your computer

FOR BUSINESS AND PLEASURE

December, 1982 $2.00* NZ$3

PORTABLE COMPUTERS

GETTING SMALLER AND SMALLER AND SMALLER AND SMALLER

BUMPER ISSUE – PLUS BONUS 16 PAGE POCKET PROGRAMS LIFTOUT • THE COMING PORTABLES • TESTED: HP:75C AND KAYPRO II • LANGUAGES: PL/1 AND LISP • IBM PC • MULTI-TASKING CP/M

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The information race

In a world where the speed of conveying information is so vital, Ampec have the fast, quality printers to help you move with the times.

The Ampec Mercury 8510 provides 2" to 9½" paper widths and combines a print speed of 120 cps with high resolution graphics (144 x 144 positions per square inch maximum). It lets you switch select for unidirectional or bidirectional print and all switches for setup selection are placed together.

For greater capacity and performance at a surprisingly low price you can choose the Ampec Mercury 1550. This high-quality matrix printer accommodates up to 15½" paper width and can print up to 231 columns at a fast 120 cps.

Quality printing, quietly and quickly produced, is now within your reach, through the Ampec Mercury matrix printer range.

AMPEC

The absolute in peripheral thinking.

inside your computer

Vol 2, No 6.
December, 1982.

special

news

features

for beginners

business

reviews

Stirring the micro market: Hewlett-Packard launches its 75C (or D, as the machine on our cover is labelled — although such a model hasn't been announced yet!). We have the full story on this powerful, pricey little box of tricks on page 28.

The world according to Clive Sinclair: we talk with the man who has put microcomputers into more homes than anyone else outside the USA. Martin Hayman's profile begins on page 44.

departments

editorial

From time to time, we publish brief case studies of how individuals and companies have installed and are using computers. These success stories show how people are really putting the new technology to use in often imaginative ways.

There's another side to the coin however; some organisations have been lumbered with machines that are either disappointing or just don't work at all. While the manufacturers are only too happy to bombard us with pieces of paper telling how their products have upped sales and lowered costs at the Acme Widget Company, they are understandably coy about their disasters.

We are interested to hear from those whose forays into the silicon age have been less than successful. In some cases, we may be able to help; sometimes, we may not. But in any case, your experience will be of help to others. (And if you fear reprisals, names will be changed to protect the guilty!)

All is not well in the rose garden. Although computers can do some amazing things and are an important business tool, they are not the incredibly foolproof universal panacea the salesman's glib comments would have you believe.

By cataloguing the disaster areas, we should be able to concentrate better on the areas where computers can be used successfully. Our business readers are already smarter and more successful than the average computer user — we aim to keep them that way!

Here it is again, another year gone by, and we're all busy stuffing turkeys and so on. It's been an interesting year, a successful one for Your Computer, *and we hope that our advertisers, and indeed our readers have prospered despite the general economic gloom. We'd like to wish you all a Merry Christmas and a happy New Year.* □

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Merry Christmas!

City Personal Computers wishes all its customers a very Merry Christmas and a Happy New Year, with the greatest range of computers, accessories and software! (ALL PRICES INCLUDE SALES TAX)

Star Printer

The best low cost printer available. 80 c.p.s. with bi-directional printing. Friction and tractor standard. Centronics parallel interface. $595

APPLE SOFTWARE

We sell far more software than can be listed here – over 400 titles! The selection below should wet your appetite, but come in to see the whole range.

ACTION GRAPHICS		ADVENTURE	
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STARBLAZER	$38.95	DEADLINE (NEW!!)	$63.95
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THE COMMODORE

VIC-20 COLOUR COMPUTER

NOW $299

The Commodore VIC-20 is the best value available and we have Sydney's widest range of software and accessories for it.

VIC-20 Computer	~~$399.00~~
Arfon VIC expander	$249.50
16K Expansion cartridge	$129
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PLUS LOTS OF SOFTWARE

OSBORNE

THE PORTABLE COMPUTER

We are THE Osborne experts and have the complete range of hardware and software. Here are a few examples:

Cardbox Database	$290
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Still the most widely-used business program and now with many expansion options:

VISICALC 3.3	$360.00
V.C. EXPAND (for RAM cards)	$134.00
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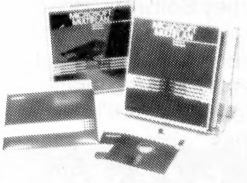
STOP PRESS – STOP PRESS

80 COLUMN VISICALC

Yes! Now you can use your Vision 80 Card to give 80 column work sheet.

VISICALC 80 COLUMN UTILITY $79.00



MICROSOFT MULTI-PLAN

New Generation spreadsheet program. Features 80 column display as standard, multi-sheet consolidation and lots lots more!! For Apple II, Osborne and CP/M formats $365

APPLE CARDS

Get more out of your Apple with these quality expansion cards:

DIGITEK COLOUR CARD WITH RF MODULATOR	$235	SATURN 64K RAM CARD	$595
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MICROSOFT Z80 CARD WITH CP/M	$449	MICROBUFFER PRINTER CARD, 16K	$385
T.K.C. JOYSTICK	$74		

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CROWS NEST
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CITY PERSONAL COMPUTERS

your computer news

Newsagent System

DENMAN-CROFT Software has just released NAPS, a Newsagent's Account-Processing System.

NAPS is a fully integrated software package that addresses the most time-consuming area of newsagency management — paper accounts. It allows up to six papers and 15 magazines for each customer. Papers may be delivered on any day or days of the week. NAPS handles holidays and price variation as well. Over 300 accounts per hour are calculated and printed by NAPS.

Written in CBASIC, the system currently runs on the Osborne 1 and will be available shortly on other hardware.

For more information, contact Mark Fletcher, Denman-Croft Software, Suite 11, 285 Carlisle Street, Balaclava, Vic, 3183, or phone (03) 527 3443. □

Adelaide Merger

SEVERAL well-known but small Adelaide software houses have been incorporated as SBS Pty Ltd.

The new company's managing director, Peter Hartley, said the merger combined Peter Hartley Software, Hope Software, P.H. Com-Soft, Freethinkers and the Great Australian Byte into a single, viable operation.

SBS has acquired total ownership of Hope Software's Commodore-based CAI, a computer-aided instruction system currently in use at the School of Biological Sciences, Flinders University; Transpak, a complete manifesting, invoicing, debtors and creditors system for independent transport operatives; a funeral debtors package; and the Epsom PED, a personal equine database system for the storage, retrieval and analysis of race-horse track and genetic histories.

SBS has also acquired Peter Software's touchtype, a touch-typing course for TRS-80 owners; Comparts, spare parts, stock and inventory control system for Commodore; Maintain, a motor vehicle service and maintenance recall and scheduling system for Commodore; Estimeit, a job-estimating system originally developed for the printing industry but with applications in all jobbing trades; and Trader II, an integrated invoice-driven inventory, creditors, debtors and sales tax analysis system for small wholesalers.

From the Great Australian Byte comes another horse-racing package, Micromint, and from Freethinkers comes the medical billing system and Directory, an order debtors control package for directory publishing houses.

SBS has also been appointed sole Australian distributor for the GTX chip, a new utilities retro-fit chip for 80-column Commodores. □

The Organiser

FDP SOFTWARE, a division of Fletcher DP Services, has been appointed the sole Australian distributor of the Organiser by its American developer, Conceptual Instruments.

The Organiser is a hardware/software package for the Apple and IBM-PC and retails for $320. It puts all desk-top tools together: Appointment calendar, index cards, notepads, calculator, programmable alarm clock and an automatic phone dialer.

For further information phone Mark Fletcher on (03) 527 3443, or see him at FDP Software, Suite 11, 285 Carlisle Street, Balaclava, Vic, 3183. □

Are You Superstitious?

ON THE assumption that computer programmers are not superstitious, *YC* editor Les Bell and well-known industry identity Rod Whitworth

Free Languages

BARSON Computers presented free languages to Footscray Institute of Technology when it installed a Sirius computer in the Department of Civil Engineering on November 15.

The languages — COBOL, Pascal, FORTRAN, CBASIC-86 and GW-BASIC — are provided by Sirius USA, with the compliments of Chuck Peddle, following his recent offer of free languages to Australian educational institutions using the Sirius.

Amongst others who have taken advantage of this offer is the Western Australian Institute of Technology which purchased no less than nine Sirius (Sirii?) last September for its Business and Administration division.

Pictured at F.I.T. are (l to r) Geoff Saunders of Barson Computers, Doug Ramm and Vaughan Beck of F.I.T. and Tony Cookes, Managing Director of BBJ Computer Shop, which introduced Sirius to F.I.T. □

are inviting computer buffs to join them on an 18-day jaunt to the States for NCC and associated activities.

The problem is, you see, that the group departs from Sydney on Friday 13th May 1983, and will spend a second Black Friday in Honolulu.

While the trip is primarily to visit the National Computer Conference in Anaheim, other activities are being planned, such as a visit to New Jersey (home of Bell Labs — no relation, but no coincidence) where it is hoped to organise a briefing session with industry seer Sol Libes, as well as to Chicago, home of the Chicago Area Computer Hobbyists Exchange, where the bulletin board idea first started.

Les and Rod promise lots of special interest for UNIX/C buffs, as well as interesting info for software houses thinking of trying the US market.

Other attractions will include a discount buying spree and visits to manufacturing facilities.

For those who find it difficult to sustain 18 days of constant concentration on computer matters, the tour also includes visits to Disneyland (of course), Universal Studios, a Broadway show in New York, and the world's largest shopping centre.

Wives and children will be specially catered for on the tour. □

Apple Group

SUBSCRIBERS to the newly formed Professional Apple Users' Group will have access to the Melbourne-based organisation's software library through special disks. These will contain many new programs not available elsewhere, and the 'pick of public material'.

Unlike other sources of public domain software, each of the group's disks will be fully documented with instructions and advice on how to use each program and any possible side effects they might have.

A sample copy of the group's magazine, *Pro*, can be obtained by sending a large, self-addressed, stamped envelope to: Professional Apple Users' Group, GPO Box 969G, Melbourne, 3001.

The group's subscription rate is $25, being a once-only payment of $15 as a joining fee, and $10 annual subscription. □

Yankee Seminar

THE TECHNOLOGY research and consulting firm Yankee Group has announced its next seminar, "Restructuring of Australian Telecommunications", to be held on February 23-24 in Sydney.

Senior officers of Telecom, OTC, BTS, AUSSAT and other organisations will be presenting topics of critical relevance to the current evolution of future telecommunications policy.

Registrations for the seminar can be arranged by contacting Mrs Lee Ford on (02) 399 8200. The cost of the two-day program, including refreshments, luncheons and course materials, is $495. □

Piracy Ruling

THE FIRST major victory in the growing war against microcomputer software piracy has been won in the United States by MicroPro International Corporation and Digital Research Inc.

The two companies, coplaintiffs in what is believed to be the first copyright infringement action based on unauthorised copying of microcomputer applications software, have received a settlement agreement from Data Equipment Inc, of California, defendant in the suit.

Federal District Judge William W. Schwarzer entered a stipulated final judgement against Data Equipment, awarding MicroPro and Digital Research $250,000 and reimbursement of the plaintiffs' legal expenses.

Also named in the suit was Daniel M O'Rourke, chairman of Data Equipment. Under terms of the settlement, O'Rourke will be personally obligated to pay MicroPro and Digital Research installments totaling $30,000.

Seymour Rubinstein, president of MicroPro, hailed the settlement as a significant legal precedent and an encouragement to legitimate software manufacturers.

"Piracy is an ominous cloud on an otherwise profitable industry horizon," said Rubinstein. "Our success in federal court should be taken as a sign that software manufacturers will act aggressively to protect their own products against all unauthorised duplication."

Rubinstein said piracy is more of a problem for manufacturers of consumer-oriented software, but is also a serious concern for makers of business-oriented microcomputer software, such as MicroPro.

MicroPro, with such branded products as WordStar, DataStar, SuperSort and CalcStar, is one of the world's leading manufacturers of software for business applications.

Some pirates have been emboldened by the apparent difficulties in detecting and punishing unauthorised copiers of software.

MicroPro learned of Data Equipment's piracy only after an end-user returned a bootlegged program to MicroPro for updating.

The Computer Software Copyright Act of 1980 placed the source and object codes of computer programs under copyright protection, but the law offers no protection for the underlying logic of programs.

The software industry is working for legislation providing for tougher laws against unauthorised duplication.

"We favour stiffer penalties for piracy," said Rubinstein, "but the outcome of our suit demonstrates the feasibility of using current status to go after pirates." □

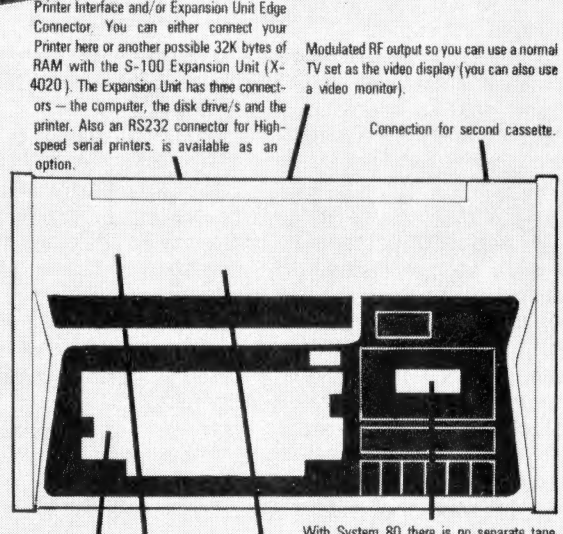
E.T. Comes Home

ATARI, a subsidiary of Warner Communications, and the Merchandising Corporation of America, a subsidiary of MCA, have made an agreement under which Atari has been granted the world-wide right to market coin-operated and home-video games based on *E.T.*, the record-breaking film directed by Steven Spielberg.

Spielberg and Atari worked together on the development of the *E.T.* game, which was launched simultaneously in Australia with the film. □

THE DICK SMITH SYSTEM 80 GROWS WITH

16K RAM expandable to 48K, CPU is the powerful Z80 microprocessor – that's the System 80...



Looking for a computer that's suitable for the beginner . . . but ideal for the expert? You want the new Dick Smith System 80 Blue Label!
If you know absolutely nothing about computers, the System 80 is the ideal way to learn. If you know a little about computers, it's a great way to improve your knowledge. And if you know a lot about computers, you'll find the System 80 will go as far as you want it to - and further.
The System 80 is expandable (with the optional S-100 expansion unit - see opposite page) to accommodate a huge range of options and accessories. You could even run a small business if you wished!
Have a look at the superb new Blue Label System 80 soon. Anything else could be wasting your money!

Check these features:

- Flashing Cursor.
- Built-in speaker and Amplifier for programs with sound effects.
- Full upper and lower case video display capability.
- Screen print facility (obtain a printout of any 'page' appearing on the screen).
- Monitor program (suitable for the hobbyist to program in machine language).
- Access to enormous amounts of software that has been written for the TRS-80.
- Three month guarantee from date of purchase.
- Great expansion capability and flexibility.

Cat X-4005

WAS ~~$750.00~~

ONLY $699

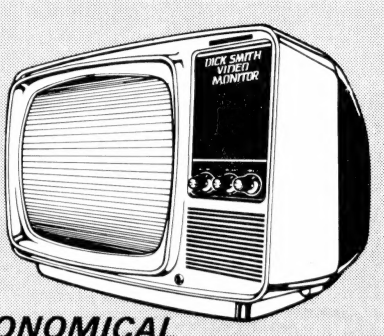
$16.24 per week (to approved applicants)

HFC

YOU!

"the best value around for a ready built Computer"
– quotation from Electronics Australia, June 1982.

OVER 10,000 SOLD



ECONOMICAL MONITOR $149.50

A video monitor gives a sharper clearer image – this black & white monitor is really economical and can be used with most computers on the market. Cat X-1196

Why pay more?

& LOOK AT THIS TOP VALUE

HI RES GREEN SCREEN MONITOR

Anti-glare screen with its jitter and ghost free image makes viewing much easier and sharper (80 characters with 24 lines). A MUST for the serious computer hobbyist or professional. Cat X-1200

ONLY **$349**

ON OUR TOP SELLING PRINTER

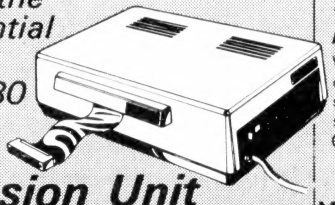
ITOH DOT MATRIX

We've sold more of these superb printers than any other type. Features high speed (up to 125 characters/sec) dot matrix type with bi-directional printing. Takes standard computer fan-form paper up to 240mm wide. Cat X-3255

NOW **$699** *HURRY STOCK LIMITED*

WAS $970

Unlease the full potential of your System 80 with this



Expansion Unit

To get the most from your computer, you need to be able to add on all sorts of 'peripherals'; disk drives, printers etc. This unit gives interface ability and also a further 16K of memory with room for further 16K (giving a total of 48K). Cat X-4020

FEATURES :

$74 LESS THAN PREVIOUS MODEL!

- Optional S-100 interface with 2 vacant slots, provides further expansion.
- A floppy disk controller for controlling up to 4 disk drives giving up to 400K bytes.
- A Centronics-type parallel printer port.
- An optional RS-232C serial communications part for modems & acoustic couplers. May also drive a teleprinter.

Value Amazing

$425

SUPERB LITTLE

MATRIX PRINTER

We've broken the $400 barrier for a computer printer! A tractor-fed impact dot-matrix printer uses ordinary fan-fold sprocketed paper (up to 204mm wide). Great for high resolution graphics. At this price can you afford to miss out? Cat X-3252

WAS $495.00

$399

STOCKS LIMITED

DIRECT COUPLED & ½ PRICE

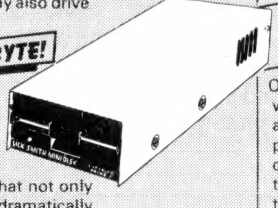
DATA PHONE MODEM

A truly high performance direct coupled modem. Authorised by Telecom – and costs less than half the comparable acoustic modem! Simple plug-in connections, full duplex operation for speed & convenience. Ask for a brochure at your nearest Dick Smith Store! Cat X-3272

ONLY **$199**

CHEAPEST PER BYTE!

DICK SMITH SYSTEM 80 DISK DRIVE



Fast reliable disk drive that not only gives your System 80 dramatically increased speed but also increases effective memory. Your computer can handle much more involved programs, and much faster! Drive includes inbuilt power supply.

Drive 0 – Cat X-4060
Drive 1 – Cat X-4061

ONLY **$495**

BRAND NEW DOT MATRIX PRINTER & WHAT A BEAUTY!

Our very **newest** model – with built-in 2K buffer allowing storage of data to be printed – less down time on the computer. Numerous printing types. Superb (you've got to see to believe) high resolution graphics. You'll save hundreds of dollars on this printer! Accepts both standard stationery AND fan-form (tractor feed) paper.

ONLY Cat X-3260 **$970**

NEW AMATEUR RADIO LOG

Disk based program enables you to store the necessary information for up to 500 calls on a single disk, save it, retrieve and display it by call or sequence no. A must for the amateur radio operator! Cat X-3774 **$39.50**

NEW & INTERESTING SOFTWARE

Starfighter (Cat X-3674)	$36.50
Air Traffic Controller (Cat X-3681)	$12.50
Asylum (Cat X-3687)	$19.50
The Institute (Cat X-3661)	$27.50
Z-80 Disassembler (Cat X-3690)	$24.50
Penetrator (Cat X-3673)	$34.50
Newdos 80 Vs 2.0 (Cat X-3565)	$225.00
Microsoft Fortran (Cat X-3669)	$199.00
MMS Forth (Cat X-3668)	$199.00

GIVE YOUR COMPUTER A VOICE! SEE THE VOTRAX TYPE-N-TALK ON PAGE 5 Cat X-3290

PRINTER CABLE

This is a universal printer cable for connecting any standard centronics-type printer (eg. our X-3255 or X-3260 printers) to either the X-4020 expansion unit or X-4013 printer interface. Cat X-3232 **$57.50**

DAISY CHAIN DRIVE CABLE

The 'daisy chain' cable allows you to connect up to 4 disk drives, quickly & easily. Cat X-4014 **$42.50**

Dick Smith Electronics

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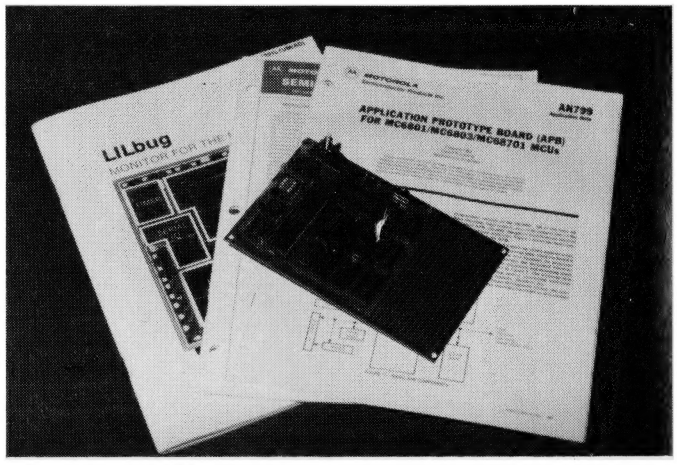
MAIL ORDER CENTRE: PO Box 321, North Ryde, NSW 2133. Phone: (02) 888 3200



APB For MC6801

PARIS RADIO Electronics, of Sydney, has announced the availability, from Innovative Technology in the United States, of a MC6801 Microprocessor Applications Prototype board.

The APB is a small board which supports the MC6801 family of microcomputer. A typical 6801 contains an enhanced 6800 processor, 2 kilobytes of ROM, 128 bytes of RAM, a 16-bit programmable timer, parallel I/O, and a serial communications interface.

In addition to the resources of the 6801, the APB provides an additional 2 kilobyte Eprom (TMS2716), 2 kilobytes of RAM (TMS2114), and a full Duplex RS232 interface.

The board comes with full documentation and is only 100 by 140 mm and includes a 100 by 50 mm prototyping area.

For further information, contact Paris Radio Electronics, 161 Bunnerong Road, Kingsford, NSW, 2032, or telephone (02) 344-9111. □

ICL Manufactures Locally

INTERNATIONAL Computers Limited has started manufacturing computer terminals locally, with a forecast production of 500 terminals in the first year, in a newly opened manufacturing area adjoining the company's shipping and distribution warehouse in the Sydney suburb of Mascot.

The units being manufactured are ICL's models 3484, 3485 and 3573 which are used with ICL's networked product line range of computers.

Mr Neil Lamming, managing director of ICL Australia, said "We have a well motivated, highly skilled labour force and now that these three models of terminals are being manufactured we will examine the possibility of manufacturing other products in Australia".

"A major advantage of manufacturing here is that we will be able to reduce our costs and offer even more competitively priced products to our customers". □

Orders Is Orders

A NEW generation of at least six different types of robot able to respond to spoken orders is expected to be ready in Britain by July next year.

They will be the product of a major competition launched in London by the British Computer Society. Under its guidance, technicians taking diploma courses at British colleges and polytechnics will produce plans for a crop of robots which can be both re-programmed and ordered to perform tasks by human voice control.

The design teams, which will each consists of up to eight people, are expected to produce their plans by the end of this year, when the six designs said to have the greatest potential will be chosen. These robots will then be built and developed in readiness for the final next July.

In the final, the robots will be required to carry out both placing and stacking duties in response to voice commands from their operators.

The ability to get a robot to respond to the human voice is proving one of the biggest tests for scientists and engineers. No two voices are the same in pitch or volume and it is therefore much easier to give the robot a voice through a synthesiser than to produce a robot 'brain' able to act on the voice of its operator. □

Printer Speed

GENERAL Electronic Developments has begun distributing the Itoh F10 printer which is claimed to offer the same speed and features as competitive models costing as much as a thousand dollars more.

