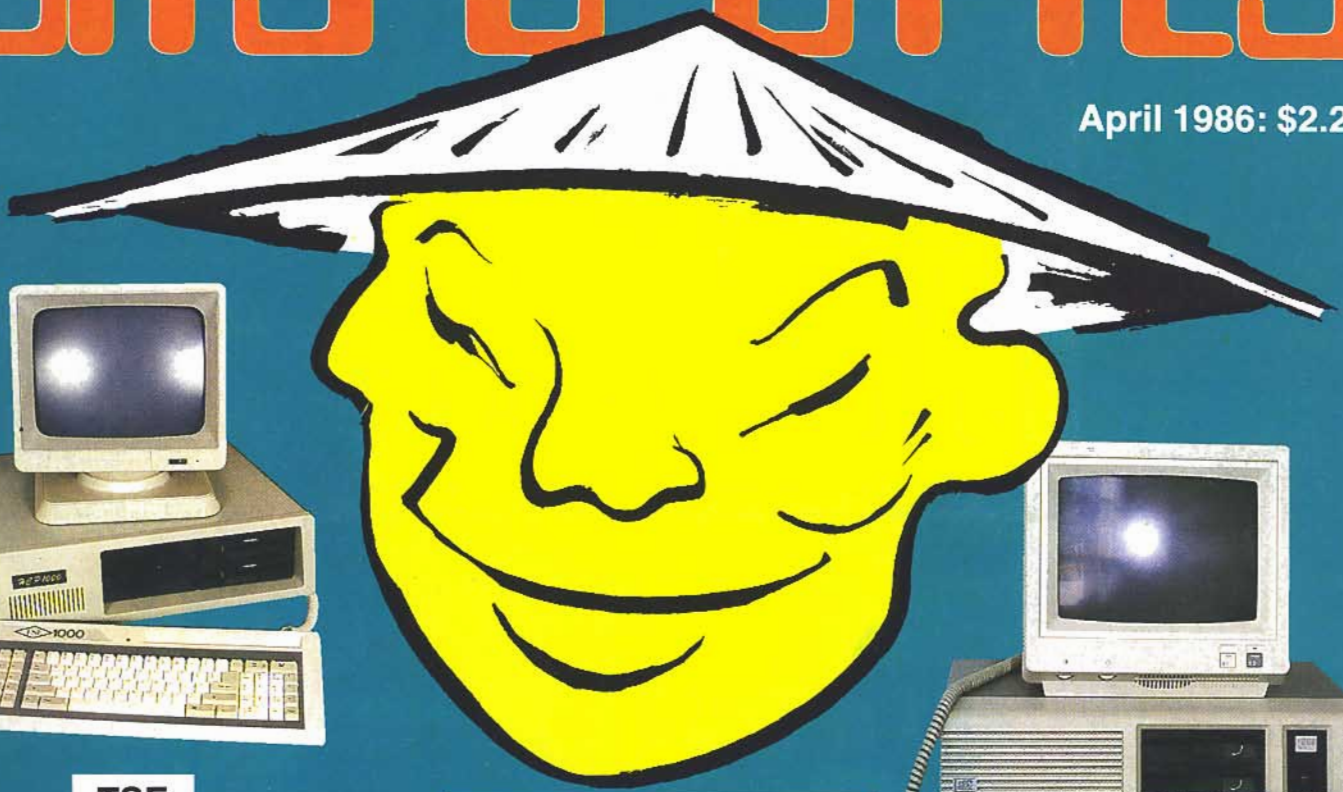
NEW ZEALAND'S LEADING COMPUTER MAGAZINE

BITS & BYTES

April 1986: $2.25



TSE

Far East Brothers of 'Blue'

A comparison of low-cost IBM clones

Ergo

White Knight

Multitech

Other Reviews

Zenith lap-micro
Reflex software
Multi-users / BOS
Pascal programming

Columns: Insider's benchmarks... Apple disc access... S/video ROMs... Sega shapes... Atari strings... Sanyo images... Amstrad languages... Spectrum scrolling... C64 programming... BBC slaves... Machine Language.

NEW

When you've already made the best home computer, what do you do for an encore?

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Amstrad CPC 6128

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The Entertaining CPC6128

With over 300 colourful games already available covering everything from advanced flight and combat simulation to slick examples of all the arcade classics, the CPC6128 has an unfair advantage over its competitors.

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The one thing you won't need a computer to work out is that the Amstrad CPC6128 represents outstanding value for money. You only have to check the cost of buying all the elements separately, 128K RAM computer, disc drive and monitor to realise that the Amstrad package is very hard to beat.

Wordprocessing and Amsword can improve the productivity of everyone from unskilled typist to trained secretary.

An Expanding System

There is a complete range of peripherals available to CPC6128 which plug into built in interfaces. These include a joystick and printers. The Centronics compatible parallel printer interface connects to a vast range of printers, from low cost dot matrix through to daisywheel printers giving superb print quality.

The expansion connector at the rear of the CPC6128 contains all the signals necessary to implement a wide range of add-on peripherals. Modems, light pens, speech synthesizes and serial interfaces are amongst products already available or in development by either Amstrad or independent vendors.

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The Amstrad Serial Interface (RS232C) is much more than just a complete means of connecting serial printers and modems. It's a complete extension and expansion system that incorporates its own ROM software to emulate terminals so that your CPC system can work in conjunction with mini and microframe computer systems.

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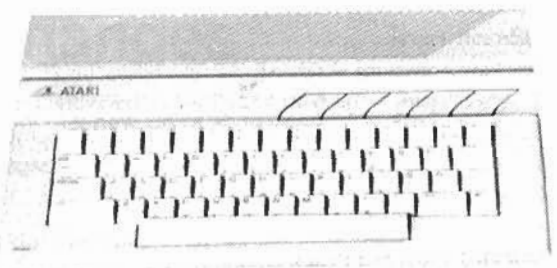

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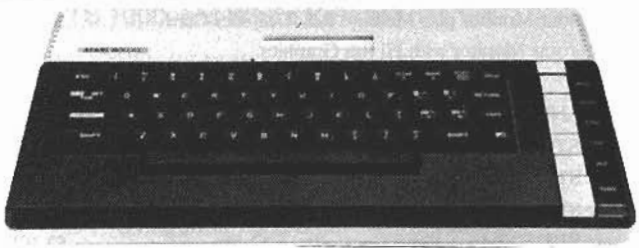

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April 1986 Vol. 4, no. 7

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HARDWARE REVIEWS

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Changes

We are pleased to announce the appointment of a new Bits & Bytes representative in Wellington.

She is Vicki Eckford, already known to a number of computer companies in New Zealand.

Mrs Eckford will handle all our advertising enquiries for the Wellington region and she can be contacted at Wellington (04) 753 207.

There's also been some changes at our Auckland Head Office.

Our new sales manager is Peter Biggs. He has a background in secondary education and has been involved in computing and computer developments "since the good old 'X81 days".

Particularly interested in marketing, he has a publishing company in his own right which specialises in educational material.

Most recently he has been occupied writing educational software and small business consultancy and it is this background that will provide Bits & Bytes advertisers with the professional and dynamic approach essential in the computer industry.

Mr Biggs can be contacted at Auckland (09) 796-775.

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TECHNOLOGY TROPHIES

PC86, in early May, will be the venue for launching a new award system of the New Zealand Advanced Technology Trust.

The trust, whose members include top companies as well as the DSIR and other sources of technological knowledge, is instituting gold, silver and bronze awards for notable achievements of technological advancement in several industries – beginning with the computer industry.

At PC86's software awards dinner the trust will present these plaques to the developers of software rates as the year's best three packages overall.

PC86 is where the NZ Microcomputer Software Awards are presented – this year's awards being co-sponsored by the Trust, AMP Finance and, of course, Bits and Bytes.

The software is judged in four categories – education, business, farming and entertainment – and presents the Advanced Technology Trust an opportunity to endow leading software developers with the recognition they deserve.

As well there is a $2000 cash prize for an overall winner, and Trust certificates for all placegetters.

The presentation is before an audience of computer industry leaders, and enthusiasts.

At the inaugural software awards event last year, Trust plaques were also presented – but this time the presentations are regarded as initiating a comprehensive awards system to be established in several industries, in addition to computing.

The intention is that, like the Designmark, these technology awards will become widely regarded as a symbol of special achievement and an assurance of high quality development of those products earning such recognition.

More products dropped

Fountain Marketing, which last year withdrew as a Commodore Computer distributor, has announced also its dropping of the local manufacture of Akai products, and the divesting of Alpine car audio, Olympus dictation equipment and Leader test equipment.

Telecom lab

The Canadian telecommunications company Mitel (which is now 51% owned by British Telecom) has been established in NZ five years as a supplier to the Post Office of PABX telephone systems.

But recently Mitel took a further step in opening a telecoms research and development laboratory under the name Mitek.

The fact it's Wellington-based indicates Mitek's work will focus on systems sold via the Post Office – for example, memory telephones, payphones, and scramblers to secure data sent or accessed via phone lines.

The lab is also to develop original projects as well as the usual 'tailoring' of imported equipment for NZ networks.

Displays at the lab opening included the 'Claudius Converse' artificial speech generator which enables people with impaired speech to use ordinary phones.

To guard against hackers, a 'Smart' access controller provides a call-back system to block unauthorised line calls to computer systems.

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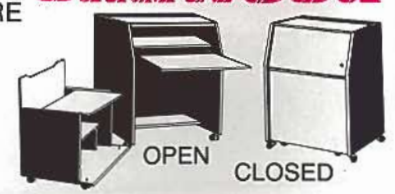

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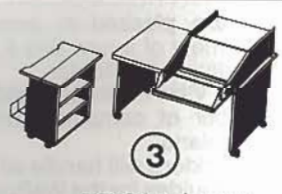

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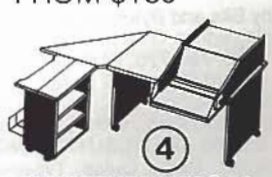

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IBM reports 'fierce competition'

IBM NZ's turnover last year totalled $208.5 m (50% up) with growth reported "across the board", and growth in large systems being strongest.

Chairman Basil Logan admitted that PC market competition "continues to be fierce with at least 15 competitors claiming compatibility to IBM products."

With PCs and other products IBM pricing was last year more flexible, he said, to maintain price competitiveness.

As well the overall costs of computer technology were dropping – in effect the unit cost per application solution was being halved every four years.

This equation, according to IBM NZ, means a supplier of computing equipment has to double its productivity, in terms of application solutions, every four years.

And that productivity, as noted in the annual report, cannot emanate from reduced customer support.

IBM had invested almost $4 million last year in education and training of its staff in New Zealand – which increased 14 percent to 608, and bumped recently with a further intake of 68 university graduates.

The latest annual report also announced an investment of $600,000 planned this year to establish IBM's local software publishing group (part of the marketing division).

IBM NZ also contributed $2 million last year to various educational, scientific and cultural programmes, including a partnership with Auckland University to establish a Cad/Cam facility.

New grants, mainly in universities' production and engineering departments, totalled $565,000.

'Good Life' in 40 columns

Some would say the 40-column screen mode of most home micros is a limiting factor for "serious" word processing.

The Commodore C64 is in that bracket – but just to demonstrate what can be done, a Birkenhead (Auckland) milk man has authored a book using the C64 and Easyscript.

So far "New Zealand – an invitation to the good life" has sold 1500 copies.

Multi-user micros

IBC Distributions NZ Ltd has released here the Ensign – a Motorola 68010-based range of three micros designed for driving multi-user systems.

The crunch is their ability to run Unix 5.2 as well as TheOs 68 – the former operating system offering universal applications, the latter being faster.

The low-end starter, costing $20,000, can support up to eight user terminals. It has 1 Mb of internal memory and the ability to access up to 300 Mb of data storage through three hard disc drives.

The addition of a single board transforms it into a 32-user system.

The top of the range Ensign is 68020-based with 8Mb of ram, and can handle 48 users.

Big spender

During 1985 MicroPro, the developer of Wordstar and other top-selling software, spent $11 m on advertising – or 13.2% of revenues.

PC 86

The New Zealand Personal Computer Exhibition

Overseas Terminal
Princes Wharf **Auckland**

8-9-10 May 1986

The second annual personal computer exhibition.

Building on the extremely successful PC85 exhibition. P C 86 will be the focal point for the New Zealand Personal Computer industry in 1986.

In addition to the three day exhibition at which exhibitors will sell and demonstrate products and services while gaining valuable contacts, there will be:

(1) Seminars, for both the public and industry, led by industry experts.

(2) The second annual Software Awards.

(3) The second annual software awards and computer dinner with an international keynote speaker.

(4) An exhibitor's night out.

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NEC arrives

NEC Information Systems is opening a NZ office in Auckland with the intention to increase its share of the national PC market from six percent to 12 percent in the next year, and to 20 percent in the long term.

A branch manager has been appointed and 10 further staff will be recruited.

The threat to local suppliers will be taken seriously as in the Australian market NEC can claim to be the second largest supplier of personal computers and the "undisputed leader" in the desktop printer market there.

The former NEC distributor here, W.M. Scollay & Co Ltd, continues as a NEC computer systems dealer and the distributor of NEC telecommunications equipment.

NEC's main strength in NZ, until now, has been in sales to the PO's telecommunications systems. Total turnover here was $17 m ($4 m in PCs).

But more emphasis will be on meeting commercial, government and higher education needs, and to upgrade the sales and service skills of its 45 dealers.

NEC will also be pushing its 32-bit Astra range of minis.

Helping is A$1.5 m being invested in software development for the Australasian market (a third of that to be fed to NZ software developers).

NEC's Australian management claim the motivation in NZ is to expand the range of NEC products from mainframe to lap-portables, and to take avantage of the large marketing resource NEC already has in Australia (the Australian marketing budget this year being A$3 m).

C128 launched

The Commodore C128 (reviewed in December issue) was launched here last month.

The "3-in-1" computer, featuring C64, CPM and C128 modes, retails for $995, and its disc drive costs $895. As a computer-and-drive unit the cost is $1795.

New peripherals include monitors (for 40/80 column display), mouse controller, printer and the faster disc drive.

An icon-based w/p-speadsheet-filer called Jane 2.0 has been produced in the US for the C128 mode.

Commodore NZ says a range of accounting software will be out by mid-April for the C128, initially offering a debtors ledger, and later a cash book and general ledger.

Commodore claims 2000 business modules sold here for the C64 (and 4000 in Australia), and is hoping for similar business response to the C128.

PC 86 PC 86 PC 86

by Gaie Ellis

With only four weeks of the countdown for PC86 to go all elements are in place and the exhibition is certain to be at least as lively as it was last year.

A number of companies are releasing new products at the exhibition and the line-up of seminars promises to see a wide range of issues discussed and debated.

A special feature of the seminars this year is a full day (Saturday May 10) dedicated to educationalists and having computers in schools.

A number of experts specialising in the computer/educational field will be providing a useful forum for teachers and industry to examine their common interests.

In the business sector one of the most controversial issues has to be GST – the requirements, and whether computerisation is really necessary to cope with it. Our seminar will provide an authoritative view on the issue.

An introduction to Small Business Computing and Creative Use of Spreadsheets will be presented by consultants from Microlab, a company which has been specialising in this type of education for business users.

It's likely that there will be more provision for hands-on experience at this exhibition, as the venue has been reorganised to cater for this.

There's been much talk about farming and computing getting together and we will have several seminars looking at what's available and what is useful to farmers.

Networking, multi-user systems and videotex are also likely to attract wide attention amongst those visiting PC86 as the latest up-dates on those activities in New Zealand are appraised.

Entries for the 1986 NZ Personal Computer Software Awards have been called and these will be presented at the second annual Computer Industry Dinner.

Last year keynote speaker Adam Osborne provoked interest with his comments on trends and marketing of software.

This year's international speaker(s) look like attracting even more attention: they will focus on software at the communications level on the one hand – a UK overview – and software for the mass market from a US person who has experienced it first hand, first with Commodore and today with another major hardware company. Our lips are sealed (at the time of going to print) but it will be worth ensuring your tickets for the dinner now!

The Postmaster General, the Hon Jonathon Hunt, will present the awards and his comments on the relationship of the Post Office with the computer industry are of high interest at this stage of the industry's evolvement in New Zealand.

And so to the exhibitors... the computer industry is one of the best for rumours, who is losing which agency, who is closing shop, who is going under.

Certainly, most companies in this industry have been going through a soul searching time, rationalising their activities and their approach to the market.

But it is interesting to note that the companies you will see at PC86 are the companies who have taken a strong line in maintaining their relationship with the public – promising support, service and that they will be there tomorrow.

There are some noticeable by their absence... the ones we have read about in the daily newspapers, the ones who have grown big rapidly and who have been brought back to earth fast for not being in touch with their customers.

We look forward to meeting you at PC86, introducing you to the technologies and developments which have appeared on the market since the last exhibition, and participating with you in finding out how these products can best serve your needs.■

Taking RISCs

Take the extra bits, like the back seat, out of the family wagon and you have the semblance of a saloon class racer.

For most it's an uncomforable option, unless you're talking about computers.

Both Hewlett-Packard and IBM have recently announced here the availability of reduced-instruction-set-computing (RISC) to enable faster processing speed at reduced cost.

RISC architecture means fewer and simpler instruction sets with which to programme applications.

End-users know no difference, excepting speed and price/performance.

Faith in RISC is such that H-P retrenched a project to develop a more sophisticated 32-bit machine, and instead focus on a honed H-P 3000 series "to take us into the '90s".

Meanwhile IBM's RISC is the RT PC series, 32-bit based, driving a Unix operating system called AIX. An optional co-processor card enables 16-bit PC compatibility.

It's aimed at the technical market and the typical entry cost is over $40,000.

Developing niches

Market segments and niches are nothing new to marketers, and it appears more PC companies are attempting to develop such specialised areas in their general market.

ICL, for example, recently sold 18 of its Handi systems to Smith and Smith stores and a further 30 sales are proposed later this year. Handi is specifically developed for home improvement merchandising.

Similarly Thorn-EMI Software Sciences recently launched its Champs package at seminars for senior hotel managers – Champs standing for "computerised hotel management processing system".

In the same niche market, but targetting retailers, is First Computer Ltd, recently established by two former Paxus marketing executives. They sell retail management systems, ideally to run on the Sanyo PC.

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Plus less than Fat

It is now cheaper to buy a Mac Plus here than in Australia, according to Apple distributor CED.

Six months ago the Fat Mac (with 512 Kb ram) sold here for $9000 – now the Mac Plus is available for $7760, with Imagewriter II printer.

The Mac Plus has 1 Mb of internal memory and an 800 Kb disc drive.

Taking a dive

What, you may ask, do suited executives racing bicycles and diving into swimming pools have to do with selling software?

The answer is that they are demonstrating the "fast start" and ease of dipping into PFS: programmes.

The concept is the basis of a new PFS: print-ad campaign in the US.

Sperrys break

Sperry Information Systems was last month trying a different approach to generating inquiries about its computer systems.

It mailed out inquiry forms with an offer of fares and accommodation for two nights in Queenstown (plus breakfasts).

The hitch was that only one respondent's name was to be drawn (otherwise we would all be on holiday).

Sperry has been in NZ for 11 years, had installed systems at the Wanganui Computer Centre and for the Ministry of Defence, and is currently saying to the PC market that is has good reasons for being late to enter that market.

Its latest PC release is an AT clone, called the IT.

Telecom lab

The Canadian telecommunications company Mitel (which is now 51% owned by British Telecom) has been established in NZ five years as a supplier to the Post Office of PABX telephone systems.

But recently Mitel took a further step in opening a telecoms research and development laboratory under the name Mitek.

The fact it's Wellington-based indicates Mitek's work will focus on systems sold via the Post Office – for example, memory telephones, payphones, and scramblers to secure data sent or accessed via phone lines.

The lab is also to develop original projects as well as the usual 'tailoring' of imported equipment for NZ networks.

Displays at the lab opening included the 'Claudius Converse' artificial speech generator which enables people with impaired speech to use ordinary phones.

To guard against hackers, a 'Smart' access controller provides a call-back system to block unauthorised line calls to computer systems.

Tough computer

Little has been heard about Commodore's PC10 and 20, the IBM clones.

Trans-Australia Airline has, however, given the machine some prominence in selecting 10 of the PC10s as on-the-spot helpers for TAA convention organisers.

The reason? TAA says the PC10s, each having 10 Mb hard discs installed, are tough; that they would stand up to consistent travelling around the country to various convention venues.

CAD decision

Fletcher Development and Construction has bought its first CAD system, a Computervision CDS 3000, with *Medusa building package software*, from Walker Scientific.

Atari prices drop

Monaco Distributors, the NZ distributor for Atari micros, has dropped by 31 percent prices of the Atari 800XL to a recommended retail of $299, and the Atari 130XE (128K) to $439.

School incentive

Grandstand Computers is offering schools $600 of free software with each order for an Amstrad computer placed by schools.

Far-East brothers of "Blue"

A comparison of low-cost IBM compatibles

by Maurice Bryham

The last few months have seen a surge in the number of hi-quality Asian IBM PC compatibles emerging on the New Zealand market. With the highly competitive prices being offered on these machines it isn't difficult justifying the purchase of an IBM compatible – the difficult decision is in choosing which one.

The aim of this article is to compare a representative selection of IBM clones.

Apart from comparing the technical specifications and performance of each machine, the ergonomic features were evaluated from a user's point of view.

Before testing the clones it was necessary to determine standard configurations to be tested. Obviously with the huge range of expansion cards available these clones can be configured for a variety of applications.

A useful minimum system requires at least two disk drives, 256K RAM, keyboard and a monochrome monitor. For test purposes this standard configuration was called version one.

The second test configuration, version two, consisted of two disk drives, 256K RAM, keyboard and colour RGB monitor.

The Blues Brothers

The four brothers of "big blue" (IBM PC) selected for evaluation were:
DSE/Multitech from Dick Smith Electronics
TSE 1000 from Pacific Computers
ERGO PC-88 from Ergo Computers
White Knight from Radley Investments

Setting up the machines was a quick and simple process.

Generally, the different leads and cables will only fit specific sockets eliminating any possible wiring problems.

Base units

After setting up the four clones side by side my initial impression was surprise at the small size of the DSE/Multitech.

Inside the Multitech the cards are mounted horizontally which enables the hardware to be enclosed in a lower and more compact housing than the other machines.

In fact Multitech has a footprint up to 50% smaller than some of its brothers.

However, to allow for this reduction in size the Multitech has a CPU card instead of the conventional mother-board arrangement.

The CPU card is packed with the usual mother-board circuitry, but with space at a premium the 8087 co-processor socket has been omitted.

The TSE 1000 and White Knight have an almost identical base unit housing.

One of the handy features of the TSE and White Knight case is a handy "Pop-the-Bonnet" lid which allows easy access to the interior hardware.

The Ergo base unit is solidly built. Its case is constructed of a heavier gauge than the other clones.

An unusual feature of the Ergo is that the power-on switch is illuminated and at the front of the machine.

Same speed

All four machines are based on the 8088 microprocessor running at the standard speed of 4.77MHz.

To test the computational speed of each machine, a Turbo Pascal program was compiled and timed. The relative speeds are shown in figure 1.

With less than a 5% difference between the fastest and slowest time it would appear that these machines have similar number crunching power.

RAM size

In the configuration tested, 256K of RAM was fitted.

However, the Multitech can be expanded to 512K RAM maximum on the motherboard and the White Knight allows 640K RAM on the motherboard.

Both the Ergo and TSE require a card for RAM expansion above 256K.

Compatibility

As expected, the clones had no problems running the usual IBM compatibility test programs: Flight Simulator and Lotus 1-2-3.

These machines use a ROM BIOS which is highly compatible with the IBM BIOS.

Further ROM expansion of up to 40K on board was available on all four machines and this ROM space could be used for ROM BASIC or specialised application code.

In/Out & expansion

Input/Output parts included a parallel centronics printer port as standard on each computer.

