPRITE 2,(Q,P),4,4
350 SPRITE 3,(Q,P+20),12,1:P=P-1.5
360 NEXT Q
370 SOUND 0
380 END
```

ZX81

Renumber

By Kevin Clark

This 16K routine will renumber programs, starting with a line number you choose, and going up in steps of your choice. You can even have every line number the same with a step of 0! However, this routine will not change GOTOs and GOSUBs, which will have to be renumbered manually.

```
9910 REM STOP
9915 PRINT AT 8,0:"WHAT NUMBER W
OULD YOU LIKE TO START AT?"
9920 INPUT STA
9925 PRINT "WHAT STEP WOULD YOU
```

```
LIKE?"
9930 INPUT STE
9935 CLS
9940 PRINT AT 9,7:"PLEASE WAIT"
9945 LET C=INT (STA/256)
9950 LET D=STA-(256*C)
9955 LET A=16510
9960 FOR B=0 TO 4E4 STEP STE
9965 IF PEEK A=182 AND PEEK (A-1)
=39 THEN GOTO 9990
9970 POKE A-1,C+INT (B/256)
9975 POKE A,B-INT (B/256)*256
9980 LET A=A+PEEK (A+1)+4
9985 NEXT B
9990 POKE 16418,0
9995 PRINT AT 25,0:"0/9995 FINI
SHED"
```

COMMODORE 64

Machine Gun

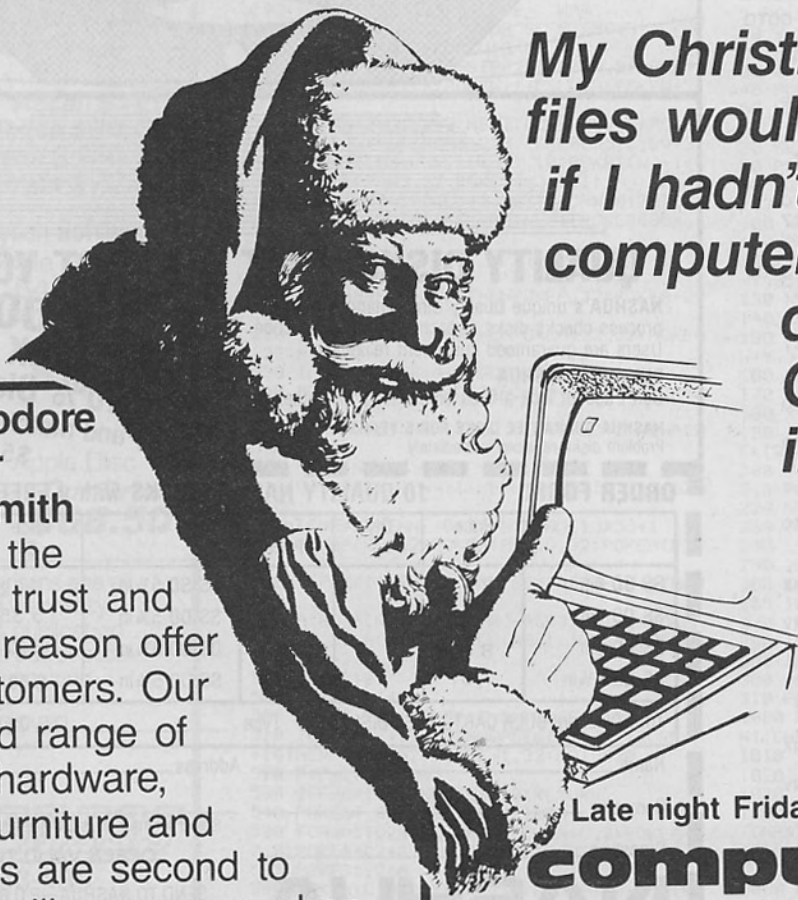
By Chris Parker

This little routine simulates the sound of a machine gun, and could be included in other programs.

```
10 REM ***MACHINE GUN***
20 POKE 54295,0:POKE 54296,15
30 X=54272
40 POKE X+6,15:POKE X+5,31
50 POKE X+1,1:POKE X+4,33
60 FOR A=1TO1000:NEXT A
70 POKE X+4,0
80 POKE 54296,0
```

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PROGRAMS

SPECTRUM

Simon

BY Paul de Spa

This program, for the 16K or 48K Spectrum, is a version of the well-known electronic game.

A sequence of notes accompanied by matching colours is played by the computer, and the player tries to repeat it, using keys 1 to 4. If the player gets it wrong, the game restarts, and if the correct sequence is given, the computer plays another sequence, one note longer.

The amount of time the player is given to repeat the sequence is governed by the .4 in lines 140 and 230, and by the 70 in line 160. These can be altered to suit the player.

```

10 LET h=0
20 BORDER 3: PAPER 7: CLS : RA
NDOMIZE
30 PRINT AT 0,13;"SIMON";AT 2,
9;"by Paul de Spa"
40 PRINT INK 0;AT 5,0;"Simon
is a memory game in which you mu
st repeat the signals given to
you visually (via the border
change), and audibly (via the lo
udspeaker).";AT 12,0;"Use these
keys: -'1' Blue' INK 2
; '2 Red' INK 3; '3 Magenta' INK
4; '4 Green"
50 INPUT "How many signals?"s
: IF s<1 OR s<>INT s THEN GO TO
50

```

```

60 BORDER 7: PAPER 6: INK 0: C
LS
70 LET s$=""
*** * ***** *** ***
* * * * *
*** * * * *
* * * * *
*** * * * *
72 PRINT AT 7,5;
74 FOR k=1 TO LEN s$: IF s$(k)
="*" THEN PRINT CHR$ 18;CHR$ 1;
"*";CHR$ 18;CHR$ 0;: GO TO 78
76 PRINT " ";
78 NEXT k
80 PRINT AT 7,25; FLASH 1;"*";
AT 8,25;"*";AT 9,25;"*";AT 11,25
;"*"; FLASH 0
90 INK 0: FOR n=3 TO 27: PRINT
FLASH 1;AT 5,n;"*";AT 13,n;"*";
: IF n<11 THEN PRINT FLASH 1;A
T n+2,3;"*";AT n+2,27;"*";
100 NEXT n
110 DIM n(s): FOR x=1 TO s: LET
n(x)=INT (RND*4)+1: NEXT x
120 FOR g=1 TO s
130 FOR l=1 TO g
140 BORDER n(l): BEEP 1/g+.4,n(
l)*5: NEXT l
150 FOR b=1 TO g: BORDER 7
160 FOR c=1 TO 100/g+70
170 IF INKEY#<"1" OR INKEY#>"4"
THEN GO TO 200
180 IF VAL INKEY#<>n(b) THEN G
O TO 210
190 GO TO 230
200 NEXT c
210 BORDER 0: BEEP 2,-15
220 GO TO 260
230 BORDER n(b): BEEP 1/g+.4,n(
b)*5: FOR f=1 TO 25: NEXT f
240 IF INKEY#="" THEN NEXT b:
FOR f=1 TO 60: NEXT f: NEXT g: G
O TO 290
250 GO TO 240
260 BORDER 4: PAPER 2: INK 7: C
LS: PRINT AT 8,0;"Sorry-it shou
ld have been ";n(b);"!";"But y
ou got ";g-1;" out of ";s;"
";AT 20,0;"Press Enter.": IF s>

```

```

h THEN LET h=s
270 IF INKEY#<CHR$ 13 THEN GO
TO 20
280 GO TO 270
290 FOR z=1 TO 3: FOR i=1 TO 6:
BORDER i: PAPER i: CLS : BEEP
0.5,i*3: NEXT i: NEXT z: PAPER 5:
CLS : PRINT AT 10,4; INK 1;"Wel
l done-";s;" signals!";AT 20,0;
INK 2;"Press Enter.": IF s>h THE
N LET h=s
300 PRINT AT 15,2; INK 0;"Today
's highest score:";h: GO TO 270

```

VZ-200

Dodge

By Ian Thomas

You must move your craft through a rapidly-approaching asteroid storm. The lower down the screen you are, the more points you receive. Use the J, K, I and M keys to move.

```

1 CLS:COLOR,1
3 DATA 1,3,2,4,3,5,4,6,5,4,3,2,1,1
4 FOR N=1TO14:READ Z:SOUND2,1:NEXT
5 CLS
6 REM VZ-200 DODGE BY IAN THOMAS
10 Y=0
15 MEN=6
16 SC=0
20 X=RND(32)
30 POKE 28672+32*Y+X,255
31 FOR K=1 TO 10
32 NEXT
35 POKE 28672+32*Y+X,32+64
40 POKE 28672+31*15 +RND(32),239
50 IF INKEY#="J" THEN IF X>0 THEN X=X-1
60 IF INKEY#="K" THEN IF X<31 THEN X=X+1
65 IF INKEY#="I" THEN IF Y>0 THEN Y=Y-1
66 IF INKEY#="M" THEN IF Y<14 THEN Y=Y+1
70 PRINT 0.512-RND(32)," "
75 LET SC=SC+Y
80 IF PEEK(28672+32*Y+X)=239 GOSUB 100
90 GOTO 30
100 SOUND 1,3
105 MEN=MEN-1
106 IF MEN=0 THEN 120
110 RETURN
120 FOR T=1 TO 9
130 READ X
135 SOUND X,1
140 NEXT
150 CLS
160 PRINT"SCORE=";SC
170 IF INKEY#<>"S" THEN GOTO 170
180 RUN
1000 DATA 1,2,3,4,4,5,4,3,3

```

BBC

Christmas Carol

By A. Jenks

This short program will play 'We wish you a Merry Christmas' on all three sound channels.

```

10 REPEAT
20 READ N
30 IF N=0 THEN SOUND 1,0,0,2:GOTO 80
40 IF N=255 THEN SOUND 1,0,0,2:GOTO 80
50 IF N=254 THEN SOUND&201,-7,33,10: SOUN
D&202,-7,33,10: SOUND&203,-7,32,10:GOTO 80
60 IF N=253 THEN SOUND 1,0,N,2:GOTO 80
70 SOUND&201,-7,N,D: SOUND&202,-7,N,D:
SOUND&203,-7,N-1,D
80 UNTIL N=255
90 END
100 DATA 5,13,5,0,5,33,4,0,4,33,4,41,4
,33,4,29,4,21,4,0,5,5,5,0,5,0,5,21,5,0,5
,41,5,0,4,41,4,49,4,41,4,33,4,29,5,0,5,1
3,5,0,5,0,5,29,5,0,5,49,5,0,4,49,4,53,4
,49,4,41,4,33,5,0,5,21,5,0,5,0,4,13,5,253
,4,13,5,21,5,0,5,41,5,0,5,29,5,0,5,254
110 DATA 5,255

```

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PROGRAMS

COMMODORE 64

Horse Race

by Calum Wilson

Horse Race simulates a day at the races. Any number of punters can play by placing bets on the nose of the horse of their choice. The horses have different winning odds, and the payouts are adjusted accordingly.

All control characters appear as lower case letters in brackets. Upper case letters in brackets indicate that the character should be entered with the SHIFT key held down.

```

5 PRINT"<clr>"
6 POKE 53280,13:POKE53281,5
11 PRINTTAB(12);";<br>++++"
12 PRINTTAB(12);"+ HORSE RACE +"
13 PRINTTAB(12);"+ "
14 PRINTTAB(12);"+++++"
15 FORN=0T059:READ D:POKE 832+N,D:NEXT
16 PRINT"<dn><dn> BY J GADD & C WILSON"
20 FOR I=1T01000:NEXT
23 PRINT"<dn><dn>"
24 INPUT" NO OF PUNTERS ";A
25 DIM E(A)
26 FORI=1T0A
27 E(I)=50
28 NEXTI
29 DIM F(A):DIM D(A)
30 PRINT"<dn><dn><dn><dn> WELCOME TO THE RACE COURSE "
31 PRINT" THE MAIN RACE OF THE DAY IS THE"
32 PRINT" HOP-A-LONG HANDICAP COVERING A"
33 PRINT" DISTANCE OF ONE SCREEN ."
34 PRINT"<dn> -THE ENTRIES ARE:-"
35 PRINT"<dn><dn> PRESS ANY KEY TO CONTINUE"
36 GET Z:IF Z#""GOTO36
37 GOSUB600
50 FOR J=1T01000:NEXT
60 PRINT"<dn><dn>ARE YOU READY TO PLACE YOUR BETS?"
80 FORI=1 TO A
81 IFE(I)<>0 THEN B6
82 D(I)=0:GOTO105
86 PRINT"<dn>PUNTER ";I;": YOU HAVE $";E(I);": TOTAL"
87 PRINT"<dn>WHICH HORSE DO YOU WISH TO BACK:"
88 PRINT" (ON THE NOSE)";INPUT F(I)
89 IF F(I)<1 OR F(I)>5 THEN GOTO88
90 INPUT"<dn>HOW MUCH OF YOUR PRECIOUS FUNDS";D(I)
91 IF D(I)=E(I) GOTO 100
92 PRINT"<up> SORRY NO CREDIT GIVEN HERE "
93 GOTO 90
100 PRINT"<clr>";V=53248
105 NEXTI
190 PRINT"<clr>";V=53248
200 FORR=0T027:PRINTTAB(31 );";<G>";NEXTR
210 POKE 53280,13:POKE 53281,5
230 POKEV+28,31:POKEV+30,1:POKEV+39,0
240 POKEV+40,15:POKEV+41,9:POKEV+42,11
250 POKEV+43,12:POKE V+37,2
255 FIRST=0:X1=0:X2=0:X3=0:X4=0:X5=0
258 S1=RD(1)*.2+.5
259 S2=RD(1)*.2+.5
260 S3=RD(1)*.2+.5
261 S4=RD(1)*.2+.5
262 S5=RD(1)*.2+.5
264 POKE V+21,31
265 FOR HO=1T05
270 ON HO GOTO 300,310,320,330,340
285 NEXT HO
300 X1=X1+(S1*.3.4):A#="BALMARIND "
301 POKE V,INT(X1):POKE V+1,50
302 IF X1< 250 GOTO 304
303 GOTO 400
304 GOTO285
310 X2=X2+(S2*.3.6):A#="GREY WAY "
311 POKE V+2,INT(X2):POKE V+3,90
312 IF X2< 250 GOTO 314
313 GOTO 400

```

```

314 GOTO285
320 X3=X3+(S3*.3.2):A#="KIWI "
321 POKE V+4,INT(X3):POKE V+5,130
322 IF X3< 250 GOTO 324
323 GOTO 400
324 GOTO285
330 X4=X4+(S4*.3.4):A#="MAGINTY "
331 POKE V+6,INT(X4):POKE V+7,170
332 IF X4< 250 GOTO 334
333 GOTO 400
334 GOTO285
340 X5=X5+(S5*.3.3):A#="SMELLY BOY"
341 POKE V+8,INT(X5):POKE V+9,210
342 IF X5< 250 GOTO 344
343 GOTO 400
344 GOTO264
400 FIRST=FIRST+1
410 IF FIRST >1 GOTO 500
415 PRINT"FIRST HOME IS ";HO,A# "<G><up><le><G>"
416 WIN=HO
420 FOR L=1T05000:NEXT:POKEV+21,0
499 B=0
500 IFB=ATHENB=A
501 IFB=A GOTO 530
502 FORB=B+1T0A
503 IFB=ATHENB=A
504 IFB<1THENB=1
505 E(B)=E(B)-D(B)
510 IF F(B)=WIN GOTO 520
515 NEXT B
516 GOTO 530
520 FOR HO=1T05:IF HO<WIN GOTO527
521 ON HO GOTO 522,523,524,525,526
522 E(B)=E(B)+INT((B)*500)/100:GOTO500
523 E(B)=E(B)+INT(D(B)*400)/100:GOTO500
524 E(B)=E(B)+INT(D(B)*600)/100:GOTO500
525 E(B)=E(B)+INT(D(B)*500)/100:GOTO500
526 E(B)=E(B)+INT(D(B)*5000/9)/100:GOTO 500
527 NEXT HO
530 SUM=0
531 FORT=1T0A
532 SUM=SUM+E(I)
533 NEXTI
534 IF SUM=0 THEN 545
535 PRINT"<clr>DO YOU WANT TO WAIT FOR ANOTHER RACE
536 PRINT" (Y/N)?"
537 GET YN$:IFYN#""THEN537
540 IF YN#="Y" THEN 30
545 PRINT"<clr>"
550 PRINT"THANK YOU FOR GIVING US YOUR MONEY!"
555 PRINT" DO COME AGAIN:<dn>"
560 FOR I=1T0 A
570 PRINT"FUNTER ";I;": HAS $";E(I);": TO TAKE HOME"
580 NEXTI
590 GOTO590
600 PRINT"<clr><dn><dn> HORSE ODDS"
601 PRINT" <E><E><E><E><E> <E><E><E><E>"
602 PRINT"1. BALMARIND 5:1"
603 PRINT"2. GREY WAY 4:1"
604 PRINT"3. KIWI 6:1"
605 PRINT"4. MAGINTY 5:1"
606 PRINT"5. SMELLY BOY 50:9<dn><dn><dn><dn>"
607 RETURN
1000 DATA 0,1,64,0,3,192,1,87,192,13,85,32,15,85
1005 DATA40,3,85,42,3,193,106,3,192,160
1010 DATA0,250,160,10,250,160,170,186,168,170
1015 DATA186,168,170,170,168,170,170,168,34,0,42,34
1020 DATA0,42,34,0,34,42,128,34,8,160,162,8,32,130

```

```

30 FOR T=RAD (0) TO RAD (250) STEP RAD
(5)
40 X0=COS (T)*20+128
50 Y0=SIN (T)*60+96
60 H=ABS (SIN(T))
70 CIRCLE (X0,Y0),30,1,H
80 NEXT
90 GOTO 90

```

ZX81

Hexidecimal to decimal conversion

By Scott French

This 1K program converts hexidecimal numbers to their decimal equivalents. Because of lack of memory, the numbers are overprinted fairly rapidly, so you might have to press BREAK to see a particular number properly.

```

10 LET N=VAL"0"
15 LET A$=""0123456789ABCDEF"
20 FOR B=VAL"1" TO VAL"16"
25 FOR A=VAL"1" TO VAL"16"
30 FOR C=VAL"1" TO VAL"16"
35 FOR I=VAL"1" TO VAL"16"
40 LET W$=A$(B)
45 LET X$=A$(A)
50 LET Y$=A$(C)
55 LET Z$=A$(I)
60 PRINT W$;X$;Y$;Z$,N
65 LET N=N+VAL"1"
70 PAUSE 20
75 CLS
80 NEXT I
85 NEXT C
90 NEXT A
95 NEXT B

```

SEGA

Circles

This program works on any Sega, and draws an interesting pattern of dark red circles on a white background.

```

5 REM CIRCLES
10 SCREEN 2,2:CLS
20 COLOR 6,15,(0,0)-(255,191),15

```

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PROGRAMS

COMMODORE 64

Hi-Res CLS

By David Lovatt

This short machine code routine will clear the high resolution screen, and set up the colours by POKEing the appropriate numbers into the screen location (1024-2023). To set the colours, POKE 49184 with 16 x foreground colour + background colour

You can change the screen colours without clearing the screen by using SYS 49175. SYS 49152 will clear the screen and set up the new colours.