Priced at less than $2000, the Itoh was chosen by GED to complement its range of locally manufactured microcomputers.

"Since our single terminal, dual terminal and networking computers are relatively inexpensive," says GED's marketing manager, Ian Hardwick, "we needed a high quality daisy wheel printer at a price compatible with the rest of our equipment. But we are now marketing the Itoh as a separate unit as well."

The Itoh F10 is available in two Shannon-text rated speeds — 40cps and 55cps. It can be driven via industry standard parallel or RS-232C interfaces and includes extensive built-in word processing functions which allow the unit to be readily adapted to most equipment and user requirements.

The printer is normally supplied with bi-directional friction feed as standard but tractor feed is available as an option.

The printer is attractively housed and has been acoustically treated to reduce noise.

Memories, Memories

DELEGATES to the British Computer Society's annual conference were told that by 1990, the computer industry would have produced a single chip capable of containing four million 'bits' of memory.

It was also predicted that the computer would have achieved a processing speed of around three picoseconds; a picosecond is to one second as one second is to 30,000 years. □

The Source's Source

THE SOURCE, America's world-famous information utility, has shifted its computers from the traditional Maryland base to McLean, Virginia.

Since The Source began in 1979, its computers have been located in Maryland and its administration offices in McLean.

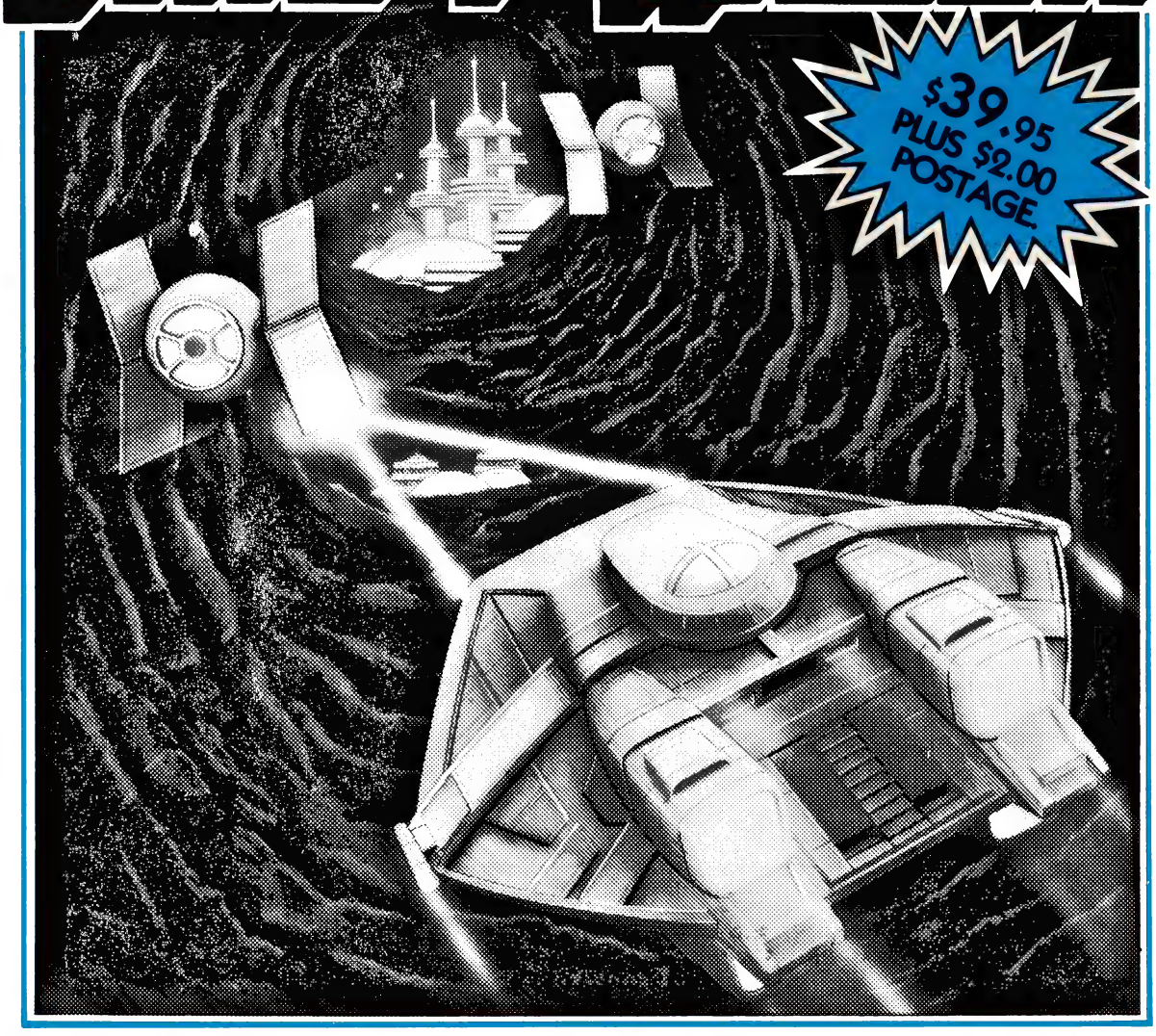
The original idea of The Source, a subsidiary of the Reader's Digest Association, was to use idle time on other people's computers, but the system has grown beyond expectations and now supports 200,000 users.

The relocation of the computers in McLean is the culmination of more than a year's planning, system design and coding, and is the first major step in gearing up for the anticipated two million users of the not-too-distant future.

The Source's address is 1616 Anderson Road, McLean, Virginia 22102, United States. □

DEFEND ★ DESTROY ★ SAVE ★ SURVIVE

SHAFT RADER



The newest form of Arcade style programming- exclusively for the ATARI machine.

Multiple levels of play. Joy Stick required.

100% Machine language.

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Educational Software

A NEW range of locally written educational software has been launched on the Australian market.

The first, The Music Learning Fun Disk, teaches the treble and bass staff notes, and also the piano or organ. This program is being used at Music World of Auburn NSW where children are given experiences on the computer as part of their music instruction. The program is available only for the Apple II.

Maths Invaders is an educational game for the Apple, System-80 and TRS-80 computers. As the name implies, an army of 20 alien maths problems invade the screen and the learner has the task of shooting down these attackers by typing the answers to the questions.

The third new program, BASIC For Beginners, teaches BASIC programming on the Apple II computer, and has been used at a number of high schools, as well as at the classes held by Colin Legg at the Parramatta Computerland shop on Wednesday evenings. This program takes a raw beginner to programming from an introduction to the keyboard in lesson one, to writing a number of guessing games, and a simple invoicing program in lesson six and seven.

The programs should be available from Apple dealers. Enquiries to Computer Cognition, PO Box 2164, North Parramatta, NSW, 2151, or phone (02) 724 4847. □

Calc Courses

SYDNEY expert Nick Lindsley is offering intensive SuperCalc and VisiCalc cours for would-be financial modelling users.

The courses are aimed at two groups: those who just want to get productivity quickly without any fuss and bother; and those who don't want to spend $3000-$6000 on hardware to find out how they can use SuperCalc or VisiCalc.

The method is 'hands-on' experience throughout based on the notion that five minutes worth of mistakes is equivalent to at least five hours reading or listening.

Examples relevant to the student's applications are used throughout (students are encouraged to bring anything that involves paper, calculator and pen. Projections, cash flows, premium adjustments and so on).

For further information contact Nick Lindsley on (02) 922-1644. □

Commodore 64 Preview

By Andrew Farrell

THE VIC 20 has been a huge success for Commodore worldwide; however, it appears that the VIC was just a small preview of what was in store.

Commodore has released in America its new 64K personal computer, featuring high resolution (320 by 200) 16 colour graphics, a true sound synethesiser and Z80-CP/M option at a price it feels will make it an attractive alternative to the Apple II.

The 64 made a brief appearance at Data '82, where I managed to have a quick look at its capabilities. Externally it looks just like the familiar VIC 20. It has the same full-stroke 66-key keyboard and the same compact plastic case. The only noticeable difference is the colour and the small 64 in the top corner next to the power light.

Close inspection also reveals the expansion ports are arranged differently although the 64 will support most of the VIC 20 peripherals already available such as the printer and disk drive. However, inside the 64 is a far mightier machine, with exceptional power in the graphics and sound area.

The basic machine comes with 64K RAM and 16K ROM but unlike its predecessor it uses the 6510 CPU which has additional input/output lines to the 6502 — but uses the same instruction set.

Video and sound are handled by two separate chips, a technique also used by Atari to help decrease processing time. The 6567 video interface chip allows 255 combinations of border and background colours, 16 text colours and all 64 PET graphics characters which may be redefined on a much improved 40 by 25 screen. Character definition is fairly good and the display is of the quality expected using a video monitor.

Then there are the sprites. To the newcomer a sprite might sound like something you spray on your kitchen floor; it is in fact one of the most powerful graphics facilities available on some of the more recent machines, such as the TI99/2⅔A and the Atari — where they are better known as player-missile graphics.

The 64 allows you to define up to 256 sprites each on a 21 by 24 grid in three colours. In practice, memory overhead limits the maximum number of sprites to about 48. Still plenty to work with for most of us! It is also possible to set priority and collision detection registers so that once you set a few sprites in motion, in any desired direction or speed, the 64 will know what to do when they collide. For example, a sprite of an aeroplane might have priority over a cloud sprite. If the aeroplane collides with the cloud it will in effect pass over it — great for simple animation.

The sound chip, called the 6581 sound interface device or SID, makes as many noises as you could ever want from a computer or for that matter, from a synthesiser. The SID is a giant step from the four channel tone generators of other computers.

The SID is a true sound synthesiser with an envelope generator for each of its three voices, programmable attack, sustain and release for each voice, plus a choice of four waveforms, plus programmable high, low, band and notch filters and 16 bit frequency resolution over a nine octave range from 0-4 Khz and even a variable resonance and master volume control.

You're probably wondering what all that means in English. Roughly speaking, the SID chip gives the Commodore 64 the capability to implement the sound of nearly any instrument you desire, not to mention a wide variety of noises useful for games.

The 64 uses the same BASIC as the PET with added commands for graphics and music. Of the Commodore's 64K, 39K is available for basic programs and 52K for machine language. Syntax errors are detected upon entry, similar to the ZX81/]fl style. An assembler for the 6510 CPU is promised soon and plug-in cartridges will allow up to 16K ROM and 2K RAM to be added.

Commodore expects the 64 to be available here in January/February for between $800 and $1000. □

Now, McWang...

WANG IS TO build a major plant at Stirling in Scotland for the manufacture of computers and office automation equipment.

Over the next five years, Wang intends to spend about $65 million on the project, which will employ at least 700 people. The plant will export 80 percent of its products, with projected earnings of $102 million a year by 1988. □

Rural Programs

COMPUTERS are playing an increasing role in Queensland's farming operations, but the software can sometimes be difficult to locate.

The new, third edition *Inventory of Agriculturally-Orientated Software in Australia and New Zealand*, published by the Queensland Department Of Primary Industries provides a ready index of existing programs and those in the process of development.

The majority of the 230 programs listed in the inventory involve farm management, though teaching, statistics and research are also covered. The inventory had been compiled by computer which would allow frequent and regular updating of the information.

Of the 123 agricultural institutions surveyed to compile the inventory, only 35 had usable programs in varying stages of development and documentation. Programs are available from 13 private organisations, nine universities, eight State and Commonwealth Departments, four agricultural colleges and one college of advanced education.

The inventory could be purchased for $7 from the DPI Information Centre, 10th Floor, Mineral House, 41 George Street, Brisbane. Mail orders should be addressed to GPO Box 46, Brisbane, Qld, 4001. Return postage and handling costs an additional $2 within Queensland and $4 from interstate. □

Padmede's Progress

PADMEDE Commercial Systems' Malaysian offshoot has secured firm orders for 6000 commercial microcomputer software modules, worth over $2 million, from microcomputer distributors in the Asean region since opening offices in Kuala Lumpur and Singapore this year.

The modules have been sold for a number of machines, including OKI, Wordplex, Apple, Panasonic, Osborne, Kaypro, Hewlett-Packard, Otrona, Sharp, NEC and Fujitsu, and represent distribution of the company's products in Hong Kong, Singapore, Malaysia, Indonesia and the Phillipines.

Cromer Programming Services markets the Padmede Business Control System range of microcomputer software in Australia and New Zealand.

Further information can be obtained from Barrie Meredith, Padmede Commercial Systems, 275 Alfred Street, North Sydney, NSW, 2060, or by phoning (02) 92 6783. □

Midas Expansion

SINCE ITS introduction in 1979, OTC's MIDAS service has been greatly developed. Among services now offered are 110, 300 and 1200 bps direct-dial telephone access, as well as 1200/75 bps Prestel access.

The service now accesses computers in the USA, UK, Austria, Switzerland, Italy, Canada and France, and further expansion is planned during 1983.

A new MIDAS operator's manual has been issued to reflect these developments, and further details can be obtained from your nearest OTC office. □

Acorn Man Moves In

AUSTRALIA now leads the world in educational computer networking, following several major network installations of BBC microcomputer systems in secondary schools and tertiary colleges.

The BBC micro is manufactured by Acorn Computers Limited in the UK and distributed in Australia by Barson Computers, whose own development of networking equipment and other peripherals provides the machine with well over 50 percent of local content.

Julian Barson, managing director of Barson Computers, Melbourne, visited Acorn Computers in the UK in October to share local experiences and market information.

Pictured here with Bob Bayham, Marketing Director of Acorn (Overseas) Ltd is Julian Barson (left) at Acorn's new premises at Cherry Hinton, Cambridge. The two discussed the BBC micro's growing domination of the Australian educational market and completed arrangements for the transfer to Australia of Acorn's production manager, Colin Priestly, who will take up a similar position with Barson Computers. □

Common Sense Guide

SIX-S Business Advisory, whose software has previously featured in these pages, has released a small book entitled 'A Common Sense Guide to the Selection of a Computer System'. The book covers the various criteria which should be considered in choosing both the software and hardware elements of a computer system for a small business.

Although a large part of the book promotes Six-S software, the bulk of the discussion is fairly unbiased, and the examples of a real-life accounting package help to keep the content on a practical footing.

Not a bad effort at all, and it's available from most computer stores at a suggested price of only $1.50. □

Apple Sales Up

APPLE Computer Inc has reported a 74 percent increase in net sales and a 56 percent increase in net income over 1981 for the year ended 24th September 1982.

Worldwide sales grew to $US583.1 million, with sales of Apple II and III still increasing. □

M20 Growing

OLIVETTI has announced a number of enhancements to its M20 microcomputer.

A number of new software items have been announced, including packages for property management, credit unions, club membership, hotels (including bar stock

and bottle shop), point of sale operation, school fee management, newsagents, local government and critical path management. Most of the packages have been written locally.

Also new from Olivetti are two new packs of programs for statistics and numerical analysis. Based on packages developed for earlier Olivetti machines, the libraries are priced at $250 each.

On the hardware side, the machine's memory has been upgraded with a new 512 Kbyte memory card. Perhaps most interesting is the announcement of a new $850 8086 processor card which will give the machine the capability of running MS-DOS and CP/M-86. A software emulator which will enable CP/M-80 software to be run should also be available shortly.

An 11.7 Mbyte Winchester disk, which will replace one of the integrated floppies, is due for release shortly, and by June 1983, the machine will sport a multi-tasking operating system with foreground/background partitioning. A local area network is also planned.

The basic M20, which includes 128 Kbytes of memory, two 320 Kbyte floppy disks, monochrome VDU and 100 cps dot matrix printer, sells for $6535 including tax, and a colour upgrade is available.

For further details, contact Olivetti Australia at 140 William Street, Sydney 2011 or phone (02) 358 2655. □

New IBM Machine

JUST AS we Antipodeans finally get the IBM Personal Computer (due for release 'first quarter 1983'), rumours have started to surface of the IBM PC Mark II, currently close to release in the US.

These rumours have reached us from several independent sources, and in one variant even suggest that the new machine may be based on a 32-bit processor! □

Cheap Frills

VIP HARDWARE, of Galston, New South Wales, is offering two useful services to computer owners:

The first is the manufacturer of paddle sets for the VIC-20 personal computer, and the conversion of 'floppies' to 'flippies'.

The conversion is aimed at those computerists whose system disk drive only uses one side of the disk. The process enables both sides of the disk to be written on and read from. This transformation only costs $1, including postage and packing.

VIP Hardware's paddle set for the Commodore VIC-20 is, at $25, nearly fifty percent cheaper than those already on the market.

The paddles measure 28 by 54 by 83 mm and are a matt black moulded plastic case with an aluminium top. The controlling knobs are made of knurled matt black plastic with a brushed aluminium top and have a diameter of 40 mm and a height of 16 mm. The whole set up is easy to hold and has a push button at the side.

For further information, write to Victor Zalakos, VIP Hardware, 34 Knight's Road, Galston, NSW, 2159, or telephone (02) 653 1738. □

Nyplan Package

A FINANCIAL modelling package is now available in Digital Equipment's Customer Support Centre.

The easy-to-use package, called Nyplan, is designed for non-computer professionals, such as accountants and sales and marketing personnel. Simplicity is a strong feature of Nyplan with less than an hour required for basic familiarisation.

Digital Equipment recently signed an exclusive computer time-share service agreement for Nyplan with its Australasian agent, the Melbourne-based software distributor Proven Systems.

Nyplan was developed by Mycroshare Inc, a systems house in Washington, and has been on the American market since 1975.

For further information, contact Digital Equipment Australia, Chatswood Plaza (North Tower), Railway Street, Chatswood, NSW, 2067, or phone them on (02) 412 5252. □

Super Speed For TRS-80

A NEW company specialising in TRS-80 software and hardware modifications has announced a 300 percent speedup modification for the Model 1. Cost is $199 fitted.

They state that because of design limitations in the expansion interface, all memory must be in the keyboard.

They supply and fit a high-speed 48K in-keyboard kit to take advantage of the higher speed.

All functions of the system are effectively performed at three times standard speed, including disk I/O.

A Model 3 version is currently under development.

For more details contact Ilehead Pty Ltd at PO Box 215, Forestville, 2087 or phone (02) 452 4435. □

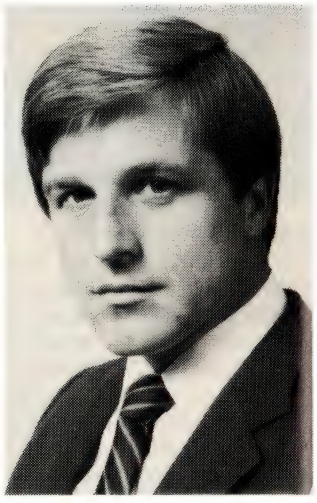
Peachtree's Growth

MANAGEMENT Sciences America Inc, the world's largest independent software company, is opening a Peachtree Software International sales and support operation in Australia on January 1, 1983.

Peachtree Software International offers an integrated range of microcomputer software for business accounting applications. Established in 1975 and acquired by MSA in July 1981, Peachtree began international operations in January 1982, when offices were opened in Britain.

Since then, Peachtree has appointed agents in Scandinavia, South Africa, Saudi Arabia, Singapore and Japan.

Commenting on the decision to establish the Peachtree operation in Au-



stralia, Robert Fisher, general manager designate, said, "We realise the importance of the Australian market place and believe it has an enormous potential. For this reason, it was important to have our own sales and support office, as opposed to working through an agent. MSA has been successful in Sydney for some time and, therefore, it has made sense for us to establish our own operation here in close proximity.

The Peachtree product range covers basic accounting systems, business management systems and office productivity systems. The software packages run under Digital Research's CP/M and MP/M operating systems, and are now also available under Microsoft's MS-DOS. The programs are written in MBASIC and MicroFocus CIS COBOL.

For further information, contact Barry Nash, Management Science America (Australia) Pty Ltd, 100 Miller Street, North Sydney, NSW, 2060, or by phoning (02) 929 0711. □

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DRS20 gets CP/M

ICL, Britain's answer to Big Blue, has announced a version of the CP/M operating system for its DRS20 Distributed Resource System computer.

The DRS20 is a rather neat little system based on multiple 8085 microprocessors, so that it forms a miniature distributed processing system in its own right. Connected through a local area network, the DRS20 becomes part of a much larger distributed system — wheels within wheels.

ICL's implementation of CP/M runs under the DRX operating system, allowing the user to run standard DRX applications in the local networked, multi-workstation, shared file mode of operation.

Later this year, this facility will be extended to allow DRS20 Model 10 intelligent workstations to run CP/M applications when connected to other DRS20 systems through ICL's Microlan local area network. □

Acme's Openers

A NEW company, Acme Software, has started operations in Melbourne. Acme Software specialises in programs for the Commodore range of microcomputers. Its initial offerings are four programs for the VIC20 computer.

The programs are:

Locomotion: This game displays a railway network on the screen, and trains enter at random intervals on to the network. Control over the eight switch points is by the number keys. The first few trains are easy to keep track of, but the operator soon needs total concentration to avoid collisions and derailments.

Vic-Derby: Up to nine players can place bets on one of eight horses. The game simulate horse racing, with variable odds and provision for placing bets for a win, place or each way.

Sentinels: A corridor is displayed running down the screen divided into three lanes. Sentinels are distributed throughout the corridor and move to block your progress. As your score increases, the Sentinels become more ferocious.

Vic-Voice: This machine language program shows how pseudo voice synthesisers can be achieved utilising the standard VIC electronics. You can record your own voice and utilise the routines in your own programs.

Acme software requires at least an additional 8 kilobytes of memory in addition to the VIC's standard memory to operate.

For further information, contact Acme Software, PO Box 1053, Richmond North, Vic, 3121. □

Computer Summer School

THE NEW adult education organisation SCOLA (Sydney Centre Of Learning for Adults) is holding a week-long residential school at Mitchell College, Bathurst, from January 8 to 15.

Following the enormous popularity of its computer classes held in Sydney during the year, SCOLA will be running an intensive introduction to microcomputers as part of the summer school.

The course is designed for beginners and assumes no background knowledge at all.

The course will cover all aspects of computing including history, hardware and programming.

The class will have 10 Apple computers for students to use and get 'hands on' experience. The class will be limited to 20 students.

Students will live in at the college during the week and apart from the daily class program, there will be a variety of leisure activities to choose from in the evenings.

SCOLA will begin its regular Sydney program of beginner and advanced classes in February 1983.

For details and brochure write to The Secretary, SCOLA, PO Box k705, Haymarket, 2000, or phone (02) 371 8197. □

Colour Video Board

A PROFESSIONAL-quality colour video board, the Provida, is now available in Australia.

The board is standard S100 pin-out to enable easy upgrading of existing software. Only software changes are needed to implement the extra features.

Both 64- and 80-column formats are catered for, with the option of other combinations within these limits. The 128 characters in each set are organised as 7 by 10 and 5 by 7 matrix respectively and a further 128 characters are possible using the programmable character generator (PCG), which may also display high-resolution graphics with up to 16,000 independent picture elements.

To enhance the graphics potential of the Provida, a unique function is used to advantage in the display of symmetrical graphics, whereby only half the image is stored as PCG data and the other symmetrical half is generated internally by using the same data but reversing it with a programmable shift register.

Memory on the board consists of three 6116 static RAMS organised as 2K for the function block, 2K for text page store and 2K for PCG. A 2532 4K PROM generates the two character sets and permits the board to operate off a single supply of 8 or 5 volts.

For further information contact Technitron at 84 Targo Street, Bundaberg, Qld, 4670, or telephone (07) 72 5606. □

OSI Multiprocessing Micros

M/A-COM OSI (formerly Ohio Scientific), the world's longest established hard disk microcomputer manufacturer, has released a new range of business-oriented micro systems it claims position the company at the forefront of the small business computer systems market.