The Multitech however, includes the equivalent of the multifunction board in its base configuration. This board offers a serial RS232 port, joystick port and clock/calendar (with battery back-up).

The others require a multi-function board to enable those further facilities, although Ergo also has a serial port as standard.

Further expansion is available by plugging cards into full length expansion slots. The TSE has 8 slots of which 2 are used, the White Knight also has 8 slots of which 3 are used, Ergo has 6 slots with 3 used and the Multitech has 4 slots with 3 used.

Power & cooling

When expanding a system, care must be taken not to exceed the power supply wattage rating. The Multitech has the lowest power supply wattage rating at only 67 watts. The best machine for expansion is the TSE with 6 free slots and a 150 watt switch mode power supply.

To keep the computers' electronic circuitry running reliably each clone is fitted with an 8cm fan. Fan noise seems a necessary annoyance but the Multitech had a higher noise level from its fan.

The White Knight and Ergo had an acceptable level of fan noise, while the TSE was the least audible.

Disc drives

The next operational test involved 145 sequential reads from the floppy disk drives as they accessed a database file. As each machine used Teac disk drives,

it was expected that the speeds would be similar.

This proved to be true with one notable exception; the White Knight was much slower at 2 minutes, 3 seconds. It may be the disk drive controller card in the White Knight which is causing these slow times.

Radley says its PC normally runs at the same speed as others when accessing discs – and ran through a similar disc read test in 85 seconds.

The review machine's slower speed, says Radley, is probably due to a poor drive controller card.

Feel the difference

Probably the most important factor from a user's point of view is the quality of the computer's keyboard. Here the field varied widely.

The Ergo boasted a 99 key-keyboard with "Caps" and "Num Lock" lights, and with function keys well spaced across the top of the keyboard. Cursor keys are also separate on the Ergo, arranged in a star with the Home key in the centre.

An unusual key on the Ergo keyboard is "system reset", which when used with the Control key has the same effect as the CTRL, ALT, DEL combination – a warm boot.

The Ergo keyboard, in keeping with its base unit construction, is metal and heavy, but the feel of the keys is Commodore 64ish – OK, but lacking tactile feedback on "contact".

The White Knight has a real IBM PC Compatible keyboard. It's even styled and coloured in the same way. But it does inherit some IBM flaws – no "Caps" and "Num Lock" lights, small enterkey and no numeric keyboard enter key. Radley says the standard White Knight keyboard does feature these extras – and the reviewed keyboard was a non-standard sampler.

However, the White Knight doesn't boast the key quality of the IBM and again has a Commodore 64ish feel (which is adequate for most applications).

The keyboard is not the DSE/Multitech's good point. Apart from no "Num Lock" and "Caps Lock" lights, it has the ESC key on the right hand side of the keyboard – it's over by the numeric keypad – as on the IBM AT.

Worst is the feel of the Multitech's keys. In comparison they are best described as having a plastic, soggy feel.

Dick Smith Electronics acknowledges this keyboard's flaws and is in the midst of negotiating the provision of an improved keyboard model.

TSE manufacture their own keyboards.

It has "Num" and "Caps Lock" lights and as well, like the Ergo, a "Pause" key for pausing long directory listings or files.

The TSE keyboard has an audible click on each key press with different beeps for "Auto Repeat" and "Keyboard Buffer Full".

Description	TSE 1000	DSE/Multi	ERGO	White Knight
CPU 8088	YES	YES	YES	YES
4.77 MHz	YES	YES	YES	YES
RAM in Kbytes	256	256	256	256
Max On Board RAM	256	512	256	640
Parallel Port	YES	YES	YES	YES
Serial Port	NO	YES	YES	NO
Co-Processor Socket	YES	NO	YES	YES
Joy Stick Port	NO	YES	NO	NO
No. of Keys	85	84	99	84
Function Keys	10	10	10	10
CAPs & NUM LOCK Lights	YES	NO	YES	YES
DOS Version Supplied	NO	2.11	2.11	2.10
BASIC Included	NO	NO	YES	YES
Expansion Slots Free	6	1	5	5
Power Supply Rating	150W	67W	130W	130W
Warranty Period (Months)	12	3	12	3
Prices:				
Version One. 256K RAM, two disk drives, keyboard and mono monitor.	$2400	$2495	$2980	$2245
Version Two. 256K RAM, two disk drives, keyboard and colour monitor.	$3220	$2995	$3490	$2900

Display

Video display monitors and graphic resolutions can be a confusing subject. Each of the clones were tested with their respective monochrome monitor in version one and their colour RGB monitor in version two.

In the monochrome field, there are basically two types of display cards. One of these is known as the Hercules Graphics Adapter and can display 348V (vertical) by 720H (horizontal) pixels in monochrome.

The other type of display card is a colour graphics adapter which can display 200V x 640H in four colours.

The Ergo and TSE are fitted with a Hercules compatible card.

In the default mode these cards dis-

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play 400V x 640H pixels.

Both the TSE and Ergo have a Hi-Resolution monitor with a 9 pin d-type connector. On the TSE monitor there is a handy swivel/tilt base that adjusts the screen's viewing angle.

A colour graphics adapter with composite and RGB output is supplied on the Multitech and White Knight.

A colour graphics card on a monochrome monitor is really a compromise.

Apart from having the inferior text mode display, the composite monitors used on the White Knight and Multitech just didn't have the picture clarity of the 9 pin TTL monitors of the Ergo and TSE.

The text display on the White Knight was poor with the characters having a fuzzy appearance – however, Radley Investments is sourcing an alternative monochrome monitor, a Thomson monitor.

When you're scrolling through a wordprocessing document or spreadsheet, screen flicker can be an annoying effect. The monochrome compatible card in the Ergo and TSE 1000 produces flicker-free, vertical scroll while the White Knight and DSE/Multitech screens flickered markedly.

With colour cards already installed on the Multitech and White Knight, it's simply a matter of plugging in a suitable RGB monitor for colour display.

On the Ergo and TSE, the colour models are supplied with the Hercules compatible cards replaced by a standard 200H x 640H colour graphics card.

With the graphics resolutions on each of the clones the same version, two tests involved comparing the different RGB colour monitors. The dot pitch on RGB colour monitors is measured in mm between colour cells. The closer the colour cells the clearer the display.

A low resolution 0.47mm dot pitch colour monitor was supplied with the DSE/Multitech. As with the other monitors, the colours were bright and vibrant, but the Multitech's RGB monitor was capable of displaying crisp, clear 80-column text.

The Ergo and White Knight both had monitors with a 0.38 dot pitch, however, the White Knight's monitor suffered from misconvergance which blurred character display.

The RGB monitor supplied with the TSE was easily the best. With its 0.31mm dot pitch it displayed crisp colour graphics and also had no problems in 80 column text mode.

Backup

The quantity and quality of documentation supplied with each unit varied.

Accompanying the Ergo comes a User's Manual in Lotus 1-2-3 type packaging. This is a well laid out manual with chapter divisions and index.

A comprehensive DOS guide is included with the usual hardware information making the Ergo User's Manual a single source for information.

The White Knight comes with a green manila folder containing a quick DOS intro, technical description, I/O address map and Dip switch settings.

Also included is a copy of the IBM Dos 2.10 manual which is probably of marginal legality. Thrown in for good measure is a booklet on the mother board.

The DSE/Multitech is supplied with a paperback size users guide and an MSDOS 2.11 manual. Again technical information and Dip switch settings are included.

An important factor when purchasing any computer is the hardware and software support offered by the dealer.

The DSE/Multitech and White Knight come standard with a three month warranty period while the TSE 1000 and ERGO have twelve month warranties.

Regarding software, none of these units comes with bundled applications. Dos is supplied with each, excepting the TSE, while Basic is thrown in with only the Ergo and White Knight.

In conclusion, the clones offer what they claim – low cost, IBM software compatibility. ■

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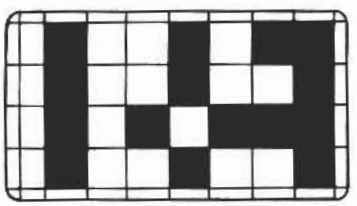

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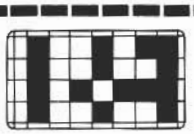

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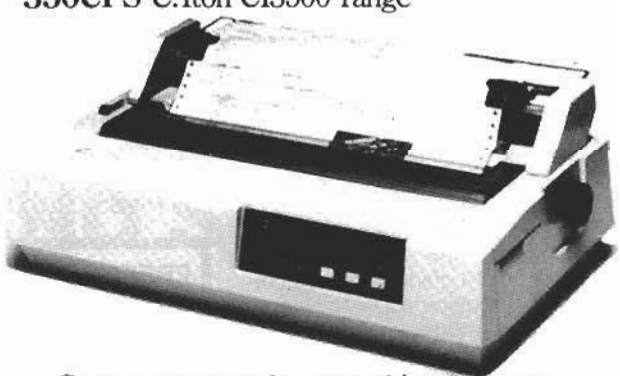

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'Don't drop your knees'

by Shayne Doyle

The past 2-3 years have seen many "lap portable" personal computers emerge, each claiming to be the greatest thing since sliced bread. However, in my opinion, they have all had some failing which prevents any of them from being nominated the complete, portable PC. So, how does the Zenith ZF-171 rate on my "Portables I Must Have" list?

This computer can be found also under the Morrow Pivot II name, both being manufactured by Zenith. The ZF-171 version has apparently been further modified by Zenith for greater IBM compatibility, but still sports a "Morrow/Zenith" banner on the system setup menu.

Designed differently to most other laptops, it remains sitting upright on your knees and the keyboard folds down. When in use in its intended role (as a lap unit), one must therefore be most careful not to allow one's knees to drop.

When used on a desk, the upright configuration is excellent.

Screen improved

The blue back-lit LCD screen is an improvement over other LCD units I have used, allowing the screen to be legible in most light conditions.

Legibility is still not crystal clear however, as the pixels are more grey than black, and your viewing angle again remains fairly critical.

A control is provided to adjust back lighting intensity and contrast.

The screen gives off enough light to operate the machine in a darkened environment.

As is usual with LCD screens, graphics displays are compromised due to the pixels being square. Pictures and circles tend to be "squashed" vertically — a drawback one can accept in view of other conveniences.

The left side of the computer holds a socket for the mains power adaptor, dial for back-light adjustment, on-off switch, and compartment for the battery pack.

The right side houses the two 5¼" disk drives — each only 28mm thick!

Although slim, the drives however are noisy. But again, one can make allowances in exchange for the versatility of being able to carry an MS-DOS software machine from site to site.

The rear houses connectors — DB25F serial, DB25M parallel, expansion bus, BT telephone connector, and another BT socket allocated for "future use". With the colour video board installed, RGB colour and monochrome composite video connectors are also available.

Keyboard

The keyboard feels reasonable to use, but neither is this component particularly quiet.

In order to squeeze everything in, some multi-function key assignments have had to be made — in particular, a slanting block from 5 — 0 on the top row through to N — ? on the bottom row become the separate numeric pad and calculator control keys, toggled by a combination scroll lock/num/pause key which has moved to the bottom left corner.

Now this arrangement probably works well with most applications software, but I happen to use the Leading Edge word processor and this utilises the numeric pad + key as the main "execute action" key.

The result is to turn easy software into less easy software.

The same problems arise when playing some games — I gave up trying to fly Flight Simulator on it.

Another compromise is the location of the Home/End/PgUp/PgDn keys as shifted functions of the four cursor keys, which have moved to the right bottom row. These are accessed only by using the right shift key.

Insert and delete also share a key, again only with right shift.

There were no Caps Lock and Num Lock LEDS as provided on most PCs these days — strange, as there would seem no mechanical reason to omit them, and I sure did miss them.

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Function pressure

The Function keypad is located above the main keyboard, and I did not like it at all. The keys require too much pressure to operate them, sometimes needing two or three firm presses before registering.

Software making extensive use of function keys was hence more difficult to use. (I personally prefer them in two vertical columns to the left of the keyboard.)

The design of the computer case has obviously necessitated use of membrane keys here, but their mechanical action could have been better.

Map and calendar

Three of the four Icon keys below the function keys give access to the in-built software for the unique World Map and Appointment Scheduler, Modem program, and Calculator software.

The fourth either boots off disk if no operating system is loaded, or returns to an applications program if one has jumped to one of the above mentioned programs.

The switch-on display is a World Map with a calendar and large time display to the left, although it may be set up to boot from disk instead of the map display.

Function keys are used to change time zones and display the local time of those zones, access the appointment scheduler, or enter the system setup menu.

Within the scheduler, appointment times are set to hourly intervals and default but any time may be inserted.

An alarm may be set for individual appointments (only sounding if the computer is switched on).

I would have found the built-in calculator more useful with a decimal/hex/binary conversion feature, as in Sidekick.

Modem option

In the U.S. an option is an internal modem card, common with these computers.

Unfortunately this is for the Bell 103 system and there is no CCITT version available — apparently US manufactueres do not recognise any other system except Bell.

However, the NZ distributor, Warburton Franki, claims the Bell modem card does enable this unit to "talk" to CCITT-based computers, conditional to the right baud rates and other factors.

The purchaser might have to shell out more money for an external modem, and the need to take this around as well could get to be rather a nuisance unless a really slim compact unit such as a Racal-Vadic 1200V is chosen.

The usual Communications and terminal software with dialling directory features is present in ROM, but I did not get to try it out as I am still hanging around after 2 months, waiting for Father NZPO to fit BT connectors to the modem and phone.

Over the past three years I have had the opportunity to use a number of portables, ranging from small 4 line LCD screen models up to full "luggable" IBM compatibles with 9" CRT displays.

Of all of these, the ZF-171 is the most useful for practical use without inconvenience.

I referred earlier to difficulties using Leading Edge on it, but using a different word processor obviously negated those criticisms.

To be able to just pick up the disks used during the day on one's desktop machine and carry on at home on the ZF-171 is the ideal situation — no time wasting file transfer procedures to go through, and just use the same software as used during the day.

If I were to buy one of these, I would certainly invest in the add-on video board which would enable me to use my CRT monitor at home also. With this board fitted, colour displays are shown in grey shadings.

Shades of grey

Almost all of my PC software ran without any problems on the ZF-171 with one exception, Leading Edge, but swapping to Multimate fixed that.

Some of my games programs were a little difficult to use due to the lack of grey scale contrast for the various colours in their displays and I found Flight Simulator impossible due to the keypad arrangement.

The LCD display used in this machine is very fast, Night Mission Pinball and the demo disk which accompanies the machine both demonstrate this well.

Documentation was fairly sparse, a single user guide accompanying the computer which would be OK as a reference to the experienced user or a novice user with a few clues.

In contrast, the MS-DOS manual supplied by Zenith for their machines, while being a most comprehensive reference guide to the operating system, would be hard going for an inexperienced PC user.

I can see the ZF-171 finding a home in offices where desktop PCs are used and where there is frequent need to take computing work home.

This computer also fits the standard role of the travelling executive, and as a mobile "office" for building contractors and the like.

I can also see myself and other computer enthusiasts dreaming of such a machine to end the difficulties in lugging desktop machines everywhere.

To sum up, a capable and portable (IBM) PC-compatible.

If Zenith bring out a slightly stretched version with a separate numeric/cursor pad and fix up those dreadful touch function keys, then it would be a clear leader on my "Portables Must Have" list. ■

MICROCOMPUTER SUMMARY

Name:	Zenith ZFL-171-42	
Manufacturer:	Zenith Data Systems	
Microprocessor:	80C88, clock speed 4.77 Mhz	
RAM:	4K Non-volatile RAM, 256K Dynamic user RAM (expandable to 640K onboard)	
ROM:	32K x 8 System Monitor ROM	
Keyboard:	64 key typing keyboard, layout mostly standard but refer to review comments. 16 key membrane Function & Icon keypad.	
Display:	Liquid Crystal with blue backlighting. 80 characters x 25 lines text format.	
Graphics:	640 x 200 individually addressable pixels.	
Input/Output:	RS232 serial, Centronics parallel, RJ-11 telephone connector. PC system bus interface.	
Disk Drives:	360 Kb 5.25" DSDD IBM PC standard x 2.	
Operating System:	MS-DOS	
Languages:	Any language running under MS-DOS.	
Cost:	$3999	
Options:	Rechargeable battery pack	$174
	Internal Colour Video card	$577
	Protective carrying case	$174
Dimensions:	13"W x 9.5"H x 6"D, 14.5 lbs.	
Reviewer's ratings: (1 low, 5 high)	Documentation 3, Ease of use 5, Language 5, Support 3, Value for Money 4½.	

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7005R

Analysis of analytic Reflex

by Richard Gorham

After my last (Jan/Feb) review, of SubLOGIC's hot Jet simulation program, this month we turn to a more business-like product from Borland International.

Borland have made quite a name for themselves in the PC software market with both the quality of their programs and support, and their highly aggressive pricing strategy – most of their products retail in the USA for less than US$50.

This has resulted in huge sales of software.

Turbo-Pascal, Borland's aptly named editor, compiler and development package, is said to have over 300,000 "official" users (with probably many more thousands of unofficial users).

Other Borland goodies include Sidekick (grandfather of a whole generation of "pop-up" permanently resident software), SuperKey (keyboard redefinition assistant), and a recently released high-speed interactive spelling-checker and reference retrieval system called Lightning, that will be permanently resident in your PC checking every word you type – as you type it.

The latest Borland product to arrive in New Zealand is aimed at a sector of the software market already containing a number of established and popular packages – the PC database manager market.

To make a significant impact into this area, any product would have to be something quite novel, with a large price advantage.

On past performance, if anyone could come up with such a product it might well be Borland.

What is "Analytic Database"?

Reflex is a database manager package containing facilities for building, maintaining, viewing, listing, and graphing files of data.

It requires an IBM PC, XT, AT, or fully compatible computer, with at least 384K of memory (more on that later), twin diskettes or one diskette and hard-disk, and colour graphics adaptor or equivalent (say Hercules monochrome adaptor).

Microsoft and Mouse Systems mice are also supported, as are numerous printers and plotters.

Operating system must be PC DOS 2.0 or later.

Reflex was developed and marketed initially by a Canadian software house, Analytica Inc., and originally had a New Zealand price around the NZ$1500 mark. The product did not sell in particularly great numbers in this format.

Now Borland have joined with Analytica to form Borland/Analytica Inc, and have re-developed the product in its present format.

New Zealand retail price will now be NZ$350.

This is substantially below other "database manager" software products on the market (viz. DBase III at NZ$1200), and thus will be of interest to almost all PC owners.

Documentation

The package consists of three 5.2 inch diskettes and an A5 paperback manual containing appproximately 600 black and white pages.

In the manner of all Borland products the binding of the manual seems to have suffered most from the price reduction, and I would suggest cutting off the spline with a new Stanley knife and putting the whole lot into a three-ring binder.

Apart from the binding, the manual is very well presented, with nice clear sample screens and a refreshing approach to the initial "Basic Tutorial" stage of familiarisation.

First-time PC users will have very few problems with the manual, as there are step-by-step examples with explanations of what is happening at each step.

More experienced computerphiles will appreciate the brevity with which commands and examples are explained.

I usually find a packaged software manual's index to be indispensable. I was pleased then to find that the Reflex manual has a comprehensive index (and a worthwhile set of appendices).

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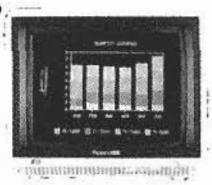

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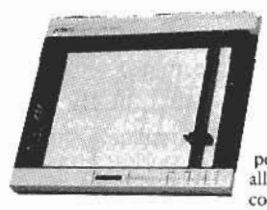

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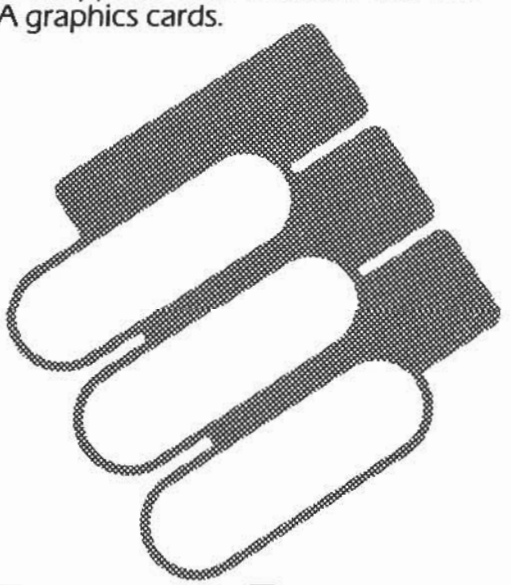

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Initial skirmishes

Installation is simply a case of running one of the supplied batch files, which will copy certain DOS files to the Reflex diskettes for a two diskette system, or create a Reflex directory (complete with appropriate DOS files) for a hard disk machine.

On starting up the main Reflex program, the user is presented with a title screen having four boxes zooming in and out, each enclosing a single word corresponding to the different "views" that Reflex provides of data.

On line one of this, and all other screens, is the options menu line.

Activation of the options menu is achieved throughout the system by means of the "/" key (as in Lotus 1-2-3 and other well known programs).

On activation the options menu turns into a series of "pull-down" menus in the Macintosh tradition, and the user can then select one of these menus by moving cursor left or right along the main menu line, or selecting an option from one of the pull-down menus by scrolling up or down that menu and pressing enter at the appropriate option.

When one of the pull-downs is selected, then pressing the first letter of an option will also select that option.

This system works well, and provides quick and intuitive access to the extremely large number of options available.

The graphics display of menus is rapid and very clear (using a sans serif text style larger than standard PC screen text), all screens in the program being displayed in 600 x 200 high-res mode.

One drawback of this, due somewhat to limitations imposed by the IBM colour graphics adaptor itself, is that you have Henry Ford's choice of colours available (for text and graphics) – that is, one.

Unlike Henry's Model-T though, we are limited to white-on-black as against black-on-black. Provision has not been made in this release to take advantage of the extended four-colour facilities in the high-res mode of the Enhanced Graphics Adaptor card, or clones thereof.

The decision to use the high-res mode has obviously been made to allow the concurrent display of text and high-res graphs of data on the screen, and it is interesting to compare this with the similar approach in the case of the Macintosh itself (although the Mac uses the rather unusual – at least in PCs – approach of black-on-white text).

Screen update of menus etc is very fast, and the impression of speed is maintained throughout the use of the program.

Suppressing my natural instincts to jump in and start using the product without consulting the manual (the good old "...only if all else fails" approach), I undertook all the sections in the manual that comprise the "Basic Tutorial".

From my experience of this I would think that most users will be able to start using the product constructively after only the Basic Tutorial – probably an hour's reading.

My first impression when using the package was that of a cross between a jazzed up DBASE II, and LOTUS 1-2-3, with a generous handfull of Psion's EASEL (business graphics) thrown in for good measure.

At-A-Glance

Product Name: REFLEX, Borland International
Type: Hybrid database manager and spreadsheet package
Requirements: 100% IBM PC compatibles
DOS 2.0 or later
384K minimum memory, (512K/640K recommended)
IBM Colour, Hercules Mono, or equivalent graphics adaptor required
Cost: $350

(Review Software provided by PC-POWER, Wellington).

Different views

The main components of the package are it's five different "views" of a file of records (rather grandly termed a "database" in the manual).

The five "views" are:

"FORM" view – to design a database record and allow input and modification of records, one at a time.

"LIST" view – to display multiple records at a time on a screen in a similar fashion to a printed report, but allowing scrolling up and down through the file. Modifications and input of records can also take place as all data is "live".

"GRAPH" view – allows graphical representation of database records in line, scatter, bar, and pie chart formats.

"XTAB" view – (crosstab view) enables detailed summaries of various categories of records (ie having selected fields with the same contents) to be produced on screen.

"REPORT" view – allows complex hardcopy reports on database information to be produced with great flexibility.

To establish a new database file, one designs a "Form" for inputting and displaying individual records, using an interactive screen painting option.