```

10 rem hires screen cls
20 rem (c) d.lovatt 1983
30 :
40 fora=49152to49200:reada$:forb=1to2:c(b)=0:ifmid$(a$,b,1)>="a"thenc(b)=7
50 next:d=16*(asc(a$)-c(1))+asc(right$(a$,1))-c(2)-816:pokea,d:next
60 :
70 dataa9,20,85,fc,a9,00,85,fb,a0,00,91,fb,c8,d0,fb,e6,fc,a2,40,e4,fc
80 dataa0,f1,a9,04,85,fc,a9,00,85,fb,a9,00,a0,00,91,fb,c8,d0,fb,e6,fc
90 dataa2,08,e4,fc,d0,f1,60
100 :
110 poke53280,0:poke53272,peek(53272)or8:poke53265,peek(53265)or32
120 base=8192:poke49184,16:sys49152
130 :
140 rem rest of program ...
    
```

VZ-200

Enlarged characters

By John ten Velde

This program allows the user to create a "notice board" containing a message in enlarged characters. It could be used for advertising purposes or as a teaching aid.

The program consists of three main parts: the character information section (lines 33 to 90); the input section which allows the user to enter a message of up to 5 lines of 15 characters (lines 100 to 290); and the output section which displays the message on the screen.

In the character information section,

each character is defined by a 27-digit code which represents the pixels to be turned on in a 7 x 9 pixel grid. The 27 digits are made up of nine three-digit groups, each group representing one line of the character in binary form. The character information can be altered to produce characters chosen by the user if required.

```

4 '00000000000000000000000000000000
5 '000 ENLARGED CHARACTERS 000
6 '00000000000000000000000000000000
7 REM
10 POKE 30744,1:CLEAR1500:DIMA$(90):CLS
20 DIMB(15,5)
33 A$(33)="00800000000000000000000000000000"
42 A$(42)="073073042028127020042073073"
48 A$(48)="028034065065065065065034028"
49 A$(49)="00802400000000000000000000000000"
50 A$(50)="028034065002004000016032127"
51 A$(51)="028034065002012002065034028"
52 A$(52)="0040120200361270040040004004"
53 A$(53)="127064064064124002001002124"
54 A$(54)="028034065064092090065034028"
55 A$(55)="127001002004000016032064064"
56 A$(56)="028034065034028034065034028"
57 A$(57)="028034065035029001065034028"
58 A$(58)="0000000280280000280280000000"
59 A$(59)="000000028028000028028012024"
65 A$(65)="008020034065127065065065065"
66 A$(66)="124060606066124060606066124"
67 A$(67)="028034065064064064065034028"
68 A$(68)="12406060606065065065066124"
69 A$(69)="127064064064124064064064127"
70 A$(70)="127064064064124064064064064"
71 A$(71)="028034065064071065065034028"
72 A$(72)="065065065065127065065065065"
73 A$(73)="02800000000000000000000000000000"
74 A$(74)="001001001001001001001065034028"
75 A$(75)="0650606060072000104000606065"
76 A$(76)="064064064064064064064064127"
77 A$(77)="065099005073065065065065065"
78 A$(78)="065097001073069067065065065"
79 A$(79)="028034065065065065065034028"
80 A$(80)="1240606065066124064064064064"
81 A$(81)="028034065065065065069034029"
82 A$(82)="124060606066124072079066065"
83 A$(83)="028034065032028002065034028"
84 A$(84)="12700000000000000000000000000000"
85 A$(85)="065065065065065065065065034028"
86 A$(86)="065065065034034020020000000"
87 A$(87)="065065065065065065073093119034"
88 A$(88)="065065034020000020034065065"
89 A$(89)="0650650340200000000000000000"
90 A$(90)="127001002004000016032064127"
100 FOR X=28007 TO 28823:POKE X,96:NEXT
120 FOR X=28839 TO 28967:STEP32:POKE X,96
130 NEXT
140 FOR X=28855 TO 28983:STEP32:POKE X,96
150 NEXT
160 FOR X=28999 TO 29015:POKE X,96:NEXT
180 FOR Y=168 TO 296:STEP 32
190 FOR X=0 TO 14
200 A$=INKEY$:A$=INKEY$
210 IF A$="" THEN 200
220 PRINT$(Y+X),A$
225 IF INKEY$<>""THEN225
230 NEXTX
240 IF INKEY$<>""THEN240 ELSE NEXT Y
250 FOR Y=0 TO 4
260 FOR X=0 TO 14
270 B(X,Y)=PEEK((901+Y)*32+0+X)
280 NEXT X
290 NEXT Y
300 MODE (1)
500 FOR Y=0 TO 4
510 FOR X=0 TO 14
520 B =B(X,Y)
550 IFB<32THENB=B+64
560 IFB= 32 THEN 660
570 B$=A$(B)
580 FOR Y0=0 TO 8
590 A=VAL(MID$(B$(, (Y0+1)*3-2,3))
600 FOR N=6 TO 0:STEP -1
610 M=2^N
620 IFA)=M THENSET(X*8+6-N,Y*11+Y0):A=A-M
630 NEXT N
640 NEXT Y0
660 NEXT X
670 NEXTY
680 T$=INKEY$:T$=INKEY$
690 IF T$="" THEN 680
700 IF C=2 THEN C=3 ELSE C=2
710 COLOR C
720 GOTO500
    
```

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PROGRAMS

SPECTRUM

Water Fight

By Allan Murray

You are a little man who must run along scaffolding, fill a bucket with water from taps at either end, and drop it on monsters which are climbing towards you. You move left and right with keys 5 and 8, and drop water with the 0 key.

```
10 INK 0: PAPER 7: BORDER 7: C
LS
20 GO SUB 100: GO SUB 8000: GO
SUB 8100
30 LET sc=0
40 GO TO 200
100 RESTORE
101 IF PEEK USR "a"<>32 THEN F
OR f=USR "a" TO USR "o"+7: READ
a: POKE f,a: NEXT f
105 RETURN
110 DATA 32,48,56,188,254,155,3
1,115,4,12,28,63,125,217,248,206
111 DATA 255,231,255,0,0,0,0,
24,44,24,52,24,44,52,84
112 DATA 4,31,4,31,63,60,48,48,
32,248,32,248,252,28,12,12
113 DATA 0,14,31,27,31,30,12,30
,63,57,62,62,60,24,30,14,128,192
,224,248,132,72,48
114 DATA 0,112,248,216,248,120,
48,120,252,156,124,124,60,24,120
,112,1,3,7,63,33,18,18,12
115 DATA 0,0,0,0,0,255,170,255,
5,7,5,7,5,7,224,160,224,160,
224,160,224,160
200 PRINT AT 20,0: INK 2:
": FO
R f=1 TO 4: PRINT AT 15+f,0: INK
2: " ( TO f): AT 15+f,32-f: "
" ( TO f): NEXT f
210 FOR z=3 TO 28: PRINT AT 9,z
: CHR# 146: NEXT z: FOR f=1 TO 3
: PRINT AT ++1,10: CHR# 157+CHR#
32+CHR# 32+CHR# 32+CHR# 158: AT 5
+f,2: CHR# 157: AT 5+f,29: CHR# 158
: NEXT f
220 PRINT AT 5,1: CHR# 156: CHR#
156: AT 5,29: CHR# 156: CHR# 156: AT
5,11: CHR# 146: CHR# 146: CHR# 146
: AT 14,0: CHR# 156: AT 14,31: CHR#
156
230 FOR f=6 TO 14: PRINT AT f,1
: CHR# 158: AT f,30: CHR# 157: NEXT
f
240 PRINT AT 7,3: CHR# 149: AT 7,
28: CHR# 148: AT 2,15: "WATER": AT 3
,16: "IN": AT 4,15: "BUCKET"
300 DIM a(5): DIM b(5): FOR f=1
TO 5: LET b(f)=20
310 LET a(f)=INT (RND*20)+6: IF
SCREEN# (19,a(f))=" " THEN IF
SCREEN# (19,a(f)+1)=" " THEN GO
TO 320
315 GO TO 310
320 PRINT AT 19,a(f): INK 1: CHR
# 144: CHR# 145: NEXT f
330 LET x=15: DIM a$(2,2): DIM
b$(2,2): LET a$(1)=CHR# 150+CHR#
32: LET a$(2)=CHR# 32+CHR# 153:
LET b$(1)=CHR# 151+CHR# 152: LE
T b$(2)=CHR# 155+CHR# 154
350 LET wa=3: GO SUB 2000: LET
d=1
1000 LET sc=sc+1: PRINT AT 0,10:
PAPER 6: "SCORE:": sc: FOR f=1 TO
4+lev: LET z#=INKEY$: IF z#<>"8
" THEN IF z#<>"5" THEN GO TO 1
030
1010 PRINT AT 7,x: " ": AT 8,x: "
": LET x=x+(z#="8" AND x<27)-(z
#="5" AND x>3)
1020 LET d=(z#="8")+(2 AND z#="5
")
1030 PRINT AT 7,x:a$(d): AT 8,x:b
$(d)
1035 IF f>5 THEN GO TO 1100
1036 IF b(f)>20 THEN LET b(f)=b
(f)-1: GO TO 1100
1040 PRINT AT b(f),a(f): " ": LE
T b(f)=b(f)-1: PRINT AT b(f),a(f
): INK 1: CHR# 144: CHR# 145
1050 IF b(f)=9 THEN GO TO 9000
1100 PRINT AT 7,3: CHR# 149: AT 7,
28: CHR# 148: IF x=3 OR x=27 THE
N LET wa=wa+(wa<3): GO SUB 2000
1110 IF z#="0" THEN GO SUB 2000
: IF wa>0 THEN GO SUB 3000
1150 IF b(1)>20 AND b(2)>20 AN
D b(3)>20 AND b(4)>20 AND b(5)
>20 THEN GO TO 7000
1190 NEXT f: GO TO 1000
2000 FOR h=2 TO 4: PRINT AT h,11
: " ": NEXT h
2010 IF wa>=1 THEN PRINT AT 4,1
1: PAPER 5: " "
2020 IF wa>=2 THEN PRINT AT 3,1
1: PAPER 5: " "
2030 IF wa>=3 THEN PRINT AT 2,11
: PAPER 5: " "
2040 RETURN
3000 LET wa=wa-1: GO SUB 2000: L
ET xx=(x+2)-d: FOR h=10 TO 19: I
F SCREEN# (h,xx)<>" " THEN GO T
O 3050
3010 PRINT AT h,x: INK 1: CHR# 14
7: BEEP .01,h: PRINT AT h,x: " "
: NEXT h
3020 RETURN
3050 FOR h=1 TO 5: IF a(h)=xx OR
a(h)+1=xx THEN GO TO 3100
3060 NEXT h: RETURN
3100 FOR v=b(h) TO 19: PRINT AT
v,a(h): INK 3: CHR# 144: CHR# 145:
BEEP .01,v: PRINT AT v,a(h): "
"
3110 NEXT v: LET b(h)=INT (RND*5
)+24
3120 PRINT AT 20,a(h): INK 3: CHR
# 144: CHR# 145: LET sc=sc+10: RE
TURN
7000 PRINT AT 10,10: PAPER 4: "**
BONUS**": FOR f=1 TO 10: BEEP .1
,f: BEEP .05,-f: NEXT f
7010 PRINT AT 10,10: " "
: LET sc=sc+100
7020 FOR f=1 TO 5: LET b(f)=20:
NEXT f: GO TO 1000
8000 PRINT AT 0,8: INK 1: FLASH
1: BRIGHT 1: " ": CHR# 148: "WATER
FIGHT": CHR# 149: " "
8010 PRINT " "You are the little
man with "+CHR# 150+" the buc
ket. You can move "+CHR# 151
+CHR# 152+" left and right with
keys 5 & 8 The idea of the game
is to stop the monsters": CHR#
144: CHR# 145: " from reaching y
ou."
8020 PRINT "To do this you must
collect water from the taps
"+CHR# 148+" "+CHR# 149+" and dr
op it on them by pressing key '0'
. This will send them back to th
e bottom for a while."
8030 PRINT "The amount of water
in your bucket is shown at t
he top of the screen."
8035 PRINT "If you manage to get
all of the monsters at the bott
om you will get a bonus."
8040 PRINT AT 21,6: PAPER 6: FLA
SH 1: "PRESS KEY 'P' TO PLAY"
8050 IF INKEY#="p" THEN CLS : R
ETURN
8060 GO TO 8050
8100 PRINT AT 0,8: INK 1: FLASH
1: BRIGHT 1: " "+CHR# 148+"WATER
FIGHT"+CHR# 149+" "
8110 PRINT AT 10,5: "LEVEL ? " " "
"1 - SUPER FAST" " " "2 - VERY FA
T" " " "3 - FAST"
8120 INPUT lev: IF lev<1 OR lev>
3 THEN GO TO 8120
8130 GO TO 8040
9000 FOR f=1 TO 10: BEEP .1,f: N
EXT f: PRINT AT 9,3: " "
9010 PLOT 21,100: DRAW 75,-75: P
LOT 20,99: DRAW 75,-75: BEEP .1,
10
9020 FOR f=7 TO 18: PRINT AT f,x
:a$(d): AT f+1,x:b$(d)
9030 BEEP .1,f/d: PRINT AT f,x: "
": NEXT f
9040 PRINT AT f+1,x: " ": AT 20,x
-1: INK 2: FLASH 1: "SPLAT"
9050 PRINT AT 0,10: INK 1: PAPER
6: "SCORE:": sc
9060 GO SUB 8040: RUN
```

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PROGRAMS

SPECTRAVIDEO

Clock

By Paul Drew

This program, for the 318 or 328, will produce a digital clock, with hours,

```
.10 '*****
11 '* *
12 '* --< C L O C K >-- *
13 '* *
14 '* By Paul David DREW *
15 '* *
16 '* 83 Caernarvon Drive *
17 '* *
18 '* Flaxmere, HASTINGS. *
19 '* *
20 '* 26 September 1984. *
21 '* *
22 '*****
23 '
100 CLS
110 CLEAR200
120 SCREEN,0
130 LOCATE15,6:PRINTSTRING$(10,179)
140 LOCATE15,7:PRINTCHR$(167);STRING$(8,32);CHR$(165)
150 LOCATE15,8:PRINTCHR$(167);"00:00:00";CHR$(165)
160 LOCATE15,9:PRINTCHR$(167);STRING$(8,32);CHR$(165)
170 LOCATE15,10:PRINTSTRING$(10,161)
180 LOCATE0,0
190 PRINT"ENTER THE STARTING TIME"
200 PRINT"....."
210 LOCATE0,2:INPUT"HOURS ";H:IF H>12 THEN 490
220 LOCATE0,3:INPUT"MINUTES";M:IF M>59 THEN 500
230 LOCATE0,4:INPUT"SECONDS";S:IF S>59 THEN 510
240 LOCATE0,0:PRINTSTRING$(200,32)
250 SCREEN,0:LOCATE,,0
260 INTERVAL ON
270 A$=":##"
280 B$="##"
290 ON INTERVAL=(50)GOSUB 330
300 GOTO 300
310 '
320 '
330 BEEP
340 STOP ON
350 ON STOP GOSUB 520
360 S=S+1
370 IF S>59THEN 420
380 LOCATE21,8:PRINTUSINGA$;S
390 LOCATE18,8:PRINTUSINGA$;M
400 LOCATE16,8:PRINTUSINGB$;H
410 RETURN
420 S=0:M=M+1
430 IF M>59 THEN 450
440 GOTO 380
450 S=0:M=0:H=H+1
460 IF H>12 THEN 480
470 GOTO 380
480 S=0:M=0:H=1:GOTO 380
490 LOCATE0,2:PRINTSTRING$(12,32):GOTO210
500 LOCATE0,3:PRINTSTRING$(12,32):GOTO220
510 LOCATE0,4:PRINTSTRING$(12,32):GOTO230
520 LOCATE,,1:SCREEN,1
530 END
```

minutes and seconds. When RUN, the program requests the starting time. On entering the seconds, a digital clock is placed at the centre of the screen which beeps each second. The program could easily be altered to include an alarm, or by adding a line 225 SCREEN 1 or 2 and changing the LOCATE co-ordinates, the clock size and position could be changed.

ZX81

Unsimple Simon

By Jeremy Hollobon

Simon is a game for the 1K ZX81. First you are asked how many flashes you are aiming for (10 is good for starters). This is the length of the sequence you must try to memorise. It will then print the numbers from 0 to 9 and flash a black square briefly above one of them.

After you have typed in that number, the computer will flash the square above the same, and one new number. This will continue, with the computer adding one number to the sequence every time, until you get it wrong (and the computer displays the correct sequence) or you reach your aim. Press any key to play again and remember to enter the whole code before pressing newline (not number by number).

The flashes speed up as the game progresses, and you may wish to make them even shorter by decreasing the 15 in line 112. (The numbers in line 30 have double spacing.)

```
SIMON
5 PRINT "NUMBER OF FLASHES?"
10 LET A$=""
20 INPUT C
30 PRINT,, "0 1 2 3 4 5 6 7 8 9"
90 FOR B=C TO 1 STEP -1
100 LET A$=A$+STR$ INT (RND*10)
105 FOR A=1 TO LEN A$
110 PRINT AT O,VAL A$(A)*3;"■"
112 FOR C=1 TO B+15
114 NEXT C
116 PRINT AT O,VAL A$(A)*3;" "
120 NEXT A
130 INPUT B$
135 FOR A=1 TO LEN A$
140 IF A$(A)≠B$(A) THEN GOTO 160
145 NEXT A
150 NEXT B
155 PRINT "ALL CORRECT"
156 PAUSE 999
157 RUN
160 PRINT AT O,O;"WRONG,,IT WAS ";A$
170 RUN 156
```

APPLE

Jalpainter

By John Lewis

Jalpainter is a picture-drawing program, best used on an Apple IIe with a colour monitor, although it can be used with less impact on a II plus in black and white.

The program allows the creation of a picture in the 40x40 lo-res graphics, which can be SAVED as a six-sector binary file and reLOADED for further refinement, or used in another program.

There are two main modes, Paint and Wander. In Paint mode, a line is left by the cursor, while in Wander mode, no trace is left. The cursor is moved with the arrow keys, or with keys I, J, K, and M.

Colours can be selected by single-stepping using the P key, or by using the 0-9 and A-F keys to enter the hexadecimal number of the colour.

The program is completely error-trapped, and is very popular with the pupils at Ruawai College, where Mr Lewis teaches.