Under the umbrella name 'Heyfamily' the range is distributed locally by Australian agents for OSI, the TCG Group, and according to the group's marketing director, Mr Mike Barraclough his company expects the new equipment will see OSI taking a considerably greater share of the business market than in the past.

"The Keyfamily computers include personal systems, business systems and integrated office systems, all taking advantage of the company's solid reputation for producing goods offering top price/performance appeal,' he said.

According to Mr Barraclough, the greatest impact of new range is the system's potential for networking and multiprocessing.

"The new systems incorporate OSI's proven dual-processor technology in a multiprocessing environment. This means each user will have his own processor with 64K of memory and choice of using software written for either the 6502 or Z-80 CPU with OSI's standard 65U operating system, or the industry's popular CP/M," he said.

The Keyfamily range is made up of Keymate, a line of personal computers and workstations which utilise CRT's; Masterkey, the backbone of the family which includes timesharing and multiprocessing business systems; Keyware (software); Keyword (wordprocessing); Keyring (networking); Keyoptions (peripherals, boards and accessories); and Sparekey (spares).

For further information contact MiKe Barraclough on (02) 699 8300. □

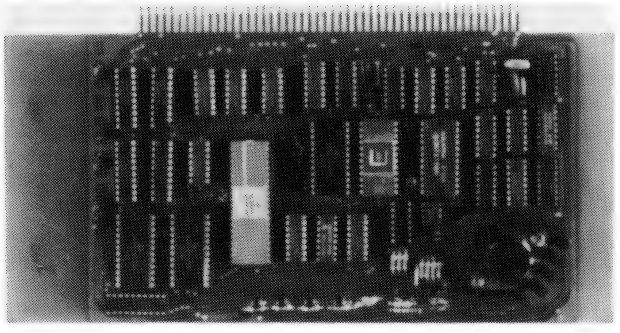
Sinclair Software

GLOSTER Software has announced further additions to the range of software available for the ZX81 and ZX80-8K computers.

In response to a demand for flexible household utility software, Gloster has introduced a "Household Management Pack". The pack features a budget system which not only allows for inflation and other changes in income and expenditure over time, but makes possible introduction of irregular variations, seasonal items and once only items. It can handle up to 255 entries. It requires 16K RAM, and a printer is helpful (but not essential). The price of the "Household Management Pack" is $19.50.

Gloster Software has also expanded its popular utility pack "Data Pack". Besides allowing data manipulation and taped data files, program merging, line re-numbering and bulk line deletion, the system now features a command to verify program saving. The "Data Pack" will cost you $19.50.

Enquiries to Gloster Software, GPO Box 5460cc, Melbourne, 3001, or phone them on (03) 232 2398. □



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DEALER ENQUIRIES WELCOME

'Rotten Apple' Banned

A RESTRAINING order has been issued by the Supreme Court of Victoria prohibited the sale of bogus Apple II computers by Micro Pro Computers of Melbourne.

According to David Strong, general manager of Apple Computer Australia, the order is the first action resulting from extensive investigations in Australia.

"We will continue to seek out and identify not only stockists of fake Apple machines, but also the sources from which they are coming,' David Strong said.

The Victorian Supreme Court order not only restrains Micro Pro from selling bogus Apple machines, but also requires the company to provide the names of all suppliers.

In the USA the Customs Service has begun detaining, seizing and destroying imitations of the Apple II being imported. Most of the imitations were coming from Taiwan and Hong Kong, the company said.

At the beginning of August, Apple Computer filed a number of lawsuits in Taiwan, Hong Kong and New Zealand to prevent the manufacture and export of fake Apples. Since then Sunrise Computer of Taiwan, maker of the Apollo II computer has agreed to cease production and in New Zealand, Orbit Electronics, which was selling 'Orange' computers from an unknown Taiwanese manufacturer, has ceased trading.

"In Australia we anticipate instigating and obtaining similar court orders against all stockists of fake Apples," David Strong said, "not only to protect the investment of existing Apple II users, but also to protect potential buyers who may unwittingly purchase one of the bogus products. Not only does this mean that these buyers will be unable to obtain the after-sales service and support which Apple provides for all its users, but also should they try to sell the machine, they will find it has virtually no resale value.

"Apple Computer Australia and Electronic Concepts are currently continuing investigations in all major metropolitan and provincial cities in Australia", Mr Strong said. □

DEC Price Cuts

DIGITAL Equipment has reduced prices on its VT18X personal computing option by up to 40 percent.

The VT18X option converts Digital's popular VT100 video terminal to a CP/M-80 personal computing system.

By purchasing the option, the VT100 user has the means to quickly obtain an economical personal computing system that can perform fairly basic applications using the CP/M software.

The basic option consists of a module with a Z80 microprocessor and 64 Kbytes of memory which is mounted within the VT100 cabinet; a dual minifloppy disk drive, which provides 160 Kbytes of data and program storage; and connecting cable, documentation, and diagnostic routines on a minifloppy disk. A second dual minifloppy disk drive can be attached to the option if desired.

The basic VT18X option, including the CP/M operating system, is now priced at $1840 (exclusive of duty and sales tax).

For further information contact Digital Equipment Australia at Chatswood Plaza (North Tower), Railway Street, Chatswood, 2067. Or Phone (02) 412 5252. □

Cutting the Paperwork

TURNING their newspaper delivery service from a cost centre to break-even or into a profit centre has been a dream of newsagents for many years.

The dream is now realisable, judging by the experience of a number of West Australian agents who were prepared to test out a new computer system being offered by deForest Software.

In fact the system was conceived following the approach of one agent who asked managing director Peter deForest if there wasn't some way he could cut down the innumerable hours he spent each night changing round lists and updating ledgers.

The software package, based on a TRS-80, made such a dramatic change for the agent that he began buying up paper runs from other agents, who found the cost of earning their 14 cents a week per paper insufficient to cover the time and effort.

The system, called Newspac, is a special program running on a Tandy microcomputer, specially modified by deForest Computers.

The program will record and keep track of regular deliveries to each customer, prepare afternoon and/or morning run lists in delivery order weekly or daily and, most importantly, keep track of all stop/start dates for people going on holidays, and print them on the newsboy's run lists.

On top of that it also does the accounting automatically, so the printing of the end of month invoices is a matter of minutes, rather than hours of sorting through ledger cards.

The system also prints labels for the invoices in run order so that they can be delivered by the paper-boy next day, which speeds up cash collection.

The system is distributed in Australia by deForest Software, 26 Station St, Nunawading, 3131. Phone (03) 877 6946. □

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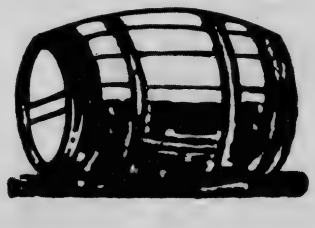

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DEFENDA — (Needs extra 8K & Joystick)
Defend the people on the Moon Colony from the Aliens who come down from the sky to kidnap them. But beware! Though your space fighter is very fast, the aliens can launch short-range homing missiles at you and even if you wipe out one wave of the aliens each successive wave will be harder with different and more powerful types of aliens joining their comrades. (Use F1 Key to set start level from 0 to 9).

KRAZY KONG — (Needs extra 3K & Joystick or Keyboard)
The crazy Gorilla has taken three fair maidens up to the top of the giant stairway and you (being the valiant hero that you are) are going to attempt to rescue them at the risk of your own life while Krazy Kong rolls huge barrels down the stairway at you! To survive you must jump the barrels as they reach you or be squashed and each time you rescue one of the fair maidens Kong climbs to the top of a more difficult stairway. (You better have good timing on this one).

CHOPPER RAID — (Needs extra 3K & Joystick)
Your mission is to fly deep into enemy territory in your heavily armoured helicopter gunship and destroy their installations. You must avoid the interceptor missiles and attack helicopters which will try to blow you apart. Also fuel will run low, so to stay in the air longer bomb enemy fuel depots for extra fuel.

SAD FACES — (Needs extra 3K & Joystick)
Fast action as you work your way up and down levels to catch the falling objects, constantly aware that a false move could send you plunging to your death on the deadly spikes below. The object is to stop the SAD FACES from escaping through the holes in the moving floors by catching them before they reach the spikes below. You can move from level to level by jumping up and down through the holes but avoid falling down or you could end up on the spikes. (P.S. If you reach 300 points the holes double in size making survival very difficult).

COSMIADS — (Needs Joystick)
Variation on a popular arcade video game in which the attacking alien hordes peel off out of the formation and come swooping down at you from all different angles. Starts of fairly easily but watchout as things speed up.

3-D MAN — (Needs extra 3K & Joystick)
Ever wonder how it would look if YOU were PACMAN? Now's your chance to find out. Rush around in the corridors of the maze eating all the dots but don't get eaten by the monsters that inhabit the maze. (Watch the radar screen to see where you are in the maze and help you find all the dots).

VIC GAMMON — (Needs extra 3K).
For more of a challenge to the intellect and less of one to the reflexes, try BACKGAMMON, one of the world's oldest games. Your VIC-20 becomes a skilful player of Backgammon and displays both the board and dice. (Moving is simple, just type A-X to move a piece. Y to move a piece off the bar, & Z to change order of moves of if you cannot move).

SEARCH — (Needs extra 3K & Joystick)
Drive through a maze of rooms to find as many of the 18 hidden bags of money that you can before your car runs out of fuel. But beware of the deadly Blobs, constantly changing mobile oil slicks whose mere touch will throw you back to the room you started in.

SPELIT — (Needs extra 3K)
This is a game for from 2 to 20 people who compete against each other in showing off their knowldge of English words with their ability to combine a random set of letters into said words. A set of "LETTER DICE" is mixed up by the VIC and then displayed in a 4 x 4 grid. Players must make up words from letters that are adjacent to one another, either horizontally, vertically or diagonally. The VIC allows everyone 3 minutes and at the end of that time players score up, longer words being worth more. The VIC also keeps score over a series of games and announces the winner.

SEE DEALER LIST PAGE 41

A Play With The Kaypro II

By Les Bell

FOR THE past month or so, I've had a Kaypro II in the office, courtesy of Tom Cooper of President Office Machines. You see, I rashly mentioned to Tom one day that it shouldn't be too difficult to get YAM (the *Yet Another Modem* communications program) running on the Kaypro, and he promptly thrust a machine into my hand and asked me what I was waiting for.

The result was that I've been using the Kaypro fairly heavily for both 'software development' and also, since the disk drives on my main system collapsed for a week, to do some writing.

Being somewhat set in my ways, I preferred to bring WordStar up on the Kaypro, but before doing that, I gave the Select word processor a tryout. My impressions were quite favourable. It works in a rather different way to WordStar, with most editing commands available through single letter commands rather than control keys, but can perform quite sophisticated tricks nonetheless.

I managed to work through the 'Teach' course supplied in about an hour or so, and got the impression that I could now edit quite complex documents, only requiring an occasional refresher course.

Select has been replaced now by Perfect Writer, part of the new package of software which is supplied with the Kaypro. I've only briefly experimented with Perfect Writer; it seems to be a bit more sophisticated than Select, but has some quite complex command sequences. There's an instructional course supplied with this program too.

In the rush to get YAM, Tom forgot to give me the manual for SBASIC, so I wasn't able to fully investigate it. However, there were a few sample programs on the disk he gave me, and I was able to get the gist of it. Basically, SBASIC is a highly structured version of the BASIC language; since it needs no line numbers, and makes heavy use of procedures, it doesn't look like BASIC at all.

However, it seems to be able to run simple programs in 'straight' BASIC, but would balk at variations of Microsoft BASIC, as used in the 'Birdwatchers' series. Furthermore, it is a compiled language, which gives it a tremendous speed advantage over BASIC interpreters, but a disadvantage for the beginner, who learns best by trial and error — a slow process when every change means recompilation.

Profitplan has been supplanted by Perfect Calc, a spreadsheet calculator more in the Visicalc mold. Perfect Calc is supplied with a whole range of models already set up. It seems to be quite a powerful package, although I only had a brief look at it.

Hardware-wise, the Kaypro has performed well. The screen is comfortable for prolonged periods of use. At first, 200K per disk seemed a bit limiting, compared to my big system, but I could still fit the PL/I compiler on a disk complete with its linker and library. Similarly, the BDS C compiler and WordStar will both fit on a single disk, so it's workable. After a while I hardly noticed.

The Kaypro got toted around a bit from office to home, to cope with my homework such as the YAM installation. For one weekend Matt Whelan borrowed it to work at home and was so impressed he wants a

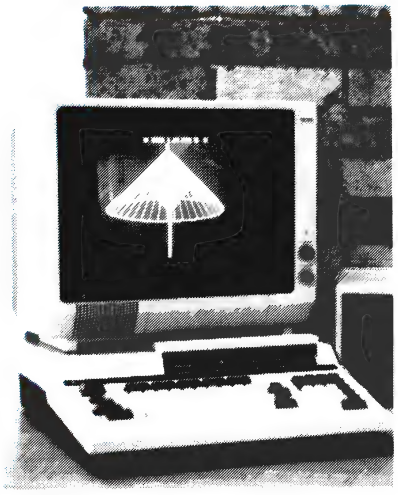
couple for the office. Now he's muttering darkly about networking the Kaypro, and as soon as Tom Cooper gets to hear about that, I'll be sucked in again...

By the way, I did finally get round to installing YAM on the Kaypro; it turned out to be even easier than I'd expected, as it uses 'proper' I/O ports and not memory-mapped I/O from a hidden bank. So Kaypro owners can now get a free copy of YAM from their dealer; it comes with full source code, but you'll need to buy the BDS C compiler to re-compile it.

As regards installing other software on the Kaypro, I discovered that the Kaypro has a 62 Kbyte transient program area, which is one of the biggest around. This means that it will runs some pretty big software, such as the Whitesmiths C compiler, which won't run on other machines. It needs bigger disks for that job, though.

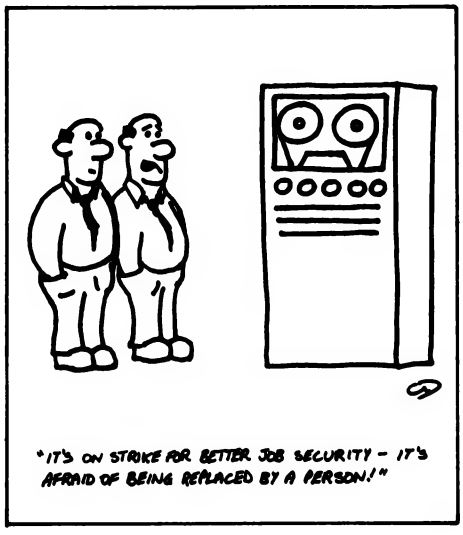
And as regards screen driving, I installed both WordStar 3.0 and Supercalc, and they both worked beautifully.

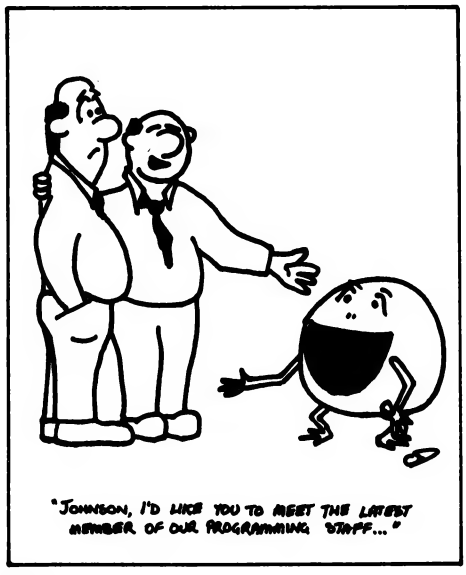
So the Kaypro seems like quite a useful little addition to my stable of computers; it'll be a shame to give it back. □



READER'S CARTOONS

by Craig Delahoy





Specifications and Report Card

Unit:	Kay-pro II
Made By:	Non-Linear Systems, Inc.
Processor:	Z-80A
Clock Speed:	2.5 MHz
RAM:	64 Kbytes
ROM:	2 Kbytes
I/O:	RS-232C and Centronics parallel
Languages:	S-BASIC, will run other CP/M stuff
Other software:	Perfect Writer, Perfect Speller, Filer and Calc
Keyboard:	Full QWERTY plus numeric pad and cursor
Display:	80 × 24 green, 9 in diagonal
Graphics:	What graphics?
Peripherals:	battery pack and carrying case
Best Points:	Low price, heaps of software
Worst Points:	None of the software is 'industry standard'

Ratings:	**excellent**	**very good**	**good**	**poor**
Documentation:				✓
Ease of Use:		✓		
Functionality	✓			
Support:			✓	
Value-for-money:		✓		

Options:	Battery pack, carrying case
Price:	$2995
Review Unit from:	President Office Machines, Hornsby

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Hewlett-Packard 75C – The Missing Link?

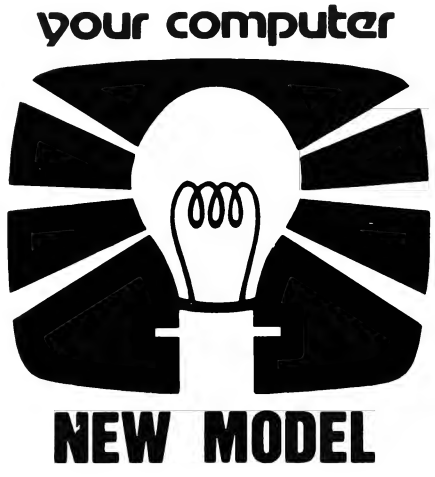
As the distinction between calculators and computers blurs, Hewlett-Packard has introduced the missing link — a computer which is not much bigger than a calculator. Les Bell, an HP freak from way back, has the exclusive review...

HEWLETT-PACKARD has been making desk-top calculators since the late sixties and pocket calculators since 1972, while it also has a full range of commercial and scientific minicomputers, including a recently-released 32-bit computer small enough to fit on a desk-top.

In recent years, the divisions which manufacture these various products have been working together much more closely, and the result is that the products have started to become less clearly distinguishable. This is particularly true of the latest portable computer, the HP-75C.

This small package, about the same size as a largish notepad, contains a full computer with quite staggering performance. It has a qwerty keyboard which, although based on a calculator keypad-style action, is quite suitable for touch typing, plus a 32-character display which scrolls sideways to give a 96-character capacity.

Also inside the box is a CMOS version of the same processor used in HP's '80' series of desktop computers — the HP 83, 85, 86 and 87. The operating system and BASIC language interpreter is stored in 48K of ROM, and a basic 16K of RAM is supplied, supplemented by an 8K plug-in module.



Built into one corner of the machine is a manually-operated intelligent magnetic card reader. Unlike the motor-driven devices used in previous HP pocket calculators, this uses larger cards which are pulled through by hand.

To talk to the outside world, the 75C has a built-in HPIL (Hewlett-Packard Interface Loop) circuit. This supports a growing range of peripherals, including two printers, a high-speed cassette deck, video display, test instruments and an acoustic coupler.

The BASICS

Unlike other, superficially similar, hand held computers, the 75C is not just a pocket calculator programmed in BASIC. For a start, it has a much more powerful microprocessor, and this is reflected in its benchmark performance.

The HP-75C completed the *Interface Age* prime number generation benchmark in 22 minutes 51 seconds using floating point arithmetic. This is broadly comparable to a 2 MHz 8080 system running Microsoft BASIC-80.

By comparison, the HP-41CV programmable calculator runs an RPN version of the same program in 9 hours 22 minutes seconds. The 75C would be even faster if the variables were declared as integers and the program modified accordingly.

The 75C has a quite comprehensive operating system which allows activities apart from BASIC language programming.

For a start, the 75C can maintain multiple named files in memory, and the CATALL command will list them together with file type, size and date and time of creation.

Several file types are possible. Obviously, BASIC program files are possible, but so also are text files, data files, LEX files (language extension files — actually machine code), LIF files (logical interchange format for communication with other HP computers) and other system files.

Files can be copied using the COPY filename TO filename command. By specifying a device name at the end of the filename, such as 'BACH:CD', the computer will search on the appropriate peripheral device; in this case, the cassette deck.

In addition, filenames can have a password specified at the end of the name. For example, the command COPY 'BACH' to 'BACH:CD/1234' will copy file BACH to the cassette deck and protect it with the password '1234'.

For those who want an even greater level of protection for their jealously-guarded information, the 75C itself can be protected with a password, so that whenever it is switched on, it asks for that password. If it is not supplied correctly, the computer will switch itself off again.

Once switched on, the computer powers up in EDIT mode, the main mode of operation. However, there are two other modes, which should be covered first.

In time mode, the computer displays the current date and time. Like the HP-41C time module, it can be set up for 12 or 24 hour format, as well as month/day/year or day/month/year. The clock can be adjusted forward or back, so globe-trotting executives won't have the hassles current among owners of wrist-borne digitalia. And like the HP-41C time module, the machine can calculate its own accuracy factor, keeping it spot on.

In appointment mode, the user can set appointments up to a few thousand years in the future (actually any date from the year 0000 to the year 9999). The 75C has a full calendar for those years and can even be used to find dates and days of the week. Great for calculating the dates of Easter and such.

An appointment can sound any one of 9 different alarm tones and can also immediately reschedule itself to repeat in the future or reschedule itself after being acknowledged. In addition, alarms can also run programs or execute edit mode commands. Rather like BASIC, multiple commands can be concatenated in one line, making appointments an interesting facility indeed.

Appointments are stored in a file called 'appt'. Unlike other filenames, which are internally translated to uppercase, this one (like the 'keys' file, which contains keyboard redefinitions) is stored with a lower case name, and cannot be accessed by regular file commands. Both these files can, however, be copied to mass storage devices such as the 82161A cassette drive or the card reader.

In addition, these files can be renamed, in which case they lose their special properties and have no effect. So, if the keyboard is set up to perform special functions, the command RENAME keys to 'FRED' will restore the keys to their standard functions, while saving the special definitions in a file called FRED.

Similarly, the command COPY appt to 'JAN:CARD' will save your appointments for the month of January on a magnetic card.

The 75C's BASIC interpreter is about the most comprehensive I have seen, with an understandably heavy inclination towards numerical function — to the extent of including built-in functions for secant and cosecant.

Three variable types are available. REAL variables extend from 1.00000000000 E-499 to 9.99999999999 E 499, with corresponding negative values (and zero of course), in other words 12 digit precision with a three digit exponent. SHORT variables cover 1.0000 E

Specifications and Report Card

Unit:	HP 75C
Made By:	Hewlett-Packard
RAM:	16K, extendable to 24K
ROM:	48K, containing operating system and BASIC, expandable through ROM drawers.
I/O:	Through Hewlett-Packard Interface Loop
Languages:	BASIC and cross assembler
Keyboard:	QWERTY, based on calculator type, but okay for touch typing.
Display:	Liquid crystal, 32 characters, scrolling to 96, dot matrix, with Greek and graphic characters.
Peripherals:	Cassette drive, printers, video display, plotter, acoustic coupler.

Ratings:	**excellent**	**very good**	**good**	**poor**
Documentation:	✓			
Ease of Use:		✓		
Functionality	✓			
Support:	✓			
Value-for-money:		✓		

Price:	$1639
Review Unit from:	Hewlett-Packard Australia, 47 Talavera Road, North Ryde, 2113.

—99 to 9.9999 E 99; that is, five digits with two digit precision.

INTEGER variables lie between -99999 and +99999 — five digits with no exponent.

The richness of functions of the HP-75C extend to functions like ANGLE(X,Y) which returns the arctangent of Y/X in the proper quadrant, a particularly useful function for polar/rectangular coordinate conversion. The INF function returns the largest positive value the 75C can represent, while the EPS (epsilon) function returns the smallest.