Lotus-like

Individual fields on the form can be linked together using formulas in much the same way as cells in a spreadsheet, and there are comprehensive predefined functions to allow calculations and validation to be performed.

Once designed, the "Form" view is used for inputting and modifying data into the database.

Switching from "Form" to "List" view allows you to see multiple records at once in a tabular format – whilst still allowing input and updating of records to take place.

In this mode the tabular columns of fields can be adjusted to display only those of interest if required, scrolling left-to-right and top-to-bottom as required through the file.

"Graph" view allows multiple fields from each record to be simultaneously represented in the traditional bar, scatter, line, or pie chart manner.

In all views except "XTAB", split screen mode with two views active at once can be achieved.

When scrolling through files being showed in split screen mode both views are updated simultaneously – thus with "Graph" and "Form" views active one could be looking at the peak of a graph and seeing the individual record represented by the peak in the "Form" view.

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Summariser

The "Xtab" view is a more abstract, but extremely powerful tool.

Its purpose is to provide on-screen a means of summarising groups of records with similar characteristics.

For example, if some of the fields in a "form" are Date, Salesman, Product, and Quantity-sold, then a likely "Xtab" view might be summary by Product for each Salesman of the total Quantity-Sold.

A number of pre-defined summary functions are provided such as totalling, averaging, counts, variances etc.

The "Xtab" view provides (in effect) a means of establishing dynamic linkages between various fields and records in the database – and is consequently a very useful tool for analysing data.

"Report" view produces quite complex printed reports, with facilities for sub-totalling on change of nominated fields, formatting of fields on output and other features.

Sorts, filters

Other features of the package (worthy in their own right) are facilities for filtering out records meeting (or not meeting) certain criteria from each of the views, sorting of records on any fields, searching for specific records, creation of records containing a pre-defined range of values in fields, and translation of files from and to external programs (such as Lotus, and DBase II/III etc).

You might expect that there would be some limitations in a package costing so little (well, relatively little...), and inevitably Reflex has some.

Perhaps the most compromising aspect of the program is its limit of only one file being open at any one time, thus fields in one file cannot be linked to another file's data.

You couldn't for example reference a file of standard product descriptions in one file via a product code in another.

Also, a data file must fit wholly into memory to be used by Reflex – and there are many ominous error messages in the manual relating to lack of memory for data files.

Admittedly this situation is no different to most spreadsheet programs, but Reflex attempts to be a fully fledged database manager, and so should provide some method for holding larger data files than the maximum 430K (ie about a diskette's worth) available on a 640K machine

The documentation makes no comment about the use of the newer extended memory cards which may well improve this situation significantly as memory prices drop to an all time low.

Another niggling omission is the lack of a facility for setting up "batch-files" or "procedures" to drive applications (ie "black-boxing"), so that they can be run by users who are not familiar with Reflex and all its facilities.

However, I feel the potential is there for a really significant product, and these aspects would probably not require a great deal of further development to implement.

When comparing the true database facilities of Reflex against the competition, say DBase III, then Reflex just isn't in the race – however, if your file storage requirements aren't greater than one diskette full per file then don't write Reflex off.

The simplicity of operation and graphics capabilities are far superior to DBase or its clones.

All omissions aside, I feel that most users – even first time PC'ers – will find the product simple, fun to use, and with a great deal of depth for analysis of compact data files.

At only $350, Reflex looks set to become a real contender to the title in the battle for what appears to be a rapidly developing hybrid database manager-cum-spreadsheet market.■

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Judging the Bos

by Mark James

In last month's Bits & Bytes, we looked at five portable, multi-user operating systems for microcomputers. A sixth one, BOS, received only a brief mention. Since that article was written, however, London-based BOS Software Ltd have set up a subsidiary company in New Zealand with the intention of raising the profile of BOS in this country.

It is timely, then, that BOS should be the first of the microcomputer operating systems to receive a more in-depth review in our multi-user series.

BOS, which stands for Business Operating Software, is marketed mainly as the underlying operating system for specific vertical-market business software packages.

Roughly a hundred of these are in existance; some were created by BOS Software themselves, while others have been written by software houses who have purchased BOS expressly for software development.

In a future article, Bruce Simpson will examine some of the business software available under BOS; we shall limit ourselves here to a consideration of the operating system itself.

BOS consists of an operating system kernel surrounded by an array of utilities, development tools, office automation features and business programs. Each of these may be purchased separately, but all require the BOS operating system in order to run.

Portable

The BOS operating system itself is available for over 50 different types of micro- and minicomputers. It is structured such that programs written on one BOS machine may easily be transferred to another; however, BOS does not coexist well with other operating systems.

It is interesting to look at why this is so.

All BOS programs require the BOS operating system in order to run, because they are interpreted at a very low level by the proprietary BOS interpreter.

When a BOS program is compiled, the result is not some machine-specific assembly or object code, but rather an abstract, machine-independent code that is known as "pseudo-assembler". The advantage to using such a pseudo-assembler is that programs can run identically (in theory at least) on any computer that has an interpreter for that pseudo-code.

Programs are thus not tied to one particular machine type or manufacturer, nor should there be problems with different versions of the operating system or "flavours" of the programming languages.

The disadvantage, however, is that interpreted code is almost always slower than true compiled code; also, a pseudo-code interpreter must be created for every machine type that is expected to run the programs.

Unspoiled

The use of the pseudo-code concept is by no means unique to BOS; both AMPS and the p-System operate on the same principle, as do some implementations of PICK.

Unlike PICK, however, BOS seems to have kept close control over the implementations of their interpreter,so that the portability of BOS programs has not been spoiled by a proliferation of incompatible versions.

When BOS runs on a computer, it takes it over completely, to the point that it cannot even read files created under MS-DOS or other operating systems (there are optional "File Converter" utilities which can get around this limitation).

Two new network-based versions of BOS were introduced last year, but again, they will link only computers running BOS.

BOS is thus an exclusive system; the one exception to this is the Burroughs CTOS system, with which BOS can run concurrently.

A version of BOS that runs under UNIX has also been promised for this year, but it remains to be seen whether BOS and UNIX will be able to operate concurrently.

Program development

As with many portable operating systems, the number of programming languages supported by BOS is limited, but those languages are tightly integrated with the system's database and utilities.

With BOS, the two languages that it can handle are Micro-COBOL, and a fourth-generation language called SGL.

Micro-COBOL bears only a passing resemblance to real COBOL.

This is good news to anyone who has to program in it, since any change to COBOL is bound to be an improvement; it is bad news, however, to people who might wish to convert existing COBOL code to run under BOS.

Micro-COBOL supports structured, modular programs, has batch file and screen formatting capabilities, and includes an extensive library of system calls.

The text editor has some context-sensitive features, and there is an interactive, symbolic debugging program.

Many of these programming tools, however, require the purchase of the optional "Advanced Programming Facilities".

Quicker, but slower

SGL is a typical fourth-generation language in that it is based around a database, generates a form of data dictionary, and provides both structured procedural and non-procedural code.

This means that program development in SGL is quicker and simpler than in third-generation languages such as Micro-COBOL, but at execution time the programs run slower.

BOS, however, has some tricks that an experienced SGL programmer can use to speed things up; for example, file indices may be read into a form of RAM disk.

The database to which SGL interfaces is called Microlink, and is one of at least four filing-system methods supported by BOS.

Microlink maintains its records in a network format, but clever database design will allow Microlink to fake hierarchical or relational formats as well.

There are some inherent limits to file sizes, number of record types and the quantity of data available to any one program, but these should not present a problem for most microcomputer applications.

The other three filing methods are simpler; they are relative sequential,

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indexed sequential, and a special format used by BOS/Finder, a list-maintenance and query utility.

All files used by BOS are contiguous and must have their sizes declared.

Frequent reorganisations of indexed files are required; this is neither a lengthy nor complicated procedure, but it is not automatic, and therefore necessitates the intervention of someone who knows how to do it.

Security

Backup and recovery procedures under BOS are complicated somewhat by the multiplicity of filing methods that the operating system supports; however, it is possible to save some or all of the files to tape, and to get them back again.

BOS has no transaction logging facility; this means that, in the event of a serious database corruption, all work done since the last backup is irretrievably lost.

The Autoclerk program, which is a data management and report writing utility, does maintain an audit trail, but it is not clear whether the audit trail could be applied to a restored backup file. (I was unable to test the audit trail, so I cannot say whether its maintenance drags down system performance.)

User password security is available (but is not automatic) for the log-on procedure, and also for access to files under Microlink and BOS/Finder.

Each user is assigned a level in a hierarchical privilege structure; this means that each user has access to all functions at or below his/her level.

This is not as flexible as function-based access classes, but it is better security than many systems have.

File lock-out

Similarly, file locking facilities exist in Micro-COBOL and are automatic under Microlink, Autoclerk and BOS/Finder; however, there is apparently no provision for locking at the record level.

File locking prevents two operators from interfering with each other's work by allowing only one person at a time to maintain a file.

Record locking, if BOS had it, would have permitted two people to update the same files, as long as they were not working on the same or related records.

Ease of use

To the uninitiated user, BOS presents a somewhat forbidding face: a log-on prompt with little indication as to what to do (there is no indication, for example, that you must type in your assigned log-on name in upper-case characters), along with requests for numeric codes representing your terminal type and the printer to which you wish to be assigned.

Once over these hurdles, however, a series of menus appears taking the user through the system features and application programs available.

The programs themselves, unfortunately, sometimes suffer from the same cryptic command procedure as the system log-on.

I was lucky enough to have one of the New Zealand's few BOS veterans sitting next to me; otherwise I would have been lost.

The documentation tends to be good when you can find what you are looking for.

BOS/Finder, for example, has a well-thought-out tutorial that relates to a specific example file on the system.

The reader learns quickly how to use BOS/Finder itself; but when it comes to figuring out the best size to allocate for a database, or why you just got the error message "$50", the documentation leaves something to be desired. There is also little in the way of on-line help.

Efficiency

Most multi-user operating systems like to compare themselves with UNIX in order to prove their efficiency, although this is a bit like saying your racehorse is faster than a donkey.

BOS claims that its system can support twice as many tasks on any given computer as UNIX; if this is so, then BOS falls into roughly the same league as PICK.

I tested BOS on a Pinnacle computer, a very fast machine, and found that two users could get response times almost as fast as one.

I tried getting both terminals to run the same disk-heavy job at the same time; the elapsed time was almost exactly twice as long as it took for one terminal to run the job. This is an impressive result, because it indicates that BOS wasted almost no time in the overhead of switching from one task to the other.

On the other hand, a company in Auckland who run BOS on a slower ICL micro have a different opinion.

While response times are good with one user working, the system slows irritatingly as soon as a second one logs on.

In fairness to BOS, this could be the fault of the application programs rather than the operating system, but BOS' own Autoclerk was one of the programs mentioned.

Summary

BOS was created ten years ago for the ubiquitous PDP-11 minicomputer. It stagnated for several years, but since its implementation on micros in 1979 it has become successful to the point where it now has distributors in 30 countries.

In implementation and presentation, BOS seems to be a thorough, well-integrated system. A systems person is required to set BOS up; thereafter, with some training, an inexperienced end-user should be able to cope with the system – although an experienced user would definitely be able to make better use of the system's efficiency.

BOS, like THEOS, was ahead of its time in the promotion of micros as multi-user computers.

Several years ago BOS, frustrated that no-one manufactured controller boards for the IBM PC that would allow it to run more than three users, designed and built their own board to run eight. Apart from BOS, only AMPS can pretend to support that many terminals on an IBM PC.

In fact, BOS resembles both AMPS and PICK in many ways. All three systems place great stress on their portability, efficiency and ease of use; all implement some form of pseudo-code; all claim fast program development and advanced database technology, although the databases differ broadly from one system to the next.

What, then, sets BOS apart from its competitors?

The operating system is well-designed, but contains little that is unique, apart perhaps from its commitment to networking among BOS machines.

What is special to BOS is not BOS itself, but the broad selection of business programs that have been written for it over the past 10 years.

Future articles in this series will examine AMPS, PICK and other operating systems more closely; in the process, we shall attempt to devise benchmark tests to assess just how efficient they are as multi-user systems. ■

Mark James is support manager with Advanced Management Systems in Auckland.

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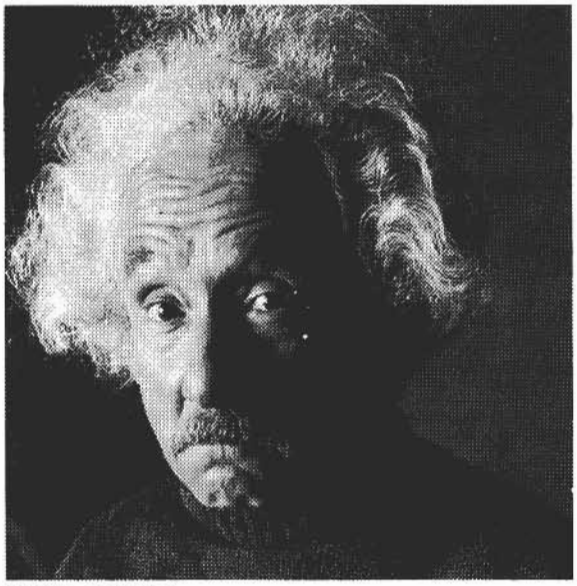

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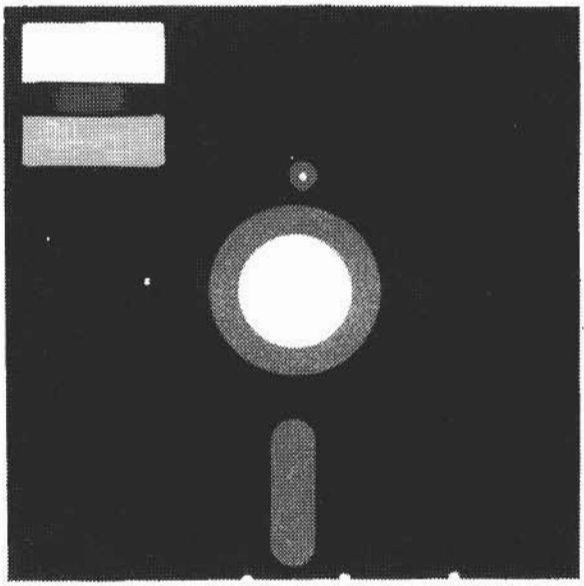
Likes a drink



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What is Pascal?

by Bruce Simpson

Pascal is probably the second most popular microcomputer programming language in use today. It can be used to produce almost any kind of program you can imagine from simple games and exercises through to complex integrated accounting programs.

Written by Professor Niklaus Wirth in the late 1960s, Pascal was originally intended to be a simple teaching language that would be both easily learnt and simple to implement on a wide range of computer equipment.

The fact that Professor Wirth succeeded in his aim is borne out by the number of universities that teach Pascal as a first language, and the number of computers on which it can be seen to run.

Pascal is a preferred first language mainly because of the 'good programming habits' that it instils in those who use it.

Using BASIC, for instance, it is quite possible to sit down in front of a computer and start typing in a program without any preliminary planning or design work having been done.

The result of such an effort is usually a tangled web of programming code that is full of bugs and which no programmer can truly understand.

Most programmers quickly learn that such 'bad' programming techniques are very difficult to perform when using a disciplined language such as Pascal.

In general, the Pascal language forces the programmer into making sure that the planning and design of the program have been completed before the computer is even turned on.

The resultant Pascal programs generally require less debugging and the code produced is easier to understand.

It is worth noting however that the disciplines of the language can only go so far, and that those who try hard enough can still write bad programs in any language.

Pascal offers other advantages over BASIC. Some of these advantages include:

SPEED: With the arrival of Turbo Pascal from Borland, Pascal has become one of the fastest programming languages around.

A program written in most implementations of Pascal will run three to twenty times faster than the equivalent interpreted BASIC program.

This means that it becomes possible to write arcade action type games that were previously not practical in slower languages.

Once you are familiar with Pascal, the time take to develop all but the smallest programs is also reduced when compared to BASIC.

PRICE: Although most computers are supplied with a version of BASIC (frequently Microsoft BASIC), these are usually interpreters rather than compilers and as a result run very slowly (see the accompanying explanation of the difference between compiled and interpreted languages).

The cheapest BASIC compiler for most microcomputers is frequently several times more expensive than the equivalent Pascal compiler.

PORTABILITY: Unfortunately although most computers are supplied with a version of BASIC, few (if any) of these BASICs are compatible.

It is, for instance, very difficult to convert a BASIC program written for the BBC micro to run on a Sinclair ZX-81.

Even though both computers purport to run BASIC, the manufacturers have each chosen to "improve" BASIC in their own way. The result is that they may as well be running totally different languages.

Although Pascal is not 100% consistent amongst different implementations, generally speaking most Pascals are very compatible.

One of the main reasons for this is that Pascal is a sufficiently powerful language that few if any additions need to be made to "improve" it.

READABILITY: Even well written and documented BASIC code seldom reaches the standards of readability of Pascal. And don't for one minute underestimate the value of readable code. Take these two pieces of program code for instance:

code sample 1 (Pascal)

```
REPEAT
  Type_In(New_Customer.Name)
  Type_In(New_Customer.Address)
UNTIL Entries_are_OK;

Old_Customer := New_Customer;
Save_To_Disk;
```

code sample 2 (BASIC)

```
1090 GOSUB 22200:GOSUB 22350
1110 PRINT "Is this data OK (Y/N)? ";:INPUT OK$:GOSUB500
1130 IF OK$<>"Y" AND OK$<>"y" THEN GOTO 1090
1140 C1$ = N1$: C2$=N2$:GOSUB 30100
```

Both pieces of code perform exactly the same job, but it is clear that even in a simple example such as this, the Pascal code is far more readable and therefore more easily understood.

If these reasons alone were not enough to encourage an interest in Pascal, I'm pretty sure that most programmers would be keen enough to "give it a go" out of sheer curiosity.

It is interesting to note that BASIC itself is gaining more and more of the features and facilities found in Pascal.

An example of this "new generation BASIC" is the BBC BASIC, which includes procedures and parameters.

Pascal has significant advantages to offer those who use it, and it is my intention to explain some of these advantages in Bits and Bytes.

Compiled vs Interpreted Languages

Unfortunately, today's microcomputers cannot directly understand English-like languages such as BASIC or Pascal.

The meaning of the individual words or statements used in these languages is far too complex for the microprocessor chip to comprehend.

The most complex instruction one of these chips can understand may simply be to store a single character in part of the computer's memory.

Most of the commands in BASIC or Pascal require hundreds or perhaps even thousands of these simple microprocesor level insruction to perform the desired task. *(Continued on page 30)*

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These microprocessor level instructions are commonly called MACHINE CODE or MC for short.

For example:

```
In BASIC    In MC
PRINT "A"   LD   A,41H
            LD   HL,113H
            LD   (HL),A
            INC  HL
            CALL 3345H
            ...etc.
```

As you can see, the simple Basic command used to print a letter "A" on the screen requires quite a number of MC instructions to perform this task.

You can slso see why we prefer to use high level languages such as BASIC and Pascal rather than MC instructions.

Although these instructions are simple for the microprocessor chip to understand and perform they are not very easy for humans to use.

You should now be able to see that before a computer can run the program you have typed in, your instruction needs to be converted into machine code instructions that the computer can understand.

This translation process can be performed in two ways:

INTERPRETED LANGUAGES: An interpreted language will translate your typing into machine code as the program is running.

For instance, when running your program, every time the computer comes across the word 'PRINT', it will translate that word into a group of MC instructions that cause the computer to print something.

Similarly all the other words in the language used will have to be translated as they are encountered.

The problem with this type of language is that a considerable amount of the computer's time is spent repeatedly translating what you have typed into MC that the computer can understand.

COMPILED LANGUAGES: A compiler however, converts all of your program into MC instructions prior to being run.

This MC is then stored as the actual program that will be executed by the computer.

Consequently when your program is run, there is no longer any need to translate your typing, as this has already been done by the compiler.

All that your program actually consists of after compilation is the MC instructions that the computer can understand directly.

The bottom line is that the compiled program runs more quickly than the interpreted one.

Another side-effect of this is that once you have compiled your program, you can supply people with only the MC rather than the human-readable code you typed in.

This makes it much easier to protect your programs from unauthorised duplication and alteration. ■

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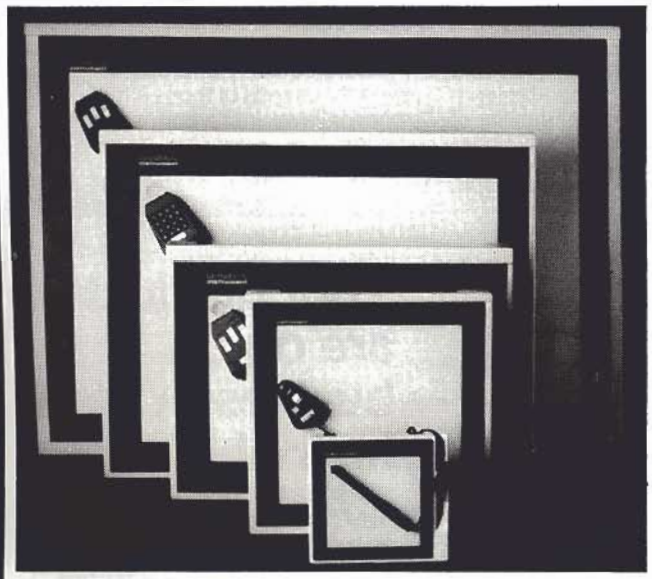

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Comet tracking

Dear Editor,

As the programs printed in *Bits & Bytes* are, through necessity, fairly short and simplistic in nature, the printing of a program to calculate the ephemerides of a comet is probably a little beyond your editorial guidelines (my assumption only).

I would have preferred to have taken one of my current programs and drastically modified it for Comet Halley only, normalising the listing for as many computers as possible. Even the production of a series of Chebychev polynomials simulating the comet's location for use with a 20 line BASIC program takes time.

To give you an indication of what I mean, I have attached a listing of a modified version I wrote for a firm in Auckland who wanted something to run on an Apple Computer, for inclusion with a school project kitset on the subject of comets etc. The listing is heavily modified from a 32K version I wrote last year to produce data and graphs for the publication *"An encounter with Halley's Comet 1985 – 1986"*, ($5.95) published by Wilson & Horton, Auckland.

While some of the accuracy is superfluous, it would be quite a job to assess what could be removed without affecting the final output too much.

I am a strong critic of "simple" astronomical programs that promise so much and deliver so little (a sign of old age perhaps), but my involvement with astronomy requires the highest accuracy attainable.

Too many overseas publications carry "junk" programs of this nature, so I am wary of repeating their folly.

Celestial Mechanics is not a simple subject.

Many home computers do not have the double precision capability that the attached listing requires for all variables beginning with the letter "J". These Julian Date variables must be of at least 8-digit accuracy.

However, thanks for the thought – maybe next time.

By the way, I currently run an Epson QX-10 with FX-80 printer, and program in BASIC, FORTRAN, FORTH, PASCAL & "C".

Keep up the good work with *Bits & Bytes.*

Regards,
Ranald McIntosh
Computing Section,
The Royal Astronomical Society of New Zealand

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Acorn critic

Dear Sir/Madam,

I was one of the "Critics" who wrote in inquiring about the Acorn Electron & its future in the market. I have read the article (reply) in the December edition of BITS & BYTES, which has put my mind at rest.

I am writing to thank you for that article (which I see as a reply to my letter) and that I find your magazine very helpful in seeking answers.

Once again thank you very much.

Yours faithfully,
Greg Dawson

We acknowledge the prompt response of distributors in answering readers' questions via Bits & Bytes – in this case the Acorn/BBC agent, Barson Computers, had obtained answers directly from the manufacturer of Acorn Electrons in Britain. *– Ed.*

If its news. . .
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Steven Searle,
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Beware of the benchmarks

by Steve Shilham
Dealer/Technical Manager
Computer Advances Ltd, Ak.