```

1  QNERR GOTO 2400
5  TEXT : GOSUB 2000: REM SETUP
8  GOTO 1000

30  REM S/R STEERING
31  IF (MK% = "J" OR AMK = 0) AND X < 0 THEN X = X - 1: REM LEFT
32  IF (MK% = "K" OR AMK = 21) AND X < 39 THEN X = X + 1: REM RIGHT
33  IF (MK% = "I" OR AMK = 11) AND Y < 0 THEN Y = Y - 1: REM UP
34  IF (MK% = "M" OR AMK = 10) AND Y < 39 THEN Y = Y + 1: REM DOWN
35  RETURN

40  REM S/R COLOUR CHANGE
41  IF MK% = "P" AND COL < 15 THEN COL = COL + 1: GOTO 45
42  IF MK% = "P" AND COL = 15 THEN COL = 0
43  IF AMK < 47 AND AMK < 58 THEN COL = VAL (MK%)
44  IF AMK < 64 AND AMK < 71 THEN COL = AMK - 55
45  COLOR= COL: GOSUB 50: REM PRINT COLOUR
46  RETURN

50  REM PRINT COLOUR
55  VTAB 23: HTAB 35: PRINT SPC(COL < 10):COL: "
60  IF COL > 9 THEN VTAB 23: HTAB 37: PRINT "(": CHR$(COL + 55):")
45  RETURN

300  REM S/R WANDER DISPLAY
302  HOME
305  VTAB 21: PRINT "(S)ave (P)aint": INVERSE: HTAB 30:
    PRINT "MODE": NORMAL: PRINT "WANDER"
    
```

```

310  PRINT "(L)oad (W)ander"
315  PRINT "(ARROWS,I,J,K,M)": INVERSE: HTAB 30: PRINT "COLOR": NORMAL
320  VTAB 21: HTAB 17: PRINT SPC(13)
325  HTAB 17: PRINT " eXit "
330  HTAB 17: PRINT SPC(13)
335  RETURN

400  REM S/R PAINT DISPLAY
405  VTAB 21: HTAB 17: PRINT "I's or 0-9 I": HTAB 34: PRINT "PAINT "
410  HTAB 17: PRINT "I" OR "A-F I"
415  HTAB 17: PRINT "I:to set col I":
420  RETURN

1000  REM WANDER MODE
1010  GOSUB 300: REM WANDER DISPLAY
1012  IF EFLAG = 1 THEN EFLAG = 0: VTAB 21: HTAB 30: FLASH :
    PRINT "ERROR CODE": HTAB 30: PRINT PEEK(222): NORMAL :
    FOR C = 1 TO 5000: NEXT : GOSUB 300
1015  IF PEEK(-16384) < 128 THEN 2300
1020  GET MK%:AMK = ASC(MK%)
1025  IF MK% = "X" THEN 2100
1030  IF MK% = "S" OR MK% = "L" THEN 1000
1040  IF MK% = "P" THEN 1500
1050  GOSUB 30: REM VARY X,Y
1060  COL = SCRN(X,Y): GOSUB 50: REM PRINT COLOUR
1070  COLOR= 15 * (COL = 0): PLOT X,Y: FOR C = 1 TO 20: NEXT :
    COLOR= COL: PLOT X,Y
1080  GOTO 1015

1500  REM PAINT MODE
1510  GOSUB 400: REM PAINT DISPLAY
1515  IF PEEK(-16384) < 128 THEN 2200
1520  GET MK%:AMK = ASC(MK%)
1525  IF MK% = "X" THEN 2100
1530  IF MK% = "S" OR MK% = "L" THEN 1000
1540  IF MK% = "M" THEN 1000
1550  GOSUB 40: GOSUB 30
1560  PLOT X,Y
1570  GOTO 1515

1800  REM SAVE
1805  IF MK% = "L" THEN 1850
1810  HOME: VTAB 21: PRINT "Your design may be saved on disk"
1815  PRINT "Please type a suitable file name or"
1820  PRINT "(W)ander for menu then (RETURN)"
1825  INPUT MK%: IF MK% = "M" THEN 1000
1830  X% = MK% + "(PAINTER)"
1832  HOME: VTAB 21: PRINT "Type in any words to appear under your
    picture(2 lines max)": INPUT CP%: HOME: VTAB 22: PRINT CP%:
    FOR C = 1 TO 1000: NEXT
1838  PRINT D%:"BSAVE":X%,"A1824,L1824"
1840  GOTO 1000

1850  REM LOAD
1851  HOME: VTAB 21: PRINT "Next line will destroy any picture
    on the screen. Is this OK? (Y/N)": GET X%:
    IF X% < "Y" THEN 1000

1854  GR
1855  HOME: VTAB 21: PRINT "Type name of file to load or (C)atalog"
1860  PRINT "or (W)ander then (RETURN)"
1865  PRINT "(PAINTER) can be left out"
1870  INPUT MK%: IF MK% = "M" THEN 1000
1880  IF MK% = "C" THEN TEXT: PRINT D%:"CATALOG": GET X%: GOTO 1854
1885  IF RIGHT$(MK%,9) = "(PAINTER)" THEN X% = MK%: GOTO 1895
1890  X% = MK% + "(PAINTER)"
1895  PRINT D%:"BLOAD":X%
1900  GOTO 1000

2000  REM S/R SETUP
2005  HOME: VTAB 2: HTAB 16: PRINT "PAINTER"
2010  HTAB 16: PRINT "_____"
    
```

```

2015  PRINT : PRINT "In PAINTER mode,P will step through col-ours,
    or 0-9,A-F will set colours 0 to 15. ARROWS or I J K M will
    paint in set colour."
2020  PRINT : PRINT "In WANDER mode, ARROWS or I J K M move spot
    across screen leaving colours as they are. You also see
    their numbers displayed as the spot passes."
2025  PRINT : PRINT "Pictures can be saved on disk or reloaded
    for further work. Once stored, they can be used in other
    programs.eg330 GR: PRINT CHR$(4)"/BLOAD ?????/"
2028  PRINT : PRINT "The X option exists to quit or rub out
    and re-start."
2030  VTAB 23: PRINT "(RETURN) to continue": GET MK%: GR
2032  FOR COL = 1 TO 15: COLOR= COL: PLOT COL + 2,0: NEXT
2035  D% = CHR$(13) + CHR$(4): RETURN

2100  REM QUIT/WIPE OPTIONS
2110  HOME: VTAB 21: PRINT "(Z)ap picture then WANDER mode again"
2120  PRINT "(Q)uit program and lose picture"
2130  PRINT "(W)ander mode, picture unchanged"
2140  GET X%
2150  IF X% = "Z" THEN GR: GOTO 1000
2160  IF X% = "Q" THEN TEXT: HOME: END
2170  GOTO 1000

2200  REM BLINK PIXEL P MODE
2210  COL = SCRN(X,Y): GOSUB 50: REM PRINT COLOUR
2220  COLOR= 15 * (COL = 0): PLOT X,Y: FOR C = 1 TO 3: NEXT :
    COLOR= COL:PLOT X,Y
2230  GOTO 1515

2300  REM BLINK PIXEL W MODE
2310  COL = SCRN(X,Y): GOSUB 50: REM PRINT COLOUR
2320  COLOR= 15 * (COL = 0): PLOT X,Y: FOR C = 1 TO 3: NEXT :
    COLOR= COL:PLOT X,Y
2330  GOTO 1015