Options allow the user to specify the action the machine should take on over- or under-flow, so that long runs are not suddenly fouled up by error messages when you are trying to do something quite reasonable. In my opinion, if 9.999 E — 499 is not close enough to zero for you, you are down to splitting hairs.

Extensions of BASIC allow results to be printed or DISPlayed. PRINTER IS and DISPLAY IS statements allow output to be copied to HP-IL peripherals such as the video display.

Editing commands allow the user to set the width of the display and list devices, and even set the right margin (the point at which the 'bell' rings). The user can even specify the string the machine sends to peripherals at the end of lines — it need not be CR/LF.

New HP-75 portable computer communicates with larger computers, such as Hewlett-Packard's HP-86.

In fact, since the EDIT mode commands generally work as BASIC statements too, it is possible for one program to modify another, and an example of this is given in the manual. Since one program can CALL another, this is tantamount to self-modifying programs — shades of LISP yet!

Data files in 75C BASIC are just like a BASIC program consisting only of DATA statements; this allows random access by positioning to a line number, and also allows editing of data files using the standard editing facilities.

The BASIC is a superset of ANSI BASIC, and has in fact run the National Bureau of Standards BASIC validation suite of programs. It includes about everything one is used to in Microsoft BASIC-80, plus a number of extras.

For example, 75C BASIC allows the user to set up to 1001 timers in memory. Each timer can be set to interrupt anywhere from 0.1 seconds to around 69,700 years. The ON TIMER # statement allows the timer to interrupt program execution, usually trapping to a subroutine.

Debugging facilities are extremely good, with the ability to trace program flow and also variable value changes. You can also single-step through a program.

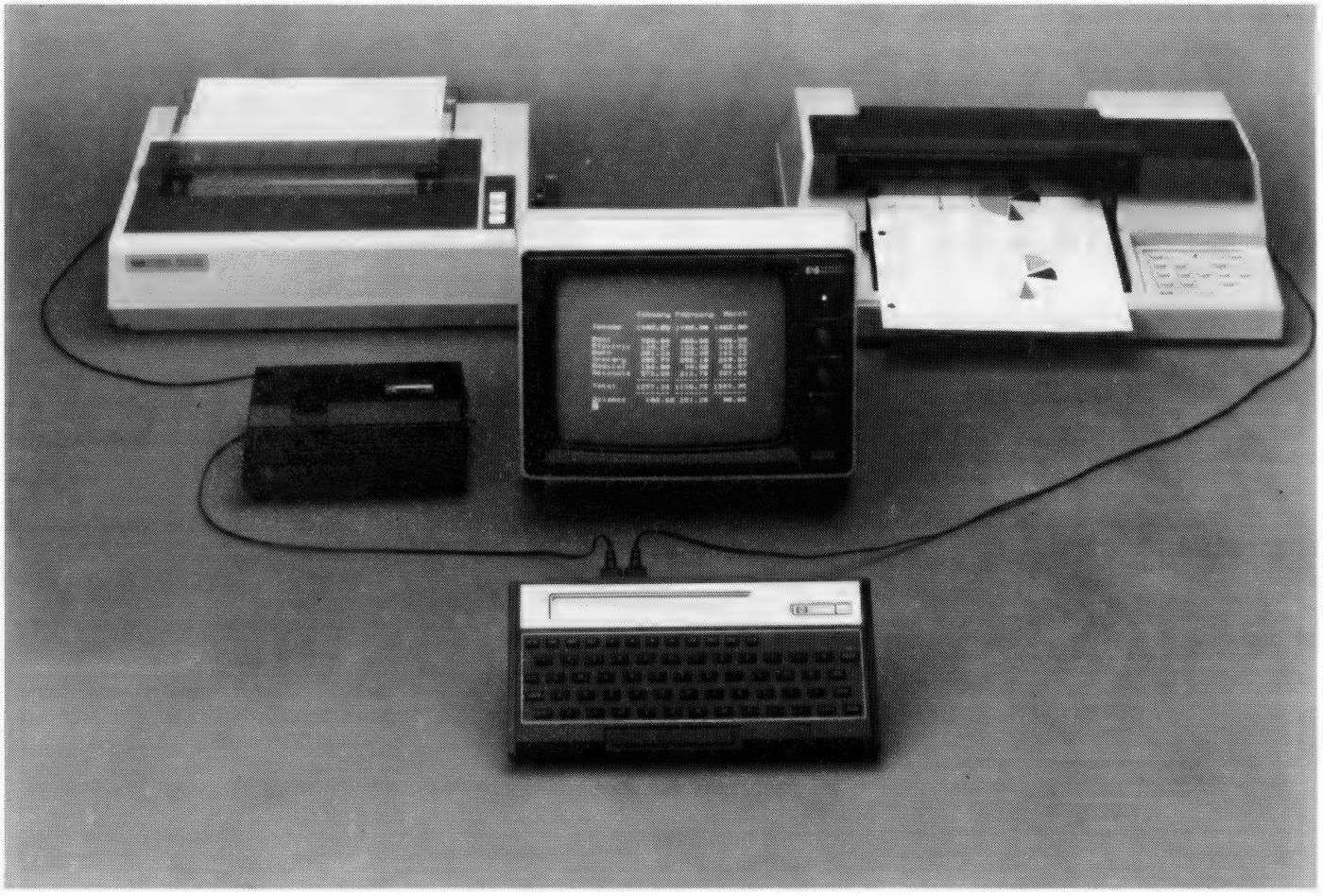
Hewlett-Packard has traditionally implemented BASIC through incremental compilers rather than interpreters, and the 75C seems to continue this trend.

When a program is RUN, the 75C takes a few seconds to (presumably) analyse the program for GOTO non-existent line numbers and similar problems, as well as linking the lines together, allocating variable space and other tasks. As a result, the program runs faster, but there is a few seconds pause at the beginning when you don't think anything is happening.

The HP-IL interface allows up to 30 peripherals to be connected to the 75C. The 82161A digital cassette drive is a portable device which uses miniature data cassettes, with a capacity of 131K. The cassette is organised rather like a floppy disk, with a directory at the beginning of the tape which shows the positions and sizes of the files.

Using this technique, it is possible to access files with no need for manual rewind or positioning, as with conventional audio cassettes. The fast forward/rewind speed of the tape is 30 in/s, so that any file can be located and read within a minute or so at the worst.

As files are erased and created, the tape will progressively start to comprise



New HP-75 portable computer also works with personal computer desktop peripherals.

smaller and smaller blank areas, and this is difficult to use. The tape can then be PACKed, a process of reading files and rewriting them with no gaps between. Depending on the number of files and amount of free space, this can take anywhere from a few minutes to an hour, and is likely to put a severe strain on the drive's battery pack.

The 82162A thermal printer is similar to the earlier printer for the HP-41C. It allows 24 characters across the paper,and has commands for left and right justifying text as well as centering. Additional commands allow graph plotting and user-definable graphics.

The 82163 Video Interface is an interesting device. It is a 32 by 16 video display with cursor addressing and some rudimentary graphics capability. Two outputs are provided, one direct video and the other RF. The HP-IL loop works sufficiently fast to allow the 75C to play the video game Breakout — quite a creditable achievement for a 'hand-holdable' computer!

Other HP-IL peripherals include a version of the MX-80 printer: in fact, only the mechanicals are the same as the electronics is much smarter for HP-IL operation. There's also the 7470A Option 003 two-colour pen plotter, which will be supported by special graphics software.

An acoustic coupler is expected to be announced in 1983, making communication over phone lines a snap. Already the 75C can talk to HP's 80 series computers through HP-IL, making the 75C an ideal device for portable data capture.

At the bottom edge of the computer are three drawers which will accommodate plug-in ROM packs. These will include both applications programs and language extensions such as graphics commands. Of particular interest is the projected availability of Visicalc in ROM for the HP-75C; whether this will operate without the video display, we don't yet know.

HP has already announced a range of Solutions Books of software for the 75C. These include Maths, Finance, Real Estate, Statistics, Electronics and Games packs, and the books are complete with pre-programmed magnetic cards.

More software can be expected rapidly, as the 75C's BASIC is very similar to that of its bigger brothers in the 80 series. In addition, HP is supporting third party software.

"Software suppliers are a key part of HP's portable computer strategy," said John Deftereos, HP area manager for personal computers. "We're committed to working with suppliers to create an unsurpassed number of portable computer solutions."

Assembly language programs can be developed on the HP 86 and 87 computers, transferred into a plug-in ROM simulator and field tested. BASIC ROMs can be similarly tested and, of course, software can also be distributed on mag cards or cassettes.

HP will also run a programme called HP PLUS, under which independent software will be listed in HP's software catalogue and can be sold through HP dealers.

The prices? Well, you can't get as much computer power as this on the cheap. The HP-75C will sell for $1639 including tax, while the 8K memory module is an additional $321. It comes complete with an owner's manual, reference manual, owner's pack of magnetic cards, keyboard overlay kit, field case, adapter/recharger, two HP-IL cables and other miscellaneous accessories.

Footnote: *HP refers to the HP-75C as the first of the 70 'family' of computers, and the manual refers to the HP-75, not the HP-75C. Also, one of the photographs supplied in the the press kit shows a machine clearly labelled 75D and not 75C. One wonders what's coming up, but it can't be far away if the HP-75D already exists!* □

The Talking Computer

By Jack Cross

MANY BLIND people develop capacities — good memory, powerful learning ability, touch-typing skills — ideally suited to make them become more than competent computer programmers and operators.

At British institutions such as the Worcester College for the Blind and Chorley Wood College for Girls, pupils receive at least as much tuition in computer studies as sighted youngsters do in ordinary schools. Many go on to use the devices in their studies at university and polytechnics.

There, they may encounter some difficulty. Their training has been with special Braille terminals and, while these are available in special schools, there is no guarantee they will be found in every institute of higher education.

The Open University, with its specific dedication to learning at home, in local study centres and at summer schools, finds this a real problem. In the absence of the special Braille equipment, blind students have tended to avoid all courses which need the support of the computer; these days this means something like 40 percent of the entire curriculum.

The answer, believes the Open University's Dr Tom Vincent, is to provide some facility which will enable blind students to work at a standard console — to substitute the spoken word for visual display. But it would have to be inexpensive, for cost cannot be ignored.

Talking computers already exist — at a price. An IBM terminal used to train blind programmers costs more than $8000; one which is used very effectively in general education is priced at $40,000. In 1980, Dr Vincent set out to devise a unit which could be put together for less than $1400.

He did it by linking a commercially available Tandy voice synthesiser to a standard microcomputer and developing three kinds of software which could be used with it:

- The first program developed 'keyboard awareness' by announcing which key is struck, and then directing the student to select specific ones on demand.
- Further software allowed the blind student to use the machine in carrying out the kind of calculations needed in mathematics and science subjects.
- The microcomputer could be used as a vocal interactive data-retrieval device; one program guided candidates through the complex maze of Open University course units, each with its own demands, credit-rating and connection with parallel studies.

Effective though it was, the device had technical limitations. The synthesizer could only produce an acceptable spoken quality when using a limited, predictable, pre-programmable vocabulary. If it were to be able to handle original programs — and the Open University students were keen to get on with writing their own — something more sophisticated, though equally inexpensive, was needed to produce its voice.

Understandable

It was John Fitzgerald, of the Royal National Institution for the Blind, who came across the Votrax synthesiser and suggested its use. It contained a microchip which, by fitting together phonemes (essentially syllables) in accordance with known linguistic rules, could pronounce any word typed into the console.

This was in May 1981, and students could now input anything in BASIC language and hear what they were doing. The cooperation of blind students encouraged Dr Vincent to incorporate in his modified interpreter a number of subroutines that would adapt the machine to meet their special requirements.

Listening to speech is necessarily slower then visual scanning; the number of key entries had to be reduced to a minimum, and spoken repetition had to be available on demand. Using an ordinary keyboard, mistakes had to be anticipated, the operator informed and the program itself protected against input error.

More subtly, perhaps, the machine was made sensitive to the proficiency of its user. The beginner, identified by his typing speed, might need each character read back to him. Those with more experience would not want it to talk too much. "It's surprising," says Dr Vincent "how little vocal feedback the skilled blind operators really need."

Software Development

The biggest step so far is the development of software which will allow anyone anywhere to be connected by teletype to the Open University mainframe at Milton Keynes, 70 kilometres north-west of London, and use an ordinary microcomputer as an intelligent talking terminal.

When this is achieved — and it is already being tested in several students' homes — blind people will gain access to the vast number of programs at present available only to their sighted colleagues.

For further information, write to Dr Tom Vincent, Open University, Manchester Regional Office, 7070 Manchester Road, Chorlton-cum-Hardy, Manchester, England. □

MICRO WORLD REPORT

Merry Micro Xmas to All our Readers

MicroBee announces latest state of the art technology with the new MicroBee "plus" series

New from MicroBee .... the 'PLUS' Series .... from the new 16K PLUS to the 64K PLUS (with optional disk system) MicroBee now offers you a range of microcomputers with capabilities far greater than anything else in a similar price range.

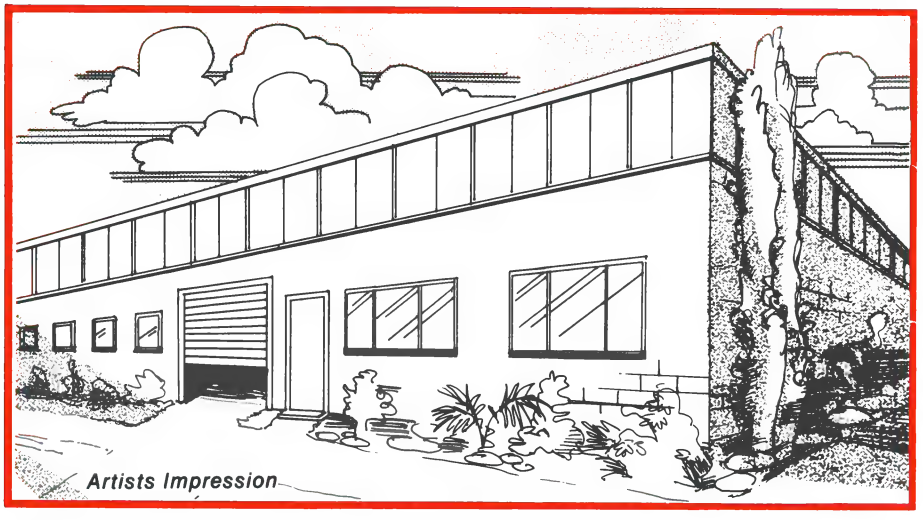
The **16K PLUS** and **32K PLUS** are both stand alone personal computers based on the powerful Z-80 microprocessor, with either 16K or 32K of CMOS RAM. These low power RAMS allow programs to be held in memory by using the Battery back-up system now standard on the new MicroBee PLUS series.

Standard features of the MicroBee PLUS Series now include:

- RS232 serial interface.
- Parallel interface.
- Battery back-up.
- Programmable character generation.
- Cassette interface with I/O at either 300 or 1200 baud.
- 16k of BASIC in ROM.
- Selected continuous memory.
- Full size 60 key QWERTY keyboard layout.

MicroBee's NEW AFFORDABLE WORD PROCESSOR PACK

WORD BEE ROM PACK — a new easy to use word processor which plugs into any 16K or 32K MicroBee and incorporates features from the "Electric Pencil" and uses commands similar to "WORDSTAR" from MICROPRO at a fraction of the price.



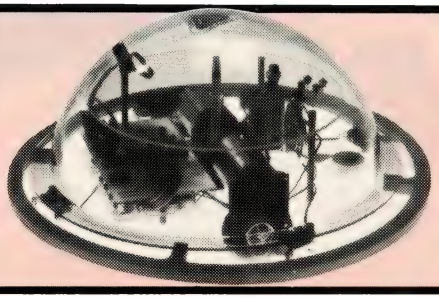
Artists Impression

NEW GOSFORD FACTORY: The success of the Australian designed MicroBee with over 3,500 sold has meant we must expand our production facilities. Our new factory at Gosford (opening in January 1983,) will add a further 8,500 sq. ft. of manufacturing and product handling space enabling us to fill new and existing MicroBee orders.

NEW DEALER NETWORK: In addition a **New Australasian Dealer Network** (see list — 2 pages over) has been established to improve your access to MicroBee technology, sales, service and software. All Dealers should have limited stocks of the newly released MicroBee PLUS Series available shortly.

PET PROJECT FOR MICROBEE (Tasman Turtle interface)

MicroBee and Flexible Systems, Hobart have developed the necessary hardware/software interface to run the sophisticated Tasman Turtle Robot on the MicroBee, making possible many experiments in robotics and Turtle LOGO commands. This fascinating technology seems destined to become a major talking point in 1983.



LOOK what the MicroB

NEW 'PLUS' SERIES WITH EXTRA FEATURES

16K PLUS

The 16K PLUS with features such as built in music generation, high and low resolution graphics, with a screen display of 16 lines each containing 64 upper and lower case characters. When you also consider all of the standard extras like continuous memory, built in printer and input/output interfaces and parallel port, 4.5 volt battery back-up and self testing BASIC in ROM, the MicroBee 16K PLUS is unbeatable in its class.

32K PLUS

All of the standard features of the 16K PLUS with twice as much usable RAM. When you add the new Word Bee ROM Pack, you have a powerful word processing capability which does a lot more than play the many games available for the MicroBee. Add a printer and maybe even the Tasman Turtle and just see what you and your family can now do with your home computer.

64K PLUS

The MicroBee 64K is equipped with 56K of user RAM with Battery backed continuous memory and has built-in 80 x 24 screen format as well as 64 x 16 line. All characters are upper and lower case and powerful graphics are readily available. A value packed exclusive feature of the MicroBee 64K PLUS is that it can double as an ADM3A Terminal operating in serial mode at either 300 or 1200 baud (full or half duplex). You can add a modem and use your MicroBee 64 as your personal information window to the world.

A better Bee for '83

- Now with
- BATTERY BACK-UP
- PARALLEL INTERFACE
- SELECTED CONTINUOUS MEMORY

64

32

PLUS SERIES

Merry Christmas from all the folks at MicroBee

ee Family can do NOW!

BEE POWER

Powerful, affordable Word Processing
WORD BEE ROM PACK Australia's First!

Everything you'd expect in a fully blown 'Pro' Word Processor. Call at your MicroBee Computer Shop today for a demonstration of the sensational new WORD BEE ROM PACK. A must for every MicroBee owner with a need to write.

Unlike many so called 'Word Processors' on the market today, the Word Bee incorporates many features until now only available on 'megabuck' Word Processors costing many times as much as the mighty Word Bee!

Bee early and snap up this powerful, affordable, Word Bee today. You can fit it yourself or your local MicroBee Computer Shop will fit it for you FREE!

Features/Functions

INTERFACE MODE — Allows loading/saving/transferring files, printing your file and so on.

20 Powerful Easy-to-use INTERFACE COMMANDS such as:
? — For general help menu
P — Print the entire file
S — Save file to cassette

EDIT MODE — familiar key functions;
Control F (Go to Find/Replace Menu).
Control R (Scroll file towards end, with freeze feature).
Control B (Full Block functions).

17 SEPARATE DOT COMMANDS
SAVE AND LOAD TAPE FILES

Other features include verifying tapes, force loading and appending tapes.

MicroBee 64K PLUS

The MicroBee 64K also runs MicroWorld BASIC which is supplied on cassette. **You do not need disk drives to use your MicroBee 64.** Just load the tape and thanks to the unique CMOS continuous memory, you can run any program available for the 16K or 32K PLUS. With the built-in monitor ROM, with commands to enable you to examine memory, run programs, block move, compare and search through memory, the MicroBee 64 will load and save programs from cassette tape and read and write to disk drives.

"ESC" KEY

A sophisticated single key program for the 16 and 32K Plus. Allows you to enter single letter commands for ease of operation. A must for the serious programmer!

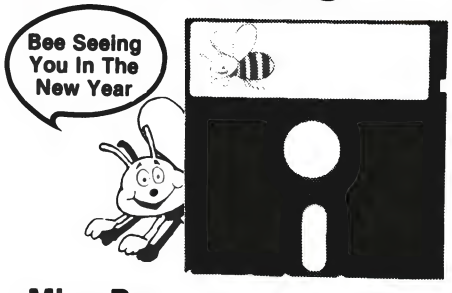
EASY LEARNING LANGUAGE — MicroBee PILOT

Pilot is an easy language to learn and use. Developed in the 70's it allows you to use the MicroBee without having to spend large amounts of time learning the system. MicroBee Pilot has several enhanced features and includes full integer arithmetic support. It is suitable for teaching beginners and young people the essentials of computing and is ideal for Computer Aided Instruction (CAI).

MicroBee EDITOR ASSEMBLER ROM

Consists of a "line oriented" text editor with automatic line numbering and an assembler which will generate Z-80 Machine Codes. Text files may be saved and loaded to tape. Object code may be assembled directly into memory and assembly listings may be sent directly to the printer. A monitor is also available to allow debugging of machine language programs. When fitted your MicroBee has built-in Basic, Editor/Assembler, Machine Code Monitor and Word Processor all in 24K of ROM — another powerful MicroBee feature.

MicroBee PERIPHERALS

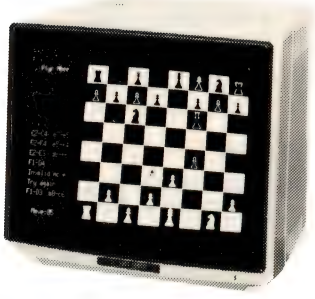


MicroBee DISK DRIVES (Available in February '83)

An S-100 expansion system, capable of driving two MPI 52 Disk Drives, takes the MicroBee 64K PLUS into a world standard CP/M system, capable of supporting word processing packages, electronic spread sheets, Microsoft BASIC, PASCAL and a world of other programs capable of running under CP/M 2.2.

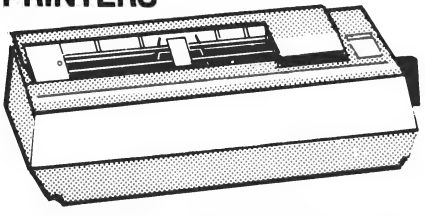
The MicroWorld CP/M Distribution Disk is supplied with a suite of useful utilities including Disk MicroWorld BASIC, Compare, Config, DTCopy, Format, as well as the normal CP/M support such as ED, ASSM, DDT, STAT, SUBMIT, XSUB and of course, the full documentation package from Digital Research.

MONITORS



You can choose from the low cost B & W monitor (converted B & W TV) or a green phosphorous high resolution monitor with 30 cm non-glare screen.

PRINTERS



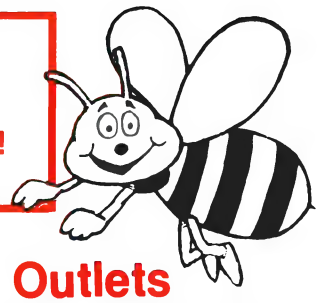
The MX 80 III F/T and MX 100 III F/T are only two of a wide range of low cost powerful printers which can connect to the MicroBee PLUS.

NEW SOFTWARE

In addition to the WordBee ROMPACK a vast quantity of exciting software is continually being prepared for the MicroBee with cassette based programs like EDPACK II for education and entertaining programs with MISSILE WARS, GRAPHIC GAMES and the PCG Tutorial available for the PLUS Series.

MicroBee

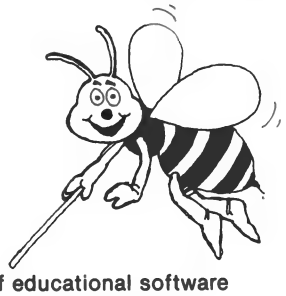
Make a BeeLine for your MicroBee Computer Shop today!