Not so many years ago the micro computer market consisted of a mixed assortment of machinery with a frightening variety of different operating systems and standards. There was LDOS, NEWDOS, TRSDOS, CP/M, OASIS, MP/M and a whole lot more that seem to have slipped my mind. And, what's more important, there was a horribly confused buyer market desperately searching for some sanity to help solve their problems. And then, for all the world, it arrived, or at least seemed to, in the shape of Charlie Chaplin and ubiquitous "PC".

Almost overnight the micro-computer industry was turned upside down and many nice machines disappeared in the furrow (farewell Osborne et al) leaving behind a panic rush to produce machines that were compatible to this new "standard" — not an easy task bearing in mind the copyright restrictions that exist.

So MSDOS became de rigueur, not because it was the best, but because the world craved compatibility — the irony being that MSDOS could not guarantee this elusive quality.

While the user interface remains very similar we now have PCDOS (the IBM standard) as well as many flavours of MSDOS to suit the various manufacturers' machines working on half a dozen different processors and as many different disk drives and formats.

Yet still our poor prospective purchaser arrives, cheque book in hand, demanding a "compatible" which must be faster, cheaper, and at least have a better screen and keyboard, and often more, but still it must be compatible.

When one buys a car there is no burning necessity that the vehicle also be capable of doubling as a 4 x 4, a campervan and a ute.

The car is bought for its ability to service certain requirements, not for its ability to be everything to all men even if it means settling for a lower performance.

The strange thing here is that most micro's are capable of doubling as the proverbial 4 x 4, campervan and ute, just not *the* particular one that is regarded as "compatible".

Possibly this desire for compatibles stems from the relative immaturity of the micro computer industry.

When buying a car the purchaser is investing in something which he has either already owned himself or knows somebody who has, but we are not yet at this stage with micros, so the buyer has to have something in the way of a category to look for, i.e. if it's not a mainframe and it's not a home computer, it must be a "P.C. compatible".

Where does all this lead to and what does it have to do with benchmarking?

Well, much of the information that prospective purchasers glean must come from magazines and journals such as this one, where subjective and various other factors are judged and compared.

Much of this information proves to be only more baffling for the uneducated reader (and even the more learned of us, for that matter).

The problem is, with the plethora of compatibles now available, the differences between machines are often tiny — after all, to remain compatible there are only so many performance areas that can be changed.

Consequently many of the benchmarks and test results that are stressed as being important are in fact quite trivial in the real world of the user.

Let's not lose sight of why we are installing a micro computer.

Number crunching

One of the standard benchmark tests used by many reviewers is the sieves of erasthmus system. Without going into it in depth, this benchmark gives an ideal of the pure number crunching ability of the machine in question.

So what's wrong with that, I hear you ask.

Bearing in mind the minimal differences that often occur between machines, these differing results can often confuse rather than assist.

After all, what do you want to do with the machine, because if it does not require large heaps of number crunching there is little point in assessing the intended purchase on this criteria.

If you are looking at word processors, just how fast can you type?

To go back to our car comparisons, it's a little like buying a Lambourghini instead of a Porsche because the Lambourghini has an extra 10kph at the top end — so what if you rarely, or ever, get to use it.

A more valid benchmark would be to assess individual applications that the consumer can identify with, and some reviewers now do this, although not often enough.

For instance, a recalculation of a 100 x 100 cell spreadsheet would be far more meaningful than the infamous sieves of erasthumus.

Furthermore, how was the machine set up, how much RAM, how many buffers and files were set up in the configuration, was it hard or floppy drives and which type, and a heap of other factors?

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Useful or not?

In short, a benchmark system only proves useful to a potential buyer when the system tested matches exactly what he intends to buy.

If two identically configured machines running identical software are tested side by side and one performs the same test recalculation of a spreadsheet or a regeneration of C.A.D. program-drawing faster than the other, surely this must prove something.

Well, what if the slower machine does not have its own dedicated video RAM but shares some of its normal internal RAM whilst the faster machine has separate video RAM? If the bottleneck in our slower system was caused by memory, does the addition of say an extra 64K of memory and faster performance abilities then give it "the edge"?

It may be better in every other way, it may out perform the "faster" machine in every relevent test except in processing speed — but is that an important criteria.

Where does all this leave our potential customers?

How do I assess comparable products?

Well, number one must be to assess what it is that you wish to do with the machine, be it word processing, C.A.D., accounting, whatever.

Add to this list all of the things you are realistically likely to want to do in the future with your system and now we have a system criteria to go looking for. Bear in mind that the system should be capable *now* of doing the things you may want to do in the future — the industry is full of vaporware, products which will be here really soon but never quite seem to land.

Next step

Basically, the system should be at least adequate for your present, and likely future requirements.

The next step is to find a distributor with the hardware capable of at least doing all of the things that you want to do, and herein lies an often ignored but important consideration.

To return once more to our car analogy; the Sportamatic may well suit what you want from a car better and cheaper than the Super-sleeek, but that will be poor consolation if the mechanics know nothing of the car, if parts are scarce, or if the Sportamatic company is sinking.

In short, start shopping for products from well established suppliers who have supportive distributors in your area.

These few criteria should reduce your list of potential suppliers.

Now that we know what we are looking for, and what type of supplier we want to be purchasing from, we can start looking at some of the more personal areas, such as keyboard feel, screen handling, general aesthetics, and pricing — and at this stage you should have a realistic list of what will suit your application perfectly.

Hold on, let's review those last few paragraphs. We have achieved exactly what we wanted without demanding compatibility, without pouring over sieves benchmarks or trying to make sense of mips ratings or whet stones.

We have decided on a computer the way we decide on a car, doesn't that seem to make sense?

Beware of the benchmark people.

It is like the camera which doesn't lie, it shows you exactly what you set it up to show you and this may be with little regard to what you wanted to focus on.

I hope the above offers a glimmer of hope for buyers.

I for one look forward to the day when customers arrive saying "no, it doesn't have to be compatible. I'd like something better than that". ■

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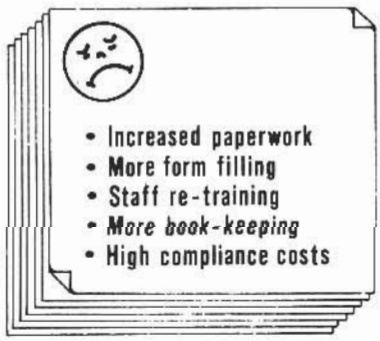

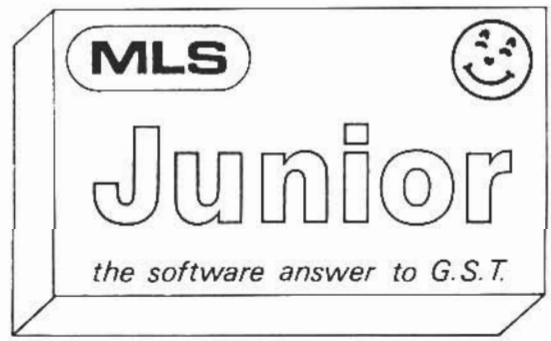

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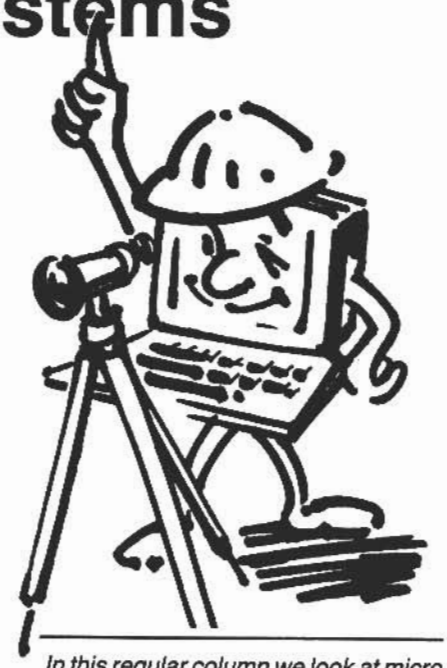

In this regular column we look at micro computers at work.

The research reports are from Phil Ashton, Brent Hill and Rob Clarke, who are d.p. consultants at MicroLab, a "neutral" consultancy established by the accountancy KMG Kendons, Auckland.

Many businessmen, having installed their first micro-computer system two to three years ago, are now approaching the review stage with those systems and asking themselves "Where to from here?"

The stand-alone in its zenith offered tremendous processing power compared with previous methods of processing – though it suffered in the early days from poor quality, low reliability business software.

Most business people withstood the aggravation of tender software and in retrospect perhaps wonder how they retained their sanity whilst becoming totally familiar with the restore routines in CPM and MS-DOS.

For these people computers were a giant learning curve.

Many businesses now have overcome the initial apprehension, they have settled software and are now ready to take their next step forward into what is no longer 'the great unknown'.

What is available to grow into?

We are seeing major developments on both the hardware and software scene.

In terms of equipment we have seen a standardisation of MS-DOS as the industry standard operating system in New Zealand.

What was designed as a single-user (i.e. one screen) operating system, is now capable of residing under 'networking' software so that the once restricting PC can now add further PCs sharing disk storage space.

But be aware that the application software needs to "enjoy" the network environment.

The PC that was once sold primarily as a dual floppy drive machine is now invariably sold with a high volume hard disk storage medium. In fact, there really is no limit to the amount of disk storage available on PCs, within reason.

The development of the microchip has meant machines are now marketed with a minimum memory size of 256K with the ability in many cases to upgrade this to 1M. A far cry from the 64K CPM machines of three years ago.

(Increased memory in comparison with 16bit and 32bit data transfer has meant a staggering improvement in processing and response times.)

Back-up copy

Getting back to the availibility of vast disk storage. If we think about it, this introduces a major problem at back-up time, when we may have 10-15M of data to store on 360K diskettes.

A 40 diskette back-up. Practically, it wouldn't happen. The operator would forgo the security copy routine.

Hence the introduction recently of 'streaming tape' devices which normally can handle up to 60 Mb of data. A streaming tape looks very much like a cassette tape with its own drive, sometimes available in a slim line version that resides inside your existing PC.

The transfer disk can be backed-up in its entirety in 15 to 20 minutes.

Streaming tape devices vary in price from $3000 to $7000 depending on capacity, level of intelligence and brand.

So much for hardware developments. Of greater concern to business people is "What is happening to software?, Can we upgrade from our existing software?, Can we add another screen and have multi-user access to our files?"

Software lag

In some ways software has not kept pace with the machine developments. Up until six months ago there was no dramatic increase in functionality with so-called commercial accounting software, except that the ability to draw used-defined information out of a database did improve reporting options.

More recently released products are starting to take advantage of the massive increase in disk storage available – e.g. Sales Analysis, which traditionally has been limited, now offers a wide range of options in terms of reports.

Multi-user capability is commonly built into software, through in some cases this will involve running under the networking operating system as described earlier.

8-bit upgrades

Any business running CPM/80-based systems will find it generally impossible to upgrade to current DOS-based software products.

There are very few upgrade paths available from CPM/80. It is a question of reloading all data from scratch.

This rule applies to most products, unless the user is remaining within software from the same manufacturer. In these cases the upgrade may have been provided.

For those businesses running 8-bit CPM/80 machines there is an extensive range of sophisticated multi-user software available but it will involve upgrading both hardware and software and reloading data from your existing systems.

For DOS-based systems there is a chance that you can add additional screens to your single screen system, in a networking environment.

Multi-user systems

A further alternative is to look at a true multi-user option on a micro computer running under PICK or Concurrent CPM.

Some excellent software products are on the market and again it will involve a re-investment in new hardware and software and re-entering of client's data.

So existing users, what do you do with your system after three years?

Carry on using it.

If its capacity is now inadequate you are looking at a totally new investment with little trade in value for your old system. And great joy, you are very likely going to be rekeying your data into the new software product.

Before launching into new d.p investment spend time looking at up-grade options, particularly in terms of software.

Ensure a system can run in a multi-screen environment and that it offers sufficient features into which your company can grow.

You don't want to be going through a data reload every three years! ■

LATEST SOFTWARE AVAILABLE IN N.Z. OR DIRECT OVERSEAS MAIL ORDER

COMMODORE C64

REFERENCE	TITLE	T/D	NZ$
CACTIV75	Eidolon	T	45.95
CACTIV95	Mindshadow	T	45.95
CACTIVI110	Little Computer People	D	52.00
CACTIVI125	Hacker	D	54.00
CACTIVI155	Koronis Rift	T	39.95
CACTIVI165	Koronis Rift	D	52.00
CACTIVI95	Little Computer People	T	39.95
CAMERICA45	Masquerade	D	68.80
CARIOLA115	Wild West	T	45.80
CARIOLA125	Wild West	D	59.60
CARIOLA135	Axis Assassin	T	36.00
CARIOLA145	Axis Assassin	D	39.95
CARIOLA95	Sky Fox	D	50.00
CARIOLAS85	Sky Fox	T	39.95
CARTIC25	International Rugby	T	36.60
CBEAUJOL55	Computer Hits	T	39.95
CBEAUJOL65	Computer Hits	D	39.95
CBEYOND110	Enigma Force	T	39.95
CBEYOND115	Superman	T	39.95
CBEYOND21	Boulderdash II	T	45.80
CBEYOND55	Spy V's Spy II	T	39.95
CC.D.S.35	Colossus Chess 4	D	52.00
CCASCADE25	Ace	T	45.80
CCOMMOD236	Superscript 64	D	159.95
CCOMMOD796	Print Shop	T	89.95
CCOMPUTE65	Gazette November 1985	D	24.95
CCRL15	Blade Runner	T	38.00
CCRL25	Causes of Chads	T	39.95
CCRL35	Space Doubt	T	39.95
CDATAEAS15	Kung-Fu Master	T	45.75
CDATAFAS15	King-Fu Master	T	43.30
CDATASOF65	Zorro	T	39.95
CDATAOFB5	Zorro	D	52.00
CDISNEY15	Donald Duck's P/Ground	T	39.95
CDISNEY25	Winnie The Pooh	D	50.00
CDISNEY35	Donald Duck's P/Ground	D	50.00
CDISNEY45	Mickeys Space Adventure	D	52.00
CDISNEY55	Kermits Elec. Story Bk	D	52.00
CDOMARK65	Friday The 13th	T	38.00
CDURRELL45	Critical Mass	T	38.00
CE/DREAM15	Back To The Future	D	59.80
CELEC/DR15	Deux Ex Machina	T	45.95
CELECTRI65	Back To The Future	T	48.20
CELITE55	Commando	T	39.95
CELITE85	Roller Coaster	T	36.60
CELITE95	Commando	D	52.00
CENGLISH25	Elektra Glide	T	38.00
CENGLISH35	Elektra Glide	D	50.00
CEPYX5	Winter Games	T	39.95
CEPYX95	Winter Games	D	52.00
CFANTASY65	Seas of Blood	T	45.80
CFIREBI15	Nightshade	T	45.75
CFIREBIR15	Elite	T	45.50
CFIREBIR25	Elite	D	54.75
CFIREBIR55	Gunfright	T	45.80
CFIREBIR65	Revs	T	52.00
CFIREBIR75	Revs	D	58.00
CFIREBIR85	Music System	D	64.50
CFIREBIR95	Advanced Music System	D	102.00
CGLOBAL15	The Magicians Ball	T	36.60
CGREMLINF5	Bounder	T	39.95
CHEWSON65	Uridium	T	41.20
CHEWSON75	Uridium	D	59.60
CHITSQUA15	They Sold A Million	T	39.95
CHITSQUA25	They Sold A Million	D	52.00
CIMAGINE25	Yie Ar Kung Fu	T	36.60
CIMAGINE85	Comic Bakery	T	39.95
CINFOCOM15	Wishbringer	T	147.00
CKINGSOF15	Frankie Crashed/Jupiter	D	52.50
CKINGSOF25	Codeword Argosey	D	52.50
CLEISURE25	Scalextric	T	39.95
CLEISURE35	Scalextric	D	50.00
CLEVEL915	Red Moon	T	31.20
CLEVEL975	Worm in Paradise	T	39.95
CLLAMASO25	Battalyx	T	42.05
CLUCASFI15	Eidolon	D	55.30
CMARTECH35	Zoids	T	36.60
CMASTER25	BMX Racers	T	14.95
CMASTER35	Formula I Simulator	T	14.95
CMASTER45	Master of Magic	T	14.95
CMASTER55	Last V8	T	14.95
CMASTER65	Kick Start	T	14.95
CMASTER75	Action Biker	T	14.95
CMASTER85	Rockman	T	14.95
CMEL/HO25	Gyroscope	D	52.00
CMEL/HO45	Gyroscope	T	38.00
CMEL/HO55	Way of Exploding Fist	D	52.00
CMEL/HO65	Fighting Warrior	D	52.00
CMEL/HO75	Hobbit (The)	D	55.30
CMEL/HO85	Rock 'N Wrestle	T	39.95
CMEL/HO95	Lord Of The Rings (+ Bk	T	52.50
CMEL/HOU15	Way Of Exploding Fist	T	39.95
CMEL/HOU18	Fighting Warrior	T	38.00
CMELBOUR35	Rock 'N Wrestle	C	45.80
CMELBOUR45	Rock 'N Wrestle	D	68.80
CMICROPR55	Kennedy Approach	D	52.80
CMICROPR75	Kennedy Approach	T	43.45
CMINDSCA45	Halley Project	D	120.00
CMIRCOPR65	Crusade In Europe	T	91.80
CMONOLIT25	Quake Minus One	T	45.80
CNOVAGEN45	Mercenary	T	39.95
CNOVAGEN55	Mercenary	D	50.00
COCEA85	Knight Rider	T	38.00
COCEAN115	Never Ending Story	T	39.95
COCEAN125	Transformers	T	38.00
COCEAN135	Rambo	T	36.60
COCEAN145	Rambo	D	54.80
CPROBE25	Adv Of Basidon Bond	T	45.95
CPSS35	Battle of Britain	T	39.95
CQUICKSI15	The Flintstones	T	36.60
CRHINO25	Z	T	39.95
CSILVERS45	Bored Of The Rings	T	36.95
CSPRINGB15	Newsroom	D	133.00
CTASKET45	Souls of Darkon	T	36.60
CTASMAN11	Tasword 64	D	85.00
CTASMAN64	Tasword 64	T	69.95
CULTIMAT55	Outlaws	T	39.95
CUSGOLD85	Crusade in Europe	T	91.80
CUSGOLD95	Law Of The West	T	45.00

SPECTRUM

REFERENCE	TITLE	T/D	NZ$
SACCESS25	Raid Over Moscow	T	36.00
SACCESS35	Beachhead II	T	36.00
SACTIV45	Hacker	T	36.00
SACTIV55	Barry McGuigans Boxing	T	39.95
SACTIV65	Mindshadow	T	45.95
SACTIV75	XCEL	T	36.00
SACTIVIS15	Ghostbusters	T	39.95
SACTIVIS25	G European Road Race	T	35.60
SALPHABA15	Robot Messiah	T	36.60
SARGUS15	The Bulge	T	45.95
SARIOLAS25	Panzadrome	I	36.00
SARIOLAS85	Think	T	36.00
SARTIC15	International Rugby	T	38.70
SARTIC25	Discs of Death	T	32.00
SBEYOND14	Enigma Force	T	39.95
SBEYOND24	Superman	T	39.95
SBEYOND45	Boulderdash II	T	44.75
SBIGFIVE15	Bounty Bob Strikes Back	T	36.00
SBUBBLEB25	Brainstorm	T	9.15
SBUDGIE15	Convoy	T	11.50
SBUGBYTE15	Zoot	T	11.50
SC.P.S.14	Astromoner 2	T	39.95
SC.P.S.24	Bridge Player 3	T	39.95
SC.P.S.55	Golfing World	T	29.95
SC.R.L.45	Tau Ceti	T	42.50
SCAMBEL14	Masterfile (With Print)	T	49.95
SCELECTR15	I Of The Mask	T	45.80
SCENTURY15	Finest Hour	T	42.75
SCPSOFTW15	Superchess 3.5	T	48.15
SCRL55	Endurance Racing	T	36.60
SDATASOF95	Strip Poker	T	45.80
SDIGITAL55	Tomahawk	T	39.95
SDKTRON145	Popeye	T	34.00
SDKTRON155	Benny Hill's Mad/Chase	T	34.00
SDOMARK35	Gladiator	T	38.00
SDOMARK55	Friday The 13th	T	38.00
SDURRELL65	Critical Mass	T	38.00
SDURRELL85	Saboteur	T	38.00
SEL/ART35	Wizard	T	36.00
SEL/ART45	Sky Fox	T	36.00
SELECTRI135	Riddler's Dean	T	36.95
SELECTRI65	Winter Sports	T	41.20
SELITE35	Frank Brunos Boxing	T	34.00
SELITE45	Dukes of Hazard	T	34.00
SELITE75	Commando	T	36.00
SELITE85	Roller Coaster	T	34.00
SEPYX55	Impossible Mission	T	36.00
SEPYX85	Winter Games	T	38.70
SFANTASY55	Seas of Blood	T	42.35
SFIREBI15	Costa Capers	T	36.60
SFIREBI45	Gerry The Germ	T	36.60
SFIREBIR25	Gyron	T	47.75
SFIREBIR55	Elite	T	54.95
SFIREBIR75	Runestone	T	36.60
SGARGOYL35	Marsport	T	39.95
SGARGOYL45	Sweevo's World	T	36.00
SGLOBAL15	Magicians Ball	T	36.95
SGREMLIN15	Rocky	T	30.30
SHITSQUA15	They Sold A Million	T	39.95
SIMAGINE15	Hyper Sports	T	36.00
SIMAGINE21	Yie Ar Kung Fu	T	36.60
SIMAGINE25	World Series Baseball	T	30.30
SIMAGINE75	Movie	T	36.60
SINSIGHT25	Vectron	T	36.60
SINTERC15	Warlord	T	32.00
SELEVEL915	Red Moon	T	34.00
SLEVEL995	Worm In Paradise	T	39.95
SLOTHLOR25	Waterloo	T	45.80
SLOTHLOR35	Arena	T	45.80
SMARTECH45	Zoids	T	36.60
SMASTERT15	Spellbound	T	14.95
SMASTERT25	Formula 1 Simulator	T	14.95
SMASTERT35	BMX Racers	T	14.95
SMASTERT45	Rockman	T	14.95
SMASTERT55	Action Biker	T	14.95
SMEL/HOU25	Way of Exploding Fist	T	38.00
SMEL/HOU35	Fighting Warrior	T	36.00
SMEL/HOU65	Lord Of The Rings	T	57.50
SMELBOUR15	Starion	T	36.00
SMICROGE15	Shadow Of The Unicorn	T	52.00
SMICROSP75	Back To Skool	T	34.00
SMIKROGE15	Sir Fred	T	39.95
SMIKROGE55	Battle Of The Planets	T	45.80
SMIKROGE65	Three Walks In Paradise	T	45.80
SMINDGAM25	N Falldo's Open Golf	T	49.75
SMIRRORS55	Star Seeker	T	43.25
SMIRRORS65	Spitfire 40	T	43.95
SNEWCONC25	Surf Champ	T	55.00
SOCEA35	Knight Rider	T	36.00
SOCEA45	Cosmic Wartoad	T	36.60
SOCEA55	N.O.M.A.D.	T	36.60
SOCEA65	Movie	T	38.60
SOCEA85	Rambo	T	38.70
SOCEAN115	Transformers	T	36.00
SOCEAN35	Hunchback II	T	34.00
SOCEAN55	Frankie Goes to H/Wood	T	39.95
SOCEAN654	Never Ending Story	T	39.95
SOCEAN95	D/Thompson's Supertest	T	34.00
SODLIN15	Robin Of The Wood	T	43.60
SPSS15	Macadam Bumper	T	36.95
SPSS25	Swords and Sorcery	T	45.80
SSEGA55	Spy Hunter	T	36.00
SSEGA65	Buck Rogers	T	33.60
SSILVERS15	Robin of Sherlock	T	36.70
SSILVERS25	Bored Of The Rings	T	31.95
SSOFT/WA15	BC's Quest For Tires	T	36.00
SSOFTECH15	The Artist	T	48.95
SSTBRIDE15	Snow Queen	T	41.20
SSYDNEY11	Dambusters	T	39.95
SSYDNEY25	Desert Fox	T	49.30
SSYSTEM315	International Karate	T	29.90
STASKET45	Souls of Darkon	T	36.60
STASKSET15	Super Pipeline II	T	33.60
STERMINA45	Merlock the Mede	T	27.40
STHEEDGE35	Fairlight	T	45.95
SULTIMAT15	Underwurlde	T	39.95
SULTIMAT45	Nightshade	T	39.95
SVIRGIN15	Falcon Patrol II	T	34.00
SVORTEX15	Highway Encounter	T	29.95