2400  REM ERRORS
2410  EFLAG = 1: GOTO 1000
    
```

Change of name

A well known developer of computer systems for the manufacturing and distribution industries has changed its name to Framework Systems, Ltd.

Formerly MACS (Manufacturing and Commercial Systems, Ltd), the company - part of the PAXUS Informations Services group - says the new name reflects its industry diversification and commitment to research and development.

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BEGINNERS

Each article in this series is a gentle introduction to some topic in the computing field. It is written for the beginner, so may appear very simple to the rest of you. If you find it too easy, and so not worth reading, congratulations — you are a beginner no more. Each issue will deal with a different topic, of general interest. Occasionally, material may seem to repeat what has already appeared in "Bits and Bytes". But remember, new readers are coming along all the time.

Peripherals

By Gordon Findlay

Mention a computer and most people immediately think of a processor — a piece of hardware which can do the actual number work, make decisions and so on. But that isn't all there is to a computer system, by any means.

A peripheral is any piece of hardware which forms part of a computer system but which isn't part of the main unit. The processor and the main memory (that mysterious ROM and RAM) are part of the main unit. So probably, is a language interpreter for say BASIC, and a few interfaces. It is these interfaces which provide access to all the peripherals you want — or can afford!

What is an interface? I'll avoid detail just now, and devote a future article to them, but for now an interface is a piece of electronics between two other pieces of electronics (such as a computer and a printer) which enables them to talk to each other. It must convert from the electrical terms one deals with to the terms the other can cope with. That is sometimes dead easy, and sometimes it isn't. Most computers have a range of interfaces either built in or available to add on.

There are a lot of peripherals on the market, and it isn't always straightforward to decide which are wanted or needed. Let's look at them in turn.

The most elementary, and most essential peripheral is a monitor. Naturally, you need a screen to see what is going on! The screen might be the family TV set, another TV, or a special unit designed solely for use with a computer. These special units are what is properly known as a monitor.

A monitor proper is much better than a TV set. Why? The monitor will give a better image — clearer letters, usually decaying slightly more slowly. A TV set just isn't clear enough for more than 40 letters across the screen at a maximum. Better monitors can cope with up to 132 characters easily. The measurement to be concerned with is the bandwidth — the higher its value the better.

Amber screen on its way

Of course, the TV set may be coloured — as may a monitor at a price. Monochrome monitors ("one colour") used to be all black and white, but nowadays are more likely to have green screens. Green is regarded as much easier to tolerate for a long time than black and white. Amber screens have recently appeared, and I predict the amber screen will replace the green one

in a very short time. Amber is the standard colour for public service use in many European countries, and is meant to be even better than green for prolonged use.

Blue is said to be even better, and red screens have been advertised. Clearly, differences between the colours are subjective to some extent. My personal preference is for a blue screen, but that is based on only a short trial, and could be misleading.

The next major peripheral is some form of off-line or permanent storage, such as a tape recorder or disk drive. A lot of ink has been spilt over the relative advantages and disadvantages of the various types. Of course, tape is much cheaper — that's the only reason for using it. Obviously, disks are faster and more versatile as well as expensive. There are things such as storing large volumes of complex data which just aren't feasible from tape, but which are very elementary operations for a disk system.

There are lots of different types of disk drives — far too many in some opinions! One firm in Christchurch has a device for changing between disk formats — more than 115 of them!

For all business purposes, a printer is essential and it is very desirable at home too. There are literally hundreds of different printers available — far too many to even summarise here. *Bits and Bytes* has covered the field comprehensively in earlier issues. This is the point at which you really need to come to grips with the different forms of interface and make sure the computer and printer are compatible.

To communicate with another computer, you need a modem. This device allows you to connect your computer to a telephone, and so communicate with others via the telephone system. This opens up all sorts of possibilities. Not only can computers share information, a home computer can access information "banks" or databases, and bulletin boards. This is reputedly the fastest growing area in computing in the USA, and it looks poised for a major expansion here too. Expect to see major developments in the next 12 to 18 months.

Tired of typing? A mouse might be just for you. It isn't something which eats holes in your computer, but a small box running on a ball. Move the mouse and the cursor on the screen moves. The mouse can be used to perform all sorts of operations just by pointing an arrow on

the screen with it, and clocking a button on the top. Naturally, you need software which understands mouses (mice?).

Plotters draw pictures on paper. Joysticks and track-balls give control over games. Real time clocks keep track of the time, and even act as an alarm and on it goes. Oh for a money tree!

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Games galore: a mixed bag

By Steven Darnold

With Christmas on the horizon, it's time to take a good look at some of the new games for the C-64. There is a much larger range of games available than last year, and Santa Claus is going to have to choose carefully.

I'm reviewing eight games here - the first five from Micro Utilities are all available on tape, and the two adventures are also available on disk; the last three games from Fountain Marketing are available only on disk.

Loco

Loco is my favourite. It has excellent music, nice graphics, and an interesting theme. At the lowest level, it is suitable for 10-year-olds; but it is possible to increase the speed and level of play to challenge even the most hardened arcade addict. At \$34.95, Loco is good value for money. It compares favourably with games selling for two to three times as much.

Loco is easy to learn, but difficult to master. You guide a locomotive along a network of tracks, collecting fuel and dodging runaway wagons. Overhead, airships and planes are trying to bomb you.

All the action is displayed from two perspectives. The top half of the screen shows a side view from above. The two halves are perfectly co-ordinated so that objects are seen simultaneously in both halves of the screen. This gives the game a solid three-dimensional feel.

Part of the challenge comes from having to do so many things at the same time. You have to scan the tracks for fuel tanks and plot a route to get to them. You have to scan the tracks for runaway wagons and judge how likely they are to end up on your line. You have to scan the sky for planes and figure out when to send puffs of smoke their way. It often gets quite hectic.

Son of Blagger

Son of Blagger, written by the same author as Loco, has the same high quality feel to it. It's slightly more expensive at \$39.95, but is still reasonably good value for money.

A Jumpman-type game, it therefore requires not only good hand-eye coordination, but also a certain amount of intelligence (not to mention stubbornness). Son of Blagger has only 12 rooms, compared to Jumpman's 30, nevertheless it does provide an interesting variety of challenges.

I am a great fan of Jumpman so I really should be excited by Son of Blagger. However, it has two shortcomings. First, the controls are slightly unresponsive and occasionally the little man doesn't go where directed. This can be deadly. Second, the beginning of the game is so difficult some people will give up. The

Competition

The winner of October's competition was Christopher O'Leary, of Porirua. Christopher has been sent a copy of "Moon Buggy" (donated by Alpine Computing).

This month's competition has two prizes: a tape of "Loco" (donated by Micro Utilities) and a disk of "Evolution" (donated by Fountain Marketing). Please specify in your entry which prize you would prefer.

Your task is to list three benefits of belonging to a Commodore user group. Send your list with your name and address to: Christmas Contest, P.O. Box 546, Blenheim. Entries close on January 15, 1985. The winners will be selected randomly from among the correct entries. Only one entry per person.

first room really should be much easier, to give people a chance to learn what's going on.

Neither of these problems is very serious, and overall the game is quite nice. If you are looking for a Jumpman-type game and are prepared for some frustration at the beginning, Son of Blagger is certainly worth considering.

Killer Watt

Killer Watt, another from the same author, also sells for \$34.95 but is not such good value for money.

The game itself is pleasant enough. You guide a ship through a maze of caverns, blasting obstacles. Several of the objects are quite unusual - leaping fish, waddling ducks and strange floating statues. The first time through the caverns is quite interesting, but after that the game becomes repetitive and loses much of its appeal.

The graphics are good, with a nice smooth-scrolling display. The sound effects are appropriate, but nothing special. Overall, Killer Watt is better than the average low-priced game, but not as good as Loco and Son of Blagger.

Mystery of Munroe Manor

I am very keen on adventure games so I really looked forward to playing Mystery of Munroe Manor. However, it was a disappointment.

The key to a good adventure is the ability to create a credible environment for the player to move around in. This requires both a carefully balanced plot and a reasonably intelligent input routine. Without these, an adventure is little more than a complicated guessing game.

Munroe Manor uses one of the most unintelligent input routines I have seen in an adventure. Not only does it have a very small vocabulary, but it also has

only a limited number of stock replies. For example, any use of the verb, get, with an inappropriate or unknown noun yields: "I'm not that strong." This is not a satisfactory reply to GET NEEDLE.

Besides being stupid, the input routine is clumsy. After every response from the computer, a few seconds pass before it is ready for the next input. This delay is annoying, particularly when you have a long chain of moves to make.

As for the plot, I got stuck at a fairly early stage. If an old hand like me gets stuck so soon, then I must conclude the game is too obscure for most people.

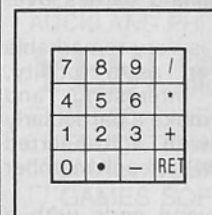
To give credit though, the author has spent a lot of time designing graphics and sound to go with the adventure. The introduction, in particular, is very effective. However, his efforts here do not really compensate for the fundamental flaws.

King Solomon's Mines

The Search for King Solomon's Mines is written by the same author as Mystery of Munroe Manor. The two programs are very similar in presentation, with graphics filling the top two-thirds of the screen and text displayed on the bottom. The author has used pretty much the same input routine, although it is slightly improved. There is also less delay between reply and input, but on some occasions this leaves insufficient time to read the reply.

King Solomon's Mines incorporates a lot of nice ideas and has the potential to be a first-rate adventure. However, for me, it was undermined by its arbitrariness and inflexibility. For example, when I first came across the corpse, I figured it might conceal something. I tried to PUSH it, PULL it, KICK it, EXAMINE it, TAKE it. No effect.

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Later I was given a hint to MOVE the corpse. This was very annoying – I had had the right idea but failed to find the one word the computer would accept. This sort of thing happened several times and I found it frustrating.

A disk of King Solomon's Mines sells for \$49.95. At half that price, it would be reasonable value for money; however, at its present price I don't recommend it.

Cuddly Cuburt

Last May, I reviewed a hopping game called Hexpert which I criticised for poor joystick control and inaccurate collision detection. Recently, I received a similar game from Fountain called Cuddly Cuburt. It is much better than Hexpert.

The idea is to guide a little man round a pyramid of cubes, changing the colour of the faces. When all the faces are changed, you proceed to a more difficult pyramid.

The main problems with this type of game is that movements are along the four diagonals, and joysticks do not register diagonals very easily. Cuburt handles this better than Hexpert, and it is easier to move your man where to want. Similarly, Cuburt avoids the problem Hexpert had registering collisions when two objects were not really on the same space. As a consequence, whereas Hexpert was almost impossible to play, Cuburt normally progresses without too many hitches.

The graphics in Cuburt are adequate but not really exciting. In fact, the author appears to have about as much artistic ability as I have (none). The sound effects, too, are pretty basic, but they do the job.

Cuburt is pleasant enough and compares favourably with games selling for around \$25. The only problem is that it sells for \$49.95 – not good value at that price.

Evolution

Evolution is an interesting collection of games based on a common theme. You start off in the first game as an amoeba, and if you succeed, you move on to the next game where you are a tadpole. From tadpole, you go to rodent to beaver to gorilla to human. Each of the games is totally different, and the only relation between them is that the score and number of lives remaining carries over from one to the next.

None of the games is very remarkable on its own. However, as a totality, Evolution is quite interesting and entertaining. It would make a particularly nice family game, with light-hearted competition to see how far each member can evolve.

Each game begins and ends with a brief strain of music, and there are appropriate sound effects throughout. The graphics are generally pretty good, although far short of spectacular.

Evolution sells for \$69.95. At \$40-\$50, it would be good value. However at \$70 it's competing with Jumpman and the like, and doesn't look nearly so good.

Tapper

Without a doubt, Tapper is one of the most unusual games I have seen. The basic idea is that you are a bartender with a rather rough and demanding clientele. If you don't serve the drinks quickly enough, someone will pick you up by the scruff of the neck and throw you down the bar. Similarly, if you break any glasses you're in trouble. You spend the whole game rushing from bar to bar, catching empty glasses and distributing fresh drinks. If you manage to satisfy everyone, you move on to a cute bonus game and then back to bartending.

I didn't think there would be much to the game; however, once I got into it, it turned out to be more complicated than it appeared. So many things happen at once that to succeed, you have to plan your moves carefully. It's not just a game of speed and reflexes.

A lot of thought has gone into the presentation. Very good use is made of music and sound effects, and the

graphics are very nicely done. There are several options to choose from and there is an attractive demo.

Tapper falls squarely in the middle range of games. It's far more polished than most of the cheaper games, but lacks the complexity and variety of the best \$100 games. Fountain hasn't told me the price of Tapper, but if it's under \$50, it's good value.

More Windows open

Windowing computer technology is now available on AT & T Information Services' PC6300 personal computer. An extension of the MS-DOS system, Microsoft Windows allows independent software vendors to develop graphically based software programs that run without modification on any windows-based microcomputer.

Do-it-yourself Auto-run

By Steven Darnold

If you've bought many commercial programs on tape, you've probably noticed some of them automatically run when they are loaded. This not only helps to protect the programs from copying, but it also enables multi-part programs to load in one continuous operation.

Such auto-run routines are basically very simple, and it's not difficult to tack one onto one of your programs. All you need is a machine language monitor. If you don't already have a monitor, there are several excellent ones in the public domain.

Activate your monitor and type M 02EE 0304. This should give you three lines of eight two-digit numbers. Replace the first line with A9 01 85 C6 A9 83 8D 77 and press RETURN. Replace the second line with 02 A9 FC 8D 02 03 4C 83 and press RETURN. Replace the third line with A4 00 8B E3 EE 02 7C A5 and press RETURN. That's all there is to it: the routine can now be saved to tape. This is done by typing: S "XXXX", 01,02EE,0304 (the XXXX can be any name you wish).

Save the auto-run routine at the beginning of your tape. Then immediately following it, save your program. No special treatment is required for your program; just save it in the ordinary way. The auto-run routine is not fussy – it will load and run whatever program follows it on the tape.

If you're interested how the routine works, the key is in the third line you entered. The EE 02 changes the BASIC start vector. After a program loads, this vector tells the computer where to go next. Normally it goes to READY, but instead you are sending it

to \$02EE. If you want to see what happens at \$02EE, type D 02EE (from the monitor). This will give you a disassembly of the hexadecimal code.

The first line puts 01 into the accumulator, and the second line stores it in memory location \$C6 (which is 198 in decimal). This is the machine language equivalent of POKE 198,1. The third line puts \$83 (=131 decimal) into the accumulator, and the fourth line stores it in location \$0277 (=631 decimal). This is the equivalent of POKE 631,131. The rest of the routine merely points the BASIC start vector back to where it belongs.

POKE 198,1 tells the computer there is one character in the keyboard buffer. POKE 631,131 tells the computer this character is a RUN. Thus, the computer thinks someone has pressed shifted-RUN/STOP, and it automatically loads and runs the next program on the tape.

The whole process is really quite simple. The user inserts the tape and types LOAD. The auto-run routine takes a few seconds to load and then the computer goes to print READY; however, first it is diverted and a shifted-RUN/STOP is put in the keyboard buffer. Then, when the computer prints READY, it immediately loads and runs the real program.

Note: When you take X to exit a machine language monitor, it returns to BASIC via the same vector used by the auto-run routine. Therefore, when you exit the monitor after typing in the auto-run routine, don't be surprised if the computer tries to load a program.



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The screen merge

By Tony Graham

One very simple yet very useful programming technique which can be achieved on Commodore computers is the "screen merge". Merging programs means taking two or more programs and joining them to make a single program. There are utility programs which contain merge facilities but for many purposes the "screen merge" is just as effective.

When writing programs, we often want to use a routine of some type which we already have on tape or disk. It's not a problem to LOAD the first of these routines as a base for our program but what happens if the next routine we want is not in the same program as the first? When we LOAD our second routine, our computer will reset itself and the first program will be deleted, which is not much help.

The "screen merge", as its name implies, uses the screen to store the first program while the second is loaded. This method of merging is practical only for short programs although we can use successive screen merges to transfer as much program as we wish.

The amount we can merge at any one time depends on the screen format of your computer. The maximum we can achieve for the VIC is about 350 bytes, around 700 bytes for the PET and 64, and around 1400 bytes on the 8000 series models.

How do we go about performing a merge? The idea is simple enough. We LOAD in those lines on the screen, then enter NEW. We now reload the program we are writing, run the cursor up to the top line of our LIST and press RETURN to

re-enter LISTed lines. That's it, the two programs are merged.

In practice, we have to be careful not to scroll the LISTed lines off the top of the screen after we have typed NEW, or we are back to square one.

Let's go through the necessary steps one at a time:

- Step 1: If you're developing a program and don't already have a copy SAVED, make a SAVE now.

- Step 2: LOAD the program that contains the lines you want to merge with your new program.

- Step 3: LIST the lines to be merged. If you have more program than can be LISTed on one screen, your merge will need to be done in stages. We also need the seven bottom lines of the screen (only five for disk) free to work with. So if you still have LIST 200-250 etc at the top of the screen, use the cursor down key to make the screen scroll until the first line to be merged is at the top of the screen. Use the space bar to wipe out anything on the lines sixth and seventh up from the bottom of the screen.

- Step 4: Position the cursor on the seventh line from the bottom of the screen and enter NEW. The cursor will re-position on the fourth line from the bottom of the screen. We need to move

it up to the line containing NEW and over-type the NEW with LOAD to load the program we are writing. If you are using a cassette, press PLAY just before entering LOAD. This stops the PRESS PLAY ON TAPE message from being displayed and using up screen space.

- Step 5: When the LOAD is complete, move the cursor to the top line of the screen and press RETURN to enter each line as if it had just been edited. Be careful not to re-enter the LOAD which will still be on the screen, and on which the cursor will land. Note we must have different numbers for the lines being merged to any existing lines; if not, the merged lines will replace any which had the same number.

- Step 6: LIST the program to check the lines were merged correctly and SAVE the new version.

If all your program could not be merged on one screen, repeat the process as many times as required.

Merging by this method — although slow when using cassette — is frequently quicker than re-typing whole sections of program. And of course, routines merged are usually tried and tested, so less time is spent in debugging.

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VIC lives on

By Peter Archer

During its eventful life, Commodore's VIC-20 has set many records – first colour computer to sell for under \$US500; first computer to sell one million units of one model; first computer to sell two million units of one model.

There are now well over two million VICs in use around the world with 10,000 of these in New Zealand and more than 100,000 in Australia. Commodore has stopped producing the VIC, but is still supplying them from a large stockpile.

The replacement – the C-16 – is now on sale in the U.S.A. and England, at a similar price to the VIC, and is due for release in New Zealand early next year.

But the old VIC is not quite dead and buried yet! The large "installed base" means there will be a large continuing demand for VIC software, peripherals, books, etc.; and for continued coverage in computer magazines. So you VIC owners, don't panic! If you feel you are ready to move up to a more powerful machine, by all means consider upgrading to something like a Commodore-64 (or the new C-16 when it arrives). But if you are still getting good value out of your VIC, why change for the sake of change? There is a good market for second-hand VICs so your old computer will always be worth something.

I still believe that for some people, the VIC is a good "starter's" computer. Younger children can still get good value out of it and the proper keyboard and easy-to-use operating system make it an ideal, low cost first computer for families looking at the second-hand market.

No advance on eight

By Peter Archer

In September, I mentioned that the list price of Commodore's own cartridge games for the VIC had been reduced to \$49.95 but this may have been due to fall further. Well, this hasn't happened (as yet). The devaluation may have had some influence on pricing, but Commodore (NZ) Ltd currently has 34 cartridge games for the VIC, all priced at \$49.95. This is the recommended retail price. As with most things, you may be able to better this by shopping around.

Several independent firms also make game cartridges for the VIC. The best known of these would be Creative Software, distributed in New Zealand by Viscount Electronics. I reviewed its Pipes in September (and scored it at nine out of 10). So let's see if its other offerings can match that.

Choplifter

Choplifter has been around for a while now. It has always been more expensive than other VIC cartridges. Initially priced at \$99.95, it has been reduced to \$79.95 for some time now. But it is still a bit expensive for most pockets.

Unlike most games, the object is not to shoot anyone but to save people being held hostage behind enemy lines. You take off in your helicopter from your base and fly along until you see the little figures on the ground waving to you. You land, take them on board, fly back to base, unload them, and gain points for each one safely rescued. Sound simple? Well, there are a few obstacles to overcome.

Whenever you land, an enemy tank seems to appear from nowhere and starts shooting at you. If it hits you, there are pieces of helicopter scattered about the place and any people you have picked up are killed, detracting from your possible score. You can take off and bomb the tank, but you score nothing extra for destroying it and another always takes its place. The winning technique involves bombing the tank, landing quickly and taking on the people, then taking off before another tank appears.

From time to time, enemy planes also appear. You must either avoid or shoot them down. But you get no points for shooting them. This game does not encourage unnecessary bloodshed. (A welcome change!). A strange flying device with a deadly whirling blade also appears occasionally. If this hits you, it makes rather a mess of your lovely helicopter.

I enjoyed playing Choplifter. The graphics and sound are very good, and the joystick control smooth and realistic. But there is one major flaw. Once you have saved 48 people, that's it! Game over. No further harder levels to challenge you! This serious flaw means I can award only seven out of 10.

Astroblitz

The other Creative Software cartridges all have a list price of \$39.95. Astroblitz is a good fast action game for those who like moving a ship around the screen, dodging enemy fire, and blasting everything that moves. A real "shoot-em-up" not really to my taste, but most kids love this type of game. It is very similar to "Defender", in fact, I suspect it is modelled on this arcade classic.

I cannot really fault Astroblitz. The action is fast and furious. The joystick control is smooth. The graphics and sound, while hardly spectacular, are quite well done. Compared with some of the poorer quality offerings I have seen, I will have to give it an eight out of 10. Its lower price clinched the extra point over Choplifter.

Apple Panic

Apple Panic is a pretty standard version of the well known game. You run up and down ladders etc digging holes to trap monsters. When they fall into your holes, you have a limited time in which to bury them before they climb out.

Not exactly original. They haven't even bothered to change the name. (Why not "VIC Panic"??!!) But for all that, it's well done. A nice imp-

lementation of this classic computer game, with good graphics. Good for hours of fun. So must be worth seven out of 10.

Rat Hotel

Rat Hotel was launched in the USA, it was advertised very heavily. For months, there were full page colour ads. In several high-circulation computer magazines. Must have cost Creative thousands. And to read the ads, it sounded really good.

Well, I am disappointed. The idea is original. You are a rat on the loose in a large hotel. You have to eat the cheese scattered around the place, avoid the traps and the nasty rat-catching maintenance man, and move from floor to floor by riding the lifts.

A nice original theme. But the screen seems to be cluttered up with too many things at once. I quickly got bored. Children may find this game a challenge, but it is not good enough to hold the attention of an "old hand" for very long.

Sorry Creative, but in this case the product did not measure up to the advertising. Six out of 10.

Serpentine

Serpentine is a version of the old "snake" type game where you control a "serpent" which moves around the screen growing as it goes. You must avoid various nasties, and you are not allowed to double back and touch yourself. (Why, I have never understood, but they're the rules).

I can describe this one in one word – boring. There is an old public domain game for the VIC by Jim Butterfield called "Arrow" which is very similar and just about as good! So I am afraid this one scores only five.

Depending on whether you prefer a "shoot-em-up" type game or something a bit different, I would say the best of this bunch would be either Astroblitz or Apple Panic.

Something for nothing — almost

By Cam Firenze

Something for nothing? Free software? It sounds too good to be true. Well (of course) it's not quite true — it's not quite free. But public domain software is about the closest you'll get to it. You may have to pay for postage and physical medium (the disk), but the programs themselves cost you nothing.

The writers have placed these programs in the "public domain" — anyone is allowed (in fact, is encouraged) to copy them without paying any sort of copyright fee.

You may suspect the programs are distributed free because they're not "good enough" to sell, that public domain software must be of inferior quality to that for which you have to hand over your dollars.

It is true that most of the programs which tend to get into the public domain are for "home" rather than business use — you won't find a lot of accounting packages, for instance. But you can get programs for spreadsheets, mailing lists, word processors, database managers, statistical analysis, and so on. And at least some of these programs are quite respectable.

There are also serious educational, financial and "utility" programs, such as

for communications, using a RAM disk (if you've splashed out on a few extra chips and would like a faster machine) or file comparison, to mention just a few.

You can look and listen to sample programs for using colour, graphics and sound, learn the BASIC language through a tutorial, and surprisingly enough, there are even some games available. These range from the arcade type and "board" (checkers, chess) games to gambling and computerised psychoanalysis.

Reliant on the USA

Eventually, a group to distribute public domain software for the IBM PC may be set up in this country, but in the meantime we are reliant on the USA. I have seen advertisements for two such American groups; others no doubt operate within user groups there.

PC Software Interest Group (PC-SIG), in California, has about 200 disks in an ever-growing application program (eg, word processor) or a series of similar-purpose programs (eg, games, or financial calculations). You can buy disks individually, after perusing the directory

booklet which lists the contents of each disk, or go for the set of 10 "introductory" or 20 "most popular".

Individual disks cost \$US6; the directory (free if you're getting a set) is \$US4.95; shipping and handling for us foreigners is \$US10. You'll also need to allow for sales tax and customs duty, unfortunately — another 60 per cent. My first set of 10 disks from PC-SIG earlier this year cost about \$NZ150 all up. Exchange rate movements since will have increased this.

You can send for PC-SIG's directory (add a dollar or two for its postage if you're not getting any disks) to: PC Software Interest Group, 1556 Halford Ave, Suite 130, Santa Clara, California 95051, USA. Once you've bought something, a newsletter will keep you up to date with new developments.

Many of the PC-SIG programs require only a minimal configuration of 64K, one single-sided disk drive and monochrome screen. Some need a colour graphics card or more memory. Some disks are double-sided (at no extra charge). Programs should run on compatibles with IBM PC-DOS; some will run on MS-DOS. Submissions to the PC-SIG library are welcomed.

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The National Public Domain Library, also in California (1062A Taylor St, Vista, California 92083, USA) supplies disks on loan. You copy them yourself and send them back. I don't know whether the library will be very keen on customers from this far away, though, as postage may take too long. Charges are about \$US1 per disk, with games, utilities and business programs available.

'User-supported' programs

"User-supported" programs, distributed in the same way as public domain software, are an attempt to encourage wider distribution of software. These are generally larger programs (in terms of programming effort) for serious applications — for example, assembler language, Lotus 1-2-3 template, and word processing. These programs are not in the public domain but users are allowed to make copies and are requested (no compulsion) to send authors a donation of say \$10-\$30 if the program is useful. So it's very much a case of being able to try before you buy, at your own pace.

For instance, PC-SIG user-supported offerings include a database manager, PC-File, which guides you with understandable questions through setting up a database to your own specifications, then presents a menu of options to add data, change it, find and look at particular records, sort the database and produce simple reports from the information you have entered, for selected sub-sets of records if required. PC-File is useful and easy to use, with clear documentation (supplied on the same disk, which you can "copy" to your screen or printer from DOS).

Public domain software is often supplied as source code, so you can list a program and learn some programming by looking at how someone else has written, say, a particular game. You can also modify these programs to your heart's content — although you may be wise to take another copy of the original before you start monkeying around!

There are so many programs on some of the disks it will take a while to try them all. And be prepared for a few disappointments. However, you'll probably soon select some favourites — top games in this household from the PC-SIG disks purchased so far include Craps (lone gambler versus the computer, which I've modified extensively to make it more exciting, harder to win, and cheekier) and Starlane, which is a multi-player game (only one PC required, though) involving some concentration, and some luck. This is an interstellar trading and shipping board game which, given the amount of computation involved, works well on a computer.

"Public domain" is a notable publishing concept. If you've got an IBM PC (or compatible), take advantage of it, and get hold of some cheap software. And look — no copy protection!

Long-awaited Logo & Pascal

By Pip Forer

Although BBC BASIC is a highly praised implementation, most users have long awaited additional languages. Two minor ones have emerged in the form of BCPL and a bevy of FORTHs, plus cut-down extractions of Pascal and Logo.

Now, however, full versions of both these languages are to hand and deserve attention. Since they fell into my hands only a few days before deadline, I am not about to deliver judgement in haste. Rather, here are some overall observations and ground rules for evaluating them. You will have to wait until the next issue for a full treatment.

For different reasons (and each with people of wildly different temperament), Pascal and Logo have found favour with educational computing practitioners. The BBC and Electron are essentially educational and home machines. Therefore, the criterion for judging their Logo and particularly their Pascal should be educational value and practicability. The ability to compile megabyte programs and raw speed may be slightly less important than for the evaluation of a Pascal on a larger scientific machine.

On the other hand, a friendly environment and responsiveness may count for a lot. The closest and most obvious yardstick in this would be the Pascal and Logo systems available for the Apple II family.

An easy-to-use environment involves several factors. The environment in which users find themselves when working with one language must not be violently different from what they are used to (or will move to) with another language. Having to relearn a function similar command, to edit a program line in a particular language, for instance, is clearly not helpful. It should also be simple to bring the language into operation.

Unfriendly practices in these two matters comprise what I will call the hurdle factor. This is the requirement of specific secondary skills, such as familiarity with an arcane editor, to use a desired language.

Error reporting or debugging should be friendly and the language should comply with some international standard for its kind. And the user should get fast

reponse in getting a program running. In interpretive languages (such as most BASICs and Logo), this criterion is no problem; but in languages such as Pascal which must translate source code (what you read) into object code (what the machine works on), it can be quite a bind. Even some 16-bit Pascals can take minutes to compile very simple programs — although others are lightning fast.

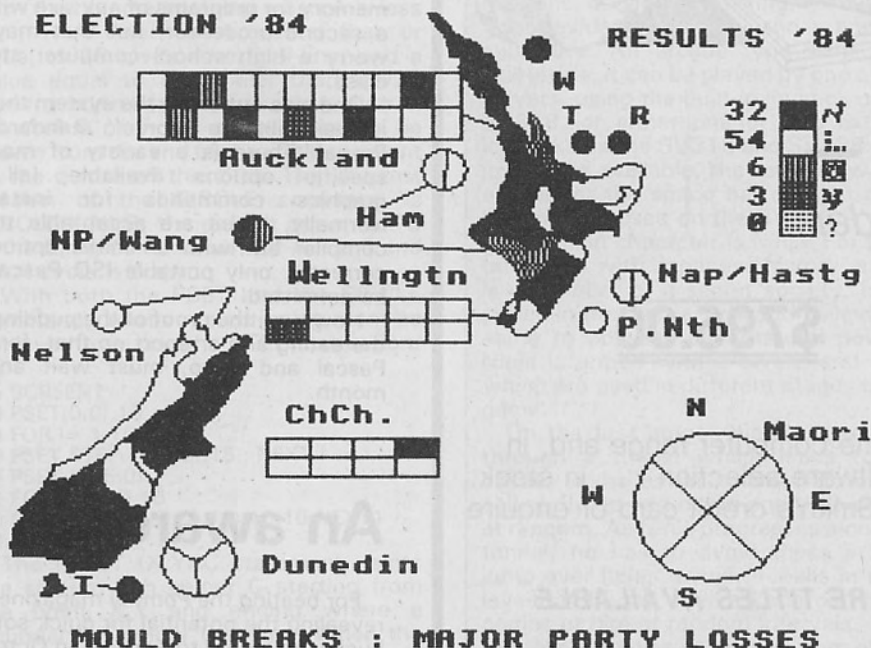
Compared with other non-Z80 eight-bit systems, the BBC releases look interesting. A comparison with the Apple II systems is inevitable and quite valuable. Apple chose to implement the UCSD P-System when it opted to offer Pascal as a second language. This sets the user up in a menu-driven shell where all choices can be reached by a series of single keystrokes. The choices available are manifold and easily accessed by anyone with familiarity with the system. The P-System has gone on to be offered on 16-bit machines and forms the model of the first Pascal on the Lisa.

Its disadvantages for the Apple user were that it was not easy to learn the shall menus to start with, it used disks formatted in a different manner to standard Apple 3.3 disks (so you had to reboot the Apple to use it) and involved either a lot of disk swapping and accessing or twin disk drives to set up painlessly.

Apple Logo was written in Pascal (without the P-System shell) and inherited some of its vices. Although a delightful language in itself, the hurdle factor was quite high. Both languages were fairly standard, however, with additional commands to take advantage of the machine's unique features.

The BBC languages are packaged totally differently. They come as two sideways ROMs (for the BBC) or as a

Screen dumps



A forthcoming item will look at colour printing on the BBC. We have used this in the geography department at Canterbury University in conjunction with a program that lets you re-run the 1984 general election. You specify new voter preferences, and the Beeb unrolls the election, then maps the results. For those without a colour printer (!), quite good results can be obtained by suitable shading techniques on a black and white printer. This map was produced from a direct screen dump of a four colour mode 1 screen where two colours became black and two white. More on this later.

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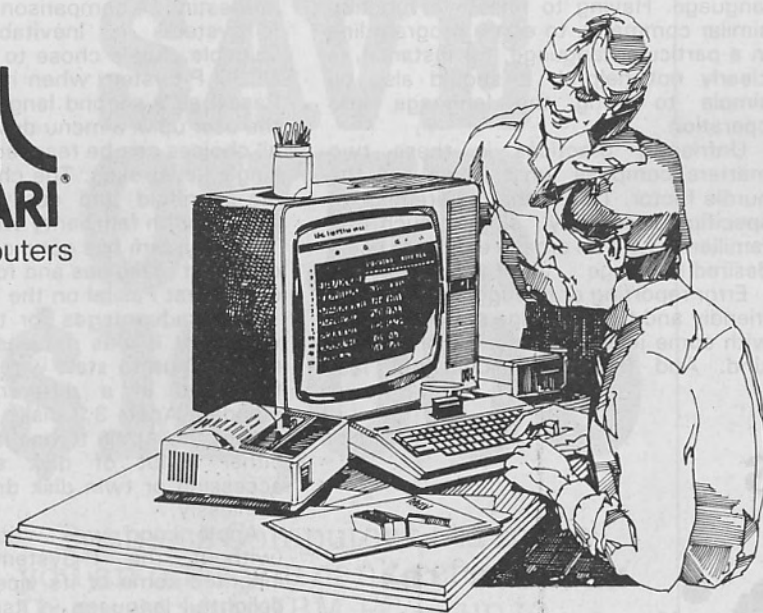
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BBC

cartridge pack (for the Electron). With a second processor, they can be loaded in from disk. The languages on the disks, or disk accesses from the ROM options, use standard BBC disks. Either language can be entered using the familiar * convention, for instance *PASCAL for Pascal. This is a plus from the user's point of view.

There is no comprehensive user shell environment but a program editor is provided. This comes about this way. The language systems themselves use two ROMs in a symbiotic way. Pascal, for instance, has one ROM which contains the compiler and another containing the editor and interpreter. A fairly small number of commands allow the user to access the editor to create or modify, save, compile and run programs.

The editor uses the function keys and a template and adds, in addition to normal BBC on-screen editing facilities, indispensable commands such as global search and replace, block movement of text and insertion of text from the disk. This is less powerful than the UCSD editor, but more transparent.

The compile option also offers the opportunity of being neater to use. Compile can work either from a file on disk or, more quickly, from a file simultaneously in memory. Like UCSD Pascal, the Acornsoft Pascal does not produce final machine code programs which can be run on any BBC. Rather, it produces code which, like P-code, needs an interpreter to function. This means either a Pascal interpreter ROM in a socket or loading the 8K interpreter from disk. You may then find yourself short on memory for programs of any size without a second processor, but that may not worry a high school computer studies class.

One nice option on the system though, is the ability to "force" standard ISO Pascal. There is a variety of machine specific options available (all the graphics commands for instance). Normally, these are acceptable to the compiler but with an initial option set correctly, only portable ISO Pascal will be permitted.

However, the proof of the pudding is in the eating and a report on that, for both Pascal and Logo, must wait another month.

An award

For beating the Pommy magazines and revealing the potential for quick software bucks: an award to Kerry K. in October's *Beeblet* (the New Zealand user group's magazine). The award is for a quick program that claims to change the View word processor into a relocated Hi-View for use on a second processor. Acorn is selling a Hi-View ROM for \$150 in Britain.

Drawing & picture commands

By Barbara Bridger

As well as commands for creating sprites, the SpectraVideo has a wide range of graphic commands which together constitute a graphic macro language. These commands range from the PSET instruction, which can put a specified colour into a particular pixel, to the LINE command which can recolour the whole screen.

The commands are used only with screens 1 and 2. In screen 2, each block of 4 x 4 pixels is treated as a unit while in screen 1, each of the 49152 pixels is addressable eg. RUNning:

```
10 SCREEN 1
20 PSET (12,12),1
30 PSET (13,12),1
40 PSET (14,14),1
50 PSET (15,15),1
60 GTO 60
```

will give a diagonal line of 4 black dots, \, but RUNning:

```
10 screen 2
any one of lines 20 to 50 above
60 GOTO 60
```

will give a black square, ■.

The full CIRCLE command is CIRCLE (X,Y),R,C,S,F,A where X and Y are the column and row co-ordinates respectively, R is the radius, C the colour, S and F the start and finish angles given as a fraction of 2*Pi radians where a complete circle is not required, and A the aspect ratio.

A value of A greater than 1 gives an ellipse extended in a horizontal direction, with the reverse applying when A is less than 1. A value for A greater than or equal to 29 gives a vertical line, and a value equal to or smaller than 0.035 gives a horizontal line. A minus sign in front of S or F will cause a line to be drawn from the end of the circle segment to the centre of the circle. The shortest version of the CIRCLE command is CIRCLE(X,Y),R; the default option for C is the foreground colour, for A it is 1 and a full circle is drawn.

With both the PSET and the CIRCLE command, relative positioning can be achieved by using the STEP instruction. eg:

```
5 SCREEN1
10 PSET(0,0),15
20 FOR I= 1 TO 16
40 PSET STEP (16,12),15 : NEXT I
50 PSET (255,0)
60 FOR I=1 TO 16
70 CIRCLE STEP (-16,12),10,15:NEXT I
80 GOTO 80
```

The PAINT (X,Y),C statement paints the screen with colour C starting from the point X,Y and ending where a boundary of colour C is met. When the paint command is used to fill in an area with a complex outline, care must be taken not to have a single pixel gap, otherwise much more is PAINTed than required.

The DRAW command is very versatile and useful in combination with PAINT when creating background pictures. DRAWing starts from the current

location of the graphics pointer — wherever the last GML command placed it. The PSET command or the move draw command, BMx,y, can be used to start drawing from the appropriate place. The DRAW movement commands are: Mx,y where the movement may be absolute or relative depending on whether Z is preceded by a '+' or not (we cannot get the '-' to work, drop us a line if you can?); and the eight direction commands — Un ↑, Dn ↓, Ln ←, Rn →, En ↗, Fn ↘, Gn ↙, Hn ↖. The number of points moved is determined by both the value of n and the scaling factor set by the Sn command.

These movement commands may be preceded by any of these commands: B — move but don't draw any points; N — move and after drawing return to the original position; Cn — sets the colour n; Sn — sets the scaling factor to n/4 (default n is 4, same as n=0), n can range from 0 to 255; An — determines the angle of rotation, n ranges from 0 to 3.

However we can get A0 and A2 to

work only with all move commands, A1 and A3 work only with DR and F.

The versatility of the DRAW command is increased by the option of being able to use variables to assign values to x,y, and n in these commands. It is also possible to execute a second string from within a string by using the command, Xstring variable.

Try these examples to get a feel for these commands:

```
10 SCREEN 1
20 DRAW 'BM100,100NU8ND8NL8NR8NE8
NH8NG8NF8'
30 GOTO 30
10 SCREEN 1
20 PSET(33,191):A$='U10R10F10L10'
30 FOR I= 1 TO 78
40 CO=CO+1:IF CO > 15 THEN CO=1
50 SC=SC+1
60 DRAW'C=CO;S=SC;XA$;'
70 NEXT I
80 GOTO 80
```

Some unwanted running of colour may occur when using the LINE CIRCLE or DRAW commands. This is related to the way the graphics screen is organised. The pixels — there are 156 in a row and

Ninja: top value

By P.D. Drew

This is an excellent program, written in machine code and making full use of SpectraVideo sound and graphics capability. An arcade type with three skill levels, it can be played by one or two players, using the built-in joystick on the SV318, or either one or two external joysticks on the SV318 and SV328. If no joystick is available, the four arrow keys and either the space bar or right graph key may be used on the SV328.

The main character is Ninja. For those unfamiliar with Japanese history, a ninja is a member of a secret society, highly skilled in the martial arts and believed by some to possess supernatural powers. Ninja is armed with a sword and darts which are used in different stages of the game.

On the first stage, Ninja has to pass through a tunnel which leads to the castle. In the tunnel, many bats on the ceiling fly up and down and drop stones at random. As Ninja progresses along the tunnel, he has to avoid these stones, jump over holes, avoid fireballs in some levels and jump over a knife car which comes at him at random intervals.

If Ninja makes it to the end of the tunnel, he enters stage two which is a castle. Once in the castle, he cannot return to the tunnel. In the castle are eight opponents, each guarding a diamond. Ninja's task is to jump from platform to platform and engage the opponents one at a time. As an opponent is killed with Ninja's sword, a diamond

appears and Ninja has to retrieve it.

When all eight opponents are dealt with and diamonds collected, Ninja goes on to stage three — a tunnel similar to stage one except that there are eight keys hanging on the wall. Ninja has to get all eight keys which will enable him to open the door and get out of the castle.

While getting the keys, he has to avoid the bats, arrows and knife car. He may protect himself by using his darts. He also has to jump over holes on the ground. Once all eight keys have been obtained, Ninja enters stage four. He has to avoid collision with the bats, their shadows and weapons from opponents on both sides, to reach the castle exit which is built on top of a well.

That is basically the full extent of the game, except for the varying levels of difficulty. You start with five ninjas. If all five are killed, the game starts again.

If you are using a SV318 computer, you must have a SV-601/602/605 expander, with a SV-803/807 16k/64k RAM cartridge connected, as the game uses more memory than is available on board.

I found this game most enjoyable and thoroughly addictive. So much so, I narrowly avoided being late for work the first time I played it. It is well worth the \$18 price. An equivalent game for another popular computer would cost at least three times as much.

192 in a column — may be thought of as being in compartments, eight in a single row in each compartment. If one of the pixels in a compartment has its colour changed when you are using the LINE CIRCLE or DRAW commands, the colour of the rest of the pixels in the compartment which are switched on is changed and creates the impression of the colour running. For example:

```
10 SCREEN 1
20 CIRCLE(123,100)11,15
30 LINE(111,90)-(111,110),1
40 LINE(135,90)-(135,110),1
50 GOTO 50
```

Here, the colour runs only on the right side of the circle because the leftmost circle pixels and the left line pixels are in adjacent compartments, while the rightmost circle pixels and the right line pixels are in the same compartment. This can be avoided by designing your graphic picture with the boundaries between compartments in mind.

If you vpoke the number, 255, into successive compartments, the numbering in SCREEN 1 is:

0	8	248
1	9	249
2		
3	10	250
4	11	251
5		
6	12	252
7	13	253
256	14	254
257	15	255
		6143

Different numbers can be poked in to give different patterns:

```
10 SCREEN 1
20 FOR I=0 TO 255
30 VPOKE I,255
40 NEXT I
50 FOR I= 256 TO 511
60 VPOKE I,204
70 NEXT I
80 COLOR ,,10
90 FOR I= 512 TO 767
100 VPOKE I,170
110 NEXT I
120 CT=768
130 DA=1:COLOR ,,3
140 FOR I= 1 TO 32
150 IF DA=1 THEN RESTORE 230 ELSE
RESTORE 240
160 FOR J= 1 TO 8
170 READ A
180 VPOKE CT,A
190 CT=CT+1
200 NEXT J
210 NEXT I
220 IF DA=2 THEN GOTO 250 ELSE
```

```
DA=2:COLOR ,,15:GOTO 140
230 DATA 0,20,56,122,255,122,56,20
240 DATA 1,2,4,8,16,8,16,32
250 GOTO 250
```

One point about setting the screen colour: the instruction COLOR X,Y,Z (where X,Y,Z are values 0 to 15), will have an immediate effect on the border and printing colours but the background colour will not change until a CLS is encountered.

Look out for a book by Deane Whitmore (New Plymouth) which will enable you to achieve some interesting

The graphics tablet

By Alex Bridger

The Tablet is a neat compact and light unit but does not come with the usual excellent Spectravideo polystyrene packaging. The supplied machine code tape takes 90 seconds to load after which a bright and simple menu comes up, which my five-year-old quickly mastered and enjoyed using. So full marks for user friendliness.

Initially, it seemed a bit of a toy for children and "oldie children" to draw pretty pictures with but I soon became more demanding in my requests and was rather interested in the speed with which I could draw pie charts, bar charts, sawtooth inventory charts and even maps — all labelled boxed and coloured — so much faster than preparing them with a program.

The menu offers 13 choices (draw, paint, background, erase, text, boxes, circle, paint, ruler, print, line, (save and load) plus the 16 colours. As you create your design, you flick back and forth between this menu and your picture by pressing the escape key (ESC). The SELECT key is used to choose the desired option, with the cursor being moved the normal way.

The resolution and faithfulness of the pad was good but not excellent. Some very irritating spikes and aberrations occasionally appeared when you lingered on draw in one spot — fortunately the erase and a re-draw would repair the damage. A medium fast drawing speed was better than slow drawing. The shape of circles or maps on TV screens a big squashed — not the case for

screen effects by various PEEKs and POKEs into RAM and VRAM.

If you want to obtain a printout of your screen pictures, we have a SCREEN DUMP program available for \$15 which, although a bit slow, is very reliable. Your printer must be capable of bit image mapping.

Suggestions for topics for future articles would be welcome, along with any questions you may have. Write to B. Bridger, 11 Mawson St, Lower Hutt. (We cannot guarantee a reply but a self-addressed envelope will help).

monitors.

The Tablet's software can operate only in a tape environment. Presumably, a disk version will come later?

Unfortunately at the time of writing, there were problems with the supplied software. Sometimes for a complex drawing, it is not possible to save the picture to tape. Another serious problem with the software was that no hard printed copy was achievable on any printer including the specifically mentioned Epson. (However, we have developed a screen dump program that solves this problem, provided picture saved to tape, for printers that can do bit image mapping, or can be used with Artist or any other program to get hard copy. If interested, send \$15 to 11 Mawson St, Lower Hutt with printer name and model, plus evening phone number. If disk version wanted, send disk).

Another annoying small bug with the software is the secret Ancient Egyptian message that comes up in the upper right screen quadrant when the shift key is pressed in text mode.

The small manual is the usual crystal clear, super brief Spectravideo documentation, with some fleeting glimpses given to the more sophisticated user on how to use this tablet under your own program control using the interesting new PAD(i) command.

While the Tablet is small for full professional architectural and engineering design uses, it is an economical step in the CAD (computer aided design) direction, particularly if coupled with an X Y plotter. It is ideal for graphic design where trial and error approaches are needed, and useful for educational drawing and design purposes.

We have written an introductory maths and shapes program for it. It has been suggested as being useful for designing circuit diagrams and even complicated knitting patterns (no laughing matter if you are a knitter).

At around \$280, it is an interesting peripheral device which stimulates pictorial creativity and may be the nursery for economical commercial applications. Its usefulness will, as usual, be governed by the quantity and quality of the software available for it.



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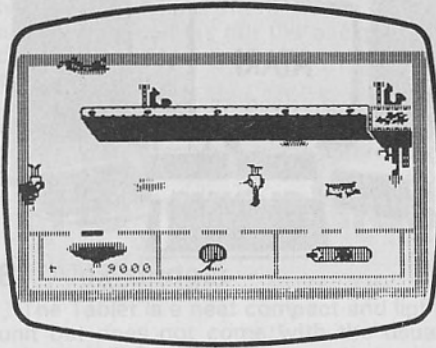
By Michael Fletcher

Pieman, by Eagle Berns & Michael Kosaka, must be one of the most original games that I have reviewed. It has a very unusual game scenario (a pie shop) and madcap antics which the apprentice pieman and his rival baker get up to.

It is set in a modern pie bakery, with a pie maker and a conveyer belt in the middle of the screen. Running along the conveyer belt is a freshly baked apple pie which has just come out of the pie-making machine. As the pie is made by machine, all you have to do is add topping (whipped cream and cherries) as the pies come out on the conveyer belt, and put them away when they are decorated.

The sound is superb, perhaps some of the best I've heard for the Atari computer, except maybe Mr Robot. The Pieman music is played throughout the game and adds greatly to the slapstick theme.

On the screen, you guide a little pieman who must rush up to the bin at the top left of the screen and pick up a tube of whipped cream, then dash down to the conveyer belt and squirt the whipped cream on the freshly baked pie.



A screen from Pieman

You then go to the cherry bin (in the top centre of the screen), grab a cherry and put it on the pie. After this, you take the finished pie and put it in the pie bin at the top right of the screen. By this time, another pie has begun to come out of the machine, and you start the process again.

As you proceed, flour sacks are stacked on the floor to get in your way and grease spots magically appear, ready to trip you up and make you drop whatever you are carrying. As if this weren't enough, every so often the slightly tipsy wedding cake baker dances around with his creations and steals your pies if you get in his way.

If you let seven pies fall on the floor from the conveyer belt, you will be fired and the game will end.

Pieman is non-violent and very humorous, making it suitable for all ages. Although the concept seems silly and simple, it is extremely addictive. Every time I said, "This is the last game", I decided to try it "just once more." I am sure you will too.

Pieman is a 32K disk or cassette, made by Penguin Software and, as far as I know, costs \$60-\$70 and is available only at West City Computers Henderson Ltd, Auckland.

(Review copy supplied by West City Computers Henderson Ltd, Auckland).

Battling the mad bomber

By Michael Fletcher

Kaboom is one of the new games Monaco is importing from the USA under the Activision label. It was one of the first games Activision brought out for the Atari TV game (2600) and is now the first game the company has converted for the Atari range of home computers.

Kaboom makes its name as a humorous musical action game combining the everlasting idea of the goodies versus the baddies.

The game is based around a very evil character called the mad bomber who has recently escaped from prison and has climbed onto the top floor of a sky scraper with a stockpile of bombs. Once at the top of the screen, the mad bomber lives up to his name and starts throwing flaming bombs at innocent bystanders.

The mad bomber is situated at the top of screen with a graphic backdrop of New York city. You control three water pails, at the bottom of the screen, to catch and douse the flaming bombs.

The game has many variations and can be played with a paddle. But I prefer me against the computer in "pitch and catch". You control the water pails and the computer controls the pyromaniac. The game starts when you push the action button on the joystick. Immediately the mad bomber will start hurling bombs downward. However, there is little danger as the bombs are

falling very slowly and are very easy to catch. Each time a bomb is caught, a note rings out from the 1012 overture. If you successfully catch the falling bombs in fairly rapid succession, the computer will play the 1012 overture for you.

The other variations offered are the two player version; you in control of the mad bomber; and the paddle version of these two.

To lose a game, you have to miss three

bombs — relatively easy to do as after each completed screen, the bombs fall faster and faster until you eventually drop one and start the screen again.

I didn't find Kaboom all that addictive, and I think it would be more acceptable to the younger Atarian. It costs about \$69.95, comes as a 16K cartridge, and is available at most Atari stockists.

(Review copy supplied by West City Computers Henderson Ltd, Auckland).

The Atari organisation

By Michael Fletcher

For any new computer buyer, the idea of joining a computer user club should not be passed up lightly — especially if you want to use your computer to its utmost.

Back in 1982 when the only Ataris around were few and very expensive, an Atari computer club, based in Auckland, was formed. At the start, it consisted of about 20 people with only the modest 400s to represent the Atari interest in Auckland. Now this club has more than 100 members and the latest variety of machines and peripherals. Most of this membership growth was achieved after Monaco Distributors Ltd took over the

New Zealand Atari dealership.

A question often asked by new computer owners is: what can my computer do for me and how can I use this? Most computer clubs are able and very happy to answer it.

Most Atari clubs have monthly meetings, where all manner of Atari and Atari-related products are discussed and sometimes demonstrated. I find the most interesting demonstrations are new imported software, especially games. If you see a game you were thinking of buying from overseas played on a screen in front of you, it's very easy to decide whether or not you want to buy it.

Memory scanning

By Dick Williams

This program will let you set a starting point anywhere in the Sega memory and look at all memory locations from that point on. As set up, the program will start looking at location & H9800 where normal basic programs start from.

The program prints four column headings at the top of the screen — memory, ASCII, decimal and HEX.

As the program runs, it prints the memory address in the memory column and extracts the number held in that memory and prints it in the decimal column. Any decimal number over 31 has the corresponding ASCII character printed in the ASCII column.

This will be of considerable assistance when scanning the basic program storage area because you will be able to see, in approximate English, this program as it is stored in the memory locations.

Type the program, run it just to make sure it does run, save to tape, verify, and switch off your computer. This will clear the memories. Wait for about 10 seconds, turn on, load and run the program. Let it run for several minutes.

All we have to do is figure them out

Okay, now break, run again and press the space bar when the screen is just filled. These numbers and characters are really good clues as to what goes on inside your beloved computer. All we have to do is figure them out.

This is the data you will have on your screen, and I have added comments at the right. Don't worry about the HEX column as it is only there to show you how decimal numbers look when converted to the HEX (hexadecimal) format.

Memory	ASCII	Decimal	
9800		9	= number of bytes
9801		10	= *1 line number
9802		0	= *256 line number
9803		0	= separator
9804		0	= separator
9805	A	65	= byte 1
9806	A	65	= byte 2
9807	\$	36	= byte 3
9808		203	= byte 4
9809	"	34	= byte 5
980A	J	74	= byte 6
980B	I	73	= byte 7
980C	M	77	= byte 8
980D	"	34	= byte 9
980E		13	= carriage return
980F		11	= num. bytes next line
9810		20	= *1 next line number

We are looking at the program which is looking at the program. All programs you type or load into the Sega have to be stored somewhere.

Normal basic programs start at memory location HEX.9800. HEX is a short form of the word, hexadecimal — a numbering system used to describe binary combinations. HEX 11 would be

pronounced HEX one one, HEX 12 as HEX one two, and so forth.

Just for the moment, take it as read that computer memory locations are normally specified in HEX. If we ask the computer to PEEK into a memory location, we will receive our answer in decimal.

The memory locations are in HEX and the value held in each location is in decimal. It's the decimal number we want because with that, we can find the

We want the decimal number

characters which correspond in the tables on pages 154, 155 of the blue Sega manual.

Each line of a program is held in the memory in this manner: first memory location=number of bytes in the line; next two =line number; next two

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=separators; next group of bytes=line content; next=13 carriage return, end of line; next=number of bytes in following line.

Let's look back at our screen of data. Can you see the pattern"?'. Let's check it. The first line of this scan program is 10 AA\$="JIM".

If you exclude the line number, there are nine characters, each of which is a byte. Therefore, there are nine bytes in the first line.

Turning our attention back to the scan printout, we see 9800 shows 9. These are the nine bytes from memory locations 9805 to 980D. Memory location 980E has the value, 13, and this is the end of the first line. Next, we have memory location 980F which has the value, 11.

We can conclude that the next line in the program will have 11 bytes in it. Just to confirm that, let's have a look at the next line, line 20 BB\$="12345". Yes, 11 characters.

There are four memory locations between 9800 and 9805. These are 9801, 9802, 9803 and 9804. The last pair (9803, 9804) always show 0 and they appear to be separators. The first pair (9801, 9802) are the line number indicators.

The latter pair tells us the line numbers:

Memory	Decimal				
9801	10	(10	*	1)	= 10
9802	0	(0	*	256)	= 0

The line number is 10

Same pattern repeated

As you can see, the first reads directly and the second is a multiple of 256. As you run the program, you will see the same pattern repeating for each program

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line — first the number of bytes, then the line number pair, then the separator pair, and then the program bytes followed by 13. This is how the computer stores your programs.

You will also see 0 after the last 13. This is the end of your program and the strings and variables are stored next.

The number held in each memory location is printed in the decimal column. It is also converted (line 90) to the appropriate character and printed in the ASCII column.

Numbers 1 to 31 have been specially treated so that they are printed in the ASCII column as a blank space. This has been done to stop them acting as control codes and disturbing the screen display.

Note too that some numbers appearing in the decimal column are unexpected and give rise to apparently unrelated characters in the ASCII column. Memory location 9808, you would think, should have 61 in the decimal column and an = character in the ASCII column. Instead, we get 203 in the decimal column and a funny C with a tail in the ASCII column.

The reason is that the = sign, when it is not inside speech marks, is one of the computer's commands and is turned into a shortened form called a token. The same thing happens to all the computer words — PRINT, FOR, COLOR, SCREEN, NEXT, etc

Tokenised computer words are only one or two bytes long. PRINT, for example, is tokenised to decimal 145 which, when changed to the corresponding character, is displayed in the scan as a diagonal cross.

The Sega computer has the capability to address 65535 memory locations starting from HEX0000 (nothing) to HEX FFFF (65535). (This program won't run on the IIA cartridge).