Price List

CODE	DESCRIPTION	PRICE (Inc. S/T) $
HARDWARE:		
110.017	MicroBee 16K PLUS	449.00
110.032	MicroBee 32K PLUS	549.00
110.064	MicroBee 64K PLUS	699.00
110.078	S-100 Desk Top Interface	299.00
110.090	Disk drive with controller & CP/M 2.2	799.00
110.092	Add on Disk drive	659.00
110.116	16K—16K PLUS Conversion	29.95
110.132	16K—32K PLUS Conversion	125.00
110.164	32K—64K PLUS Conversion	175.00
110.025	New MicroBee Moulded Case	25.00
120.580	S-100 Digitalker	155.00
120.274	S-100 Romblaster	165.00
110.210	Parallel Port inc. DB 15 plug & hood	19.95
250.003	MicroBee Editor/-Assembler ROM	59.50
MONITORS:		
150.020	Kaga Denshi Green Phosphorous 30 cm	299.00
150.025	B & W Monitor (converted T.V.)	149.50
PERIPHERALS:		
110.011	Printer/Cable Interface Kit	49.95
150.030	Audio cassette tape I/O drive	39.50
110.310	C10 Data Cassette Tape	1.10
110.311	C20 Data Cassette Tape	1.20
110.312	C30 Data Cassette Tape	1.30

CODE	DESCRIPTION	PRICE (Inc. S/T) $
PRINTERS:		
150.080	Epsom MX 80 111 F/T	1213.00
150.100	Epsom MX 100 111 F/T	1555.00
SOFTWARE:		
MicroBee CASSETTES		
250.035	Graphic Games	9.95
250.036	Missile Wars	9.95
250.037	PCG Tutorials	9.95
250.020	Space Invaders	14.95
250.021	Concentration	9.95
250.022	Chess	9.95
250.023	Typing / Solitaire	9.95
250.024	Target	9.95
250.025	Lunar Lander/Hurkle	7.95
250.026	Star Shoot/Hangman	7.95
250.027	Biorhythm/Calendar	9.95
250.028	Eliza	9.95
250.029	Kids Game	9.95
250.030	Master Mind/Nim	9.95
250.031	Chase/Wumpus	9.95
250.032	Z Trek	9.95
250.041	"Esc" Key	9.95
SOFTWARE IN ROM:		
250.003	MicroBee Editor/-Assembler	59.50
250.040	MicroBee Word Bee ROMPAK	89.50
250.007	MicroBee 5.1 Basic Upgrade	20.00
SOFTWARE DISK SYSTEM:		
	MicroBee CP/M 2.2	200.00
	MicroBee Disk Basic	P.O.A.



SOFTWARE EDUCATIONAL:

We are continuously developing a wide range of educational software cassettes for use at all levels of education.

250.038 MicroBee PILOT 14.95

250.033 Ed Pack 1 24.95

Includes: Demonstration; Star Constellations; Invasions Package; French Vocabulary; Typing Drill; Triangular; Primary Package; Computer Words; Master Mind; French Phrases.

250.034 Ed Pack 2 24.95

Includes: Demonstration No. 2; Multiplication Test; Star Maths Pack; Halving Numbers; 0 -9 + 1 (Infants); Welcome; Picture Drawing; Music Programs No 1; Subtraction Test; Spelling Drill; 0 - 7 + 3 (Infants); Division Test; Slide The Letter.

WARRANTY

Applied Technology Pty. Limited warrants that the electrical and mechanical parts of its manufactured products are free from defects in design, materials and workmanship for a period of 3 months from the date of delivery to the buyer.

Outlets

See the exciting new MicroBee 16, 32 and 64 K PLUS Series at your nearest MicroBee Computer Shop.

SYDNEY:
Applied Technology,
1a Pattison Ave. Waitara.
Phone: 487 2711.
35 Dickson Ave. Artarmon.
Phone; 439 2322.

Electronic Agencies,
117 York St. Sydney.
Phone: 29 2098.

Specialty Enterprises,
6th Floor,
104 Bathurst St. Sydney.
Phone: 267 7747.

GOSFORD:
Applied Technology,
1 Debenham Rd. West Gosford.
Phone: (043) 24 1022.

CANBERRA:
MicroBee Computer Shop,
Level 1, Cooleman Court,
Weston, ACT.

MELBOURNE:
Computerland Sth. Melbourne,
19 - 37 Albert Road,
(Cnr Kingsway & Albert Rd.),
Melbourne.
Phone: 26 6647.

Specialty Enterprises,
1st Floor,
305 Latrobe Street, Melbourne.
Phone: 67 8811.

BRISBANE:
Specialty Enterprises,
6th Floor, 246 Queen Street, Brisbane.
Phone: 229 2450.

PERTH:
Altronics
105 Stirling St, Perth.
Phone 328 1599

NEW ZEALAND
Checkpoint Computers,
36 Main Road, Tawa,
New Zealand.
Phone: (4) 32 6988.

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welcomehere

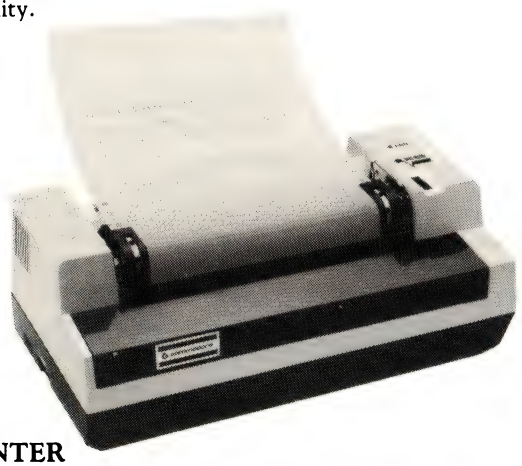
How to make the best home computer in the world even better.

Peripherals to turn a powerful computer into a super-computer for the professional.

With the Commodore VIC 20 Computer, you have the finest home computer money can buy. And the more you use it, the more you will ask it to do.

Pretty soon, you'll want to extend VIC's vast potential to the full; and there is a wide range of VIC peripherals to help you do it.

Disk drives, disk-based software, a printer, cassette unit, joysticks, paddles — with these, VIC computing becomes total computing: giving you true professional power and capability.



VIC PRINTER

The VIC Printer, like all VIC peripherals, offers a very high specification at a very competitive price.

It will print programs, letters, business data, graphic displays and so on.

Its main features include: 80 characters per line • Tractor feed dot matrix • 30 characters per second print speed • Full alphanumerics and graphic printing • Double-size character capability.

VIC FLOPPY DISK UNIT

The VIC single-drive Disk Unit provides a fast, accurate and efficient means of storing and retrieving data and programs.

Together with the Printer, it transforms the VIC 20 into the ideal system for the small businessman or serious computer programmer.

Features include:
174,848 bytes capacity
• Uses soft-sectored standard 5¼" single density floppy disks
• Direct interface to VIC
• Direct compatibility with Printer
• Intelligent system independent of VIC.

EXPANSION MEMORY CARTRIDGES

Special plug-in cartridges are available to expand VIC's memory. 3K, 8K and 16K RAM packs plug directly into the computer.

A Memory Expansion Board is also available to develop VIC's capabilities to the maximum.

1. Introduction to Basic

This package contains materials that will enable you to learn the fundamentals of programming in the BASIC computer language on your VIC 20 computer. It assumes no prior knowledge of computer programming and includes two cassettes containing 17 programs specially designed to accompany a comprehensive 152 page manual.

2. Progamming Aids

To aid programmers to write their own programs, Super Expander, Machine Code Monitor and Programmers Aid cartridges are available.

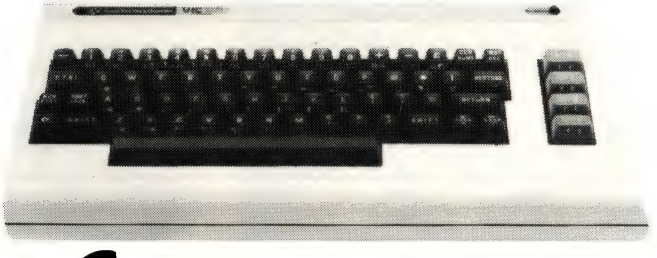
3. Games

The VIC 20 has the largest selection of cartridge and cassette-based games available on any personal computer. VIC 20 games offer a real challenge and take a great deal of skill, time and mental agility to win.

4. Joysticks and Paddles

These accessories make playing games on the VIC even more enjoyable. The joystick has even more practical uses and can be used with high resolution graphics to draw pictures or help with graph plotting.

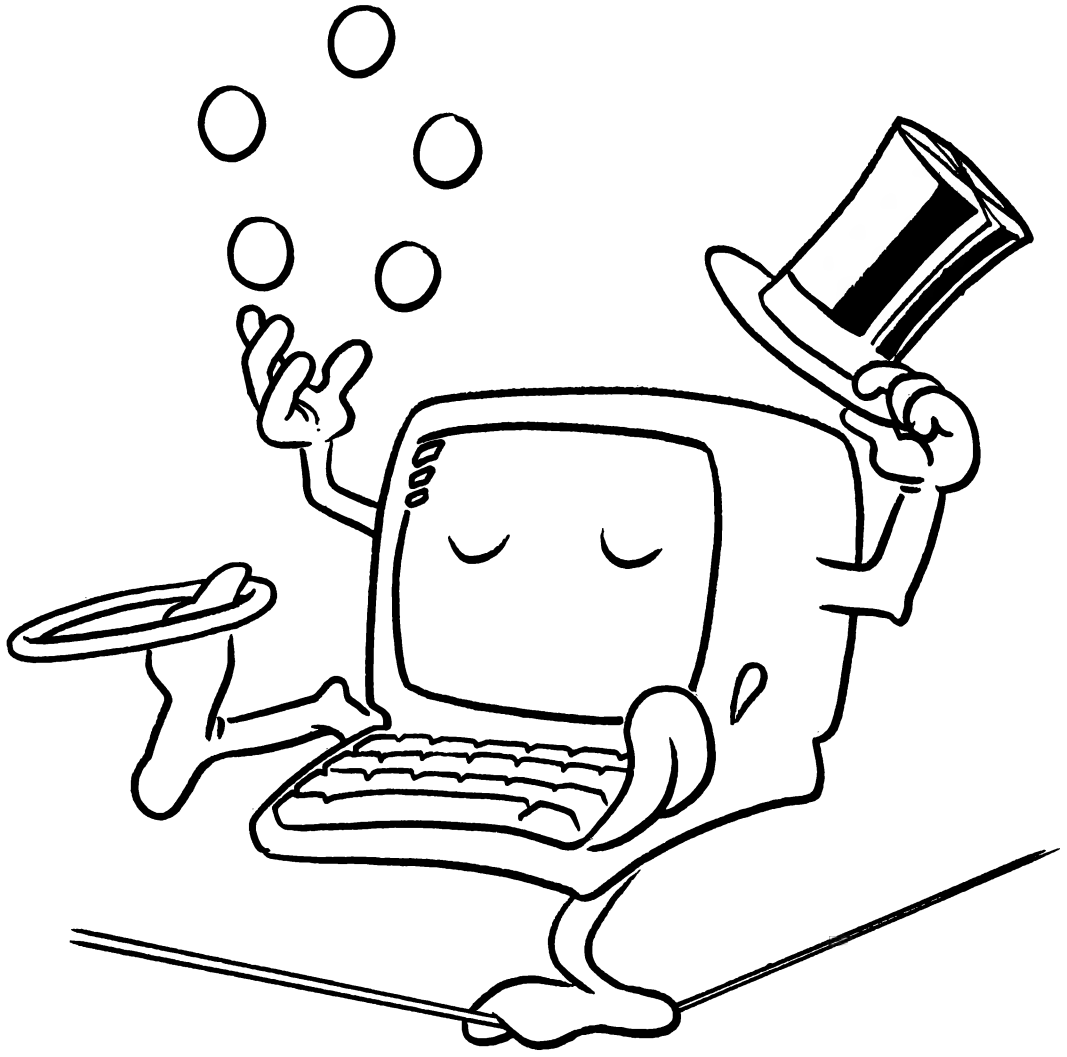
For full details of VIC 20, its peripherals and software, and a list of your local dealers, contact:
The Commodore Information Centre,
P.O. Box 336, Artarmon, N.S.W. 2064
Tel: 437 6296



commodore

VIC 20

So much brain for so little. MLVL 1613



CP/M, Four Times Over

By Peter R Harris

HOW OFTEN have you waited at your computer, saying to yourself it would be great if the sort or print could be done in a background mode while you got on with something more productive? You're not alone — it has been estimated that the operator of a typical microcomputer system spends 30 percent of the time simply waiting for the computer to finish its task.

It was with this in mind that I ordered a Concurrent CP/M-86 for my IBM-PC. A single-user multi-tasking operating system, Concurrent CP/M-86 has for the past six months been billed as 'the first of the second generation' of microcomputer operating systems. I ordered my copy from Digital Business Systems in Canberra and it arrived late September. Since the manuals are dated September 1982 and mine has the serial number 171, I assume my Concurrent CP/M-86 to be one of the first 'off the press'.

On opening the package, I was immediately impressed by the quality of the documentation. They are in the new Digital Research style, featuring two-colour printing and bound in three ring binders slightly larger than A5, with the whole lot fitting snugly into a cloth-covered box. The 13cm IBM-PC mini-floppies were securely housed in individual plastic pages.

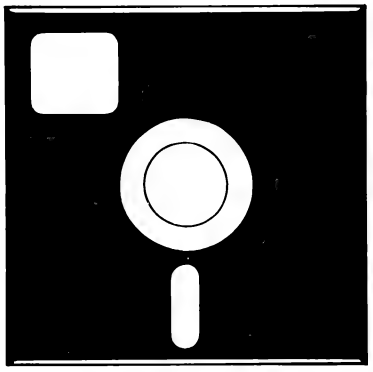
Two manuals are supplied, the 204-page User's Guide and the 338-page Programmer's Guide. Digital Research has obviously abandoned its old marketing policy of allowing independent software houses to modify CP/M to suit particular hardware environments: the Concurrent CP/M-86 for the IBM-PC is supplied by Digital Research adapted to run on the IBM-PC. The manuals also are written specifically for the IBM-PC.

Concurrent CP/M-86 is a single-user, multi-tasking operating system: one user on the one physical terminal can run a number of tasks or programs simultaneously. Although there is only one terminal or keyboard/screen combination on the IBM-PC, Concurrent CP/M-86 simulates up to four virtual terminals, referred to as virtual consoles 0, 1, 2 and 3. Like MP/M-86, on which Concurrent CP/M-86 is modelled, each virtual terminal can have a task attached to it, which means Concurrent CP/M-86 provides the IBM-PC with the ability of running up to four application programs simultaneously.

The major difference between MP/M-86 and Concurrent CP/M-86 is that MP/M requires a physically separate terminal for each task, whereas Concurrent CP/M-86 simulates up to four terminals on the IBM-PC.

On booting up Concurrent CP/M-86, virtual terminal 0 is active; any programs initiated will be attached to this terminal. While a program is running, the user can switch to another virtual terminal by pressing Control and 0, 1, 2 or 3 for the required terminal. Lo and behold, the screen clears and you have, in effect, another terminal on a multi-tasking system. From the 'new' terminal, you can now initiate that half-hour sort...

But wait a minute, what's going to happen to the console output on the first terminal (virtual terminal 0) once you've



SOFTWARE REVIEW

switched to another terminal? Digital Research has handled this neatly, in two alternative ways: each virtual terminal may run in either dynamic mode or buffered mode. If a virtual terminal in dynamic mode is switched out, the characters sent to it are lost. If, however, it is set to buffered mode and the virtual terminal is switched out, Concurrent CP/M-86 creates storage on a temporary file on diskette for the console output. When the terminal is switched back in, the saved console output is sent to the screen. The VCMODE command will set the mode of a virtual terminal. If the memory disk facility of Concurrent CP/M-86 is implemented, the buffered console output is saved in memory in a special area which Concurrent CP/M-86 uses to simulate a diskette drive.

Concurrent CP/M-86 requires an IBM-PC with two diskette drives and a minimum of 256 kilobytes of internal memory. My 256K memory board had arrived a fortnight earlier and I now had a 320K total. Both the monochrome and colour videos are supported; I used the monochrome video for my tests. Either or both single- and double-sided diskette drives and three parallel printers and two serial printers are supported.

The extra memory (up to 544K) is particularly useful for supporting the memory disk feature. The memory diskette is referred to with the drive prefix M: and is used in a near-identical fashion to normal diskette drives, the difference being that it has an extremely high transfer rate, with no seek or latency delays. In addition to being used for buffering of virtual consoles, the memory disk is useful for temporary files and for copying command files, so that both diskette drives can be used for data diskettes.

No hardware modifications were necessary on the IBM-PC in order to run Concurrent CP/M-86.

To start Concurrent CP/M-86 for the first time, I simply placed the boot diskette in drive A and the command diskette in drive B, then turned on the power. Click, click — it responded with a sign-on message telling me what hardware was supported, followed by MP/M's familiar 0A prompt (for those who aren't familiar with MP/M, the 0 in front of the A informs you that you are currently logged in user area 0; the A tells you that diskette drive A will be used as the drive when a file reference is made without an explicit drive identifier.)

It soon becomes obvious that Concurrent CP/M-86 is more like MP/M-86 than CP/M-86. In fact, only minor changes appear to have been made to MP/M-86 to create Concurrent CP/M-86. Because of this, the code for Concurrent CP/M-86 should be quite stable — in one week of testing, I was unable to find any bugs.

Full and effective use is made of the bottom line of the screen as the status line. This status line gives various important information about what Concurrent CP/M-86 is doing, which features are invoked, and which printer is currently assigned to the virtual terminal.

Reading the status line from left, the first message is Console = 0, or the number of the current virtual terminal. The next message is the background mode of the virtual terminal — buffered or dynamic. Following this is Printer = 0, or the number of the current printer. Next is Ctrl-P = 0, or the printer number that appears when Control-p is pressed, which directs subsequent console output to the specified printer. To the right is the name of the program being run; if no program is running, the message Tmp 0 is displayed. Next, the current time of day is shown, followed by the optional messages Wrap, Caps, Num, Ctrl-S and a files open message.

Wrap indicates that any lines greater than 80 characters will be wrapped around to the next line. Caps indicates the Caps Lock key has been pressed. Num indicates what happens when you press the numeric keys and indicates the current setting of the Num Lock key. The Ctrl-S field indicates that Control-S has been pressed to temporarily halt continuous console output. The file open message lists the drives which currently have

Table 1 — CCP/M-86 And MP/M-86 Common Features

ABORT	interrupts program execution on the specified console.
ASM86	assembles 8086/8088 assembly language programs.
DDT86	helps you check out your assembly language programs and interactively correct bugs and programming errors.
DIR	displays a list of all non-system files from a diskette directory.
DSKRESET	logs in diskettes when you first place them in a diskette drive.
ED	is the standard CP/M, MP/M text editor.
ERA	erases one or more files and releases the storage occupied by the file.
ERAQ	is the same as ERA but asks you for confirmation of each file.
GENCMD	produces an executable command file from the output of ASM86. It performs a similar function to the CP/M LOAD.
PIP	is the Peripheral Interchange Processor. It combines and copies files.
PRINTER	shows the currently assigned printer, or assigns one.
REN	lets you rename a file.
SDIR	displays a list of files on a diskette together with their attributes. Lets you specify and alter certain file attributes.
SHOW	displays information about various system resources.
STAT	lets you examine and alter file status.
SUBMIT	sends a file of commands to Concurrent CP/M-86 for execution.
TOD	sets the date and time displayed in the status line at the bottom of the IBM-PC display.
TYPE	writes the contents of ASCII file on the screen.
USER	changes one user number to another.

files open on them.

Concurrent CP/M-86 is almost identical in features with MP/M-86 release 2.1. Concurrent CP/M-86 does, however, have one new feature: it supports the use of start-up files, with the capacity of one start-up file for each virtual terminal. Each start-up file consists of a one-line command which is automatically executed when the system is started. If more than one line is required, the Submit command can be used. The default start-up files supplied with the system set the meaning of the IBM-PC function keys.

Some of the features of MP/M-86 are missing, including the printer facility. This is baffling, as the MP/M-86 spooler should run under Concurrent CP/M-86 with little or no modification. And the glossary of terms in the User's Manual explains a spooler, even though none is supplied. Curiouser and curiouser...perhaps Digital Research is planning to sell a spooler as a separate package.

Password protection is the same as in MP/M-86 release 2.1. Passwords may be used at the file level or at the diskette level. In each case, an extra file control block is maintained in the directory that contains the password information. In this manner, data format compatibility is maintained with CP/M 2.2 and CP/M 1.4 files. The user can supply a default password when using the system, or else a password may be specified explicitly in a file reference in the format:

d:filename.filetype;password — for example:
B:LEGAL.DOC;SECRET

Because of the ability to run multiple programs, Concurrent CP/M-86 allows the assembly language programmer to lock both records and files. A locked file cannot be used by another program, ensuring data consistency. Unfortunately, high-level languages such as CBASIC/86 do not appear to use the locking feature.

Documentation is the best I have seen from Digital Research. The User's Guide is all that is needed by the normal user; the Programmer's Guide is only required by assembly language programmers. These manuals correspond to the equivalent MP/M-86 manuals, but are considerable easier to read.

The only warranty made by Digital Research is that it will replace defective diskettes if the company is notified within ten days. However, Digital Research has undertaken to 'do its best' to notify users of any significant corrections or errors in the software for one year after purchase, provided the registration card has been returned.

I estimate Concurrent CP/M-86 users will, in a typical office environment, achieve a 20 percent increase in operator activity. With the normal allowance for office overheads, this translates to a savings of $4000 a year.

Not bad for a $375 package... □

Table 2 — Non-Compatible Functions

CONFG	programs the IBM-PC serial ports.
DSKMAINT	lets you copy, verify and format your diskettes. DSKMAINT copies track by track much faster than PIP.
FUNCTION	programs the Function Keys and the Numeric Keypad on the IBM-PC keyboard.
HELP	displays information on how to use Concurrent CP/M commands.
SYSDISK	sets the specified drive drive to system drive.
VCMODE	switches virtual consoles between Buffered and Dynamic modes.

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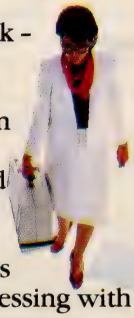

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Your Apple's Been Drafted – To The Russian Front!

By Wayne J Cosshall

NOT VERY long ago, there were no computer war games. Then along came SSI with Computer Bismarck and Computer Air Combat. Around the same time, Avalon Hill, an existing war-game manufacturer, launched North Atlantic Convoy Raider and B-1 Nuclear Bomber. These weren't particularly good as war games, but they did pave the way for Avalon Hill's latest entry to the computer war-gaming genre, Dneiper River Line.

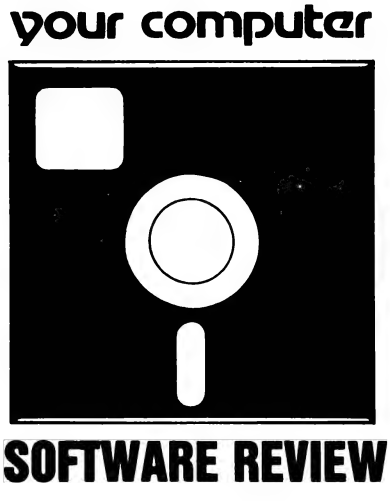
This excellent war game simulates a Soviet thrust against German positions on the Dneiper River in Byelorussia in 1943. This is a solitaire game, with the computer playing the Russian and the operator playing the German. It comes packaged in a 25mm high cardboard box, featuring a colourful cover depicting a Soviet tank and infantry moving to the attack. The box contains a plastic tray holding either a diskette or a cassette; the game is available in disk and tape form for the Apple, Atari and TRS-80 computers, and in tape form for the Commodore PET.