AMSTRAD

REFERENCE	TITLE	T/D	NZ$
RACCESS11	RAID!	T	39.95
RACCESS21	Beachhead II	T	45.80
RACCESS55	RAID!	D	54.00
RACTIVI24	B McGuigans Boxing	T	39.95
RACTIVI35	B. McGuigans Boxing	D	48.75
RACTIVIS11	Master Of The Lamps	T	44.00
RACTIVIS15	Ghostbusters	T	44.00
RALLIGAT25	Defend Or Die	T	33.60
RALLIGAT35	Who Dares Wins II	D	63.95
RALLIGAT75	Doppleganer	T	41.20
RAMSOF45	3D Grand Prix	T	39.95
RAMSOF55	3D Grand Prix	D	59.95
RAMSOFT75	Assault On Port Stanley	T	41.20
RAMSOFT85	3D Boxing	T	41.20
RAMSOFT95	Sorcery +	D	59.95
RARIOLAS55	Skyfox	T	45.75
RARTIC15	International Rugby	T	36.60
RBEAUJOL35	Computer Hits	T	39.95
RBEAUJOL45	Computer Hits	D	52.00
RBEYOND45	Spy Vs Spy	D	50.00
RBEYOND55	Spy Vs Spy	T	39.95
RBEYOND65	Superman	T	39.95
RBIGFIVE15	Bounty Bob Strikes Back	T	39.95
RBUBBLEB35	Wizards Lair	D	54.00
RC.D.S.35	Colossus Chess 4	T	39.95
RC R L 75	Formula One	T	36.00
RC.R.L.85	Tau Ceti	D	48.75
RCCS15	Arnhem	T	45.80
RDATABAS45	Mini Office	T	29.95
RDATABAS65	Mini Office	D	50.00
RDATASOF65	Zorro	D	52.00
RDATASOF65	Zorro	T	39.95
RDESIGN75	Working Backwards	D	68.75
RDIGITAL45	Fighter Pilot	D	52.00
RDKTRONI55	Benny Hill's Mad/Chase	T	34.00
RDOMARK35	Codename Mat II	D	52.00
RDOMARK45	Codename Mat II	T	38.00
RDOMARKS25	View To A Kill	T	42.50
RDOMARKS35	View To A Kill	D	55.00
RELECTRI45	Winter Sports	T	41.50
RELECTRI65	I, Of The Mask	T	39.95
RELITE25	Commando	T	36.60
RELITE55	Roller Coaster	T	41.20
RELITE75	Frank Bruno's Boxing	D	52.00
RFANTASY55	Seas Of Blood	T	45.80
RGREMLIN5	Rocco	T	38.00
RHITSQUA35	They Sold A Million	T	39.95
RHITSQUA45	They Sold A Million	D	52.00
RIMAGINE55	Yie Ar Kung Fu	D	50.00
RIMAGINE65	Yie Ar Kung Fu	T	38.00
RIMAGINE85	Hypersports	T	39.95
RINTERCE65	Warlord	T	32.00
RLEISURE45	Scrabble	T	39.95
RLEISURE55	Scrabble	D	52.00
RLEVEL995	Worm in Paradise	T	45.80
RMARTECH35	Geoff Capes Strongman	T	38.00
RMASTERT15	Formula 1 Simulator	T	14.95
RMASTERT25	Finders Keepers	T	14.95
RMASTERT35	Soul of a Robert	T	14.95
RMASTERT45	Caves of Doom	T	14.95
RMEL/HOU25	Starion	T	39.95
RMEL/HOU55	Ex/Fist and F/Warrior	D	80.00
RMEL/HOU65	Way of Exploding Fist	T	39.95
RMEL/HOU75	Lord Of The Rings (+ Bk	T	66.50
RMICROGE65	3 Weeks In Paradise	T	45.75
RNOMANS15	Amstrad Paint	T	45.70
ROCEAN15	D T Decathlon	T	36.90
ROCEAN45	Never Ending Story	T	39.95
ROCEAN65	N.O.M.A.D.	T	41.20
ROCEAN65	Movie	T	41.00
RPROBE15	Devils Crown	D	54.00
RPROBE45	Devils Crown	T	39.95
RPSION45	Match Point	T	36.00
RPSS15	Macadam Bumper	T	36.95
RPSS25	Theatre Europe	T	45.95
RPSS35	Battle of Britain	T	39.95
RSILVERS45	Bored Of The Rings	T	36.00
RTASKET35	Souls Of Darkon	T	36.60
RTASKSET45	Souls Of Darkon	D	54.75
RTASMAN15	Tasword 464	T	54.95
RTASMAN35	Tasword 6128	D	99.95
RTHEEDGE35	Brian Bloodaxe	T	42.50
RTHEEDGE45	Brian Bloodaxe	D	52.00
RVIRGIN35	Strangeloop	T	41.20
RVORTEX25	Highway Encounter	D	52.00
RVORTEX35	Tornado Low Level	T	36.60
RVORTEX45	Tornado Low Level	D	63.95
RVORTEX55	Highway Encounter	T	38.00
RVORTEX65	Android II	T	36.00

C16 / PLUS 4

REFERENCE	TITLE	T/D	NZ$
PACCESS15	Beachhead	T	41.20
PADV/INT25	The Hulk	T	24.95
PADVENTU15	Spiderman	T	24.95
PANCO15	Thai Boxing	T	39.95
PANIROG15	Favourite 4	T	39.75
PANIROG25	Skramble	T	29.95
PARCTIC15	World Cup	T	39.75
PBUBBLEB15	Cave Fighter	T	24.95
PBUBBLEB25	Hustler	T	42.75
PC.D.S.15	Steve Davis	T	24.95
PCHANNEL15	Pulsar 7	T	24.95
PCITISOF15	Slippery Sid	T	29.95
PCITISOF25	Torpedo Run	T	42.00
PCOMMOD015	Ace	T	24.95
PCOMMOD025	C16 Tutor	C	69.00
PCOMMOD035	Harbour Attack	T	24.95
PCOMMOD045	Pancho	T	30.66
PCOMMOD055	Script/Plus	C	89.95
PGREMLIN15	Gulfwing Falcon	T	24.95
PGREMLIN25	Sword of Destiny	T	24.95
PGREMLIN35	Kling-Fu Kid	T	38.25
PGREMLIN45	Jetbrix	T	38.25
PIMAGINE15	W. S. Baseball	T	39.75
PKINGSOF15	Grand Master	T	29.95
PMASTERT15	Big Mac	T	24.95
PMASTERT25	BMX Racers	T	24.95
PMEL/HOU15	Roller Kong	T	19.95
PMEL/HOU25	The Wizard And/Princess	T	24.95
PMICRODE15	Cuthbert/Tombs of Doom	T	24.95
PMICRODE25	Cuthbert In Space	T	24.95
PNAVAJO15	Home Office	T	29.95
POCEAN15	D. T. Star Events	T	24.95
PPEAKSOF15	The Boss	T	24.95
PPROBESO15	Defence — 16	T	39.75
PRAZORSO15	Sea Strike	T	30.00
PRAZORSO25	Raider	T	30.00
PROMIK15	Pottit	T	24.95
PSOLARS015	Galaxions	T	24.95
PTYNESOF15	Rig Attack	T	24.95
PTYNESOF35	Olympiad	T	24.95
PTYNESOF5	Lunar Docking	T	24.95
PWARNERB15	Gremlins	T	24.95

ATARI

AACTIVIS85	Koronis Rift	D	51.95
AACTIVIS95	Great American R/Race	D	52.00
AADV/INT15	Robin of Sherwood	T	36.60
AAMERICA15	Lucifer's Realm	T	68.80
AAMERICA25	Mission Asteroid	T	68.80
AARIOLA45	Karateka	T	45.95
AARIOLAS75	Axis Assassin	D	45.80
ABIGFIVE15	Bounty Bob S/Back 64K	T	39.95
ABIGFIVE25	Bounty Bob S/Back 64K	D	52.00
ADATABTY25	Spy Vs Spy II	T	43.50
ADATABYT15	Spy Vs Spy II	D	50.25
ADATASO55	Conan The Barbarian	D	52.00
ADATASOF25	Pole Position II	D	74.75
ADATASOF35	Conan The Barbarian	T	49.75
ADATASOF51	Goonies	T	39.95
ADATASOF55	Pole Position II	T	49.75
ADOMARK15	View To A Kill	T	54.95
AELITE757	Airwolf	T	39.95
AENGLISH15	Colossus Chess 3.0	T	39.95
AENGLISH25	Colossus Chess 3.0	D	51.00
AENGLISH35	Chop Suey	T	38.00
AENGLISH45	Elektra Glide	T	38.00
AENGLISH55	Elecktra Glide	D	50.00
AENGLISH65	Chop Suey	D	50.00
AEPYX45	Winter Games	D	74.75
AEPYX55	Impossible Mission	D	74.75
AGREMLIN15	King Of The Ring	T	39.95
AGREMLIN25	King Of The Ring	D	54.75
AINFOCOM15	Wishbringer	T	147.00
AINTERCEP5	Fighter Pilot	T	42.00
ALEISURE25	Scrabble	T	59.60
ALEVEL915	Red Moon	T	34.75
ALEVEL985	Worm In Paradise	T	39.95
AMICROPO85	Kennedy Approach	T	52.00
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Keeping discs under control

by Paul Left

DOS 3.3 stores data on disks in 560 sectors, 16 of them to each of 35 tracks.

DOS keeps its own records of where files are stored on disk, and refers to these every time a file is accessed.

This article looks below the familiar DOS interface at ways of accessing the information on these sectors more directly.

Computer users expect disk operations to be transparent; they don't want to know what sectors their precious text-file or spreadsheet is being saved onto, they just want to know that it's **safe**. Occasionally, however, disaster strikes, and disk files are corrupted or become inaccessible through human error or media failure.

That's when it may become essential to know where your files are stored, so that you can access those sectors directly and repair the damage.

It is often extremely simple to recover most of a lost file if you know how to go about it and you have one of the many sector-editors available for the Apple II under DOS 3.3.

Inaccessible sectors

As an example, I was recently asked to recover an important text-file for a AppleWriter IIe user who had saved an almost-empty file buffer with the same name as his all-important text file.

Needless to say, there was no back-up.

This meant that all 80-odd sectors of the file were inaccessible from AppleWriter.

However, AppleWriter had merely overwritten the first few bytes of the file, leaving the rest intact but impossible to retrieve normally.

The last byte in a saved file is a 'OO' which signifies the end of the file, and which is the last character accepted by a Load operation.

If you would like to try out the process, create a text file of several sentences and save it to disk as 'FAIRY TALE'.

Then create a new file of just 4 carriage returns, and save that under the same name.

Your original work is now inaccessible, a disaster if it took more than a few sectors and there is no backup.

Provided you don't save any files in the meantime, your work is easily recovered with a sector editor and a little knowledge.

Here is an outline of the process:
(1) go to the directory to find the location of the **track/sector list** of the file;
(2) read in the sectors of the file to find the error;
(3) correct the error and write the sector back to disk.

On any standard DOS 3.3 disk, and many protected disks, the directory is stored on track $11, sector $OF...that's track 17 and sector 15 if your editor uses decimal notation. Start up your editor, therefore, and read in this sector.

You should see something like Figure 1.

The numbers on the left are the start numbers for each 8-byte segment of the sector, the figures to the right of this are the values found in each byte, and the characters to the far right are the text equivalents of these values. A "?" is used to show an unprintable character.

FIGURE 1:

The directory:

```
00: A0 A0 A0 A0 A0 A0 A0 A0 :        :
08: A0 19 00 10 0F 00 C6 C1 :?????FA:
10: C9 D2 D9 A0 D4 C1 CC C5 :IRY TALE:
```

You may have to browse through the buffer to find the file name you are looking for. If you can't find it, read in the next lower sector: track $11, sector $0E.

When one sector is full, DOS goes to the next lower on track $11.

The file we want is 'FAIRY TALE', and to find its track/sector list, count back **3 bytes from the first letter of the file name.**
In this case, count back from the C6 to the 10. This is the track number and the next byte is the sector.

That is, the track/sector list for this file is found in track $10, sector $0F.

Now read in this sector. You should see something like Figure 2.

FIGURE 2:

Track/sector list:

```
00:  00 00 00 00 00 00 00 00
08:  00 00 00 00 10 0E 10 0D
10:  10 0C 10 0B 10 0A 00 00
```

Disregarding any 00 bytes, we see that the file starts in track $10, sector $0E and continues through to sector $0A of the same track.

On a disk with spare tracks, DOS writes the Track/sector list on sector $0F of a new track, and the file itself starts on the next lower sector.

Incidentally, this is why even the smallest file always takes two sectors of disk space: 1 for the file, and 1 for the track/sector list so that DOS knows where to find it.

Now read in the first sector of the file: track $10, sector $0E.

You should see something like Figure 3.

Notice that the first few bytes are '8D' carriage returns) followed by that all-important 00, and that **the rest of the original text is still there.**

FIGURE 3

Overwritten file:

```
00: 8D 8D 8D 8D 00 F5 F0 EF :?????upo:
08: EE A0 E1 A0 F4 E9 ED E5 :n a time  :
10: A0 E9 EE A0 E1 A0 EC E9 : in a li  :
18: F4 F4 EC E5 A0 EC EF E7 :ttle log  :
```

It is a simple matter now to move the editor's cursor over the 00 and type another value.

Almost anything would do, but an 8D (return) or A0 (space) is convenient.

Now write the sector back to disk, making sure first that you have not changed the track or sector numbers.

Your file should now be accessible to AppleWriter, the only loss being the first few bytes which were overwritten.

Notice that the situation just described applies only to an over-written text file, and is quite different from one where a file has been lost through the DOS 'DELETE' command.

You must use a slightly different approach to 'un-delete' a file. This will be dealt with in a future column.

Improved edit

The editor I used was Tricky Dick on the CIA disk, but one which is easy to use is the editor function of SUPERCOPYI,which was bought for about $8 from Christchurch Teacher's College on their 'Disk Utilities' disk.

This program is a vast improvement over 'FID' for file-handling, and appears to be an earlier version of 'COPY II'.

You need to be familiar with your editor's commands and know whether it uses decimal or hexadecimal notation when you specify track/sector numbers.

However, most have their commands onscreen, and nearly all use hexadecimal track/sector numbers.

Once you become accustomed to using a sector editor, you can do all sorts of tricks to recover crashed files (text, Applesoft, or binary), doctor file names, change Volume numbers, make your 'HELLO' program a binary one, examine non-standard disks, and carry out many other useful and otherwise impossible disk operations. ■

Exploring ROM locations

by Don Stanley

This month's article will explore the SVI and MSX roms.

This is technical information and requires a understanding of machine code.

While I cannot hope to cover all that is available in rom in one go, I will present some of the more useful routines available.

In most cases the comments apply to both MSX and SVI, and MSX memory addresses are enclosed in square brackets.

The ROMS are located from locations 0000 – 7FFF in bank 0 of your SVI, and SLOT 0, PAGES 0 & 1 of your MSX.

To explore this area you have 3 requirements

1 .. a disassembler
2 .. knowledge of machine code
3 .. time and patience (lots)

A disassembler is a program which takes the binary machine code instructions and converts those back to Z80 assembler commands. A number are available both commercially and in the public domain.

The Roms

Routine 1

The first routine which many will have already used is the warm boot. This occurs by doing a jump to location 0. In machine code this is the command

JP 0000

and in BASIC the equivalent is

DEF USR = 0 : A = USR (0)

The effect of the warm boot is to completely reset the system.

The code applies to both SVI and MSX.

Routine 2

Converting to uppercase can be accomplished by a call to 170CH [4EA].

You need the character to be converted to be in the A register when the call is made.

Assuming the character is already in the A register the machine code command is

CALL 170C [CALL 4EAA]

In BASIC you would need to write a machine routine which loaded the character into the A register, then made the above call. You cannot just enter

DEF USR = &H170C : A = USR (0)

because this has no way of getting the character to be converted into the A register first.

The effect of this routine is to return the character in the A register converted to uppercase.

Routine 3

To locate the cursor at a particular position on the screen in machine code you need to load the column number (0 – 80) into the H register and the row number (0 – 23) in the L register.

Then

CALL 393E [CALL 00C6]

will locate the cursor for the next lot of output.

Routine 4

To print a string on the screen you need to get the location of the string into the HL register. The string must be terminated with a NULL byte. Assuming you have the location in HL, the following is all that need be done to print on screen

CALL 0097 [CALL 6677]

The string is printed from the current cursor location.

A single character in the A register can be printed with the instruction

CALL 394D [CALL 00A2]

Routine 5

When using machine code it is sometimes useful to know if the ^STOP key has been pressed to stop some action occuring.

This is handled by the interrupt routine, which sets location FE2B to a non-zero value if ^STOP has been pressed. Thus you just need a check like

```
OR A      → LD  A,(FE2B)
            JP  NZ, <WHEREVER>
```

which just checks that loction and then jumps WHEREVER you want it to go to after detecting a ^STOP.

This is under interrupt control.

What if you have disabled the interrupts using the DI instruction.

Fortunately this is catered for in rom with a second ^STOP check routine.

This is a routine which does little more than a keyboard scan of just the ^STOP keys, and if ^STOP is being pressed, it returns with the carry flag set. To use the routine...

```
CALL 3512      [ 00B7 ]
JP   C,<WHEREVER>
```

Routine 6

These next few routines are for graphics. Sorry MSX owners, as yet I haven't found all of these in the MSX roms.

The first is to initialize the VDP to one of the 3 available SVI modes. There are, as would be expected, 3 routines...

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```
SCREEN 0 XOR   A
         LD    (FE3A),A   [ FCAF ]
         CALL  3541
SCREEN 1 LD    A,1
         LD    (FE3A),A   [ FCAF ]
         CALL  3610
SCREEN 2 LD    A,2
         LD    (FE3A),A   [ FCAF ]
         CALL  3665
```

To set up **sprite size** after the screen mode has been set use...

```
8x8 SPRITES      LD    A,1
                 LD    (FE3B),A
                 CALL  36BE
16x16 SPRITES    LD    A,2
                 CALL  (FE3B),A
                 CALL  36BE
32x32 SPRITES    LD    A,3
                 LD    (FE3B),A
                 CALL  36BE
```

The **line command** is the most useful of the graphics commands. You can do virutally all of the other commands with line. Circle is the most difficult to decode, and it's not helped by having a bug in it. Here are the machine code instructions to draw lines.

You need to have the following high memory location setup. FE42/43 and FE46/47 must contain the BOTTOM RIGHT X pixel, ie the bottom right corner of the box, or the bottom of the line.

FE44/45 and FE48/49 must have the BOTTOM right Y pixel.

The BC and DE registers are set up as follows. The top left x pixel is in BC, and the top left Y pixel in DE.

The colour of the LINE/BOX must be in FA13.

To draw a line, use CALL 243C.
To draw a BOX, use CALL 2452.
To draw a SOLID BOX, use CALL 2401.

The **PAINT command** can be carried out in machine code, but with one rider. You must ensure that location FE2B is set to zero before entering the PAINT routine.

PAINT will need to know where to paint and what colour, to do this you need the colour in FA13, the border colour in FE41 (border colour = colour in SCREEN 1), and the X pixel must be in – the BC register, and location FE42 and location FE46 – while the Y pixel must be in – the DE register, location FE44 and location FE48.

Then the necessary code is...

```
XOR   A
LD    (FE2B),A
CALL  2524
```

Note that the X and Y pixels correspond exactly to their values in BASICS PAINT statement, ie

PAINT (X,Y),colour,border colour

The two other most useful graphics, or should I say VDP related, routines are those to send the contents of the A register to a **location in VRAM**,a nd to read a VRAM locations value into the A register.

First the WRITE VRAM operation.

The address (location) in VRAM to write to should be placed in the HL register pair. The byte to write to VRAM should be in the A register. Then

CALL 372A [CALL 004D]

This does not affect any fo the registers. After CALLing the routine they will have exactly the same values they had prior to the routine being called.

Now the READ VRAM routine. Again the location to be read in VRAM must be in the HL register pair. Then

CALL 3734 [CALL 004A]

will see the byte at that location returned in the A register.

This obviously destroys the last value of the A register, no other register is affected.

Routine 7

The function key display and initialisation can be controlled in machine code as follows.

Display Off	CALL 3B86	[CALL 00CC]
Display On	CALL 3B9F	[CALL 00CF]
Initialise keys	CALL 3498	[CALL 00C9]

All these routines work from BASIC with the DEF USR command, use

DEF USR = <value of above CALL> ■

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Shaping, moving graphics

by Dick Williams

This month is part one of several articles about creating and rotating shapes on the graph screen.

The fundamental parts of a shape are the points which define the outline of the shape.

It is a relatively simple matter to take a set of points that make up an image and alter them in ways to achieve movement, rotation or scaling.

For example, let's say that you have drawn a square box on the left hand side of the screen. There will be four points defining this box, made up of an x and a y co-ordinate for each corner.

Now by adding 50 to each of the x co-ordinates of each point and then redrawing the box it would appear moved to the right by 50 pixels.

Of course you still have to erase the first box on the left otherwise you would end up with two boxes on screen.

This simple example is just to illustrate the basic principles involved in image placement by applying mathematical operations to a set of image points.

Next month I will show how to scale an image and/or make it rotate about a fixed point, but this month we are only going as far as to use the program to create a shape, using up to nine points, and having done that, to join the points up with lines and then to enter the edit mode to alter any or all points to new positions, redrawing the lines as you go.

Each point is numbered for easy identification and the current and edited x,y point co-ordinates are displayed.

Not complex

The code for this program looks complicated but it's not at all.

Consider a normal instruction to set a pixel (point) on screen. The code for this is PSET (x,y) plus the colour designation.

This is easy, but what say you have a list of nine x and y values.

The first x should be described as x(1) the second x(2) etc and the same applies to each y value. Returning to the original pixel set code of PSET (x,y) it should now read PSET (x(1),y(1)) and when using a loop, the code reads like this

```
FOR P=1 to 9
PSET ( x(P),y(P) )
NEXT P
```

The same situation arises when you want to draw a line; the basic code is

```
LINE (x,y)-(x,y)
```

and with x and y identification is:

```
LINE ( x(1),y(1) )-( x(2),y(2) )
```

In using a loop (with 9 points):

```
FOR P=1 to 8
LINE ( x(P),y(P) )-( x(P+1),y(P+1) )
NEXT
```

As you can see the code gets complicated very quickly and the secret is to realise that you are dealing with labelled x,y co-ordinates for point 1 are x(1),y(1).

The x,y co-ordinates for point 2 are x(2),y(2) and so on for as many points as the image uses.

Let's say that you have used the program and created a five-pointed star. You

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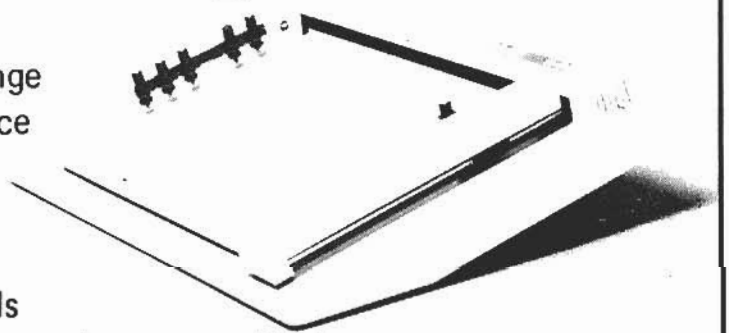

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have noted down the co-ordinates for each of the star's points and have given these to your friend down the road.

This will be a list of 10 numbers describing the x and y for each of the star's 5 points.

Your friend will probably not be able to guess what the shape is, and has three ways of finding out.

These are: plot the points on screen and guess what the shape is; or plot the points and draw lines between; or just draw the lines without plotting the points.

The last one is obviously the fastest and most economical method and this is how it is usually done.

As mentioned above, this program does plot the points, and labels each one as well.

This should make it somewhat easier for you to get the basics sorted out but it does slow the program a lot.

The program lines are in steps of ten and to make it easier to type in, use auto and place a rem after each line number. Then it's just a case of typing in any particular line that you feel like in any order until all are in.