```
31 " ROM RAM
-0000 7FFF- -8000 FFFF-
.00000000000000000000
00000000000000000000
```

This prog starts -- -9800 STRINGS & this prog ends here -99C3- -- variables

So far, we have been looking at the memory locations from 9800 on. This area stores the programs nice and tidily, so it's a good area to start with.

Alter line 60 to look at other areas, eg. 17C0, 1960, 411F, 6A1B, 6DDD, 77AA, 79D6.

The program can't cross from the end of ROM (7FFF) to the beginning of RAM (8000). It will stop. Just alter line 60 to 8000 and run again.

Operating routines all in ROM

All the routines the computer uses to carry out its operations are contained in the ROM memory (0000-7FFF) and in the reserved RAM memory (8000-97FF). When you look at these areas, they won't make much sense the first time — or the second time either.

What we will be trying to do is unearth some of the routines so that we can call them up for use in programs. The goal is a better understanding of the Sega, and being better able to use its power.

After searching through the reserved RAM area for some time, I managed to locate four memory locations which told me where a basic program starts and ends.

Using these pointers, I found it became a simple matter to work out how to merge two or more programs into one. My merge program boiled down to three very short adjustments.

Here are the pointers: start of program, &H8161 and &H8160; end of program, &H8163 and &H8162. Each pair of memories holds the values of the memory location for the start and end of any basic program.

There is, however, a slight problem. You need to convert the decimal value found in these to HEX.

Fortunately, the gentleman (that's me) who made up this program included a HEX column, so you can read it directly. Scan from 8150. On reaching 8160, you will find it shows 0 and 8161 98. 8161 should be first (most significant). So we have 98 0. Add another 0 and the result is 9800.

The start of program storage

We have the start of program storage, &H9800 which we already know is correct. To determine the end of the scan program, read the HEX values of 8163 (most significant) and (least significant) 8162. These are 99 (8163) and C3 (8162) giving memory location &H99C3 as the end of the scan program. The same applies to any program and you can determine the start and end by PEEKING the pointers using the method: Q=PEEK(&H****):PRINT Q.

This will return to you the decimal number held in the memory location **** and you will then need to convert that to HEX.

So far, I have used this information to help me make up short programs to merge programs, to find and print the strings or variables used in a program, and I am working on a program to count the spaces between words, thus arriving at an approximate word count in a text program. (So far there are about 2000 words in this article).