Under the plastic tray is a 16-page rule book, a mounted map, and two cardboard sheets of counters and a double-sided sheet giving the loading instructions. The map shows a 12 by 12 array of squares and, with the counters, is used to keep track of the position of units — this is essential, as no graphic display is used.

The game can be played at two levels, a meeting engagement or a strategic offensive. The computer randomly determines which is to be played. The difference between these is the number of units in play: the strategic offensive brings more units into action, and generally complicates play.

The player does, however, have control over the level of difficulty of the game, on a scale of one to four. When this has been indicated, the computer determines its force structure and them offers the player a choice in the force to use. The player is shown a defending force consisting of various units that start on the map (usually between five and seven) and others (between four and seven) that start the game in reserve off the map. If the player accepts the displayed force, play continues. If not, the next force choice is displayed and so on. But if the player rejects the first two force options, the third must be accepted.

Once the force structure has been settled, the player specifies the starting positions of his units, and the mode of the units. There are three possible modes for a unit: Static gives increased strength but stops movement; Attack provides normal combat strengths and movement capacity; and Mobile reduces the combat strength but doubles the movement range. All units are rated for attack, defense, armour rating and movement ability. The computer also keeps track of the actual strength of a unit as a percentage of full establishment. To reflect casualties, this figure is reduced during play. Most



German units begin play at reduced strength.

The player's force can consist of any or all of these unit types: Security Unit, Regular Infantry, SS Infantry, Panzer Grenadier, Fallschirmjaeger (Paratroop), Assault Infantry, Engineer, Anti-Tank, Panzerjaeger (Tank Hunter), Medium Artillery, Heavy Artillery, Medium Panzer, Heavy Panzer, Assault Gun and Reconnaissance.

The computer's force consists of essentially the same range of units, but with different names.

The terrain in each square on the map is classified either as City, Steppe, Light Woods, Open Hills, Light Wooden Hills, Forested Hills, Heavy Forest or River. Each type of terrain has a movement cost rating for non-mechanised and mechanised units. Six of the squares on the map are classed as objectives — four cities, the German regimental headquarters and an airfield. The possession of these objectives is worth points for both players, the compute 'secretly' rating the objectives as high, medium or priority. the player does not know the priority that the computer (Soviet) has attached to each, but can often estimate them by analysing the actions.

The player's aim is to hold off the Soviet attacks and maintain control of sufficient objectives to survive, point-wise, to the end of the game. The game ends either after a randomly determined number of turns or at any time when the computer has a greater number of victory points than the player. The computer plays quite a tough game, which is aggravated by the fog of war that the player has to work in. The only information that the player has is the position of his own units, the Soviet units in the same square as his units, and the locations through which Soviet units have moved while within observation range of the player's units.

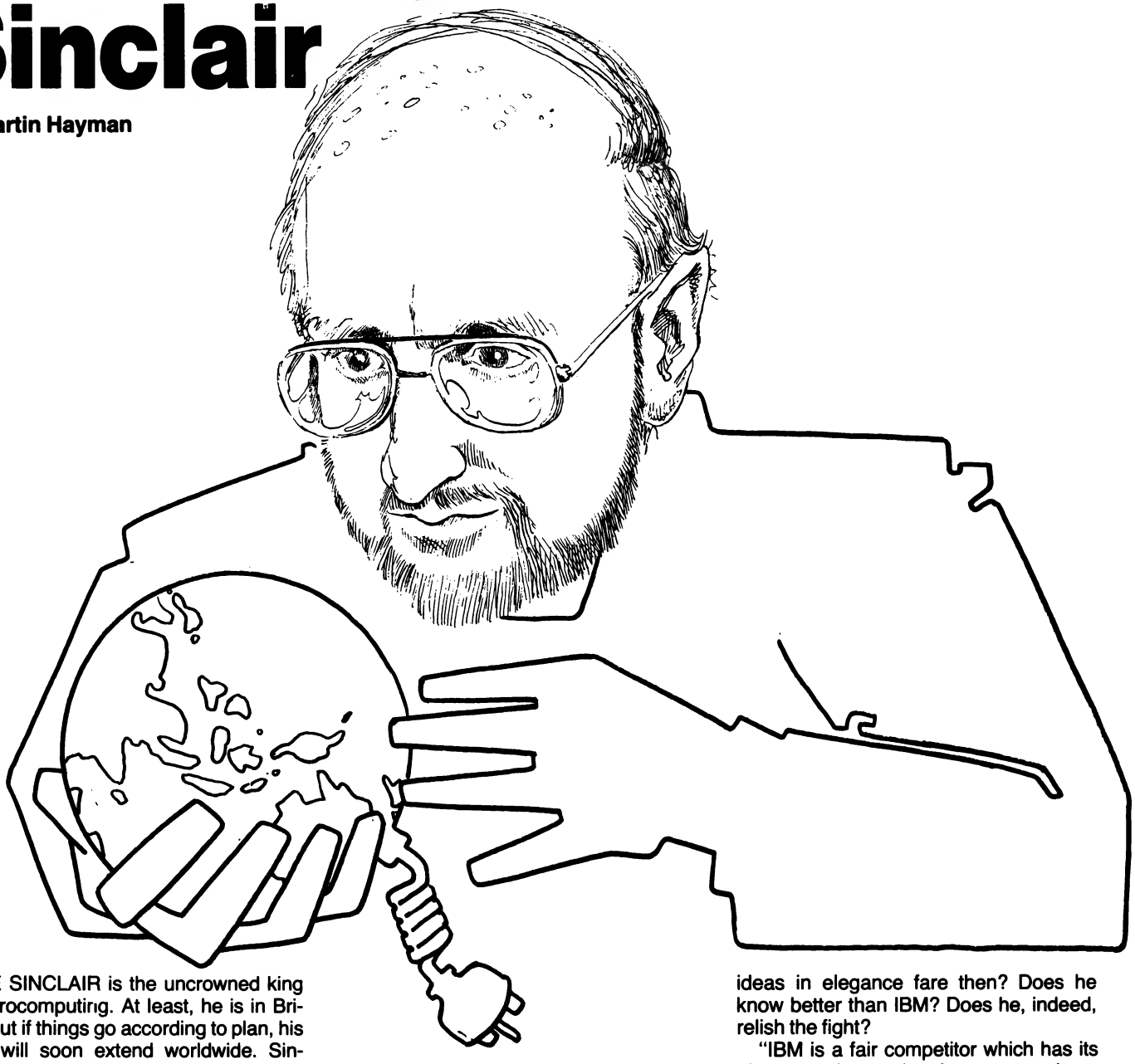
This makes playing the game difficult, as decisions must be based on partial information. It does add, however, a large sense of realism that is hard, if not possible, to incorporate into a non-computer wargame.

The sequence of play is fairly standard. First, the computer moves its units and then conducts its attacks. The player can then make his move. At this point, the player can shift individual units by specifying the unit to be moved, the mode the unit is to be placed in, and then a sequence of directions that specify the movement of the unit. The player can also examine the status of his units and the objectives (who occupies them and which are under attack), request off-map artillery support and the commitment of reserves. Once the player has finished this sequence, any attacks by the player" units are resolved and play moves to the next turn.

This game offers great depth and variety of play and at around $40, is good value. A fringe benefit is that RESET can be hit during play; the code can then be examined, enabling you to learn something about how it was programmed and also allowing changes to be made to the game.

The World, According To Clive Sinclair

By Martin Hayman



CLIVE SINCLAIR is the uncrowned king of microcomputing. At least, he is in Britain. But if things go according to plan, his sway will soon extend worldwide. Sinclair's name is synonymous with computers; in Britain, the dull acronymic thud of 'IBM' has been displaced by the cheery ring of 'Sinclair', a name that bespeaks fun with electronics.

Asked to define the nature of his success, for his firm's pre-eminence in this fastest-moving of all businesses, Sinclair responds, "Advanced design and elegance".

His belief in advanced design and elegance is matched by the ability of his own people to maintain a level of creative electronics design that has so far kept him ahead of the competition.

Yet sooner or later, the poetry-loving Englishman must confront IBM in the personal computer marketplace. How will his ideas in elegance fare then? Does he know better than IBM? Does he, indeed, relish the fight?

"IBM is a fair competitor which has its views on the marketplace, as we have ours, and which of us succeeds in whichever market will be the one that does the better job", he replies. "That's fair and straightforward. I don't relish the fight — nothing makes life more complicated than competitors — but I don't mind it.

"I think IBM is at a tremendous disadvantage because of its size, it makes it

harder for it to react swiftly — but there's the tremendous advantage of its experience and technical base. But in any one-for-one confrontation, as the phrase goes, we'd win. I think we're better.

"First of all, where does IBM have its great strengths? Let's say, marketing. In order to give ourselves that sort of strength we've allied ourselves with Timex which, with 70,000 consumer outlets in the United States, obviously has the greater consumer strength than IBM.

"Then if you take apart our new Spectrum and the IBM-PC, you'll see the IBM is a very old technology. On the outside, it may look elegant, but inside it's board after board after board of chips. The cost of making it must be astronomical. It was rushed through because the microcomputing craze caught IBM unawares.

"It's unbelievable. The IBM-PC has a board with God knows how many chips on it, it must be a hundred, and that's just to do colour. We do it on one chip. But it's the best IBM could do in the time that was available.

"That's always the case: big companies don't make the innovative steps. It's just not the way things work. In the same way, the big car companies won't be the leaders in electric cars, just as the big yacht companies of the past weren't the people that built the steamers, just as the great train people weren't the people who made the cars, just as they in turn weren't the people who built the planes.

"Every time there's a new technology, a new generation of companies comes along."

What about Sinclair Research? Could he not foresee a time when Sinclair itself would become conservative and be tripped by the rush of yet another new technology? "Yes, it will", he replies. "We've got no ability to prevent that — it will happen eventually, it's unavoidable. But we might be able to maintain our position at the leading edge indefinitely if we can continue with our present policy of not being a big manufacturer or bulk distributor."

To talk about Clive Sinclair is to talk about Sinclair Research. Interviews with the man tend to become a history of his various, very clever and some less-than-reliable products since he first started making hobby electronic kits and scientific instruments in the early sixties. He brings you neatly up-to-date and then gives you a tantalising glimpse into the future, ("Sorry I can't give any precise details, but the worldwide patents are being filed"). On the guided tour, he may shaft a competitor or two. It's all good commercial sense, and helps to popularise his cause ... and sell his computers at the rate of 60,000 a month.

So why exactly does he make computers? "I make computers because they're a good market, and they're interesting to design, so one designs them ..." He finds the answer a little too bald, so adds, "I mean, I don't feel bad about making them, or selling them for money or anything. There's a demand for them and they don't do any harm. But I don't think they're going to save the world."

Sinclair is everyone's favourite boffin in person: the pale skin; high domed forehead with its minkish rim of crisp, light ginger hair; the pale clear steady eyes behind pebbly glass. Spoiling the image, his Chelsea apartment is cool, clear and uncluttered — there are no electronic machines in sight, except for a small Japanese cassette stereo.

Two characteristics of Sinclair's products stand out when you look at the history of Sinclair Radionics and, later, Sinclair Research; their smallness, and the original use to which chips have been put. However, he is adamant that smallness was never an end which was pursued for its own sake: "I just like efficiency in design, in whatever form."

Does he equate miniaturisation with elegance? "Not quite — in fact, sometimes not at all. To miniaturise some things might be inelegant, but it's certainly inelegant to make things larger than they functionally need to be, assuming there isn't some other benefit to making it larger. Once or twice, we have made things deliberately small, like the tiniest radio in the world. But that was to make it an exciting thing for people to build, so that they could say it was the tiniest radio in the world."

In most important respects, Sinclair's current machines are not small merely in order to make them cheap: "If you take my Spectrum computer, that's compact," says Sinclair. "If we made it any larger, it would simply be more expensive. There would be no contra-benefit, so elegant design has led to a very compact shape compared with its competitors, not because we wanted it to be tiny.

"On the contrary — if we had wanted to make it really tiny, we could have made it, I suppose, the size of a cigarette packet. But that wouldn't have been functional because the keyboard wouldn't be usable.

"The Spectrum sacrifices nothing to size. The keyboard is exactly the same spacing and pitch as an IBM, which is why we went for that size."

Many of Sinclair's designs have displayed original and unconventional uses of components. This may derive at least in part from his lack of a conventional electronics engineering education. He is self-educated in electronics: when he left school — the last of more than a dozen he attended — in 1958, he decided no to go to university "because most of them offered only electronic engineering, and I had no desire for such a broadly-based course."

His first love was, and is, mathematics — "I was very good at maths, if I may say so modestly" — and he had a strong interest in English. His interests in electronics (into which, he says, he was 'diverted' from maths) and English steered him to publishing: he joined Electronic Components magazine in 1962, by which time he had already written seventeen books.

Eventually, he started to turn his theoretical knowledge into practical products. The first device bearing Sinclair's name was to have been a transistor radio kit, but his promised financial backing fell through. Electronics was once again relegated to a spare-time activity while Sinclair supported himself with freelance writing.

One of his first significant commercial ventures was to buy transistor components from Plessey, which he graded, tested and re-sold. Thus was born Sinclair Radionics, which graduated from radio and amplifier kits in the sixties to the world's first pocket calculator in 1972.

It was the adoption of the hearing-aid battery, along with the acquisition of a monolithic seven-segment gallium arsenide display chip from the Canadian firm Bowmar, which was looking for sales outlets after its military work had dried up, that permitted Sinclair to reduce so drastically the size of the calculator. Until then, portable calculators had been powered by the bulky dry-cell torch-type batteries.

Sinclair pioneered the use of Integrated Injection Logic chip in his 1975 Black Watch...and came unstuck for the first time. Up until then, everything had gone according to plan — Sinclair had stayed one jump ahead of the opposition by either releasing a comparable product to the opposition's at the lower price, or by vastly improving the product's features

and holding the price.

Sinclair designed the Black Watch, the first to have all of its components on one chip, and the design was passed out to Mullard for manufacture, who rather late in the day decided to back out.

"They didn't think there was a future in digital watches or something," Sinclair recalls. "They could have made the chip, but they didn't want to. We were told it was a matter of corporate policy — we couldn't get any more sense out of them than that. They never made us any chips."

The chip design was then passed on to ITT, a move which cost Sinclair about eighteen months — disastrous for a firm which depended on being first onto the market with a new product.

"ITT had terrible problems with yield and," says Sinclair, "didn't really keep us informed about what was happening."

There were also problems with the production of the watch. Static electricity, it was found, could switch the chip. By sheer misfortune, the pre-production models had been assembled and tested in reasonable humidity conditions. But in dry conditions, static electricity discharges damaged the watch.

Unhappily, the Black Watch fiasco came at a time when Sinclair had been investing heavily in his Microvisions pocket television, which had been under development for more than ten years. Sinclair was faced with either dropping the flat-screen television and reducing the size of his company, or of seeking outside investment. He chose the latter and went to the National Enterprise Board, which poured in sufficient funds for the Microvision to be launched in January 1977.

During the NEB era, Sinclair Radionics' principal products were the Microvision, a range of very successful pocket calculators (including the Cambridge Programmable, whose price undercut the opposition's by up to 75 percent) and a range of digital multimeters. In late 1978, Sinclair introduced the Enterprise programmable calculator which, together with a program library, sold for around $40 in Britain and was a sign of things to come.

But the rules of the game were changing. Lord Ryder, who had given strong personal backing to Sinclair, resigned as chairman of the NEB. The new personnel of the NEB decided the future for Sinclair Radionics lay with the digital multimeters rather than the calculators and the television set, in the mistaken belief that the company would not be able to compete effectively with the Japanese. And so ended Clive Sinclair's involvement with Sinclair Radionics ...

In July 1979, Sinclair Research emerged from the ashes and the following month the ZX-80 personal computer was conceived. It proved to be a runaway success.

Given that the ZX-80 and its successor, the ZX-81 were well-designed and built, what was it that made them such a runaway success? Why was Sinclair so confident of success that he ordered 100,000 sets of parts for the ZX-80 — exactly the number that were finally produced and sold? in other words, why do people want personal computers now?

"I think there's always been the potential for people to want computers, it's just that we can now offer them at a price which makes it possible for them," answers Sinclair.

Sinclair's experience in mail-order selling also paid off. It is a tactic which has immeasurably strengthened his strategy in selling the ZXs first in Britain, then to France, West Germany, Australia and now, through Timex, to the United States, (promotional mail delivered with your American Express bill) and to Japan through Mitsui.

Sinclair is amused, and gratified, by the attention the ZX-81 has received from determined customers, who fit up the machine with keyboards and character generators and colour cards and so forth, until their machine bears no resemblance to what was shipped out of Sinclair's Dundee factory. "Quite overgilding the lily," he comments.

The new Spectrum is not intended as a replacement for the ZX-81. Sinclair's insistence on a 'proper' keyboard places it firmly in the market which until now has been dominated by American products. Sinclair believes the Spectrum will be bought by laboratories, research establishments, small businesses and retailers as well as by individuals.

Looking to the future, what are his plans? Much of his time, Sinclair says, is spent trying to envisage what devices will be claiming the punter's money in two or three years' time.

"The next step will be to make a machine of a suitably higher price which would have a built-in screen and dual floppies", he says. "It will be conventional in the sense that it will contain what the Osborne or the IBM-PC have. It will have that because that's what is needed."

Conventional 13cm floppies?

"Oh, no. Our Microdrive will be miles ahead of what anyone else is doing. We have got that working, you know — it's not a figment of our imagination. But it's not fully tooled yet.

"We have three elements that people will want: our printer, the flat-screen display and the mini-floppy. Bring them all together and it's a much handier package than, say, an IBM system. Not everybody needs a handy package you can carry in your briefcase, but many people do."

How portable is portable?

"We're doing something that's maybe a couple of pounds in weight — say, two to four to be on the safe side."

This is a product which Sinclair says is due for a late 1983 release. But are people really going to need to trail around with computers under their arms?

"Not necessarily," he answers. "Sooner or later, people won't need to carry computers around. If they need one in the office and one in the home, they'll have one in each place and just transfer, say, diary data. But lots of people do need portability — schoolchildren, for example, or if you want to use it in a plane.

"But things are changing very rapidly, and the day will dawn when computers will teach better than human beings can, because computers can be so patient and so individually attuned. The computer will eventually replace the school."

Does he not fear the computer might have a de-socialising effect on people?

"Yes, I'm concerned with this. We will have to watch very carefully that we don't remove the rituals of things like shopping or banking. Sometimes, it's possible for something to disappear before we realise that it's something we want to keep...like milk being delivered to our doorstep."

Sinclair does not believe computers will help to make a better world: he points to the fact that the very best, most highly specified and supported research and development goes into producing military systems. He admits he has been asked to do military work, but turned it down because, he says, "I was worried about its implications."

Away from Sinclair Research, he still manages to pursue a wide variety of interests. He has been doing an economics degree at King's; he is chairman of the British Mensa Society; he keeps up his interest in mathematics; he has gone into partnership with an old friend, Patrick Browne, of Browne's Bookshop in Cambridge, to set up a publishing company with a planned 1982 list of 20 titles which will have, as a common theme, "a progressive approach to the problems of contemporary society"; and he is sponsoring an $8500 fiction prize, to be awarded to the author of a "novel which is not only of great literary merit but also of social and political significance."

But perhaps the most interesting of Sinclair's hobbies is music, a subject on which he is more passionate than anything else and which is reflected in his trusteeship of the Cambridge Symphony Orchestra. His tastes run to the romantic: he prefers Beethoven to Bach, Stravinsky to Bartok, and thinks it's a toss up between Vivaldi and Albinoni. His favourite composer is Schubert, particularly the Quintet in C.

"One day," he vows, "I'll find the time to pick up the pieces of my piano-playing from school. But I won't aim to be brilliant, just adept enough to amuse myself." □

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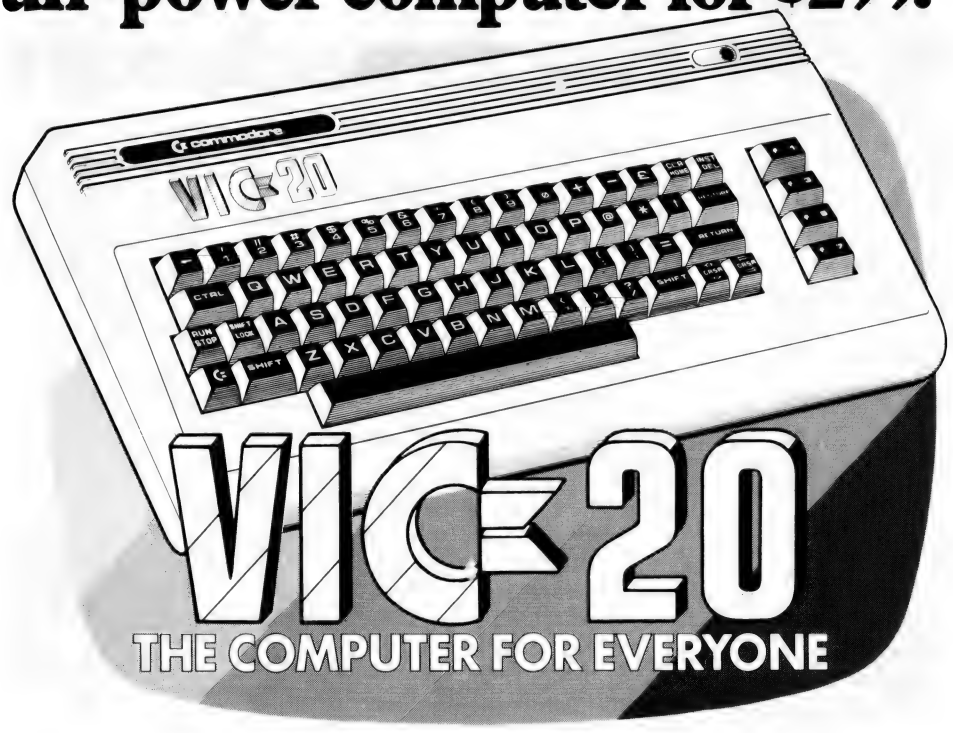

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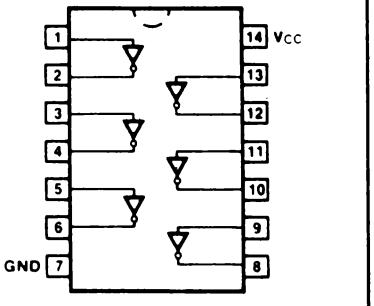
Logic For Literati
Part II: On The Breadboard Line

Last time, Les Bell described the approach he will follow in describing logic and hardware generally. This month he moves on to introduce the basics of handling integrated circuits.

NOW WE all understand about volts, amps and ohms, and we know about the difference between analogue and digital systems, it's time to start investigating digital circuits in more depth. In particular, it's time to get used to recognising the various components that go to make up an electronic circuit.

Figure 1 shows the key component of logic circuitry: the integrated circuit. This is a 14-pin chip; there are seven pins on each side. Note in particular that it DOES matter which way round the chip is inserted into its socket; if it is inserted the wrong way round, the chances are it will be destroyed.

Figure 1



54/7404

7400 series integrated circuits are of the TTL (transistor-transistor logic) family, as I mentioned last month. These circuits run off a five volt supply, and consequently have two connections to the power supply — one at zero volts (alias ground or earth) and the other at five volts (alias 5 V or often Vcc).

On this subject, this is a good point to note that logic circuits require quite tightly regulated supplies. TTL circuits operate on 5 V +/- 5 percent, in other words 4.75 to 5.25 V, and anything outside this range can damage them. For small to medium-sized circuits, this can be achieved through the use of voltage regulator integrated circuits such as the 7805. For a suitable power supply, contact electronic component/kit stores such as Dick Smith Electronics or Applied Technology.