```
10 REM  NAME =GRAPH 1       D WILLIAMS
   Experiments with graph movement.
   Type in and run, the shape you make
   should fit in the large central
   area.There is no error trapping so
   dont run off the edge.
20 REM--Set up graph screen----------
30 SCREEN 2,2 : CLS : A= -90 : B=93
40 POSITION (100,90),0,0 : J=1
50 GOSUB 700
60 PATTERN S#0, "F0C0A0900808040201
70 CURSOR A,B : COLOR 1
80 PRINT "MOVE=ARROW KEYS,CR=PSET,J=FI
NISH
90 CURSOR 118,-88:PRINT "X  Y":PRINT:
   FOR P=1 TO 9:PRINT TAB(30);P:NEXT
100 X=0 : Y=0 : REM ------------------

110 REM--PSET points on screen-------
120 Y$=INKEY$:IF Y$="" THEN GOSUB 630
130 IF Y$= CHR$(28) THEN X=X+5
140 IF Y$= CHR$(29) THEN X=X-5
150 IF Y$= CHR$(30) THEN Y=Y-5
160 IF Y$= CHR$(31) THEN Y=Y+5
170 IF Y$= "J" THEN BEEP : GOTO 210
180 IF Y$= CHR$(13) THEN PSET (X,Y),1
   :BEEP:CIRCLE (X,Y),2,1:CURSOR X-8,
   Y-12:PRINT J:X(J)=X : Y(J)=Y : J =
   J+1: GOSUB 650: IF J > 9 THEN 210
190 SPRITE 0,(X,Y),0,1
200 GOTO 120 : REM -------------------

210 REM--Park sprite pointer top left
220 SPRITE 0,(-80,-80),0,1
230 REM--Join up points with lines---
240 LINE( X(1),Y(1) )-( X(2),Y(2) ),1
250 FOR P = 3 TO J-1
260 LINE -( X(P),Y(P) ) : NEXT
270 LINE -( X(1),Y(1) )
280 CURSOR A,B:PRINT CHR$(5);"E=EDIT"
290 IF INKEY$ <> "E" THEN 290 : REM --

300 REM--Edit mode-------------------
310 BEEP : CURSOR A,B : PRINT CHR$(5);
   "ARROW KEYS ---- CR FOR NEXT POINT
320 FOR P=1 TO J-1:A(P)=X(P):B(P)=Y(P)
   :NEXT
330 FOR P=1 TO J-1
340 IF INKEY$ <> "" THEN 340
350 IF INKEY$=CHR$(28)THENX(P)=X(P)+5
360 IF INKEY$=CHR$(29)THENX(P)=X(P)-5
370 IF INKEY$=CHR$(30)THENY(P)=Y(P)-5
380 IF INKEY$=CHR$(31)THENY(P)=Y(P)+5
390 SPRITE 0,(X(P),Y(P)),0,4
400 BCIRCLE( A(P),B(P) ),2:BLINE( A(P)
   -4,B(P)-12)-( A(P)+4,B(P)-4),1,BF
410 IF P=1   THEN GOSUB 510 :GOTO 470
420 IF P=J-1 THEN GOSUB 570 :GOTO 470
430 BLINE (A(P-1),B(P-1))-(A(P),B(P))
440 BLINE (A(P),B(P))-(A(P+1),B(P+1))
450 LINE (X(P-1),Y(P-1))-(X(P),Y(P))
460 LINE (X(P),Y(P))-(X(P+1),Y(P+1))
470 A(P)=X(P):B(P)=Y(P):X=X(P):Y=Y(P)
480 CIRCLE (X(P),Y(P)),2,1:CURSOR X(P)
   -8,Y(P)-12:PRINT P : GOSUB 630
490 IF INKEY$ <> CHR$(13) THEN 350
500 BEEP :GOSUB 650 : GOSUB 700 :
   NEXT : GOTO 320
510 REM If point = first one --------
520 BLINE (A(J-1),B(J-1))-(A(P),B(P))
530 BLINE (A(P),B(P))-(A(P+1),B(P+1))
540 LINE (X(J-1),Y(J-1))-(X(P),Y(P))
550 LINE (X(P),Y(P))-(X(P+1),Y(P+1))
560 RETURN : REM ---------------------
570 REM If point = last one ---------
580 BLINE (A(P-1),B(P-1))-(A(P),B(P))
590 BLINE (A(P),B(P))-(A(1  ),B(1  ))
600 LINE (X(P-1),Y(P-1))-(X(P),Y(P))
610 LINE (X(P),Y(P))-(X(1  ),Y(1  ))
620 RETURN : REM ---------------------

630 REM--Clear top left,print new X,Y
640 BLINE (-80,-82)-(80,-90),1,BF:
   CURSOR-80,-90 : PRINT "X =";X;"
   Y =";Y : RETURN : REM ------------

650 REM--Clear right,print new points
660 CURSOR 110,-80 : PRINT CHR$(5)
670 FOR H=1 TO 9
680 PRINT TAB(34);X(H); TAB(37);Y(H)
690 NEXT : RETURN : REM --------------

700 REM-Draw X,Y axis and suround box
710 LINE (-80,0)-(+80,0),2
720 LINE (0,-80)-(0,+80),2
730 CURSOR -80,3    :PRINT "-80
740 CURSOR  63,3    :PRINT "+80
750 CURSOR   2,-78 :PRINT "-80
760 CURSOR   2, 73:PRINT "+80
770 LINE (-80,-80)-(80,80),2,B:RETURN
```

Mastering of strings

by Dick Williams

Continuing on from last month's column, here are more programmes to illustrate particular uses of string handling:-

```
10 REM Prog 18 Check that input from
   keyboard contains only alphabetical
   characters.
15 Z$="NAME CHECK OK"
20 INPUT "NAME PLEASE ";N$:BEEP
25 FOR P=1 TO LEN(N$)
30 D$=MID$ (N$,P,1)
35 IF D$ < "A" OR D$ > "Z" THEN 50
40 NEXT P
45 PRINT A$,Z$
50 PRINT "Sorry, numbers ..... not
55 GOTO 20
60 REM this prog accepts input from
the keyboard and checks that all
characters from left to right of A$
are between UPPER CASE A-Z  If any are
wrong, the input is not accepted and
the computer returns to line 20

10 REM PROG 20 Receiving input from th
ekeyboard and checking that it is
within a preset range.
12 SCREEN 2,2:N=20
14 CLS:FOR P=1 TO N
16 PRINT"HHHHHHHHHHHHHHHHHHHHHHHHHHHH
18 NEXT
20 D$="":CURSOR 0,170:PRINT CHR$(5)
22 PRINT"NUM OF LINES = 1-20 + CR  ";
24 K$=INKEY$:IF K$ = "" THEN 24
26 BEEP: D$=D$+K$ :N=VAL(D$)
28 IF N<1 OR N>20 THEN 20
30 IF K$=CHR$(13) THEN 14
32 PRINT K$;
33 IF INKEY$ <> "" THEN 33
34 GOTO 24
36 REM Input does not work in the
graph screen mode therefor you have to
use inkey$.These programs 18-20 show
a simple method to check for a key
press,a definite character,or in 20, a
variable input within a preset range.
37 REM  Line 33 waits until you take
your finger off the key before go on.
10 REM PROG 22 save text screen to 20
strings X$(0)-X$(19)
12 DIM X$(22)
14 FOR Y=0 TO 19:FOR X=2 TO 39
16 D=PEEK ( Y * 40 + X + &H3C00 )
17 D$=CHR$(D)
18 POKE   ( Y * 40 + X + &H3C00 ),45
20 X$(Y) = X$(Y) +D$ :NEXT X,Y
22 CURSOR0,20:INPUT"PRESS CR TO REWRIT
E SCREEN ";K$
24 FOR Y=0 TO 19
26 CURSOR 0,Y:PRINT X$(Y) :NEXT
28 CLSCOR 0,18:PRINT "THIS IS A REWRIT
TEN SCREEN. CONT EDIT.   CLS AND LIST
30 REM list this program and run.each
character on each line of the screen
is peeked and placed in a string,one
string per line.the character on
screen is overwritten to show progres.
dont type line 30
```

Program 26 is one answer to last month's question of how to scroll a string from right to left.

Prog. follows

```
5 REM PROG 26 string scrolling
10 A$="-MERRY CHRISTMAS AND A HAPPY NE
W YEAR"
20 FOR P=1 TO 32
30 D$=MID$(A$,P):E$=LEFT$(A$,P)
40 CURSOR 0,18:PRINT D$+E$
50 GOSUB 70
60 NEXT:GOTO 20
70 REM ------   DELAY--
80 FOR Y=1 TO 200:NEXT:RETURN
```

Ways to enable string arrays

by Savern Reweti

When I purchased my Atari 130XE in 1985 I was excited by the powerful sound and graphics capabilities of the machine. However, I was disappointed to find that Atari BASIC has quite a few limitations.

One of the glaring inadequacies, is of course, the lack of string arrays.

Nearly all other versions of BASIC have string arrays that allow you to store variable names, and recall them by number.

You can create a string array such as TELEPHONES$(12) and store a number with a different subscript eg. TELEPHONES$(5)="AUCK-23642".

This is not possible with Atari but there are several different methods for simulating string arrays.

It is important to have a string array facility because many programs use them, and you may wish to convert them to Atari. Also string arrays allow you to manage your string variables more efficiently.

Therefore, I have outlined three ways of simulating string arrays on your Atari. It is up to you to decide which method best suits your program.

Method one

The first step in this method is to create a long string which will hold all the elements of the array. Atari allows a string to be as long as you like within the limits of the computer memory.

Next we fill this string with blanks and then we position each element or name at set positions along the string.

Type in program 1, RUN it, and input the number of names you require and the maximum length.

PROGRAM 1

```
5 REM PROG1 STRING ARRAY
10 GRAPHICS 0:? "HOW MANY NAMES";:INPUT
NAM:IF NAM<1 THEN 10
20 ? :? "INPUT MAX LENGTH OF NAME";:INPU
T SIZE:IF SIZE<1 THEN 20
30 DIM ARRAY$(NAM*SIZE),NAME$(SIZE)
35 ARRAY$=" ":ARRAY$(NAM*SIZE)=" ":ARRAY
$(2)=ARRAY$:REM FILLS ARRAY$ WITH BLANKS
40 FOR N=1 TO NAM
50 ? "NAME FOR ARRAY$(";N;")";:INPUT NAM
E$
60 ARRAY$(N*SIZE-(SIZE-1),N*SIZE)=NAME$
70 NAME$="":NEXT N
75 GRAPHICS 0
80 ? "INPUT THE NUMBER (1 TO ";NAM;")":?
 "OF THE ARRAY YOU REQUIRE";:INPUT NO:IF
 NO<1 OR NO>NAM THEN 80
90 ? :? ARRAY$(NO*SIZE-(SIZE-1),NO*SIZE)
:GOTO 80
```

Though this method is straightforward it is not efficient. The string consists of a lot of empty spaces and this wastes memory. It is also difficult to choose the appropriate field size for names whose length varies.

Method two

The second method is a simplified version which is used quite a lot in adventure programs where items are stored in DATA statements.

The items are then located by using the RESTORE statement. This method uses less memory but is fairly slow.

Type in program 2, RUN it, and follow the instructions.

PROGRAM 2

```
5 REM PROG2 STRING ARRAY
10 DIM NAME$(20)
15 GRAPHICS 0
20 ? "GIVE THE NUMBER OF THE ARRAY YOU W
ISH":? "TO SEE";:INPUT NO
25 IF NO=1 THEN 50
30 RESTORE 100
40 FOR N=1 TO NO-1:READ NAME$:NEXT N:NAM
E$=" "
50 READ NAME$:? NAME$
60 GOTO 20
100 DATA BOB,JOHN,PETER,CHRIS,JANE
110 DATA PHIL,DAVE,RICHARD,JILL,JACK
```

Method three

This method stores a lits of names or items in a string but places an inverse character between them.

The inverse character acts as a flag and by counting them as we search the string we can obtain the array we require.

A BASIC-only linear search of the string would be too slow so I have adapted a machine language routine to speed it up.

Again just type in the program below, RUN it, and follow the instructions. The program allows for a maximum length of 100 characters for each name, and a maximum total length of 2000 characters for the string.

PROGRAM 3

```
0 REM PROG3 STRING ARRAY
1 DIM NAME$(2000),N$(100),ML$(57)
2 GOSUB 3:GOSUB 7:GOTO 10
3 RESTORE 4:FOR N=1 TO 57:READ A:ML$(N,N
)=CHR$(A):NEXT N:RETURN
4 DATA 104,104,133,1,104,133,0,104,133,3
,104,133,2,169,1,133,212,160,0,132,213,1
77,0,16,18
5 DATA 198,2,208,14,165,3,208,8,200,177,
0,16,251,132,1,96,198,3,230,212,208,2,23
0
6 DATA 213,230,0,208,224,230,1,208,220
7 GRAPHICS 0:? "INPUT NUMBER OF NAMES";:
INPUT NUM:? :? "ENTER NAMES"
8 NAME$(1,1)=CHR$(128):FOR N=1 TO NUM:IN
PUT N$:NAME$(LEN(NAME$)+1)=N$:NAME$(LEN(
NAME$)+1)=CHR$(128):NEXT N:RETURN
9 START=USR(ADR(ML$),ADR(NAME$),NO):LENG
TH=PEEK(1):FINISH=START+LENGTH-1:START=S
TART+1:RETURN
10 GRAPHICS 0
11 ? "INPUT THE NUMBER (1 TO ";NUM;")":?
 "OF THE ARRAY YOU REQUIRE";:INPUT NO
12 GOSUB 9:? NAME$(START,FINISH):GOTO 11
```

I hope you will find these methods useful in dealing with string arrays. If you have any queries regarding my programs send a self-addressed envelope to Savern Reweti, Bits & Bytes Ltd, PO Box 9870, Auckland.

P.S. One of my powerful pokes to disable the break key (published in December 1985 issue) may not work on all Atari models. Try POKE 16, 112:POKE 53774,112. ■

Memory management on 130XE

by Allan Clark

Using the extra 64K of memory on the Atari 130XE requires an understanding of the concepts of bank selection.

The 6502 micro processor, which is the central core of the Atari 8 bit computers, was only designed to access 64K of memory at a time.

So the 6502 chip cannot see more than 64K; it is blind to the extra 64K.

To make the extra memory visible the technique of bank selection is used.

A block of memory in the regular 64K of memory is temporarily turned off and replaced with a bank from the hidden memory — just like replacing the card at a top of a pack of cards with one from lower in the pack.

The 130XE organises the extra memory into four banks of 16K and any one of the banks may be switched in at any time. The control over which bank is switched in is the job of memory location 54017.

By flipping bits two and three of address 54017 you can switch on any 16K bank of the extra 64K Ram into the address space 16384 to 32764. No matter what the address of the extended bank, you will read and write (peek and poke) to this range, not to the address itself.

Flipping bits four and five control whether the 6502 processor or antic chips access the extra banks of memory.

Antic uses the commands like Print and List- work in the main bank area and

don't write to the extended bank unless you tell the CPU to use the extended bank at the same time Antic is using it.

An experienced machine language programmer will not have any trouble manipulating the bits at location 54017. For basic programmers use this formula

POKE 54017+4*BANK+16*MODE

where bank is the 16K bank you wish to select and mode is the chip which you wish to have access to the memory bank.

Note for Bank 0 = bank1, 1 = bank2, 2 = bank3, 3 = bank 4 and for mode 0 = 6502 and antic, 1 = antic, 2 = 6502, 3 = neither.

Location 54017 is also used to switch out basic and for other functions so it is important that you be careful in poking this location.

The programmer can use the new memory bank in several ways. You may write an adventure game with all the locations in memory, or a scrolling graphics game with different screens in different banks. As you don't have to use the banks linearly you can switch between banks as you do a pack of cards.

The following program draws a group of five stars to four different screens in different banks of memory. It then switches from bank to bank to give an interesting display.

To stop the program hit break.

For an interesting variation remove the time delay loops in lines 140 and 150.

```
10 REM *** PROGRAM TO DEMO BANK SELECTION
20 DIM P(10,2):DEG
30 COLOR 1:G=0.64
40 POKE 106,128:POKE 708,118
50 POKE 88,0:POKE 89,192
60 DL7L=PEEK(560):DL7H=PEEK(561):DL=DL7L+256*DL7H:POKE
DL+4,0:POKE DL+5,64
70 REM LOOP TO DRAW STARS TO SCREEN WITH EACH SCREEN BEING
DRAWN TO A DIFFERENT BANK
80 FOR Q=0 TO 3:POKE 54017,129+(Q*4):GRAPHICS 7+16:?
#6;CHR$(125)
90 I=12-Q/2:H=77-(Q*13+24):V=H*G:GOSUB
190:V=(138-H)*G:GOSUB 190:H=77+(Q*13+24):GOSUB
190:V=(152-H)*G:GOSUB 190
100 H=77:V=H*G:I=20+Q*15:GOSUB 180:NEXT Q:POKE 106,128
110 REM LOOP TO DISPLAY SCREEN
120 FOR X=0 TO 3
130 POKE 54017,129+(X*4)
140 FOR DELAY=1 TO 300:NEXT DELAY:NEXT X
150 FOR X=2 TO 1 STEP -1:POKE 54017,129+(X*4):FOR DELAY=1
TO 300:NEXT DELAY:NEXT X
160 GOTO 120
170 REM ROUTINE TO DRAW STARS
180 G=G+0.02
190 A=36:FOR N=1 TO 10:T=N*A:F=(INT(N/2)=N/2)+1:F=1/F
200 P(N,1)=INT(((I*F)+1)*SIN(T)+H):P(N,2)=INT((I*0.8*F)*COS
(T)+V):NEXT N
210 POKE 765,3
220 PLOT P(9,1),P(9,2):DRAWTO P(10,1),P(10,2):DRAWTO
P(1,1),P(1,2)
230 FOR X=2 TO 10:IF X>5 AND X<>10 THEN PLOT
P(X-1,1),P(X-1,2):POSITION P(X,1),P(X,2):XIO
18,#6,0,0,"S:":GOTO 250
240 DRAWTO P(X,1),P(X,2)
250 NEXT X
260 PLOT P(1,1),P(1,2):POSITION P(10,1),P(10,2):XIO
18,#6,0,0,"S:":RETURN
```

■

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Disk images of files

by Noel Weeks

Sequential files

The PRINT#, PRINT# USING and WRITE# statements are used to create these disk images for sequential files:

A$="RADIO"
B$="CASSETTE"
C$="12345"

Disk image:

PRINT#1, A$,B$,C$ RADIOCASSETTE12345 <CR>

WRITE#1, A$,B$,C$ "RADIO","CASSETTE","12345"<CR>

INPUT#1, A$,B$,C$

When the Write# mode was used, A$="RADIO".

When the PRINT# mode was used, A$="RADIOCASSETTE12345"

Using the PRINT# mode, the data written becomes one data item. Therefore, when using the PRINT# statement to write to the disk, you should follow this format so that the three data items are read separately by the INPUT# instruction:

PRINT#X, A$;",";B$;",";C$

The WRITE# statement automatically encloses each data item in quotation marks ("") and places commas (,) between the items. When the LINE INPUT# statement is used, the line beginning with WRITE# and terminating with CR is read as one data item.

Notice the likeness to Datastar records.

The PRINT# statement writes the numeric data to the disk file while the PRINT statement displays it on the CRT screen.

Unwanted TAB space is put between A and B if the format PRINT#1, A, B is used. Use PRINT#1, A; ","; B instead.

Random access files:

Since the FIELD statement defines the buffer area to be a string field, the data written must be of string type. Numeric values are converted as follows:

Integer	MKI$(I)	(two byte string)
Real Number	MKS$(R)	(four byte string)
Double-prec.	MKD$(D)	(eight byte string)

String data is written to the buffer by the LSET/RSET statements and put to disk by the PUT statement.

In reading them, they are converted back to numeric data by using CVI (for integer), CVS (for real number), or CVD (for double-prec.).

String data is unchanged and transferred to the buffer area for input.

Packed data:

Each character of string data is stored as one byte.

Packed ata stores two characters in one byte for better use of space.

Sixteen types of characters can be packed: numbers 0-9, +, -, . (period), D, E, and a space. This means that only numeric notation can be packed.

Packed data is made by the PACK$ statement and restored using the UNPACK$ statement. A$="123.45" is 6 bytes. P$=PACE$(A$), P$ becomes 4 bytes long.

P$ can then be written to disk in half the bytes. To restore the data, read it from the disk and use A$=UNPACK$(P$).

* * * * * * * * * * *

Speeding up Wordstar

Are you still waiting for Wordstar to request your next command?

Perhaps you have noticed that Wordstar has a "type-ahead" buffer?

If you haven't, next time you're processing a file try this little experiment:

First, position yourself at the bottom of the file using Control QC (^QC). Next, type ^QR ^QF (Control QR, followed immediately by Control QF).

You should see on the screen Wordstar quickly racing towards the front of the document, and then into the "Find and Replace Menu".

While many other software packages do not allow this, Wordstar very conventiently does.

I would suggest that you take a few moments to experiment with alternative multiple commands.

There is only one area where Wordstar and the Sanyo come to grief with this type of command. This is when a disk access is involved.

Unfortunately the Sanyo (it's not Wordstar's problem) switches off the interrupt table during a disk access and you may find occasionally that certain commands (or parts of) get lost. For instance, try this out:

at MS-DOS prompt,
type A:WS <CR> D

then, as Wordstar starts to write to the screen, type any easy filename e.g. "ASDFG"

Nine times out of ten, once Wordstar catches up, you will see something like "ASG" – "D" and "F" being missed out. ■

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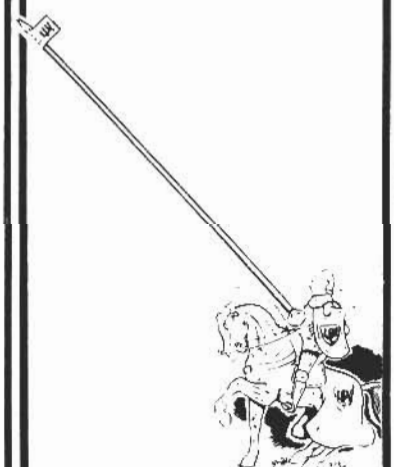

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Rundown on five languages

by Craig Beaumont

Memory expansions to increase the total memory of your Amstrad to either 128K or 256K should soon be available.

This is so you can have the 61K of Transient Program Area (TPA) as found on the 6128.

The main purpose of this area is to cater for CP/M packages like Wordstar – when they come out on 3 inch disk.

The upgrade to a total of 256K will give you the advantages of a ram-disk as found on the PCW 8256.

With these Grandstand may also be bringing in expansion ROMs like Maxam, the assembler, and Protext, the wordprocessor.

One of the beauties of these devices aside from their technical advantages is that they are rather more difficult to copy – I won't say impossible.

While there are literally hundreds of computer programming languages I think the five I have on my Amstrad are plenty.

They are all so different, yet learning something from one of them influences my use of another. Here's a short rundown on each of them:–

Locomotive Basic is praised enough for me not to have to comment – apart from saying that the Resident System eXtension (RSX) system where you can add your own commands has proved very useful.

Fast compiler

Hisoft Pascal is a good implementation of this very structured language. It compiles your source code quickly so little time is wasted when developing programs. The built-in editor makes corrections and additions to the source code simple.

These two factors persuaded me to use this package to develop and test modules for larger programs in preference to a system on a mainframe computer.

Also from Hisoft is Devpac a suite of two programs you can use together or separately.

They are Gena3, an assembler, and Mona3, a dis-assembler and monitor.

They are aids to those working in machine code.

Through an intermediary called Z80 assembly language, Gena3 makes programming in machine code about as easy as it can get.

It uses the same editing system as the Pascal package – nice to see consistency. Mona3 allows you to investigate and experiment with machine code programs, one of it's uses being debugging.

Assembly language is just a set of mnemonics that represent machine code instructions.

When speed and/or compactness are important then programs on microcomputers will generally be written in machine code – usually through a package like Devpac

Forth is a language like no other. I am just starting to learn it using Abersoft Fig-Forth.

The Fig indicates that this version of Forth conforms to the standards of the Forth Interest Group.

A program in Forth is built by creating new commands from those already in the Forth vocabulary.

Eventually you end up with one command which is an entire program.

In Forth you can work in low-level assembler then use something as high-level as the CASE statement found in Pascal.

Unlike Basic which is interpreted and Pascal which is compiled, Forth manages to do both in what is called a threaded-interpreter.

Educational

The version of Logo packaged with CP/M 2.2 called Dr Logo is not a full implementation of this educational language. It serves as an introduction to what is generally regarded as the best language to start programming in.

With a major part of Logo being Turtle graphics, new programmers should learn a logical approach to programming with the results being clearly shown.

Now for a more practical comparison of these languages.

A language's speed is one thing that can be objectively measured and the usual way to do this is through a bench test.

I used the simplest type of test – an empty loop.

Each language had to perform 30000 loops; to get more accurate results I made Forth repeat this 10 times and machine code 100 times.

The program results were:–

```
10 REM Basic Benchtest
20 a=TIME:FOR i%=1 TO 30000:
   NEXT:b=TIME
30 PRINT(b–a)/300
```

Result 16.52 seconds.