```
10 AA$="JIM"
20 BB$="12345"
30 CC$="USE SPACE BAR TO START&STOP"
40 CLS:PRINT TAB(1);"MEMORY";TAB(10);"
ASCII";TAB(20);"DECIMAL";TAB(32);"HEX"
:PRINT
50 CONSOLE 2,22 :PRINT CHR$(5)
60 X = &H9800
70 FOR S=0 TO 70000
80 BY=PEEK(X+S):PQ$=HEX$(BY)
90 B$=CHR$(BY)
100 IFB$ > CHR$(0) AND B$ < CHR$(32) T
HEN B$ = CHR$(32)
110 J$ = HEX$ (X+S)
120 PRINT TAB(2);J$;TAB(12);B$;TAB(21)
:BY;TAB(33);PQ$:GOTO 150
130 R$=INKEY$:IF R$<> CHR$(32)THEN130
140 GOTO 160
150 N$ = INKEY$:IF N$ = CHR$(32) THEN
BEEP:FOR Z = 1 TO 100:NEXT:GOTO 130
160 NEXT
```

A readable half-dozen

By Gary Parker

A number of books of Spectrum games are available, so new entrants into the field are expected to be particularly good. Tim Hartnell's *Giant Book of Spectrum Games* lives up to this expectation. For a reasonable price, you get 358 pages of games listings, most of which are of above-average quality.

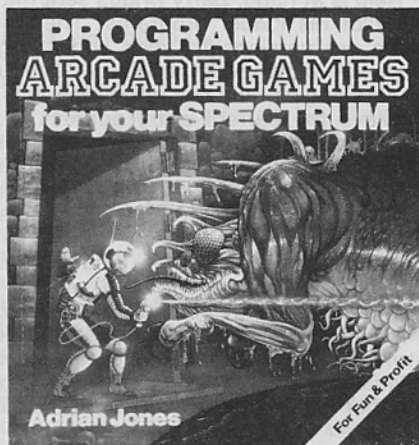
The games are written by many different people, and are divided into nine categories: arcade action, adventure, space games, board games, card games, just for fun, games for thinkers, simulations, and appendices. Understandably, in a collection of this size, there are a few fillers, and several variations of games such as "Frogger" and "Checkers", but generally I found the games surprisingly good, although it would take a keen typist to enter all of them.

Most are written by young programmers (few adults would write a game involving running down as many people as possible with a steam roller!), and would appeal to younger Spectrum users. Listings vary from a few lines to about 10K, and are quite clear despite being printed on a ZX printer. A few simple utility programs are included in an appendix.

Most people admire the impressive graphic displays seen in commercial programs, but don't know where to begin when attempting to create their own. *Spectrum Graphics and Sound*, by Steve Money, delves into the subject of graphics in depth, and should go a long way towards improving the graphics of home-written programs.

While not containing any radically new ideas *Spectrum Graphics and Sound* brings to the reader's attention a lot of useful information, and is well worth investigation by every Spectrum user, since it discusses everything from smooth movement for games, to three-dimensional graphs for business programs. The discussion of sound is limited to a single chapter, and is of a rather rudimentary nature.

It is easy to make a complex subject sound difficult, but difficult to make it sound easy, and there are few books which convey programming's essential simplicity. *Spectrum Magic*, by Steve Betts, is designed to teach children how to operate and program the Spectrum, and does so exceptionally well. The book is delightfully written, explaining everything in a way which children should find clear and interesting. Which child could resist a chapter entitled "Let's Mess Up the Screen!?" *Spectrum Magic* covers everything from how to plug in the Spectrum onwards, and parents should be able to leave a child with a copy of the book and the Spectrum, without fear that the Spectrum may not survive the



encounter. The book features two-colour text and amusing cartoons, and despite its apparent simplicity, ends with explanations of some quite complex programs.

I have often heard people complain that while they know how to write BASIC, they cannot quite work out how to program games, since most of the books on programming completely ignore them. *Programming Arcade Games for Your Spectrum*; by Adrian Jones, should help those who wish to improve their programming skills in this respect.

The book begins with a chapter discussing what an arcade game is, which despite the sub-title on the cover, "For Fun and Profit", admits that games written in BASIC are hardly likely to rival commercial machine code games. Once the reader accepts this, however, the book should certainly provide some fun, if not a great deal of profit.

Useful chapters follow, explaining ways to design BASIC programs to maximise running speed, to improve sound, and to design graphics. Several machine code routines are given, although no attempt is made to teach machine code. Finally, 10 games are listed, and their design features explained. The games are excellent, and alone may justify the purchase of the book.

The Spectrum manual supplied with the computer is acknowledged as one of the better computer manuals, yet it still seems to be written in a way which the complete beginner finds difficult. *Getting the Most From Your Sinclair Spectrum*, by Anne Sparrowhawk, covers much the same ground as the manual, but takes the time to explain programming in more detail. Everyday analogies are used to good effect, and a few example programs and colour photographs are included.

Useful extensions to the Spectrum manual are included in later chapters, such as a discussion of troubleshooting,

and an explanation of the computer's internal workings. If you want a slightly deeper treatment than given in *Spectrum Magic*, *Getting the Most From Your Sinclair Spectrum* will provide a useful introduction, although it lacks the sparkle of *Spectrum Magic*.

Anthony Camacho's enthusiastic approach makes for pleasant reading in *Drive Your Spectrum*. The reader is introduced to the Spectrum with the emphasis on the simple fun of discovery.

I also like the way the book begins with chapters on colour and sound, before leading into the more mundane aspects of programming, since this is what most beginners want to try first. Colour photographs show screen displays of the excellent demonstration programs contained in the final chapter. Every Spectrum user should enjoy this entertaining book.

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Loading: help at hand

By Gordon Findlay

Earlier this year, I mentioned in passing, a problem I was having with loading some tapes to disk. This problem is now, thankfully, solved.

The problem arises from several different features of tape storage. First, programs on tape load to specific addresses in memory. For example, a program may load from 4200 to 7798 — an actual example. If these addresses conflict with or overlap with DOS, as this range does, the program cannot be directly loaded without crashing DOS. It must be loaded to an address higher than 5200 to avoid conflict. When it is run from disk, DOS must first be removed or overwritten, which of course, means rebooting once the program is finished.

Almost all DOSes have a utility for saving tape-based programs to disk, and running them once they are captured. Examples are the NEWDOS LMOFFSET, Multidos, TAPE/CMD, and so on. Each has its own way of working and its own limitations.

A common limitation

One common limitation is that programs which automatically start will usually cause trouble, as will those which load into video RAM, and those which load separate blocks of memory. LMOFFSET will not cope with any of these sorts. Some tape programs have as many as eight blocks, each with its own starting address or origin.

Help is at hand. Barry Briggs sent me a copy of his loader programs. These — there are versions for disk and stringy floppy — allow you to read tapes with up to nine origins, and see what they are. It displays the correct entry address too, which is more than can be said for most monitors. You can then write the contents to tape, disk or stringy, execute the program loaded, edit memory and so on.

Another problem with loading tape programs with a utility such as this is that the utility may be in the same space into which the program loads — more strife. Barry's loader programs are relocatable — they can be moved to another address range, out of the way of whatever you are loading.

The programs have a few other features, and seem to be quite easy to use, provided you understand a little about the memory organisation of your machine.

These are public domain programs which Barry gives away with any of his other, commercial programs. He has a number of programs which are interesting, and very cheap. AUTOLOAD is a program for NEWDOS80 which presents a disk directory and allows you to run or kill programs with one key stroke, automatically loading BASIC if necessary. He has an enhanced version of OS-80, three programs to help use the characteristics of intelligent printers from other programs or VisiCalc, and ULTRATAS which is a combination of

TASMON and UTRAMON, with a few enhancements.

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And his prices are refreshing! The enhanced OS-80 is \$15 (send a disk with OS-80 on it); ULTRATAS is \$10 with a disk containing both monitors enclosed; AUTOLOAD is \$6 and a blank disk; and the AUTOSET programs are \$9 for the three. Post and packing is \$2. The loader programs will be included free. Barry is to be found at Briggs Software, 14 Allan Berry Ave, Napier. No doubt, he will send you a description, but please send him a stamped addressed envelope if you request information.

I have started analysing DOSes with a vengeance, A few days ago, a large package arrived with review copies of DOSPLUS and LDOS. I've seen DOSPLUS used before but never tried it myself, so it should be an interesting experience.

LDOS has been adopted by Radio Shack as a replacement for TRSDOS, so it ought to be good — both will be the subject of extensive reviews and comparisons after I've had a good long trial. Just the sheer volume of documentation is impressive, and will take quite a lot of digesting. Don't forget that next year, we will be looking carefully at DOSes in detail, and I'd be glad of your comments and reports of your experience.

Tape users, don't despair — I've a couple of projects under way for you too.

Good luck, and I hope Santa brings you all the drives, printers modems and games you asked for!

Teach Yourself

Lotus 1-2-3
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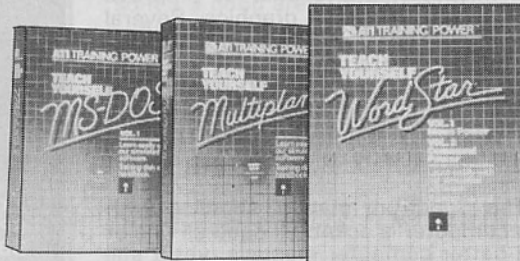
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VZ200

POKEing in sequence

This is a sequence of POKES to give a "TRON" and a "TROFF" on a Dick Smith VZ-200.

POKE 31003, 175 = TRON

That is:

>- POKE 31003, 175

>- RUN - Enter

POKE 31003,0 = TROFF

That is:

>- break in line 150

>- POKE 31003,0 - enter

VZ-200 ROM BASIC is similar to Level II TRS-80 BASIC.

BOOKS

Lotus 1-2-3 — three approaches

1-2-3 Go! By Julie E. Bingham. Addison Wesley. 271pp. \$31.65.

The Best Book of Lotus 1-2-3 by Alan Simpson. Howard W. Sams & Co. 270pp. \$27.20.

All About 1-2-3 by Robert Schware and Alice Trembour. dilithium press. 128pp. \$22.50.

Reviewed by Kerry Marshall

I had heard much of the Lotus 1-2-3 before reading these three books. Hailed as the revolution in spreadsheets, this one had me intrigued and I looked forward to both reviewing the books and learning more of the software package from Lotus Development Corp.

1-2-3 Go! is an excellent book, clear and easy to follow in its introduction to 1-2-3. Lotus 1-2-3 is a tool that allows the user to manipulate data easily and after reading this book, I was eager to try it.

After the customary introduction to the product, *1-2-3 Go!* uses the tutorial style presentation to explain the features, commands and functions available in the program. The pictures and diagrams are clear and follow the text making the book easy to understand. At the end of each section, there are exercises that could be used by a learner or perhaps an instructor taking a group through the material.

The appendices include a very good command summary, formula listings for the exercises, and a description of the keyboard of the IBM PC. I found the index very good too.

Overall, good value for money, and first choice.

The Best Book of Lotus 1-2-3 is also a very good tutorial for 1-2-3. It gives clear examples and diagrams, and is easy to follow. Section one explains how the spreadsheet is used and, as it works through the functions and commands, the diagrams show what your screen should look like — a very important feature if the book is to be used by the beginner. I found the commentary easy to follow.

Subsequent sections cover the use of graphics, data management, and the use of macros. The author has done a good job of explaining and illustrating each of the concepts.

The index is comprehensive and contained most references I needed. The only missing section was a summary of the commands which I usually find very handy for those of us who keep forgetting the options available.

Overall, a good book, running a close second to *1-2-3 Go!*

Readers of *All About 1-2-3* could be forgiven if they conclude it was written

by the makers of 1-2-3. I found the many glowing references to the product distracting, and in the end, felt much of the space in the book was wasted.

After the now expected introduction to spreadsheets and the product itself, the book explains, in narrative style, the things 1-2-3 can do. But not in any

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BB19

BOOKS

detail.

Furthermore, there are very few diagrams showing the stages of building up worksheets. The resulting text becomes very difficult to follow - particularly for the novice. Chapter 5, headed "Real-Life Uses For 1-2-3", turned out to be a disappointment. I expected to find some worksheets I might set up, but found only a description (narrative style) of what some others had done, and no details of the applications.

Overall impression - a poor last out of these three.

Solid on the fundamentals

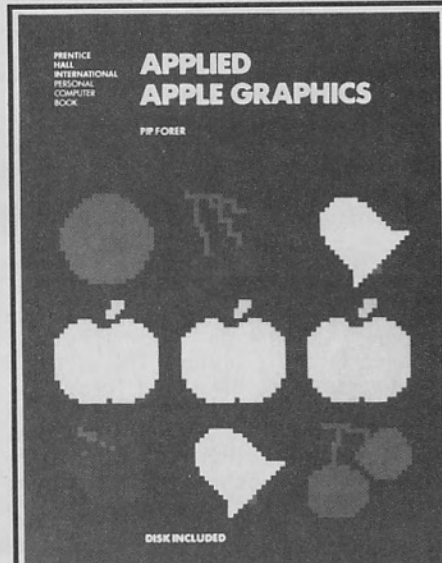
"VIC 20 Starter Book" by Jonathan Titus, Christopher Titus & David Larsen. Sams, 344pp, \$33.50. Reviewed by Steven Darnold.

This is a good book for beginners. It carefully explains how to operate the computer, how to program in BASIC, and how to use printers, cassettes and joysticks. It is extremely thorough and methodical. There are numerous experiments for the reader to perform on the computer; and each chapter finishes with problems and questions, most of which are fully answered in the back of the book.

In general, the book is pleasant to read. The authors are friendly without being condescending, and good use is made of pictures and diagrams. Highly technical details are avoided, and the more difficult

mathematical functions are grouped together in one chapter - which may be skipped.

The book aims to be a tutorial for beginners, and devotes all 300 pages to this task. Its coverage of sound and graphics is only rudimentary - it doesn't mention machine language and is totally useless as a reference guide. Nevertheless, the book succeeds in doing what it sets out to - providing solid coverage of the fundamentals and leaving the rest for other books.



Applied Apple Graphics by Pip Forer.

Published by Prentice-Hall U.K.

Book & Disk **\$66.55**
Book Only **\$42.75**

Written by Bits and Bytes own BBC Book Reviewer who is currently a Senior Lecturer at the University of Canterbury.

This book covers hardware and software enhancements as solutions to graphic problems (in particular reviewing the various software utilities that make BASIC programming pointless in some cases). Most graphic books ignore these.

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USER GROUPS

BBC MICROCOMPUTER USERS' GROUP OF NZ. Local meetings — Auckland: 2nd Wednesday of month at VHF Clubrooms, Hazel Ave, Mt Roskill. Ph Dave Fielder, 770-630, ext 518 (h). Wellington — meets last Thursday of each month in staffroom, first floor, Correspondence School, Portland Cres, Thorndon. Local contact, Anton, 286-289. Hamilton — Waikato Tech B-block staffroom; last Wednesday of the month 5 p.m. Local contacts Peter (Ham) 393-990 or Alison (Morrinsville) 6695. Hawke's Bay — Hastings and Napier alternate months. Local contacts: Kendall (Napier) 435-624, Bob (Taradale) 446-955; Mitch (Hastings) 778-235. Christchurch — fortnightly, Tuesdays, 7 pm, Hagley High School. Local contact Michael, 582-267.

SANYO USER GROUPS have been set up in Auckland, Wellington and Christchurch. Contact P.O. Box 6810, Auckland for further information.

SHARP PC1500 USER GROUP Contact: Allan Thomas, P.O. Box 155, Napier. Newsletter.

BAY OF ISLANDS COMMODORE 64 USER GROUP: Contacts — Mrs B. McLeish, P.O. Box 119, Okaiha (secretary), or Mr H. Perry, 143 Church Street, Onerahi.

KERIKERI APPLE USER GROUP: Contact S. Shearman (chairman), Fairway Drive, Kerikeri, or I. Harris, C/- Post Office, Kerikeri.

KERIKERI COMMODORE 64 USER GROUP: Contact: Brett Snow, Skudders Beach, Kerikeri. Ph 78-888.

WHANGAREI COMPUTER GROUP: 15 James Street, Whangarei. Phone 84-416. Meets every second Wednesday of the month at Northland Community College.

N.Z. MICROCOMPUTER CLUB, PO Box 6210, Auckland. A meeting is held on the first Wednesday of each month at the OSNZ Hall, 107 Hillsborough Rd, Mt Roskill, from 7.30 pm. Visitors are also welcome at Micro Workshop 10am — 5pm, at the same hall on the Saturday following the above meeting.

The following user groups are part of, or affiliated with, the N.Z. Micro Club. Meetings start at 7.30pm at the OSNZ Hall. Those shown "****" are held at the VHF Clubrooms, Hazel Ave, Mt Roskill.

APPLE USER GROUP: Ross Bryon, ph 761-670 (h). Meetings: 3rd Tuesday.

BBC USER GROUP: Dave Fielder, ph 770-630, Ext 518 (w). Meetings: 2nd Wednesday *.

BUSINESS USER GROUP: Cathy Arrow, phone 491-012. Meetings: 4th Tuesday * even months, visits on odd months.

CP/M USER GROUP: Kerry Koppert, 2/870 Dominion Rd, Balmoral. Phone 695-355 (h). Meetings: 1st Wednesday 9pm.

IBM PC USER GROUP: Terry Bowden, ph 452-639 (h) 778-910 (w). Meetings: 3rd Thursday.

NZ COMMODORE USER GROUP (AK) INC: John Walker, ph 8339-589 (h). PO Box 5223, Auckland. Meetings: 3rd Wednesday, Remuera Primary School Hall, Dromorne Rd, Remuera.

NZ OSBORNE USERS GROUP (NZOG): C/- P.O. Box 43-182 Auckland. Meetings: 1st Thursday. Auckland University, Human Sciences Building, Auckland. 7.30 pm.

POCKET COMPUTER USER GROUP: Peter Taylor, 14 Gollan Rd, Mt Wellington 6, phone 576-618 (h).

SINCLAIR USERS GROUP: Doug Farmer, phone 567-589 (h). Meetings: 4th Wednesday *.

SORCERER USER GROUP (NZ): Selwyn Arrow, ph 491-012 (h). Meets at Micro Workshop.

SORD USER GROUP: Graeme Hall, 5 Brouder Pl, Manurewa, ph 266-8133 (h).

TI 99/4A USER GROUP: Ray Tucker, ph 568-155 (h).

TOMORROW USERS GROUP: Chris Cotton, Phone 789-153. Meetings: 3rd Thursday, 7.30pm, 20 Kingsley Street, Grey Lynn.

WIZZARD USER GROUP: Richard McFadgen, 11 Hilling St, Titirangi, ph 8178-219 (h).

1802 USER GROUP: Brian Conquer, ph 695-669 (h).

2650 USER GROUP: Trevor Sheffield, phone 676-591 (h).

68XX (X) USER GROUP: John Kucernak, ph 606-935 (h).

The above contacts can usually be found at N.Z. Microcomputer Club meetings and micro workshops, or via P.O. Box 6210, Auckland.

Other Auckland-based groups:

ACES (Auckland Computer Education Society): C/- Director, Computer Centre, Secondary Teachers' College, Private Bag, Symonds Street, Auckland. Meetings, third Thursday of month, at the College.

ATARI MICROCOMPUTER USER GROUP: Ian Mason, 25 Manutara Ave, Forrest Hill, ph 467-347 (h). Meets 2nd Tuesday, Western Suburbs Radio Club, Gt North Rd, New Lynn.

BBC Club: See entry at head of this list.

COLOUR GENIE USER GROUP, (Auckland): Secretary: Mrs Nola Huggins, Ph 655-7518, P.O. Box 27-387, Auckland 4. Meets every fourth Monday, All Saints Church Hall, Ponsonby Rd, Auckland.

EPSON HX20 USERS' GROUP: Contact: C.W. Nighy, 231 Khyber Pass Road, Auckland, (Ansaphone, 774-268).

HP41C USERS' GROUP (Auckland): C/- Calculator Centre, P.O. Box 6044, Auckland: Grant Buchanan, 790-328 (w). Meets third Wednesday, 7pm, at Centre Computers, Great South Rd., Epsom.

LXIV N.Z.: Aligned towards those using Commodore 64's, mainly in education. Contact Brother Bosco Camden, 52 Onslow Avenue, Epsom, Auckland.

MSX/SPECTRAVIDEO COMPUTER CLUB: Contact: P.O. Box 22-620, Otahuhu, Auckland, 6. Meetings, 3rd Thursday of month at IHC Hall, 56 Ranfurly Road, Epsom.

NZ TRS-80 MICROCOMPUTER CLUB: Olaf Skarsholt, 203A Godley Rd., Titirangi. Phone 817-8698 (h). Meets first Tuesday OSNZ Hall, 107 Hillsborough Rd, Mt Roskill.

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

SYMPO (N.Z. SYM user group): John Robertson, PO Box 580, Manurewa, ph 2675-188 (h).

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

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

BAY OF PLENTY TAURANGA COMMODORE USERS GROUP: Contacts — phone 62-083, 65-311, and 83-610. Meets first and third Monday of month, 7 p.m.

BEACH COMPUTING CLUB (Waihi): Jamie Clarke, Box 132, Waihi (Ph: 45-364 Waihi Beach).

WAIHI COMPUTER ENTHUSIASTS: Contact: G.C. Jenkins, 10 Smith St, Waihi (h) WAH 8478. Workshops every Tuesday. Meetings last Tuesday of month.

THE ATARI CONNECTION. Contact: Paul Cormack, 29 McDiarmid Cres, Huntly. Ph (h) 88-695.

HAMILTON SUPER 80 USERS': Bruce White, (h) 436-878.

WAIKATO ATARI USERS' CLUB: P.O. Box 6087, Heaphy Terrace, Hamilton. Ph Dave (071) 73-888, Bob (071) 78-434.

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

WAIKATO COMPUTERS IN EDUCATION SOCIETY. Secretary, Geoff Franks, Fraser High School, 72 Elliott Road, Hamilton. Phone (h) 81-050.

WAIKATO SPECTRUM USERS' GROUP: Secretary: Roger, Loveless, 18 Heath St, Hamilton. Phone 492-080. Meetings: First Tuesday of the month.

WAIKATO SPECTRAVIDEO USERS' GROUP: Contact: B.M. White, 436-878 (h).

MORRINSVILLE COMPUTER SOCIETY: Contact: Alison Stonyer, 49 Coronation Road, Morrinsville. Phone 6695 (h). Meets 1st and 3rd Wednesdays.

GLOWWORM COMPUTER ENTHUSIASTS: Meets every second Sunday of the month in the Otorohanga District Council's board room. Contacts: president, Colin Wilkins, Oto 8331; vice-president, Hugh Button, Oto 7228; secretary, Laurence Bevan, Oto 7066.

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

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

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

TARANAKI MICRO COMPUTER SOCIETY: P.O. Box 7003, Bell Block, New Plymouth: Mr K. Smith. Phone 8556, Waitara.

SOUTH TARANAKI MICROCOMPUTER SOCIETY: Contacts: Apple, Jim Callaghan, 86-667 Hawera; Commodore, Allen Goodhue, 86-194 Hawera; S80, TRS80, John Roberts-Thomson, 84-495 Hawera; Sega, Dave Beale, 85-108 Hawera; Spectrum, Guy Oakly, 8060 Mania. Sub groups meet on the third Wednesday of the month. The whole society meets periodically in the Hawera High School computer room. Written inquiries to Allen Goodhue, 21 Princes Street, Hawera.

NAPIER VZ-200 USERS GROUP — Contact: Peter Cox, Ph 435-126 after 4pm or write to Peter Cox, 9 Cranby St, Orewaka, Napier.

HAWKE'S BAY MICROCOMPUTER USERS' GROUP: Bob Brady, Pirimai Pharmacy, Pirimai Plaza, Napier. Phone 439-016.

HAWKE'S BAY COMMODORE USER GROUP: Contacts: Mike Phillips, 401 Lascelles Street, Hastings (president); Mark Hodgson, 1108 Oliphant Road, Hastings (secretary). Meetings: first Tuesday of month at H.B. Community College.

WANGANUI COMMODORE 64 USER GROUP: Contact — P. Northway, Phone (h) 42-916. 7 Broadhead Avenue, Wanganui. Meets first and third Thursdays of month at Wanganui Community College.

HBES (Hawke's Bay Computers in Education Society): Contact — Grant Barnett, 89 King Street, Taradale, Napier. Ph: 446-992.

MOTOROLA USER GROUP: Harry Wiggins, (ZL2BFR), P.O. Box 1718, Palmerston North. Phone (063) 82-527 (h).