In the case of 14-pin IC's, pin 7 is 0 V and pin 14 is 5 V, while for 16-pin IC's 0 V is on pin 8 and 5 V on pin 16. In general, the more pins a circuit has, the less you can assume that this will be right. It's only a general rule, and certainly should be checked with a data book, particularly in the case of 20-pin and larger chips.

How are the pins numbered? At one end of the circuit, you'll find a little indentation. With this facing towards the left, the lower row of pins is numbered 1 — 7 (or 1 — 8) from *left to right*, and the top row is numbered 8 — 14 (or 9 — 16) from *right to left*. This same scheme of numbering applies to larger integrated circuits.

Apart from the power supply pins, the remaining pins are all either inputs or outputs. Which is which depends upon the type of integrated circuit, although there is a pattern of sorts among the very simple circuits. You'll also find that you'll start to remember the more common circuits.

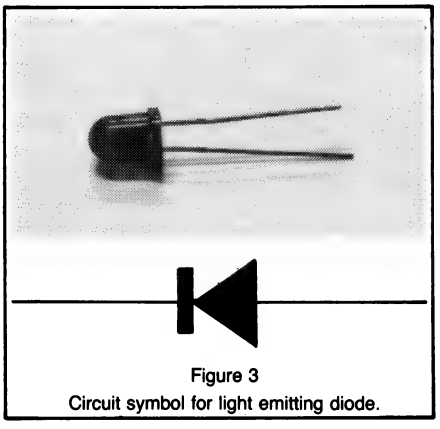


Figure 3
Circuit symbol for light emitting diode.

The component shown in Figure 3 is a light emitting diode. A diode is a semiconductor device which conducts electricity in one direction but not the other, and the light emitting version does just what its name suggests.

The LED has two leads, and it is important to get them the right way round, otherwise the thing won't work. The anode connects to a more positive voltage than the cathode, and you tell which is which by the flat side of the LED, which is closest to the cathode.

We are going to use the LED to tell us the condition of various points around a circuit. We'll connect the diode between the output of a TTL circuit and either ground or 5 V, and the LED will either light up or not, telling us something about the voltage at that point of the circuit.

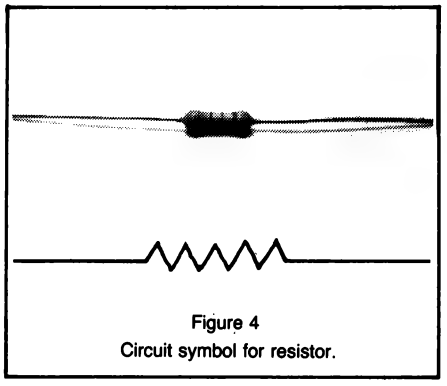


Figure 4
Circuit symbol for resistor.

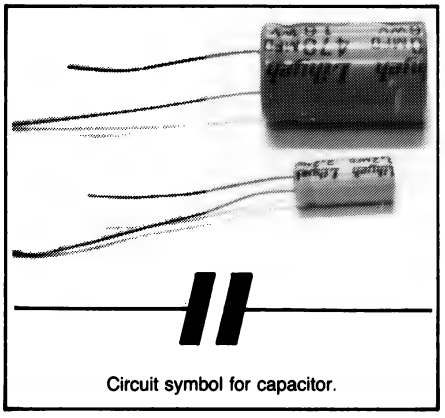
Now, when it is conducting, a diode will always drop 0.6 volts, and so we need to get rid of about 4.4 V elsewhere. This is where resistors are handy (see Fig 4).

The LED requires a current of about 10 — 20 milliamps (mA, or thousandths of an amp) to light up, and so we can use Ohm's Law to calculate the required value of resistor. Resistance equals voltage divided by current, or more mathematically:

$$R = V/A$$

Plugging in our values, we get R = 4.4 / 0.015, which is 293 ohms. The nearest value that is actually available is 330 ohms.

Now, before proceeding, we need to know one extra thing about the outputs of TTL gates. Last month we said that a logic 1 is somewhere above 2.4 V; typically a gate can only get up to about 3.3 V without help from a pull-up resistor. Furthermore,

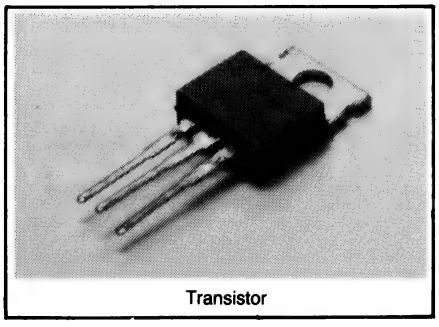


Circuit symbol for capacitor.

a high output can only source a very limited amount of current; that's all it is required to do in normal operation.

A low output, on the other hand, is very close to 0 V, and can sink a considerable current, typically up to 16 mA. Therefore, we'll connect the cathode of the LED to the output of the circuit under investigation, via a 330 ohm resistor, and the anode to the 5 V supply line. Now, when the output goes high, there is only minimal voltage across the LED, and it won't light up.

On the other hand, when the output goes low, it will pull the cathode of the LED down in voltage, producing a voltage drop across the LED and so it will light up. So a logic 1 causes no light and a logic 0 causes light. This doesn't seem very logical, and so we will do something about it later.



Transistor

Several other types of components are seen in digital circuits. Most common are capacitors. These serve a variety of purposes, but perhaps the best way to visualise a capacitor is as a kind of 'reserve tank' which can be used to 'absorb' variations in voltages.

As you may know, the wall sockets in your home provide alternating current, which varies from positive to negative and back again 50 times a second. Inside most pieces of electronic equipment (Apples excepted) there's a power supply which consists of a) a transformer which steps down the 240 V AC to something more useful like 12 V or 9 V AC, followed by b) a semiconductor diode circuit which, as mentioned above, only conducts one way, converting the 9 V AC to a DC voltage. This still drops to 0 V fifty or a hundred times a second, and needs to be smoothed out.

This is where the capacitor enters the picture. It acts like a kind of reservoir tank of electricity, absorbing the excess when the voltage is at its peak and helping to make up the shortfall when the voltage drops to zero. In this way, the circuit is supplied with nice smooth DC. Generally, after this stage most power supplies have a voltage regulator, which makes sure that the output voltage is exactly that required.

The capacitors found in power supply circuits are generally large in value, and are mostly what's called electrolytic types. Such capacitors are polarised, and the positive marked end of the capacitor must be connected to the positive supply line.

However, around digital circuitry, the circuits themselves cause surges on the power supply leads as they switch from one state to another. If nothing was done about these power supply glitches, they would cause false triggering of other circuits and generally render a circuit totally unreliable.

The glitches are smoothed out by what are called bypass or de-spiking capacitors. Every four simple circuits, or every two of the more complex ones, should have a nearby capacitor. Generally, a 0.05 microFarad (uF — millionths of a Farad) capacitor will do, and these are non-polarised, and generally made of a plastic material, typically polycarbonate. You can tell them by their green, pillow-shaped package.

Another type of capacitor you will see on logic circuits is the tantalum capacitor. This is a special type of electrolytic which is compact,and is used for power supply decoupling at the board, rather than component, level.

The Prototyping Board

We will be building circuits on a plastic and metal block called a prototyping board. This consists of a plastic block with holes in the top, beneath which are metal strips which grip the leads of components inserted into them.

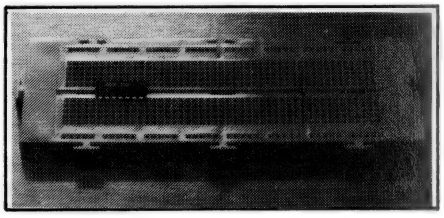


Figure 2 — Prototyping Board

The top and bottom horizontal strips are used to distribute power supplies along the length of the board, while integrated circuits are plugged in astride the central gap. The result is that each of the vertical connector bars around an IC is connected to one of its pins.

Wiring around the circuit is done by simply plugging components into the holes next to the IC pins and finally making any necessary links using point-to-point solid core wire.

Let There Be Light

I mentioned above that by using a LED in series with a 330 ohm resistor, we could indicate the state of the outputs of logic circuits, but that the 'sense' of the indication would be the reverse of what seems natural. We'll now do something about that.

The first logic function we'll use is the inverter. This is a simple logic gate which simply inverts its input so that 0 becomes 1 and 1 becomes 0. Inverters come cheap these days; in fact, you buy them by the half-dozen.

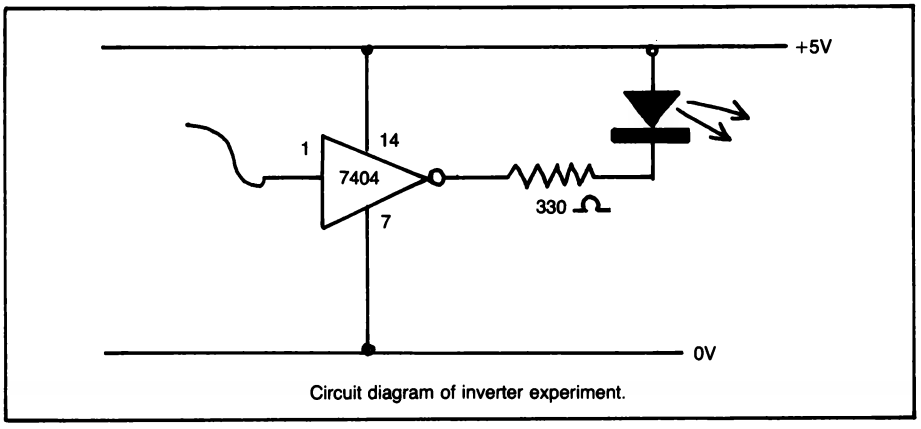
The 7404 hex inverter contains six inverters in one 14-pin package. Pins 7 and 14 are the power supply connections, while the remaining pins are inputs and outputs. We'll only use one of the inverters, but they're all identical, and we'll be using more in the future.

Plug a 7404 into your board, straddling the middle gap, and with the pin 1 indent to the left. Use two pieces of wire to link pin 7 to the ground strip across the bottom of the board and pin 14 to the 5 V line, which we'll run across the top of the line.

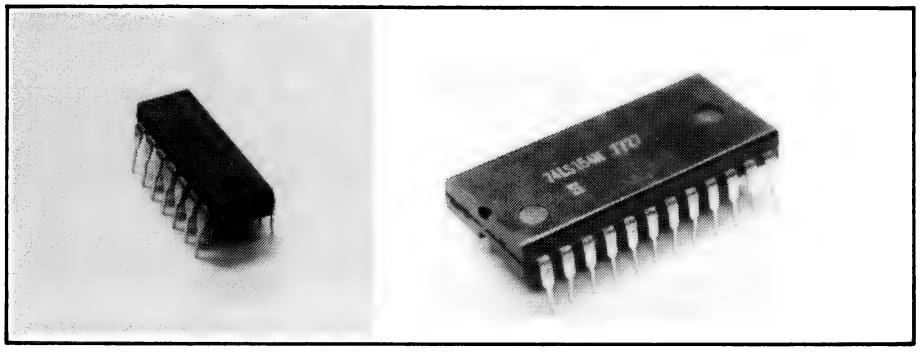
We'll use the first inverter in the package, which has pin 1 as its input and pin 2 as the output. Wire a 330 ohm resistor between pin 2 of the 7404 and a spare strip on the board; its long leads should make that easy. Now wire a LED, with its cathode connected to the end of the resistor and its anode connected to the 5 V line across the top of the strip.

Now take another piece of wire and insert one end at pin 1, leaving the other end free for the time being. That completes the circuit. All that remains is to connect it to the power.

Wire the ground of your power supply to the bottom strip of the board, and then the



Circuit diagram of inverter experiment.



5V side of the supply to the top strip. If everything is okay, the LED should light up.

Now take the free wire connected to pin 1, and plug it into the 0 V strip at the bottom of the strip. The LED should go out. What's happening? Think about it.

Instead of the 0 V side of the supply, connect pin 1 to the 5 V supply. Now what happens?

The Answer

The output of an inverter is always the opposite of the input. As a result, when the input of the inverter is connected to the 0V line (logical 0), the output becomes a 1 (5 V), so that the LED does not light up.

On the other hand, when the inverter input is connected to 5 V (logical 1), its output becomes a 0, goes to 0 V, and the LED lights up.

Our first use for the inverter will be getting our LED to light up for 1's instead of 0's — a much more sensible way of doing things. This also confers an additional benefit.

We've noted that a LED required about 10 to 20 mA to light up, but a low output can only sink about 16 mA — which leaves precious little (if any) to drive the inputs of other logic gates. Since we will often want to look at points in the middle of circuits without putting too great a load on them, we will use the inverter circuit as a 'buffer'.

Thus we avoid overloading a circuit and get the LED to light up when the input of the inverter is 1, which only seems logical.

Next month we go on to combinatorial logic and Boolean Algebra. □

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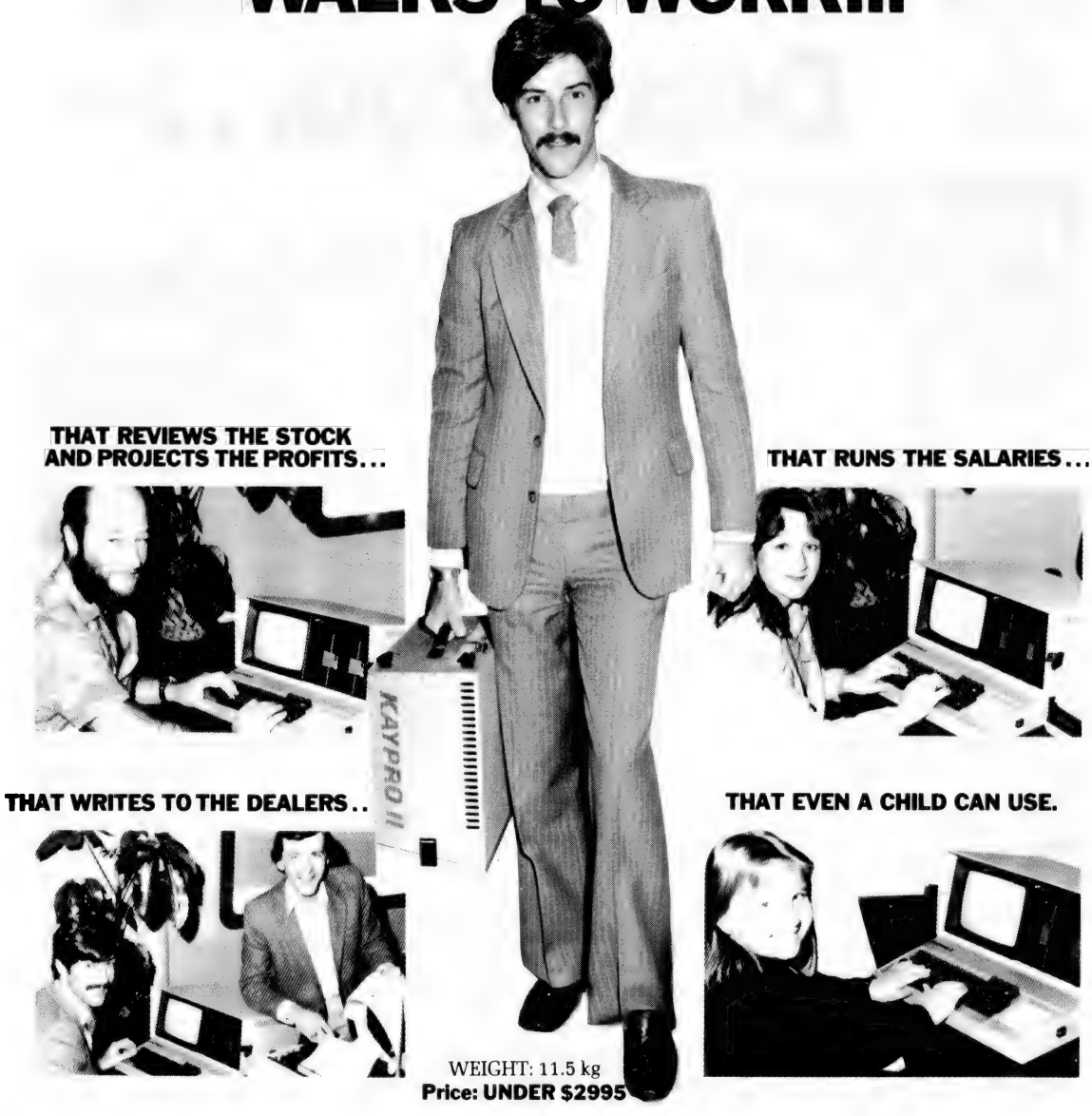

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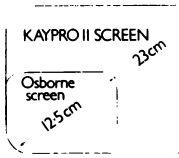

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You Speak PL/I, Don't You...

Being something of a computer linguist, Les Bell was particularly interested to add another high level language to his collection. In this article he reviews Digital Research's PL/I-80...

IN THE past couple of years, Digital Research (the wonderful group which brought you CP/M) has been making moves into the languages market, first with CBASIC 2, then PL/I-80 and CB-80. CB-80 has become quite a hit with previous users of CBASIC, offering much higher performance from almost identical source code.

PL/I-80 was released a couple of years ago, and was the software product of the year. Before delving into this particular compiler, perhaps a bit of history and the philosophy of PL/I might be in order.

PL/I (pronounced PL One) was developed in the mid sixties jointly by IBM and SHARE, the IBM User Group. At that stage, a multitude of languages were springing up — FORTRAN and ALGOL for scientific work, COBOL for commercial programming and a host of others.

The data processing community felt that the number of languages prevalent would mean increasing specialisation among programmers, and that it must be possible to design one language that would be suitable for all programming tasks.

And so PL/I was designed, as the language to end all languages. The designers are reputed to have stated 'If we felt that a feature would be used, and that it could be compiled, we put it in'. Its critics have described it as a '100-blade Swiss Army knife'.

The full PL/I language has so many features that most programmers forget many of them, and it also needs a large computer to compile and run. And so, a committee was formed a few years ago to decide upon a subset of the language for use on minicomputers. By taking out those features which were hardly used, and those which cost too much in terms of machine resources, they arrived at PL/I Subset G, which has been adopted by many minicomputer manufacturers.

PL/I-80 is almost a complete implementation of Subset G. For those familiar with the Subset G specs, PL/I-80 omits the DEFINED, FLOAT DECIMAL and LIKE attributes, the ATANH, DATE, STRING, TIME and VALID built-in functions, asterisk extents and dynamic arrays. However, it has additional facilities for ASCII file processing, additional built-ins and %REPLACE statement for macro substitution during compilation.

PL/I is a block structured language, and encourages the use of modern structured programming techniques. Unlike Pascal, however, it does not force the use of these techniques, and the programmer can 'get round' them if he has to.

Like Pascal, PL/I programs are structured, starting with declaration of the program itself, and continuing with variable declarations. Unlike Pascal, however, variables do not have to be declared; when the compiler spots a variable it has not seen before, it supplies a default declaration.

PL/I-80 is particularly rich in numeric data types. Integer, or fixed binary, variables can be 1 to 16 bits in length, while fixed decimal numbers can have 1 to 15 decimal digits, with user selectable scaling (number of digits after the decimal point). This is particularly useful for accounting programs, where fixed decimal (15,2), for example, can represent numbers up to 9,999,999,999,999.99.

For scientific calculations, it is more common to use floating point arithmetic, and PL/I-80 provides float binary variables with precision up to 24 bits. Float decimal, although in the full PL/I standard, is not supported by PL/I-80.

String data comes in two flavours in PL/I-80 character string and bit string. Character strings are just what you might expect, except that a declaration such as *DECLARE A CHARACTER (10);* sets up a fixed length string, which if printed will always occupy ten positions. If a shorter string is assigned to A, then it will be padded with blanks to the right.

On the other hand, if it is declared as *DECLARE A CHARACTER (10) VARYING;* then it can represent any string up to 10 characters in length.

Bit strings can be up to sixteen bits in length, and can be specified in binary, octal, hex or base four. The most common use of bit strings is as what Pascal programmers would call packed arrays of booleans.

PL/I allows the programmer to initialize variables at declaration time, so that the program doesn't 'wake up' with nonsense values in variables. It also allows him (her) to convert between the various data types with wild abandon, with the compiler automatically providing code for the conversions. Where the programmer wants to explicitly manage the conversions, that can be done, too.

Input/output is extremely interesting in PL/I, not to mention complex. Stream I/O treats the input or output data as a continuous stream of characters, and is rather like conventional PRINT and INPUT statements in BASIC. Sequential files are treated in exactly the same way.

On the other hand, Record I/O is used for random access files and other peripherals where data is broken up into fixed length fields.

List-directed I/O is simply specified by the commands *GET [FILE (filename)] LIST (datalist)* and *PUT [FILE (filename)] LIST (datalist).*

An interesting difference between PL/I and most other languages is that when zero-length or null data is input, the vari-

Continued on Page 107

ANYTHING IBM CAN DO....

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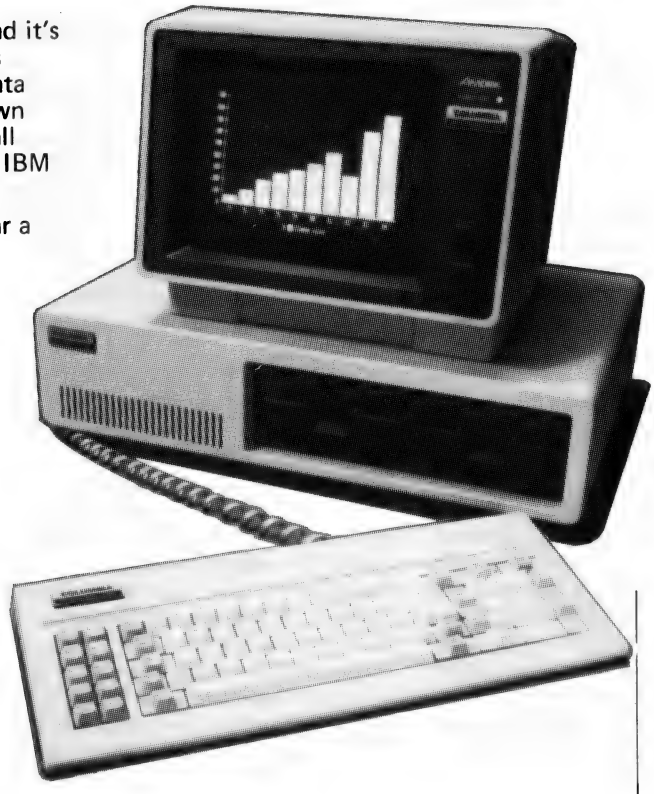
COLUMBIA

16 BIT IBM PC COMPATIBLE

It's 16 BIT. It's IBM PC compatible. And it's here now! President have a new business computer manufactured by Columbia Data Systems of the USA complete with its own software and hardware. It will also run all software and hardware produced for the IBM PC.

At first glance, this machine may bear a certain resemblance to its mentor.

That's before you switch it on.



16 BIT IBM PC COMPATIBLE

WHAT A PERFORMANCE!

Appearances can be deceptive as a look at the credentials of the Columbia MPC machine will tell you.

Operating system software is MS-DOS® or CP/M 86®.

It's 16 BIT 8088 hardware configuration provides 128 K RAM with parity, two RS-232 serial ports, Centronics parallel printer port, DMA controller, eight levels of interrupt, dual floppy disc system with one megabyte storage, Winchester interface and eight expansion slots.

Not bad for the standard version.

EXAMINE YOUR OPTIONS

Columbia like to leave your options wide open. So they've included 256K RAM boards, 8087 arithmetic co-processor for high speed math functions, dual RS-232/RS-422 boards, and a Winchester disc based system.

The Columbia MPC's expansion capability can easily accommodate just about any imaginable hardware configuration including one megabyte RAM and 10 megabyte disc.