```
10 PROGRAM Benchtest;
20 {Hisoft Pascal}
30 VAR i:integer;
40 BEGIN
```

```
50  FOR i:=1 TO 30000 DO
60  END.
```
Result 8.3 seconds.

Logo Benchtest –
```
to benchtest
>repeat 30000[ ]
>end
```
Result 94 seconds.

Forth Benchtest –
```
: BTEST 30001 DO LOOP ;
: 10–TIMES 11 DO BTEST LOOP;
```
Average result 2.6 seconds.

```
 10 ; Machine Code Benchtest
 20              org     4000
 30              ent     $
 40              ld      h,100
 50  loop1:      ld      bc,30000
 60  loop2:      dec     bc
 70              ld      a,b
 80              or      c
 90              jr      nz,loop2
100              dec     h
110              ld      a,h
120              jr      nz,loop1
130              ret
140              end
```
Average result 0.23 seconds.

So if speed is one of the major criteria for your programs then these results show some of the advantages to be gained from learning alternative languages to Basic.

The programs themselves also indicate the trade-off between speed and "readability", with Machine Code and Logo being at opposite ends of both scales.

I got a few interesting results when doing the Basic benchtests. The use of a real variable instead of i% caused it to take a little under twice as long to perform the test.

Also changing line 20 with its multiple statements to four lines with one statement per line increased the result by 1 sec.

Many people don't like to see multiple statement lines in programs but they do save a little execution time.

Other languages that should soon be available in NZ for your Amstrad include Cobol, C and a version of Pascal called Turbo Pascal 3.0 – with a name like that it should be good.

New games

Two games that probably compete for the same software buying dollar are Worldcup by Artic and Slapshot by Anirog.

Both are team game simulations with Worldcup being Soccer while Slapshot is a bit more exotic – Ice Hockey.

The problem with team games is that one player has a number of team members to control.

Both these games use the same solution, but one turns out to be a great deal more playable.

The solution is that the team member nearest the ball (or puck) becomes directly controlled by the player and the rest move in a random manner.

Somehow Slapshot seems to do this a lot better.

In Worldcup it seems the man nearest the ball (his shorts are turned white) is always changing so you often find yourself running in the wrong direction.

There are errors in Slapshot – like the spelling of GOAL, the difficulty in swooping behind the net and the lack of control over the goalie.

The game is however one of the few that is really fun to play – especially when two human opponents battle it out.

"Checking" is the term for a rough tackle – if you check too roughly your opponent is left with stars spinning around his head and you are penalised.

Worldcup has omissions – no corners or penalties, but the throw-in isn't too badly done.

The screen jerks when scrolling and tackles are made very difficult as the player with the ball can move as fast as those without.

Worldcup wins on sound but loses on graphics and playability. My choice is Slapshot by a wide margin. ■

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Scrolling on, sideways

by Gary Parker

Glancing through my back issues of Bits and Bytes I see that it is more than a year since I last gave some machine code routines.

So this month's column includes six simple machine code routines concerned with scrolling the Spectrum's screen.

Since the screen picture produced by the Spectrum consists of a high-resolution display of almost fifty thousand dots, any manipulation of those dots would take a long time using Basic.

So machine code is used to move the screen at a speed which appears instantaneous to the eye.

Scroll sideways

The six machine code routines given here are all concerned with scrolling the screen sideways.

The first two routines move objects a whole character space sideways – that is, eigtht pixels left or right.

Since the Spectrum handles the screen picture separately from the attributes (screen colours), these two routines will not move the colours.

Some strange effects can be achieved by making object 'float' over stationary colours.

Most of the time you will want to move the colours along with the objects, so the next two routines scroll the attributes sideways.

You could use these two routines by themselves to make colours slide behind objects, or you could make a screen display out of chunky colour squares along. But when combined with the first two routines true movement of both the screen picture and the colour attributes is obtained.

The last two routines move objects very smoothly across the screen by moving them a pixel at a time.

Since the routines only alter the screen picture's position by a single pixel each time they are called, objects will move eight times more slowly by this method than by using the character movement of the first two routines.

The choice is yours – speed or smoothness.

These routines have been designed to sit in a handy piece of empty memory – the printer buffer.

That means that you should not use a Sinclair ZX printer when using them.

Enter listings

Listing 1 is a loader program designed to POKE the machine code from DATA statements into the printer buffer.

Type in Listing 1, and save it if you want to use it again.

When you run this program it will try to save the machine code on tape once it has poked it into memory.

So either start the tape and allow it to save the routine, or press BREAK when it wants to begin saving.

Once you have Listing 1 entered, add **Listing 2**. Take care not to make any mistakes with the machine code numbers in line 100.

Run the program to POKE the machine code in place and save it.

It will be saved with the name given in the DATA statement ("r scroll" for Listing 1) and you can change this if you like.

Listing 2 moves all objects on the screen right one character. To use the routine, add LET X=USR 23296 in your program, or use it as a direct command. X may be any variable.

Next, replace lines 90 and 100 with Listing 3 and save that. **Listing 3** is identical to Listing 2 except that it scrolls all objects left.

Listings 4 to 7 can be entered in the same way. **Listing 4** moves the attributes one square right, and **Listing 5** moves them one square left.

Scrolling the attributes will leave a 'blank' column down one side of the screen, and this column can be filled with the attribute of your choice. Simply POKE address 23297 with the attribute number. This number is made up of:
INK + 8 x PAPER + 64 x BRIGHT + 128 x FLASH

So for example, if you wanted blue paper and white ink the attribute would be 15. POKE 23297,15 would do the trick.

Listings 6 and 7 move objects by a single pixel. It is not possible to move the attributes by a single pixel, so if you want smooth scrolling you should use a two-colour display.

Alternately, you could move the attributes one square across each time you have moved the picture eight pixels across, but since the movements don't

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synchronise this can be an eyesore.

To load any routine from tape into memory, use LOAD""CODE. Then you can use the routine with LET X=USR 23296 as usual.

If you want to use more than one routine at a time, you will have to move routines around in memory.

For instance, to use a picture scroll routine and an attribute scroll routine together, you should move the picture scroll routine so that it sits above the other routine in memory.

The easiest way to do this is to load the attribute routine as usual, and then load the picture routine into a different location by specifying a location in the LOAD command.

If you omit the last 201 of the attribute routine and put the other routine straight after it, both routines will be executed at once with one USR call. ■

Prog. follows

```
 10 REM Listing 1 (Loader)
 20 RESTORE: READ n$
 30 LET a=23295
 40 LET a=a+1: READ m
 50 IF m=-999 THEN GO TO 80
 60 POKE a,m
 70 GO TO 40
 80 SAVE n$CODE 23296,(a-23295)

 90 REM Listing 2
100 DATA "r scroll",62,192,22,0
,33,255,87,6,31,43,94,35,115,43,
16,249,114,43,61,32,242,201,-999

 90 REM Listing 3
100 DATA "l scroll",62,192,33,0
,64,85,6,31,35,94,43,115,35,16,2
49,114,35,61,32,242,201,-999

 90 REM Listing 4
100 DATA "r attr",62,62,33,255,
90,14,24,6,31,43,94,35,115,43,16
,249,119,43,13,32,242,201,-999

 90 REM Listing 5
100 DATA "l attr",62,62,33,0,88
,14,24,6,31,35,94,43,115,35,16,2
49,119,35,13,32,242,201,-999

 90 REM Listing 6
100 DATA "r pixel",14,192,33,0,
64,6,32,183,203,30,35,16,251,13,
32,245,201,-999

 90 REM Listing 7
100 DATA "l pixel",14,192,33,25
5,87,6,32,183,203,22,43,16,251,1
3,32,245,201,-999
```

Shades of grey

by Warren Hayman

Here are the listings and samples of a routine I wrote called "Shade".

It is a machine code routine that will turn a colour picture on the Spectrum screen into a black and white picture using different densities of pixels to represent the various colours (much like a news paper photograph).

This picture can then be printed out to form a resemblance to a colour hard-copy.

The different pixel densities are stored in the printer buffer so must be re-set after every time you say COPY.

If you wish to alter these densities the data is held in lines 45 (black) to 80 (white) and can be changed like a normal user defined graphic character.

Once you have typed in Listing 1 (substituting some lines for those in Listing 2 if you have a 16K Spectrum) and typed RUN there should be a brief pause while the code is poked into memory.

When this is complete the border should go pale blue indicating that you should load in a Screen$.

When you have done this, pressing "c" will shade and print out your picture while any other key will just shade it.

The computer then allows you to load another Screen$.

Prog. and sample follow

Listing 1

```
  4 CLEAR 59999
  5 FOR n=60000 TO 60096: READ a: POKE n,a: NEXT n
 10 FOR n=60100 TO 60187: READ a: POKE n,a: NEXT n
 15 FOR n=23312 TO 23375: READ a: POKE n,a: NEXT n
 20 REM shade routine
 25 DATA 213,33,0,91,6,8,26,238,255,119,197,1,8,0,9,238,255,119,237,66,35,20,19
3,16,237
 26 DATA 209,213,22,88,26,230,7,23,23,23,17,16,91,131,95,6,8,26,166,119,19,35,1
6,249
 27 DATA 209,213,22,88,26,230,56,17,16,91,33,0,91,131,95,6,8,26,166,119,19,35,1
6,249
 28 DATA 229,17,0,91,6,8,26,182,119,19,35,16,249,225,209,6,8,126,18,20,35,16,25
0,201
 30 REM shade runner
 35 DATA 33,124,234,54,88,33,148,234,54,88,17,0,64,6,0,197,213,205,96,234,209,1
93,19,16,246
 36 DATA 33,124,234,52,33,148,234,52,17,0,72,6,0,197,213,205,96,234,209,193,19,
16,246
 37 DATA 33,124,234,52,33,148,234,52,17,0,80,6,0,197,213,205,96,234,209,193,19,
16,246
 38 DATA 33,0,88,6,3,197,6,0,54,56,35,16,251,193,16,245,201
 40 REM shade data
 45 DATA 255,255,255,255,255,255,255,255
 50 DATA 255,187,255,238,255,187,255,238
 55 DATA 255,170,255,170,255,170,255,170
 60 DATA 119,170,221,170,119,170,221,170
 65 DATA 136,85,34,85,136,85,34,85
 70 DATA 0,85,0,85,0,85,0,85
 75 DATA 0,68,0,17,0,68,0,17
 80 DATA 0,0,0,0,0,0,0,0
100 BORDER 5: LOAD ""SCREEN$ : BORDER 7
102 PAUSE 0
105 LET i$=INKEY$
110 RESTORE 45: FOR n=23312 TO 23375: READ a: POKE n,a: NEXT n
115 LET a=USR 60100
120 IF i$="c" THEN  COPY
125 GO TO 100
9998 SAVE "shade": SAVE "shade"
9999 VERIFY "shade": VERIFY "shade"
```

Listing 2

```
  1 REM
  4 CLEAR 29999
  5 FOR n=30000 TO 30096: READ a: POKE n,a: NEXT n
 10 FOR n=30100 TO 30187: READ a: POKE n,a: NEXT n
 35 DATA 33,76,117,54,88,33,100,117,54,88,17,0,64,6,0,197,213,205,48,117,2
09,193,19,16,246
 36 DATA 33,76,117,52,33,100,117,52,17,0,72,6,0,197,213,205,48,117,209,193
,19,16,246
 37 DATA 33,76,117,52,33,100,117,52,17,0,80,6,0,197,213,205,48,117,209,193
,19,16,246
 38 DATA 33,0,88,6,3,197,6,0,54,56,35,16,251,193,16,245,201
115 RANDOMIZE USR 30100
```

NEWed programming

by Joe Colquitt

Recently I answered a query about EPROMs and cartridges.

The vectors that allow the use of cartridges have, like most things, advantages and disadvantages.

The major advantage is the autorun facility.

However they can be a pain when you crash a program and RESTORE won't get you out of it.

In this situation, there are two options. Switch off or use a RESET key.

The first is not very palatable if you've been working for some time on a machine-code routine and made the fatal error of not saving it before you ran it.

Or you could have been writing a BASIC program that tried to use undefined variables (a crash will occur because an undefined variable will have a value of 0. If you used the statement POKEA,10, and A had not been defined, eg A=54272, then you would be POKEing location 0000, the Data Direction Register, and your machine will just curl up and die).

The second alternative makes use of the RESET line that links all the C64 chips, drives, printers etc.

Grounded

When this line is grounded, a complete initialisation takes place, except that all data above location 2050 is preserved.

Locations 2049 and 2050 are zeroed because a NEW is performed.

The cassette buffer, stack and zero page are cleared. If you had any ML in those areas you can kiss it goodbye.

The reason I mentioned cartridges is that if there is a cartridge header at $8000 (32768) the machine will not RESET, but jump to the address at $8000-$8001. So grounding the RESET line will not always work.

To get over this, a second 'RESET' key can be installed.

This grounds EXROM, so that when the RESET key is pressed, the machine ignores the cartridge header and initialises.

UnNEWed

Unfortunately, because a NEW has been performed, any BASIC program in memory has to be unNEWed.

It is important not to use any variables before reclaiming, as they will only be written into the program space you are trying to preserve.

The following line will allow you to unNEW a program:

POKE46,XXX:CLR:POKE2050,255:SYS42291

XXX is what was in location 46 before you RESET, plus one. SYS42291 performs a 'relink BASIC'.

But what if you don't know how long your program was?

Either have a guess, or load a small ML routine that restores the program exactly. Type in Program 1 and RUN.

The ML is totally relocatable, so any address between 49152 and 53150 will do as the prompt answer. The address is included in the SAVEd filename.

After the ML is read into memory, the rountine is SAVEd, so have a disk or tape ready.

When the need arises to unNEW a program, LOAD"UNNEW XXXXX",device,1. NEW,SYSXXXXX and the BASIC portion of memory will be restored.

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Reset key

The circuit diagram below is for one RESET key.

Make two up if you want RESET and Cartridge RESET.

The only difference is the connection of the positive side of the switch.

The capacitor makes a 'soft' earth for the RESET line, and will not reset the drive. This is not normally a disadvantage, and can be handy if you have data in one of the drive's buffers.

The capacitor can be omitted if a drive reset is needed.

The resistor should not be omitted, as directly grounding the reset line can cause chips to fail.

Blow-ups

Most semiconductor devices have a safe limit for resistance between output and ground, and digital ICs are no exception.

The occasion could arise that the current dump resulting from a dead short to ground could blow part of the chip, and they aren't cheap.

I think the British model 64 doesn't use IC sockets, which makes replacement of a chip a very large nuisance.

I know people who ground the reset line directly with no ill effects, but accidents happen...

PROGRAM 1