MANAWATU MICROCOMPUTER CLUB: Contact: Richard Anger, 64-108 (W) or 63-808 (H). Meets twice a month at PDC Social Club rooms.

HOROWHENUA MICROCOMPUTER CLUB: Meets on second and fourth Thursday of month. President, Wally Withell, P.O. Box 405, Levin; secretary, Dennis Cole, 28 Edinburgh Street, Levin. Ph (069) 83-904.

WAIARAPA MICROCOMPUTER USERS' GROUP: Geoffrey Petersen, 27 Cornwall St, Masterton. Ph (h) 87-439.

CENTRAL DISTRICTS COMPUTERS IN EDUCATION SOCIETY: Rory Butler, 4 John Street, Levin (069) 84-466 or Margaret Morgan, 18 Standen Street, Karori, Wellington. (04) 767-167.

UPPER HUTT COMPUTER CLUB: Shane Doyle, 18 Holdsworth Avenue, Upper Hutt. Phone 278-545. An all-machine club.

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

MICROBEE USERS' CLUB: P.O. Box 871, Wellington, 2nd Sunday of month.

NEC COMPUTER USERS' GROUP: C/- P.O. Box 3820, Wellington.

N.Z. SINCLAIR USERS' GROUP: P.E. McCarroll, 11 Miro Street, Lower Hutt.

NZ SUPER 80 USERS' GROUP: C/- Peanut Computers, 5 Dundee Pl., Chartwell, Wellington 4. Phone 791-172.

OHIO USERS' GROUP: Wellington. Secretary/Treasurer: R.N. Hislop, 65B Awatea Street, Porirua.

POLY USERS' GROUP, Wellington: Contact — Christine Greenbank, Computer Studies, Wellington Teachers' College, Private Bag, Karori, Wellington.

ATARI USERS' GROUP, Wellington: Eddie Nickless. Phone 731-024 (w), P.O. Box 16011. Meetings: first Wednesday of month.

WELLINGTON APPLE USERS' GROUP: Inquiries to secretary, Grant Collison, 58 Lonsdale Cres, Wellington 3. Ph 872-537, evenings. Meets last Saturday of month.

WELLINGTON COMMODORE USERS' GROUP: P.O. Box 2828, Wellington. Contacts: Peter March (h) 86-701, Robert Keegan (h) 789-157.

WELLINGTON MICROCOMPUTING SOCIETY INC.: P.O. Box 1581, Wellington, or Bill Parkin (h) 725-086. Meetings are held in the Fellowship Room, St Johns Church, 176 Willis Street, on the 2nd Tuesday each month at 7.30pm.

SEGA OWNERS CLUB: Murray Hutt. Meets 1st Monday each month. Contact: Murray Trickett. (w) 724-356, (h) 662-747.

WELLINGTON SPECTRAVIDEO USER GROUP: Contact — Don Stanley, ph 896-379, C/- Box 7057 Wellington or C/- Epidemiology Unit, Wellington Hospital. Meets on one Monday a month at Staff Common Room (Level D), Wellington Clinical School, Mein Street, Newtown.

WELLINGTON SYSTEM 80 USERS' GROUP: Contact: W.G. (Bill) Lapsley, day 286-175; evenings, 268-939; or Andrew Vincent 780-371 (evenings).

HUTT VALLEY COMMODORE USER GROUP: Contact — Ken Alexander, C/- 16 Enfield St, Waiuoiomata or phone Waiuoiomata 645-830. Meetings, first and third Mondays of month at St. Bernard's College, from 7.30 pm.

NELSON COMMODORE USERS' GROUP: Peter Archer, P.O. Box 860, Nelson. Phone (054) 79-362 (h).

NELSON HOME COMPUTER CLUB: Contact — Mike Jenkins, Box 571. Ph 87-930. Meets, 7 p.m., first and third Tuesdays of the month at Nelson Intermediate.

BLENHENIM COMPUTER CLUB: Club night second Wednesday of month. Ivan Meynell, Secretary, P.O. Box 668. Phone (h) 85-207 or (w) 87-834.

MARLBOROUGH COMMODORE USERS' GROUP: Secretary, Robin Vercoe, 42 Rogers Street, Blenheim. Meetings: Second Thursday of month, 7.30 p.m., IHC rooms.

HOKITIKA COMPUTER USERS' GROUP: Contact — Adrian Mehrtens, 185 Sewell Street. Ph 943.

CANTERBURY COMPUTER EDUCATION SOCIETY: Contact — Graeme Sauer (secretary), P.O. Box 31-065, Ilam, Christchurch 4.

CHRISTCHURCH APPLE USERS' GROUP — Contact: Peter Fitchett, ph 328-189. Meets first Wednesday of month, third floor, Tower Building, Christchurch Teachers' College.

CHRISTCHURCH ATARI USERS' GROUP: Contact Ron van Lindt, 10 Silverdale Place, Christchurch 6. Ph 891-374.

CHRISTCHURCH SPECTRAVIDEO USERS' GROUP — Contact: Lester Reilly, ph (h) 428-686. Meets third Tuesday of month.

CHRISTCHURCH TRS-80 COLOUR USER GROUP: Meetings: last Wednesday of month. Contact: Dennis Rogers, 21 Frankleigh Street, Christchurch 2. Phone 34-731.

CHRISTCHURCH '80 USERS' GROUP: Brendan Thompson. Phone (h) 370-381. P.O. 4118, Christchurch.

OSI USERS' GROUP (CH): Barry Long, 377 Barrington St., Spreydon, Christchurch. Phone 384-560 (h).

SINCLAIR USERS' GROUP CANTERBURY, INC: Contact: Gary Parker (president). Phone 894-820, P.O. Box 4063. Meets 7.30 p.m. last Monday of month. Phone for latest meeting place.

CHRISTCHURCH COMMODORE USERS' GROUP: John Kramer, 885-533 and John Sparrow. Phone 896-099.

CHRISTCHURCH BBC USERS' GROUP: Contact: Michael Hopkins (h) 582-267 or Rodney Derham (h) 893-215.

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

CHRISTCHURCH COLOUR GENIE USERS' GROUP: Meets 2nd Wednesday, 7.00p.m., Abacus Shop, Shades Arcade. Secretary, Robert Wilson, 17 Warlington Street, Christchurch, 7. Ph: 881-456.

CHRISTCHURCH SORD MS USERS' GROUP: Meets first Thursday of month, 7pm. Ph: 792-771 for details.

DICK SMITH WIZZARD COMPUTER CLUB, Christchurch: Contact — Tony Dodd, 34 Mayfield Ave. Ph: 557-327.

CHRISTCHURCH VZ-200 USERS' GROUP: Meets second Tuesday of month. Contact Ian Birse. Ph 523-915, Graham Dillon, Ph 324-117, or P.O. Box 22-094, Christchurch 1.

ASHBURTON COMPUTER SOCIETY: Mr. J. Clark, 52 Brucefield Avenue.

SOUTH CANTERBURY COMPUTER GROUP: Caters for all machines from ZX81 to IBM34. Geoff McCaughan. Phone Timaru 84-200 or P.O. Box 73.

NORTH OTAGO COMPUTER CLUB: Contact: Peter George, P.O. Box 281, Oamaru. Phone 29-106 (h) 70-846 (h).

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

To page 92

GLOSSARY

- Acoustic coupler:** Connects the RS232 part of a microcomputer to a telephone handpiece.
- Algorithm:** A list of instructions for carrying out some process step by step.
- Applications program:** A program written to carry out a specific job, for example an accounting or word processing program.
- Array:** A data type found in high level languages, which is stored in a contiguous block of memory. Accessed by the array name and an index making it easier to process groups of data in many situations.
- ASCII:** American Standard Code for Information Interchange. An 8-bit code.
- BASIC:** Beginners' All-purpose Symbolic Instruction Code. The most widely used, and easiest to learn, high level programming language for microcomputers.
- Baud:** Speed of transferring data, measured in bits per second.
- Bidirectional:** A printer that prints when moving left as well as when moving right.
- Binary:** The system of counting in 1's and 0's used by all digital computers. The 1's and 0's are represented in the computer by electrical pulses, either on or off.
- Bit:** Binary digit. Each bit represents a character in a binary number, that is either a 1 or 0. The number 2 equals 10 in binary and is two bits.
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- Block graphics:** Chunky graphics, built up in small blocks rather than fine points.
- Boot:** To load the operating system into the computer from a disk or tape. Usually one of the first steps in preparing the computer for use. Short for bootstrap.
- Buffer:** An area of memory used for temporary storage while transferring data to or from a peripheral such as a printer or a disk drive.
- Bug:** An error in a program.
- Bus:** Also called a trunk or highway - a path on which several parts of a computer system may be connected so that signals can be passed between them.
- Byte:** Eight bits. A letter or number is usually represented in a computer by a series of eight bits called a byte and the computer handles these as one unit or "word".
- CAL:** Computer Aided Learning CAL programs are written to take different actions on different student answers.
- Card:** In hardware, a circuit board.
- CCIT:** An abbreviation for International Telegraph and Telephone Consulting Committee. A standard maker.
- Chip:** An integrated circuit on a single crystal of semiconductor, far smaller than fingernail size.
- CMOS:** Transistor technology - when a pair of transistors of opposite type are used together. Means low power use.
- Computer language:** Any group of letters, numbers, symbols and punctuation marks that enable a user to instruct or communicate with a computer.
- Courseware:** Name for computer programs used in teaching applications.
- dpi:** Means character per inch. A common way of describing character density, i.e., how close together characters are in printers.
- CP/M:** An operating system for Z80 based machines. It is by far the most widely used DOS for Z80 based machines and there is an extremely large software base for it. See also disk operating systems.
- cps:** Characters per second. A common way of describing speed in printers.
- Cursor:** A mark on a video that indicates where the next character will be shown, or where a change can next be made.
- Daisywheel printer:** A printer in which the letters are formed by impact of a letter on a disk rotated until the required character is in position. Daisywheel printing is close to traditional typing in appearance.
- Data:** Any information used by the computer either I/O or internal information. All internal information is represented in binary.
- DC:** Direct coupling (telecomputing); or direct current.
- Disk:** A flat, circular magnetic surface on which the computer can store and retrieve data and programs. A flexible or floppy disk is a single 8 inch or 5 1/4 inch disk of flexible plastic enclosed in an envelope. A hard disk is an assembly of several disks of hard plastic material, mounted one above another on the same spindle. The hard disk holds up to hundreds of millions of bytes - while floppy disks typically hold between 140,000 and three million bytes.
- Disk drive:** The mechanical device which rotates the disk and positions the read/write head so information can be retrieved or sent to the disk by the computer.
- Diskette:** Another name for a 5 1/4 inch floppy disk.
- Disk operating system:** A set of programs that operate and control one or more disk drives. See CP/M for one example. Other examples are TRSDOS (on TRS 80) and DOS 3.3 (for Apples).
- DOS:** See disk operating system.
- Dot matrix:** A type of print head, made up of a matrix of pins, e.g. 8x8. When a character is to be printed the appropriate pins push out and strike the ribbon to paper forming the character.
- Dot graphics:** These graphics are individual screen pixels. Used by either turning on or off one pixel.
- Double-density:** Floppy drives that store twice the standard amount of data in the same space.
- Dump:** Popular term for sending data from a computer to a mass storage device such as disks or tape.
- EPROM:** Erasable, user-programmable, read-only memory.
- Execute:** A command that tells a computer to carry out a user's instructions or program.
- File:** A continuous collection of characters (or bytes) that the user considers a unit (for example on accounts receivable file), stored on a tape or disk for later use.
- Floppies:** Thin plastic disks with a magnetic coating used for storing information. Called floppies because they are flexible.
- FORTH:** A compact language. The programmer extends the language as he programs.
- Friction feed:** A type of paper-feeding system for printers: normal paper in a continuous sheet is gripped between two friction rollers as on a typewriter.
- Hardware:** The computer itself and peripheral machines for storing, reading in and printing out information.
- Hex:** Abbreviation for hexadecimal notation, a base-16 numbering system convenient to use with computers.
- High-level language:** Any English-like language, such as BASIC, that provides easier use for untrained programmers.
- IEEE:** A standardisation based on the Institute of Electrical and Electronics Engineers.
- Ink-jet printer:** These printers form images by spraying droplets of ink on to paper. Each droplet is electrically charged and is deflected into the required position by magnetic plates.
- Input:** Any kind of information that one enters into a computer.
- Interactive:** Refers to the "conversation" or communication between a computer and the operator.
- Interface:** Any hardware/software system that links a microcomputer and any other device.
- I/O:** "Input/output".
- Inverse video:** When the background is coloured; e.g. on a black and white screen white becomes background and characters are written in black.
- Justified:** Printing is justified when the lines are flush on the left and right sides.
- K:** The number 1024. Commonly refers to 1024 bytes. Main exception is capacity of individual chips, where K means 1024 bits.
- Kilobyte (or K):** Represents 1024 bytes. For example 5K is 5120 bytes (5 x 1024).
- LCD:** Liquid-crystal display.
- Line feed:** A control code character found in the ASCII character set. Its normal purpose is to move the cursor down one line (on screen) or move paper up one line (on printer). Does not return the cursor to the left-hand margin.
- Lower case:** Non-capital alphabetical letters.
- Machine language:** The binary code language that a computer can directly "understand".
- Mainframe:** The very large computers that banks and other large businesses use are called mainframes. Also in microcomputers the term is sometimes used to describe the core of the machine, i.e. the CPU plus memory.
- Mass storage:** A place in which large amounts of information are stored, such as a cassette tape or floppy disk.
- Megabyte (or Mb):** Represents a million bytes.
- Memory:** The part of the microcomputer that stores information and instructions. Each piece of information or instruction has a unique location assigned to it within a memory.
- Memory capacity:** Amount of available storage space, in Kbytes.
- Menu:** List of options within a program that allows the operator to choose which part to interact with (see Interactive). The options are displayed on a screen and the operator chooses one.
- Microcomputer:** A small computer based on a microprocessor.
- Microprocessor:** The central processing unit or "intelligent" part of a microcomputer. It is contained on a single chip of silicon and controls all the functions and calculations.
- Minicomputer:** Originally a computer that went with a single equipment cabinet. Now a computer between a microcomputer and a mainframe. Note that the boundaries between mini's and the classes on either side of it are unclear.
- Modem:** Modulator-demodulator. An instrument that connects a microcomputer to a telephone and allows it to communicate with another computer over the telephone lines.
- Mother board:** A large circuit board that has other boards attached to it.
- Network:** An interconnected group of computers or terminals linked together for specific communications.
- Output:** The information a computer displays, prints or transmits after it has processed the input. See input and I/O.
- Parallel interface:** A type of communications interface used mostly for printers. It sends a whole character of data down eight (commonly) lines, one bit down each line. The most common type of parallel interface for printers is the Centronics interface.
- Pascal:** A high-level language that may eventually rival BASIC in popularity. It incorporates the form of structured programmes.
- PEEK:** A command that examines a specific memory location and gives the operator the value there.
- Peripherals:** All external input or output devices: printer, terminal, drives etc.
- Pinned:** (also called sprocket feed). A method of paper feed in printers using sprockets.
- Pixel:** Picture element. The point on a screen in graphics.
- Plotter:** An output device for translating information from a computer into pictorial or graphical form on paper or a similar medium.
- POKE:** A command that inserts a value into a specific memory location.
- Program:** A set or collection of instructions written in a particular programming language that causes a computer to carry out or execute a given operation.
- RAM:** Random access memory is the very fast memory inside your computer. The access time for any piece is the same. Your program and runtime data are usually stored in RAM.
- REM statement:** A remark statement in BASIC. It serves as a memo to programmers, and plays no part in the running program.
- Resolution:** A measure of the number of points (pixels) on a computer screen.
- ROM:** Read only memory. Any memory in which information or instructions have been permanently fixed.
- Serial interface:** A type of communications interface used for a wide variety of purposes (printers, terminals, telephone correction etc.). It uses a minimum of two wires, and sends the data one bit at a time down one wire. The most common type of serial interface is RS232C.
- Sheet feed:** A type of paper feeding system normally used for high-quality document printers. A special device picks up a sheet of paper and feeds it into friction rollers.
- Software:** Any programs used to operate a computer.
- SP:** Second processor.
- Sprocket feed:** See pin feed.
- System:** A collection of hardware and software where the whole is greater than the sum of the parts.
- Tractor feed:** A type of paper feeding system for printers. Special computer paper with holes along both sides is fed by the tractors gripping these holes.
- Word:** A group of bits that are processed together by the computer. Most microcomputers use eight or 16 bit words.
- WP:** Word processor.

CLASSIFIEDS

FOR SALE: 80 track, double sided disk drive, YE-DATA, model YD-280. Approx 1yr old and surplus to requirements, \$550 o.n.o. Phone Levin 89-823.

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FOR SALE: Computer Colour Monitor - Kaga 13" (composite) with Apple II+ interface card. As new. Retail \$1,200. Sell only \$399.00

CONTACT: Mr Neville Chun, P.O. Box 44-014, V.I.C., Lower Hutt, Wgtn. Phone (04) 694-830. **QUALITY VIC GAME, REDLAND** is 100% machine code defender game for \$13.00 from: M. Feldberg, P.O. Box 29, Rongotea.

FOR SALE: DD 1.0 Disk with programmes that allow you to keep a "Dear Diary" on your Apple II, II+ and IIe. Needs at least 48K. \$20 o.n.o. Greg Marr, 20 Westhoe Road, OREWA. Phone HBC 66-014, STD Code 0942.

APPLE COMPATIBLE: computer, 64K plus CPM card and 80 column card, green screen monitor, slimline disk drive plus BMC dot matrix printer and games joystick. All as new, superb deal at \$3500 o.n.o. Further enquiries phone Auckland 292-4773 or write to Box 529, Papakura.

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N.Z. SPECTRUM & QL COMPUTER CLUB: Monthly 8-page newsletter, quarterly cassette/cartridge, with programs, hints/tips, Helpline, User Input, Software File, News, & much more. Send S.A.E. for FREE newsletter to: 37 Sunbury Street, Dunedin.

PARAGON SOFTWARE MAIL ORDER SOFTWARE AND PERIPHERALS FOR THE ZX SPECTRUM. Send S.A.E. for FREE catalogue to: Paragon Software, 16 Archibald Street, Dunedin.

FOR SALE: Diablo 1640 daisy wheel printer, three years old, only light use, regularly serviced. Contact M. Petherick, Chartered Accountant, P.O. Box 152, Whangarei. Phone 82-459.

COMMODORE PET 4032, tape drive, software \$1000. Box 9465, Wellington.

FOR SALE: Commodore Software. Ph David, 2988351 Papakura.

BBC USER: Would like a penfriend to swap information and possibly software. Write: Nigel Keenan, 22RD Peel Forest, Geraldine.

FOR SALE: Apple IIe, colour monitor, some software \$2500 o.n.o. Siekosha Printer (29cm paper) \$500. Wanganui Girls' College, P.O. Box 6000, Wanganui, Phone 39-141.

WANTED TO BUY: R.F. modulator and colour card for Apple II+. S. Shearman, Fairway Dr, Kerikeri.

32K-MICROBEE for sale. Edasm ROMS, Parallel Port, Modulator, Printer Cable, programs and books, \$850. Some tapes, including educational material and Mytek Wordprocessor, available separately. Ph Wgtn 374-691.

FOR SALE: Pandata PC6600 Computer complete with twin disk drive, 64K, 80 col. card, PAL card, Printer card, TAXAN green monitor, some software. Apple compatible, \$3500 or offer. B. Pickett, 4 Harrow Place, Palmerston North. Phone 69-830.

ZX81 FOR SALE: 16K, power supply. Rom Disassembly, by Dr Ian Logan. Parts A & B and Mastering machine code on your ZX81. All 3 books, \$40. Phone 384-364 or write to: Geoff at 14 Rydal Street, Christchurch 2.

USER GROUPS

From page 90

OTAGO COMMODORE 64 CLUB: Meets first Tuesday of month, 7.30pm. Contact: Geoff Gray, 41 Eglinton Road, Ph 53-986.

DUNEDIN SORD USERS' GROUP: Terry Shand. Phone (024) 771-295 (w), 881-432 (h).

CENTRAL CITY COMPUTER INTEREST GROUP: Contact: Terry Stevens, Box 5260, Dunedin. Phone 882-603. Meetings every second Tuesday.

OTAGO COMPUTER EDUCATION SOCIETY: Jim Ferguson, Arthur Street School, 26 Arthur Street, Dunedin. Ph. 776-524.

ATARI USERS GROUP, Dunedin: Contact - Harvey Kong Tin. Phone 741-509. Meets every second Thursday, cater for 400/600/800.

SPECTRUM AND QL COMPUTER CLUB - Contact: James Palmer, 37 Sunbury St, Dunedin. Phone. 44-787, Monday to Friday after 4pm.

SOUTHERN MICRO USERS GROUP (Invercargill) - Contact: R.J. Edgeler, ph 56-052, P.O. Box 612, Invercargill. Meets every second Tuesday.

SOUTHLAND COMMODORE USER GROUP: (VIC 20 and 64s). Address: C/- Office Equipment Southland, Box 1079, Invercargill.

SOUTHLAND COMPUTER EDUCATION SOCIETY: Secretary, Bob Evans, Southland Boys' High School, Herbert Street, Invercargill. Ph (h), 73-050 or ZL4X.

GORE COMPUTER CLUB: Meets first and thirs Tuesdays of month, 7pm. Contacts: Allan Rodgers, ph 7488, Dave Clarke, ph 5836.

N.Z. SOFTWARE EXCHANGE ASSOCIATION: Non-profit group for exchange of software written by programmer members. Contact: Ian Thain, Box 333, Tokoroa.

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

If your club or group is not listed, drop a line with the details to: Club Contacts, BITS & BYTES, Box 827, Christchurch. The deadline for additions and alterations is the first weekend of the month before the next issue.

Next issue . . .

**Reviews
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Commodore 16
and
one other computer
we are not allowed
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Advertiser index

Andas	2,3
ANZ Books	88
Auckland University Bookshop	87
AWA	21
Barr Bros	17
Bennetts Bookshop	44
Business Computers	76
Byte Shop	6
CDL	I/F
Canterbury University Bookshop	88
Century 21	39
Chubb	43
Commodore	11, 71
Commodore Dealers	61
Computata Systems	18, 19
Computaware Retailers	60
Computer Advances	25
Computer Centre	77
Computer Experience	78
Computer Game Rentals	68
Computer Store	83
Computers for People	17, 22, 24
Corgi & Bantam Books	4, 5
Dick Smith Electronics	9
Einstein Scientific	13
Fountain Marketing	I/B

Genesis Systems	23
Grandstand Electronics	89
Grundman Electronic	89
Harns Electronics	38
Hi-Line Business Systems	24
Imagineering	75
ISIS	27
James Electronics	69, 89
John Gilbert Electronics	57, 89
K Rd	65
Kane Agencies	89
S.D. Mandeno	56
Manukau Computers	63
Masmedia	28, 29
Micro Software Hire	80
Microbus	89
Micro Buy	49
Microcomputer Specialists	26
Molymerx	62
Monaco Distributors	81
Nashua	59
NZ Computer Games	72
P.C. Express	58
P.C. Power	67

Pacific Software	84
Pitman Publishing	87
Roda Electronics	68
Roland Plotters	51
Sandfly Software	85
Silkwood Manufacturing	74
Sirius Systems	53, 64
Sofpro	72
Software Power	14
Solstat Industries	B/C
Spacific Software	50
Supatech Electronics	52
Total Computer Services	86
Verbatim	55
Warburton Franki	37
Whitcoulls	15
Whitehall Books	88

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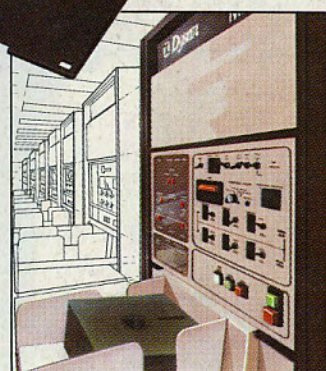
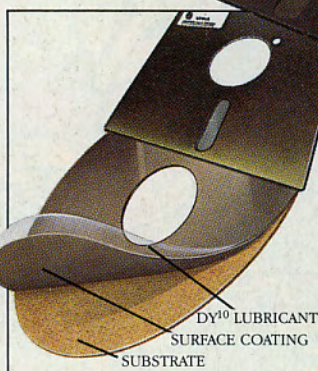
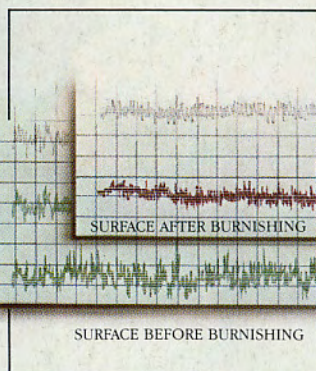
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