```
10 INPUT"WHERE DO YOU WANT IT";A
15 F$="UNNEW"+STR$(A)
20 FORI=0TO72:READML:POKEA+I,ML:CK=CK+ML
25 NEXT:IFCK<>7473THENPRINT"ERROR":END
30 A1=A+73:H1%=A/256:L1=A-H1%*256
35 H2%=A1/256:L2=A1-H2%*256
40 PRINT"■POKE52,20■:POKE56,20■
45 PRINT"■POKE43,"L1";POKE44,"H1%
50 PRINT"■POKE45,"L2";POKE46,"H2%":CLR"
55 PRINT"■SAVE"CHR$(34)F$CHR$(34)",8,1"
60 POKE198,5:POKE631,19
65 FORI=0TO3:POKE632+I,13:NEXT
100 DATA160,3,200,177,43,208,251,152,56,101
105 DATA43,160,0,145,43,133,45,200,165,44
110 DATA145,43,133,46,160,0,177,45,133,47
115 DATA200,177,45,170,5,47,240,9,134,46
120 DATA165,47,133,45,136,240,235,24,165,45
125 DATA105,2,133,45,133,47,133,49,165,46
130 DATA105,0,133,46,133,48,133,50,162,128
135 DATA108,0,3
```

How to write ZOTO!

by Graeme Fleming

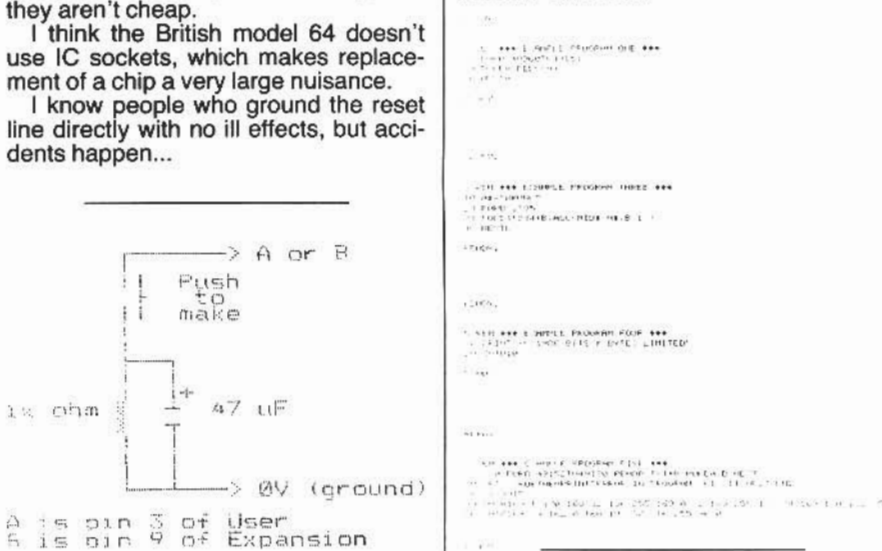
Most Commodore 64 enthusiasts know that it has 64K of Random Access Memory or RAM, yet only 38K is available to the BASIC user.

The extra 26K can be used only by machine code programs after they have turned the Read Only Memory or ROM (where BASIC's instructions are) off. This is done by altering memory location 1, often called R6510.

When you PEEK a ROM location you will receive the contents of that location, but when you try to POKE a number into it you will seem to get no effect, as the location will stay the same.

This makes sense as ROM is, as the name suggests, for reading only.

But what you probably didn't realise is that you poked the number into the RAM which comes into use when that part of ROM is turned off.



Try it using locaton 40960, the first byte of BASIC ROM, ie.

PRINT PEEK (40960)
POKE 40960, 10
PRINT PEEK (40960)

Example program number one PEEKs all of the BASIC ROM, POKEing it into the memory which would become active if BASIC were to be turned off.

The bright sparks among you (the ones who got through the first paragraph) will now realise that by turning off the BASIC ROM and replacing it with the RAM which we have just filled with the contents of the BASIC ROM, BASIC will still work. Basic eh?

So after RUNning program one, turn off the BASIC ROM and power-up the RAM by changing R6510 from 55 to 54, ie:

POKE 1, 54

You are now using a RAM-based BASIC, the advantage being that you can change it.

While large alterations are only for machine language programmers, everyone can have fun changing error messages and commands.

Your "customized" BASIC can then be saved on tape for fooling friends and protecting against piracy at a later date.

First of all let's alter things a little, remembering that switching the computer off, then back on will re-power BASIC ROM, bringing things back to normal.

Command Sector

BASIC has quite a few error messages, commands and funtions – the text of these is found from address A09E (if you don't understand hex numbers, see my September '85 scrawl for an explanation) to A388.

Example number two shows this data, commands and functions from A09E (41118) to A190 (41373) and error messages from A19D (41373) to A327 (41767).

The Power-up CBM BASIC message you receive when you turn your computer on is from A004 (40964) to A00B (40971) and the words error, break, in and ready are found in an area from A36B (41835) to A388 (41864).

After running example program one and POKEing 1 with 54, type in and run example program three. Type some nonsense and press return to acquire a syntax error?

Change line number 10 to the following, run it, and try another error.

10 INPUT "ENTER A FIVE LETTER WORD";A$

Using example two, find the address of a character in a command, convert the address to decimal, then poke the

address with the ASCII code of a letter you wish to replace it with.

Lets change the "G" in GOTO. It is in the third line down one character in from the margin.

Note how the last "O" appears as a graphic character – it is, in fact, a capital when the computer is in upper and lower case mode. Because it is one character in from the margin, you add one to the address to its left, A0C0, making A0C1. Convert this the to decimal location 41153. Now type:

POKE 41153,90

GOTO should now be ZOTO!

Try it out with example program four. When you have several commands (it pays to take note of them as you go) type in and run example program five, altering the commands and functions as you go.

Have a tape ready, as it SAVE's your customized BASIC.

If you want to LOAD it at a later stage, do so normally, and once loaded turn off the BASIC ROM by typing

POKE 1,54

To turn the ROM back again type:

POKE 1, 55

By using these two commands your version of BASIC can be changed from within a program. You may also notice that all the commands in your program will change whenever you switch.■

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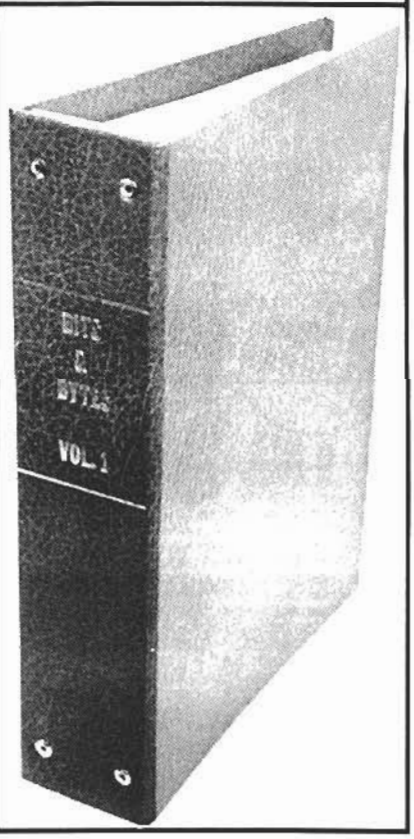

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New Masters and software slaves

by Pip Forer

Hot on the heels of the BBC B+ expansion comes news of Acorn's answer to the mourners at its premature wake: the new Master series.

This is an attempt to do what no other computer manufacturer to date has had the courage to do: provide a radical upgrade path for its products with minimal built-in obsolescence.

Apple made a clean break between its II series and the Macintosh while Commodore have a history of frequent model changes with limited compatibility (the C64 and C128 excepted).

To date IBM's developments on and from the PC have hardly been revolutionary, and not always as compatible as intended.

Acorn has gone for a path of compatible evolution with significant options for radical change.

Five new models have appeared, bearing the strong imprint of two factors: Acorn's truncated development of their business machines and the current trend of market demands.

Big steps

Almost in order of power the new releases are the 128, 128 Turbo, Master Econet Terminal, 512 and Master Scientific.

The 128 (reviewed fully elsewhere in this issue) is a significant step, far from just being an expanded (128k) B+.

It is closely related to model two, the Master Econet Terminal which, at present, is a BBC 128 cut down for network use. Between them these two models could be argued to bolster the bottom of the range.

The exciting development on top of this however is the 128 Turbo which is provided with a built-in 65C102 second processor. This chip combines a larger addressing range with 6502 compatibility and offers a 4 MHz clock speed.

One cited benchmark gives the Turbo four times the speed of a standard BBC B and twice that of an IBM PC-AT.

One suspects this is a BASIC to BASIC comparison, which would favour the Acorn machine somewhat, but clearly the Turbo is winding the 6502-based development path up another notch higher.

16/32 bit options

The 512 is a very different beast, and is Acorn's reaction to the 16 bit bandwagon.

It is based on the 80186 chip, an enhanced 8086, which Philips amongst others have recently adopted for educational use.

Like the Philips YES the 512 also runs with a WIMPs interface using GEM and Digital Research's DOS+, (Concurrent DOS optional).

This combination of operating sytstem, chip and icon-based front end is an enhancement on the MS-DOS/8088/GEM combination.

DOS+ gives MS-DOS similarity rather than full-blown compatibility but has several pleasing features that make it more human.

The strength of the 512 compared to some other entries in this market however is compatibility with existing installations. The system is based around Econet (although presumably with a DOS+ file server on the network) and retains compatability with the BBC B series through optional software disabling of the 80186.

If the 32016 BBC BASIC conversion is anything to go by (see December column) there will be an 80186 version of BBC BASIC which will also pick up existing BASIC programs under Acorn DOS with minimal fuss.

The final machine release is the Master Scientific (known in other guises as the 32016 second processor or the Cambridge Workstation). This will run along the lines of the 32016 second processor reviewed in the last two BBC columns. Its standard memory size is undetermined at present but is likely to be half a megabyte.

This is an unusually wide yet integrated range of machines from a microcomputer manufacturer and looks well-crafted to Acorn's market position.

The 512 opens doors to a wide variety of software in the general Intel-based market, the 128s expand the flexibility and power of the standard workstation.

Questions that arise are: how the bigger machines will be able to share an Econet or file server, how compatible will be important software across machine types and whether the larger memory is going to be used to offer new graphics options?

The existing 4 colours/40 columns (or 16/20 or 2/80) can actually handle a lot of educational software needs but increasingly sophisticated user interfaces need enhanced facilities.

The release of these models over the next few months should provide answers to some of the queries.

Software news

The recent national in-service course for teachers held at Palmerston North included a display of software sponsored by the British council which brought out some interesting new software for the BBC.

For a start the growth in primary school use of BBC equipment, which started later in the UK than the secondary sector, is spawning some exciting material based on upper primary/intermediate curricula.

Some of the project-based material, such as The Mary Rose and Expedition to Saqarra, look particularly good.

There are strong offerings in other fields.

AMX demonstrate growing signs of producing more than a gimmick with their mouse and have three interesting extensions. The least significant is a colour version of their Art program.

Of more interest is Zircon, a 3-dimensional display and editing program for wire-frame graphics (which includes a mouse-driven editor and the ability to bring creations into your BASIC program).

Most intriguing is PageMaker, a program to produce small handouts which combine text in various fonts, graphics and flexible column layout within the same document.

Systems like this are allowing a whole new approach to school publishing and as chalkface computer power and memory size increases so these systems will offer more and more professional results.

Finally there are further developments in viewdata/teletext emulators; the sort of programs that let you make your own Editel, Ceefax or Prestel systems.

Information skills and school information systems play a more significant role in the UK education system than here, where we seem wedded to more restricted views of educational computing. However this may be an area of considerable growth over the next few years.

The school information system, as a taste of the information technology adults will increasingly find in their workplace and homes, is an idea just waiting to happen. ■

D-I-Y BASIC — Part Two

How keywords work

by Joe Colquitt

Part One (in February issue) of this series set the operating system up, and got seven new keywords working.

In Part Two, I'll give you an outline of how the system works, what you can do with it, and general formulae for making your routines work with BASIC.

The keyword routines that I'm presenting are in a suggested format and location. If you do use them, they can be re- located.

Just make sure that the routine address table is adjusted, or if under a different name, the keyword table.

It may be advisable to make a memory map of what is where.

The three things essential to be included in the final set-up are the o/s (operating system), the address table and the keyword table.

It is necessary to have an ML monitor if you wish to do any serious work, and I could advise you on monitor types.

The bulk of the new o/s is a copy of the token detection routine in BASIC. It's been re-designed to detect keywords with values of 204-254 and execute them. It also contains new (optional) error messages.

Initialisation

When a program is running, each statement passes through a short ML routine called CHRGET, located at address 115 ($0073 hex). CHRGET is installed by the ROM routine at $E3E2 as part of the power-up initialisation.

Here it is examined byte by byte to determine what sort of statement it is (a statement is usually thought of as what you'd find between two colons in a program).

If you look at the data from Part One, you'll notice 76,115,0 or 32,115,0. These are ML GOTOs and GOSUBS to CHRGET.

As CHRGET works through a program, it sets certain flags if it finds a " or a REM. If neither of these is set, and it then comes across a value of 151, it knows that it has found the keyword POKE. Note keyword, not word.

If it had found the word POKE, it would be as an ASCII string, meaning stored as the sequence of numbers 80 79 75 69.

Because the " or REM flag is not set, it also knows that you haven't got reverse shift W in a PRINT statement or REM.

This system works for all the keywords, each with their distinct token value, between 128 and 203 (PI=255). As soon as it finds a keyword, off it goes to process it.

Our new o/s has to get to the statements before normal BASIC does, otherwise normal BASIC will think we're trying to put a whole load of graphics characters into statements. That was the purpose of changing the vectors at $0304-$030B.

So, we've got BASIC recognising our tokens. Now what? Well, we do what BASIC does. Look up the address of the routine and execute.

Keyword table

When the o/s finds a keyword, it does so by way of the keyword table.

The position of the keyword is retained in an index, and used to look up the address of the keyword's routine.

This is stored as two bytes (lo/hi) in a separate table, in the same order as the keywords. If they weren't in the same order, the o/s would be looking up the wrong address.

Did you spot that the addresses for the routines are the address-1? This is because the address is stored on the stack and treated as a RETURN address, i.e. the machine pretends that the routine address is where program flow should continue.

In this situation, the Program Counter adds 1 to the address, thus matching it to the actual start of the routine. (Don't worry about it.)

Finally, the 64 is ready to execute our new keyword.

Depending on what sort of keyword it is, there are several ways of passing parameters:—

a) CLS routine is based on those for CLR, NEW etc.

After the o/s has found a keyword, it also finds what is immediately after it. If there is a parameter, this ends up in the accumulator.

At the start of your routine, you test for the condition of the accumulator, or ignore it.

For keywords such as CLS, CLR etc, there must be no parameters present, so the accumulator is tested r a non-zero state. If A<>0 the default SYNTAX ERROR is printed.

See Program 3.

b) SENx. A test for a legal argument (no, not like Perry Mason) is made.

Any errors are handled by the new error system.

I haven't put an illegal value test for BDR or BCK.

The high byte is ignored, and a value 0-255 is used. The reason is that 53280 and 53281 are ANDed with 240 anyway, so the register has only 16 effective settings.

See Programs 4a and 4b.

c) SPHx,y. See Program 5

d) LOCx,y,z. This is where you get to be a bit creative.

Some COMPUTE! programs use up to 8 parameters. I'm thinking of the 3D Bitmap utility (11/85) in particular.

It's unlikely that you'd need to go that far, but the method is very simple.

See Program 6.

First, a breakdown of the ROM routines that are called from various new routines. Next month, a selection of sprite keywords.

Sprite moving routines using the new words (SPH SPV) show a 20- 25% speed increase over POKEing.

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SPHx,y position spritex (0-7) at horizontal y (0-255)
SENx x=0-255. Enable sprites.

1) $AD8A, get next non-string value.

2) $B7F7, convert floating point (flp) number to an integer stored as lo/hi in locations $14/$15. A very useful routine to call.

It diseminates the argument after the keyword, and allows you to test for ILLEGAL QUANTITY.

Program 1 shows the last few instructions of the routine. the important point is that the high byte value of the parameter is in $15, the accumulator and $65. The low byte value is in $14, the Y register and $64.

3) $B7EB, get address into $14/$15 and argument into the X register. Called for keywords like POKEx,y. The routine consists of four calls. See Program 2.

4) $AAB5 is halfway through the PRINT keyword routine.

```
Program 1

B801 JSR$BC9B:convert
B804 LDA$64   :
B80A LDY$65   :
B800 STY$14   :store in result field
B80A STA$15   :
B80C RTS      :
```

```
Program 2

B7EB JSR$ADBA:get non-string value
B7EE JSR$B7F7:address into $14/$15
B7F1 JSR$AEFD:check for ','
B7F4 JMP$B79E:get argument into X


Program 3 eg CLS

C459 BNE$C460 :SYNTAX ERROR
C45B LDA#$93  :? clear screen

C45D JSR$FFD2 :
C460 RTS      :

Program 4a eg BDR=

C441 JSR$ADBA :evaluate expression
C444 JSR$B7F7 :convert flp
C447 LDA$14   :get low byte
C449 STA$D020 :store in border register
C44C RTS      :

Program 4b eg SEN=

C4D0 JSR$ADBA :evaluate
C4D3 JSR$B7F7 :get # into $14/$15
C4D6 CMP#$00  :test for high byte >0
C4D8 BNE$C4E1 :go ILLEGAL SPRITE
C4DA TYA      :get $14
C4DB STA$D015 :store in 53269
C4E0 RTS      :
C4E1 LDA#$04  :index error
C4E3 JMP$C2F0 :handle error

Program 5 eg SPH=x,y

C4E6 JSR$B7EB  :get address, argument
C4E9 CLC       :
C4EA LDA$15    :test > 0
C4EC CMP#$00   :
```

```
C4EE BNE$C4E1  :ILLEGAL SPRITE
C4F0 LDA$14    :test > 8
C4F2 CMP#$08   :
C4F4 BPL$C4E1  :ILLEGAL SPRITE
C4F6 ASL       :STEP2 (D000,D002,D004..)
C4F7 TAY       :set index
C4F8 TXA       :get argument
C4F9 STA$D000,Y:into register
C4FC RTS       :

Program 6 eg LOCx,y,z

C420 JSR$B7EB:evaluate LOCx,y
C423 LDA$14  :check lo < 40
C425 CLC     :
C426 CMP#$28 :
C428 BCS$C439:COLUMN ERROR
C42A TAY     :if legal
C42B CPX#$1A :check arg < 26
C42D BCS$C43C:ROW ERROR
C42F CLC     :'SET' mode
C430 JSR$FFF0:place cursor
C433 JSR$AEFD:check for next ','
C436 JMP$AAB5:print string or variable
C439 LDA#$01 :
C43B BIT$02A9:C43C=LDA#$02
C43E JMP$C2F0:handle error

Program 7 error handler

C2F0 ASL       :double index

C2F1 TAX       :
C2F2 LDA$C2C0,X:get address of message
C2F5 STA$22    :into store
C2F7 LDA$C2C1,X:
C2FA STA$23    :
C2FC JMP$A447  :print it
```

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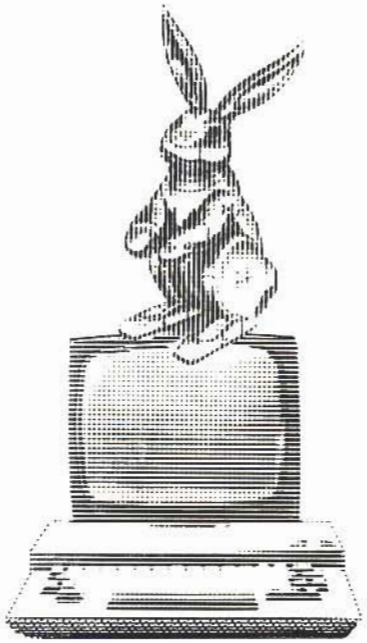

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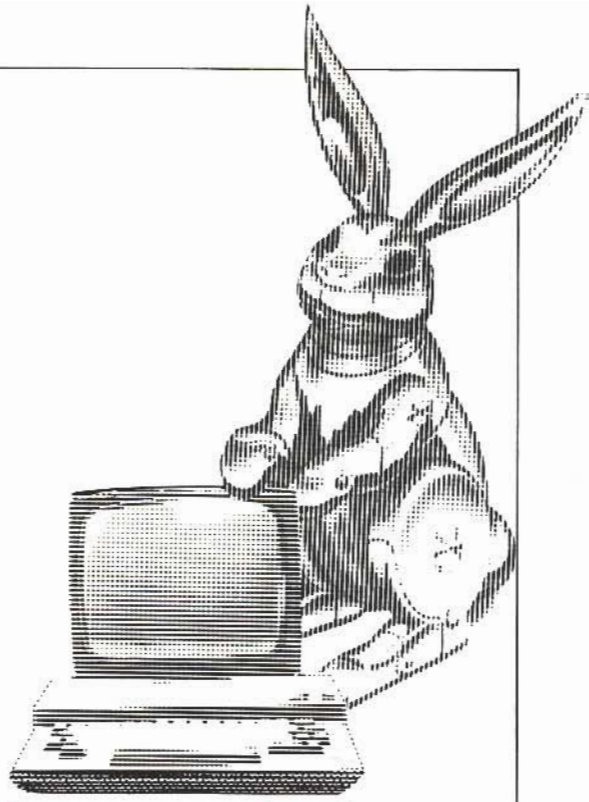

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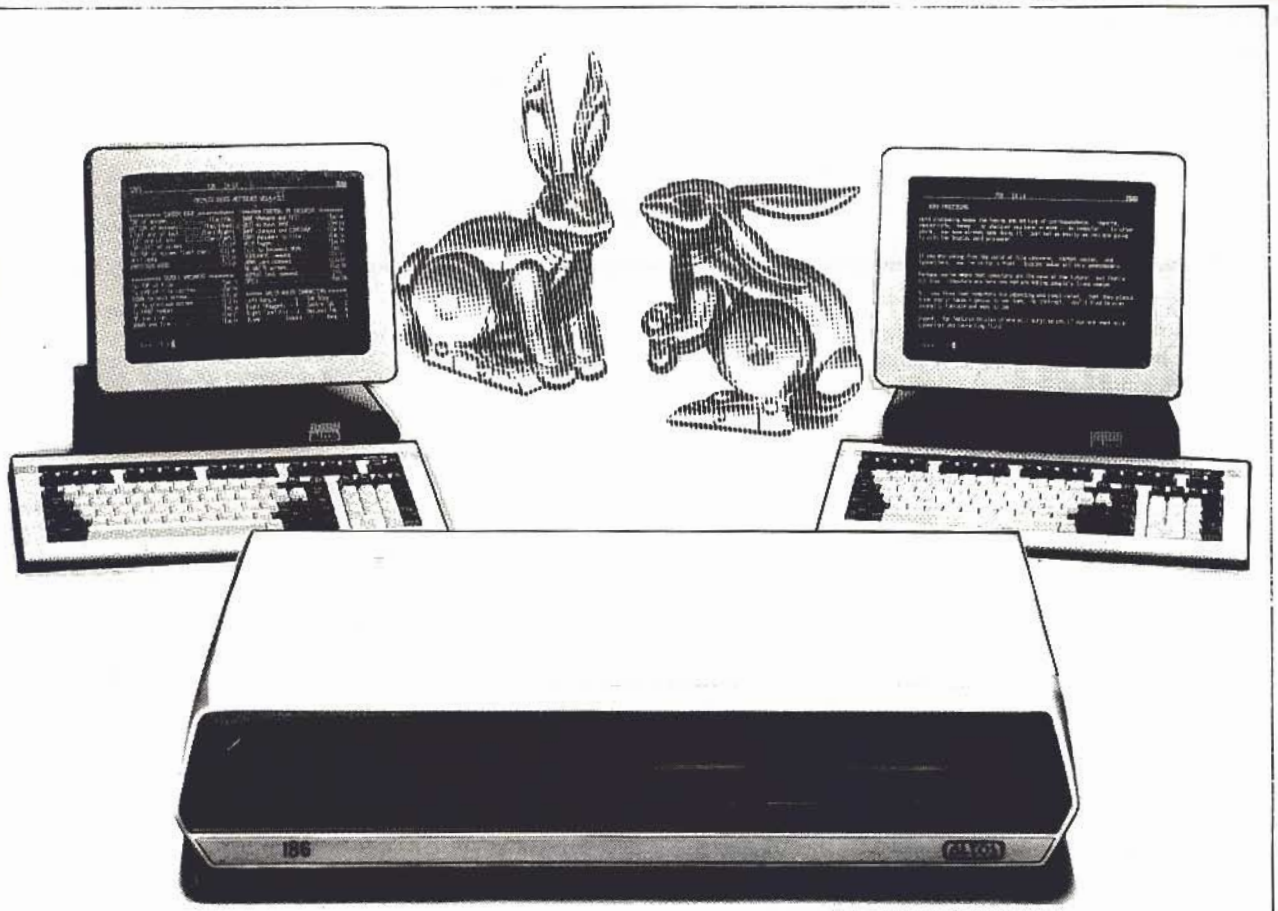

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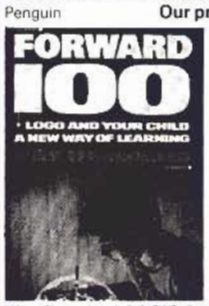

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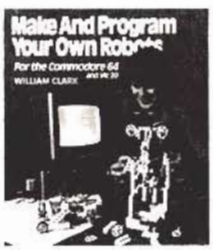

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Collection of 61 BASIC programs covering such office tasks as interest calculation, financial analysis, depreciation, property management and real estate, cash receipts and disbursements, job cost, payroll. All programs documented for implementation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

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On-Line Computing for Small Businesses - Silver's Wall
Maurice A. Silver, John Jeacocke & Ray Welland

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The ABCs of 1-2-3
Chris Gilbert & Laurie Williams

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Taking care of Business with your Commodore 64
David P. Dautenhahn

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Electron

Getting the Most From Your Acorn Electron
Clive Williamson

Comprehensive introduction to the Electron, exploring its potential and possibilities to suit each owner's needs. Intended to complement the user guide, and contains many tips on programming, software and the general use of the computer. Some features and accessories not documented in the user guide are investigated.

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Kay Ewbank, Mike James & S.M. Gee

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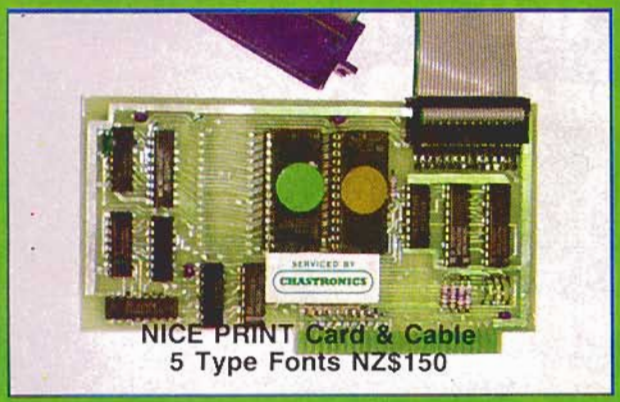

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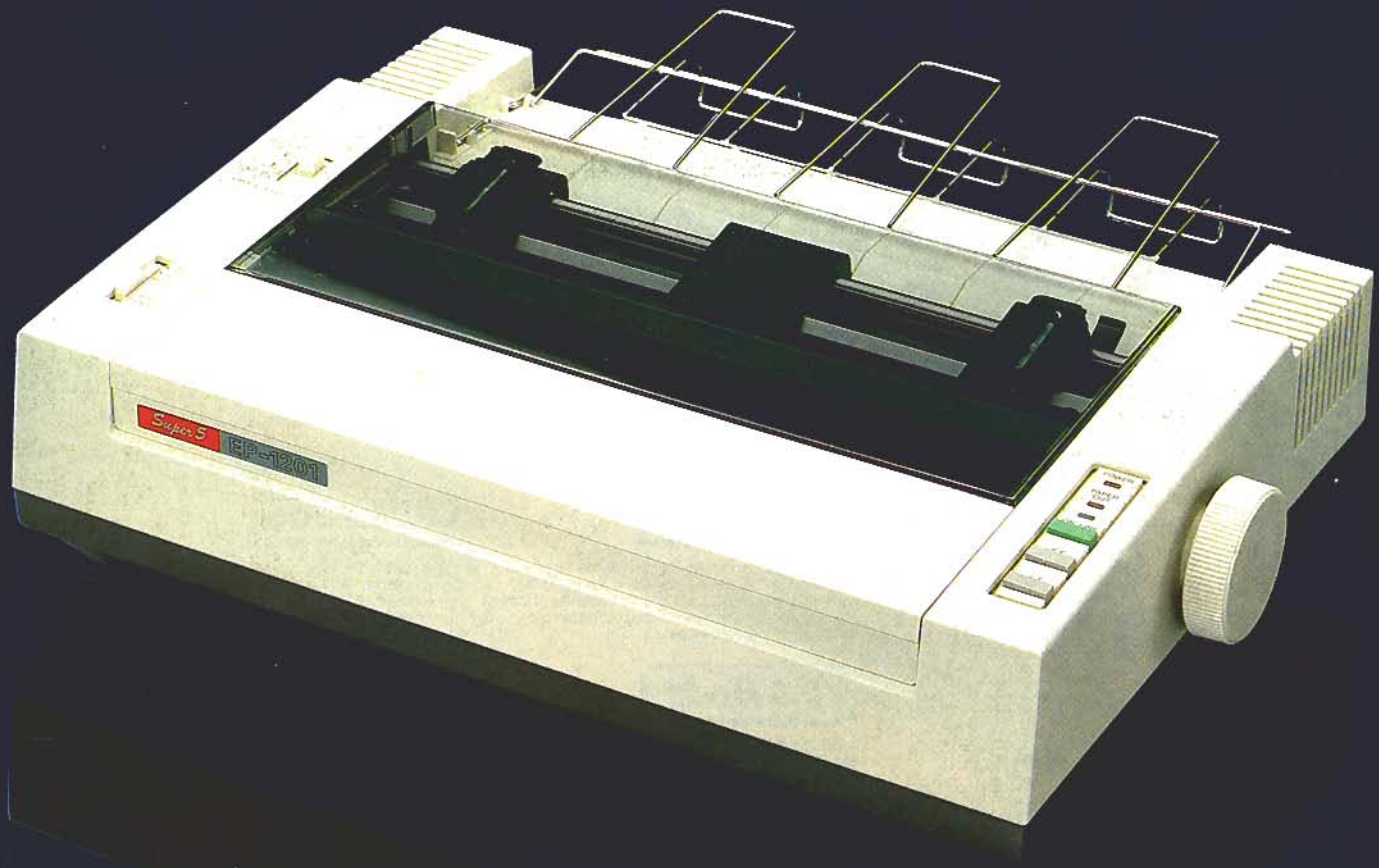

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