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president

Melbourne Goes To The Show

THE MELBOURNE Showgrounds were the scene of an odd contrast in early December. On one side of the road, whiskered gentlemen in 1920s cars and motorcycles took part in the filming of the movie 'Phar Lap' while, across the street, the hi-tech mob was moving into the future at Data '82.

Here's a rundown on the interesting bits you would have seen on a walk around the show.

Just inside the doorway, The Computer Company put on the usual excellent level of presentation for its new baby, the JB-3000. Popular opinion has it that TCC also had the best looking girls on its stand, although that's a sexist comment and not the kind of thing you'll find in this magazine, no sirree.

The JB-3000 is now out in the stores and seems to be selling well, and TCC is also getting the software act together a bit better as time goes by.

Adaptive Electronics had two new Cromemco products of particular interest to *YC* readers. The C-10 computer is a low-cost standalone unit with Z-80A processor, 64K of RAM, 24K of ROM, 30cm CRT and keyboard. Two RS-232C ports and a Centronics port allow most peripherals to be attached to the C-10.

In addition, the C-10 will connect to C-Net, Cromemco's new 'automated office' local area network. Cromemco's new 68000-based CPU will support its Cromix operating system, allowing migration of software with minimum re-writing. Incidentally, Adaptive Electronics is also Australian distributor for Tandon disk drives, and had a wide range on display.

Datamax showed its Australian-built 8000 computer. This machine can run both CP/M and MP/M 2.1, with up to four users. Hard disk systems with cartridge tape backup and a wide range of software are also available.

Delairco displayed its wide range of machinery for handling printed computer output — bursters, decollators, guillotines and shredders. My output isn't high enough to justify that kind of gear, but if you're sending out thousands of invoices every day, you might like to consider it.

At the end of the row, Tandy was showing its new machines. Of most interest is the Model 16, which is based on a Motorola 68000 with a Z-80 to run all that passe 8-bit software we don't seem to be able to give up.

Two slim-line 20cm floppies are standard, and the machine sports multi-user capability.

Discover Multiprocessing

Round the corner was Gower Smith of Archives Computers. He had several interesting new devices on display. Perhaps the most significant was the Discovery multiprocessor, which supports both 8- and 16-bit processors under a single multi-user operating system.

In fact, the system uses CP/M-80 and CP/M-86 running on individual processors, with access to system resources such as disk through a separate service processor.

Telxon Australia (if you can wrap your tongue around that name) market a wide range of portable data entry terminals — you know, the kind of things you see supermarket managers mysteriously keying as they wander round the aisles. They include the hand-held terminals with interchangeable keypads, receivers, optical wands and printers. Lots of interesting applications.

Just up the corridor was Tec and Tomas (Australia), distributor of Seiko computers. I was amused to notice, just above the keyboard of the Seiko 8300 computer, a small LCD display with time and date!

The machines are based on the Intel 8085, except the 9500 which has an 8086, 8087 and 8088. This top-line model offers colour graphics and 13cm drives with 640 Kbytes per disk.

Electronic Control Systems has ben around for a long, long time as one of Australia's few computer manufacturers. Its latest product, the Time 5600 Office Computer, is based on dual Z-80 processors — one with 64K of RAM to drive the integral Winchester, and the other, with 256K of RAM, for user programs.

Based on a new multi-user multi-tasking operating system which is claimed to run CP/M programs while featuring a complete set of UNIX commands, the 5600 has been designed to operate on the Time Network.

Datatel is the local agent for Beehive, which manufactures a range of terminals. Its new Topper is a complete micro-computer, running CP/M, which can also be used online with Bisync SNA protocol converter to look like a 3278 or a remote job entry station. Datatel also has a wide range of printers from Texas Instruments, DEC, MPI and Wenger, as well as the locally manufactured Sprite micro-computer.

Delta Semiconductor Peripherals is, of course, distributor of the Hitachi Peach,

and took the opportunity to display what is becoming a very wide range of gear indeed. With the new 16-bit machines (including an 8088 card for the Peach), it is well placed for the forthcoming boom in the 16-bit market.

Microprocessor Applications, in Box Hill, is best known for the Micromation range of equipment. Initially, Micromation suffered from a poor reputation for quality, but its later equipment was much improved, and it was one of the first to successfully implement MP/M 1.0.

The Mariner is a very nicely constructed multi-processor system with floppy and hard disks (up to 40 megabyte) as well as streaming tape cartridge backup. Over 150 installations have been done in Australia to date.

Also on the Microprocessor Applications stand was the Wyse WY-100 terminal. This extremely sophisticated device allows split-screen scrolling, every editing and forms function you could want, and a status line. The keyboard is extremely comprehensive, with numeric pad, cursor controls and programmable keys which are ideal for WordStar and similar word processors.

New Business Software

IMS Computer Systems managing director Bryan Gardiner showed us the new Ascent series of business software. This highly modular software was written in CBASIC to be portable to any popular micro, and furthermore will run in the somewhat undersized TPA left in an MP/M II system.

Because of the modularity, the user can buy only those modules he needs and no more, though the system, fully expanded, must be one of the largest around. Versions are available for 8- and 16-bit computers including Z-8000-based (hi there, Olivetti!) to run under CP/M and Unix. A version should even be available for the 68000 when CP/M-68K is released.

An interesting service is offered by Computer Tape Storage. Basically, they offer you somewhere to store your tapes — good backup policy — but go beyond that with its Recovery Operations Centre, a fully prepared and conditioned computer room for use by subscribers in the event of a disaster on their own site.

Durango Systems showed the Durango F-85 small business computer. This little unit integrates CPU, disk drives, screen and printer into one package. The addition of extra RAM, hard disk and some other bits and pieces allows the system to support up to five users, and a range of software is available for specific markets.

Business Control Systems had the Monroe OC8820 computer on display, and also showed the 7860 magnetic ledger accounting system. This represents a convenient transition step for those offices still using traditional hard copy accounting techniques. In addition, it can be used for front office accounting with hard copy, yet downloaded directly (or via modem) at the end of the day.

Rifa was at the show on behalf of Anderson Digital Equipment, showing the North Star Horizon and Advantage computers. North Star has released its NorthNet package, as well as a 16-bit upgrade for the Advantage.

Microdrive Portable

Abacus Computers had a particularly interesting little gadget on its stand. The Escort portable computer uses the new Sony 9cm (three-and-a-half-inch) disks (322 Kbytes/disk) to achieve a very compact design indeed.

Internally, there are eight STD bus slots, of which three are used for the Z-80 processor, 64K of dual-port RAM, CRT controller (80 by 25) and DMA disk controller.

The CRT controller, which has its own 8085 processor, drives a 23cm display, offers five attributes, block mode and protected fields. A third disk drive can be added, as well as an integral printer.

Two serial ports allow communications, and optional capabilities include bisync, monosync, HDLC, SDLC and other protocols. A wide range of hardware options are already available (STD bus, you see!).

Dicker Data showed its new Vector 4, with its impressive graphics capabilities, as well as its Formula 1 racing car, with its impressive speed.

Brother (the typewriter company) almost stole the show on the Almer Distributors stand, with the EP-20 electronic printer.

Despite the title, this is really a typewriter rather than a printer. With an LCD display to allow editing, integrated calculator and the ability to work with either plain or thermal paper at a price around $250, this is an amazing little gadget. It will be even more amazing once a few enterprising individuals get inside it and add RS-232C!

Next door was Tom Cooper, officially launching the Columbia Multi Personal Computer. Its designer, David Howse, was on the stand, and was able to fill us in on several of its key points.

A lot of what are optional features on the IBM PC are standard on the Columbia, including two RS-232C ports, Centronics parallel port and other hardware. Significantly, the video circuitry is optional on the Columbia — multi-user configurations will most likely not use it and it can be removed.

A financial modelling system written on the IBM PC was plugged into the Columbia and ran first time, showing a higher degree of compatibility than hitherto seen. This compatibility extends to hardware too.

Also at the stand was Bob Smith, Sales Manager of Kay Computers (for a guy on his first trip to Australia, he sure knew a lot

DATA 82

of Melbourne night spots!). Among the interesting snippets Bob revealed is that all the new 'Perfect' software is written in C, allowing easy migration to 16-bit incarnations of the Kaypro. Also, watch for a new hard disk version of the Kaypro as well as a more sophisticated screen driver based on Televideo emulation.

Tiny Toshiba

Toshiba had strong interest in the new T-100 personal computer. This device is small enough to fit in a briefcase, yet runs CP/M with a wide range of software, and offers high-resolution colour graphics. A liquid crystal display permits operation when no TV is available.

Toshiba also pulled crowds on the Atac Data Processing Display next door. The new P1350 multi-mode printer uses a 24-wire print head to achieve near letter quality at 100 cps. In draft mode, speeds up to 192 cps are achievable.

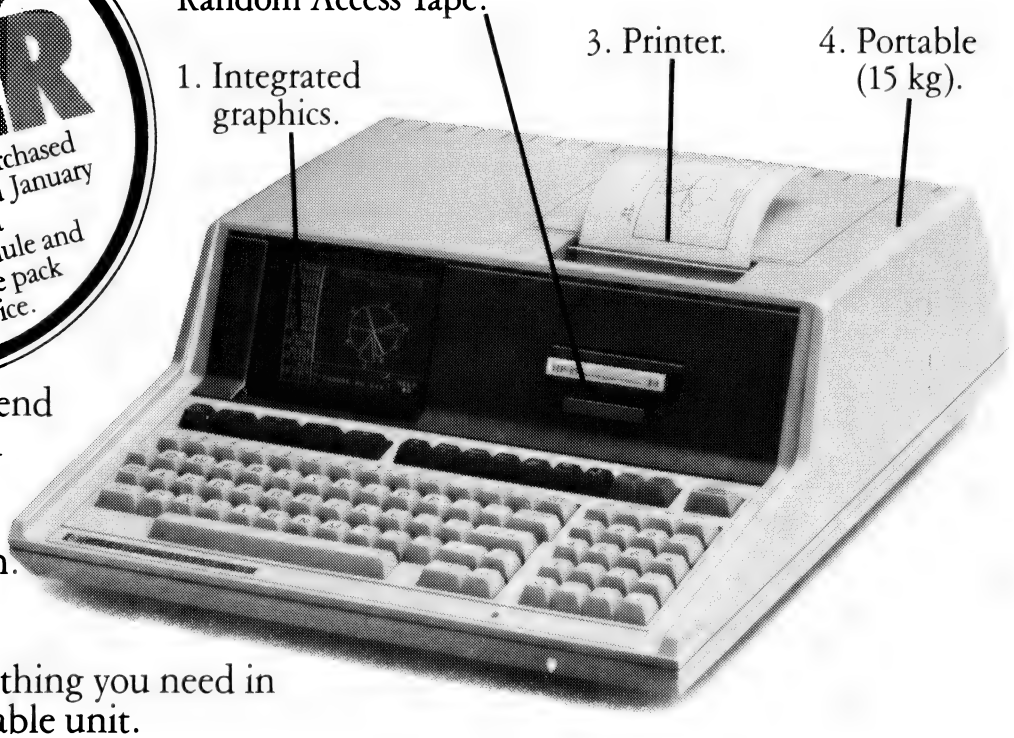
Intelligence Australia's stand was where we found Roger Walker demonstrating the MicroModeller financial modelling package on the IBM and Sirius computers.

Since we wrote about MicroModeller some months ago, a number of new products have been added to the line. These include Decision Modeller, Micro Link (a comms package specifically for downloading modelling information) and Micro Graph, which generates colour graphics from numeric data. □

Hewlett-Packard put it all together.

SPECIAL OFFER

With each HP-85 purchased during December and January receive free a 16K memory module and HP-85 Software pack of your choice.



You can spend a lot of time and money building up your own computer system.

Or you can buy the HP 85.

It has everything you need in a compact, portable unit.

Just plug it in and start programming in easy BASIC language.

You can analyse your data with the HP 85's integrated graphics.

At the touch of a key, it gives you hard copies via the built-in printer.

And in case you forget, the HP 85 offers 210 kilobytes of Random Access Tape Memory.

Other features include powerful, time saving HP Software for both business and scientific applications.

There's also a degree of friendliness in the HP 85, unrivalled in a computer of its size. Like helpful error messages and automatic syntax checking.

Of course you may eventually wish to expand your HP 85 system. An HP interface lets you plug in up to 14 peripherals without disassembly.

To locate your nearest Hewlett-Packard dealer, call Hewlett-Packard. Sydney: 887 1611; Melbourne 890 6351; Adelaide: 272 5911; Perth: 383 2188; Brisbane: 369 8022; Canberra: 80 4244.

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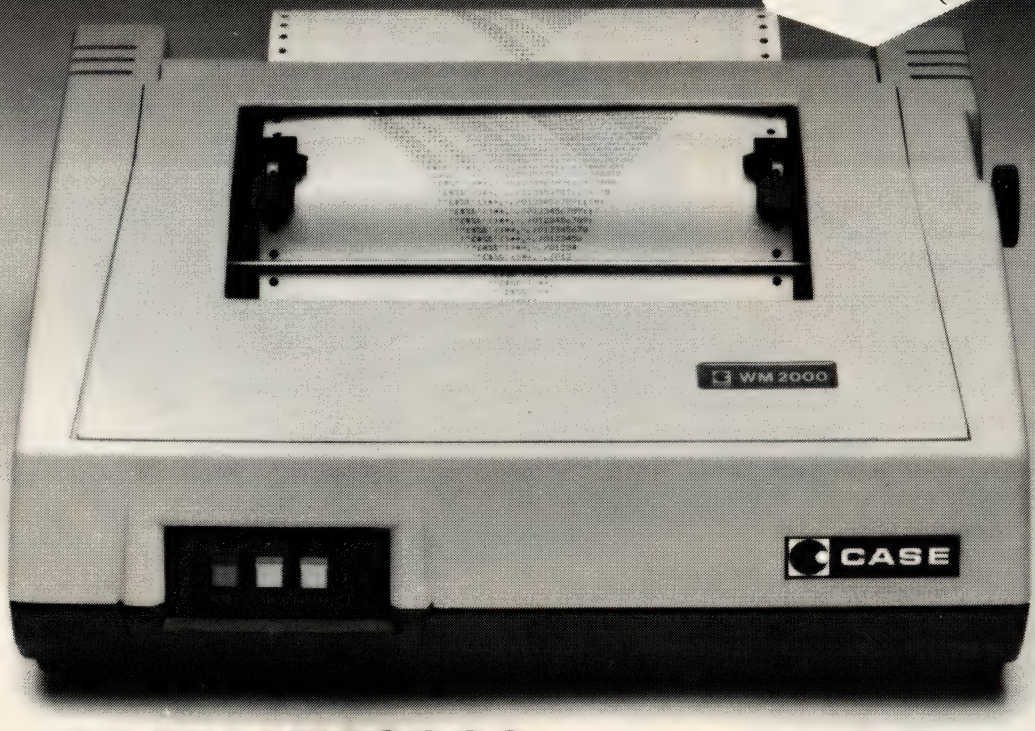

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BONUS

16 PAGE POCKET PROGRAMS

Sinclair Graphics

THIS program for the Sinclair ZX81 is designed to facilitate the fast setting up of games graphics. I feel this would be of use 'up front' of virtually any game program.

I have not pursued the possibility of multiple arrays, animation, or translation of images. These are options which may occur to the readers, once the program has been used a few times.

Having recently acquired a Sinclair printer, I felt the 'Sketchpad' program on page 13 of the accompanying handbook would help me to quickly draw screen graphics, and store them in an array for later recall.

In practice, I found the program somewhat limited for my own applications: single points cannot be just placed on the screen; one must DRAW a complete line and then laboriously edit out the unwanted segments. Furthermore, there are no provisions to introduce new characters while the program is running (PLOT pixels only are used).

In addition it is not easy to call up a stored picture and add to it at a later time.

The following program overcomes these problems. It has been kept short but does the job.

On RUN an input prompt will appear. Any character (alphanumeric or graphic) may then be entered. The character will appear flashing in the bottom left of the screen and may be moved anywhere by using 'arrow keys' 5, 6, 7 and 8.

At any time pressing '0' will fix the character at its current position. Line 120 causes this to occur upon the release of the '0' key rather than on the initial press.

Following this, another identical flashing character will appear as before. If another (new) character is required instead, press key '9' and a new input prompt will appear. The new character may then be placed and fixed.

In fact, key '9' works at any time so you can change characters at any stage. The array S$ stores only points which have been fixed by key '0'.

A useful feature is that one character can never overprint or obliterate another: you can move a flashing character right through a partially completed picture at will. Lines 230 and 240 cause the moving symbol to 'tunnel under' existing points to reappear at the next clear space.

To end a drawing session, hit BREAK when no input prompt is present. Entering STOP in input mode will cause lines 100 and 150 to run merrily on — with unusual results.

Two subroutines have been included. The command GOTO 500 will regenerate your drawing on the screen.

The command GOTO 600 provides a printout of the characters plotted along with their PRINT AT coordinates. This is useful for those who wish to note down hard copy data on how to draw a tank, monster, or whatever.

The command PRINT S$ shows how the data is really stored as binary equivalents in terms of the Sinclair character set.

Finally, do not use RUN unless you want to start over again — stick to using GOTO. Use an AUTO-SAVE for saved programs as on pages 110 and 146 of the ZX81 manual. ■

"GO TO 500"

SAMPLE PICTURE RECALL
(SUBROUTINE 500)

"GO TO 600"

```
(=) 14,12.
(=) 14,10.
(=) 15,12.
(=) 15,8.
(=) 14,13.
(0) 15,11.
(0) 15,7.
(.) 15,14.
(=) 13,9.
(=) 15,11.
(=) 12,11.
(-) 12,13.
(=) 14,11.
(=) 14,9.
(=) 15,10.
(=) 14,8.
(0) 15,9.
(0) 15,13.
(0) 14,14.
(.) 14,7.
(=) 13,10.
(=) 12,10.
(-) 12,12.
(-) 12,14.
```

COORDINATE LISTING
(SUBROUTINE 600)

```
  80 REM "DRAW AND STORE"
  85 REM JOHN NORRIS,1982.
  90 LET S$=""
 100 INPUT G$
 110 GOTO 150
 120 IF INKEY$<>"" THEN GOTO 120
 130 PRINT AT B,A;G$
 140 LET S$=S$+G$+CHR$ B+CHR$ A
 150 LET A=0
 160 LET B=21
 170 LET K$=INKEY$
 180 IF K$="9" THEN GOTO 100
 190 IF K$="5" AND A THEN LET A=
A-1
 200 IF K$="6" AND B<21 THEN LET
 B=B+1
 210 IF K$="7" AND B THEN LET B=
B-1
 220 IF K$="8" AND A<31 THEN LET
 A=A+1
 230 PRINT AT B,A;
 240 IF CHR$ (PEEK (PEEK 16398+2
56*(PEEK 16399)))<>" " THEN GOTO
 170
 250 IF K$="0" THEN GOTO 120
 260 PRINT AT B,A;G$
 270 PRINT AT B,A;" "
 280 GOTO 170
 499 REM ************************
*
 500 REM *SUBR: RECALL PICTURE*
 510 FOR I=1 TO LEN S$-2 STEP 3
 520 PRINT AT CODE S$(I+1),CODE
S$(I+2);S$(I)
 530 NEXT I
 540 INPUT A$
 550 IF A$="C" THEN GOTO 100
 560 STOP
 599 REM ************************

 600 REM *SUBR:CO-ORDS LIST*
 610 FOR I=1 TO LEN S$ STEP 3
 620 PRINT "(";S$(I);")";;CODE S
$(I+1);",";CODE S$(I+2);".",
 630 NEXT I
```

ZX Biorhythms

By P J Thornley

PEOPLE who own Sinclair ZX Printers may like to print out their own biorhythm charts or those of their friends.

Large printers usually plot the sine curves across the page but this is hardly possible with about 30 columns on the ZX printer. Accordingly this program prints the points of the three curves down the page.

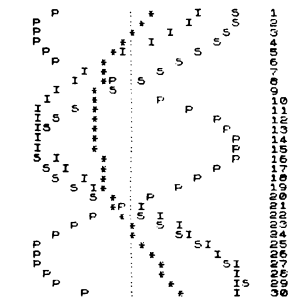
For the uninitiated, biorhythm charts purport to show state of the body in terms of its physical, emotional, and intellectual dimensions for a particular date. The physical cycle (P) is 23 days, the emotional (or sensitivity) (S) cycle is 28 days, while the intellectual (I) is 33 days. Half of each cycle is deemed positive while the body is charging up, and the other half is negative when discharging takes place. The critical times are supposed occur during the crossover from one state to the other.

Ahh...biorhythms provide us with a convenient excuse when we are not performing, feeling, or thinking well!

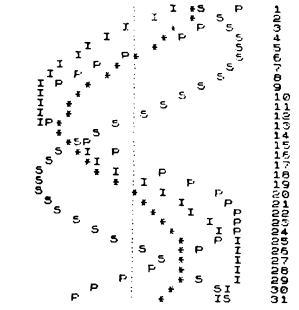
While this program is written for the printer those with just a 16K RAM can change the LPRI@T commMto PRINT for a display.

```
  50 DIM B$(1,28)
 110 PRINT "TYPE IN YOUR NAME PL
EASE"
 120 PRINT
 130 INPUT A$
 140 PRINT "YEAR OF BIRTH?"
 150 PRINT
 160 INPUT Y
 170 PRINT "MONTH?"
 180 PRINT
 190 INPUT M
 200 PRINT "DAY?"
 210 INPUT D
 220 PRINT
 230 PRINT "STARTING DATE OF CHA
RT...; YEAR?"
 240 INPUT Z
 250 PRINT
 260 PRINT "MONTH?"
 270 PRINT
 280 INPUT R
 290 CLS
 300 LPRINT A$,D;"-";M;"-";Y
 310 LPRINT
 320 LPRINT "BIORHYTHYM CHART  M
ONTH ";R;" ";Z
 330 LPRINT
 340 LET X=INT ((Z-Y)*365.25)+IN
T ((R-M)*30.6001)+(1-D)
 350 LPRINT X;TAB 11;"-";TAB 15;
"+"
 360 LPRINT
 370 LET A=INT (((X/23)-INT (X/2
3))*23)
 380 LET B=INT (((X/28)-INT (X/2
8))*28)
 390 LET C=INT (((X/33)-INT (X/3
3))*33)
 400 IF A=1 OR A=3 OR A=5 OR A=7
 OR A=8 OR A=10 OR A=12 THEN LET
 T=31
 410 IF A=2 THEN LET T=28
 420 IF A=4 OR A=6 OR A=9 OR A=1
1 THEN LET T=30
 430 FOR N=1 TO T
 440 LET P=(14+INT (11*(SIN (2*P
I*A/23)))+.5)
 450 LET S=(14+INT (11*(SIN (2*P
I*B/28)))+.5)
 460 LET I=(14+INT (11*(SIN (2*P
I*C/33)))+.5)
 470 LET W=INT ((P+S+I)/3)
 480 LET B$(1,P)="P"
 490 LET B$(1,S)="S"
 500 LET B$(1,I)="I"
 510 LET B$(1,14)=":"
 520 LET B$(1,W)="*"
 530 LPRINT B$(1);N
 540 LET B$(1, TO 28)="
 "
 550 LET A=A+1
 560 LET B=B+1
 570 LET C=C+1
 580 NEXT N
 590 PRINT "
 600 PRINT "DO YOU WANT THE CHAR
T FOR NEXT  MONTH?"
 610 INPUT U$
 620 IF U$(1)="Y" THEN GOTO 640
 630 STOP
 640 LET R=R+1
 650 CLS
 660 GOTO 320
```

```
BIORHYTHYM CHART  MONTH 6 82
15415
```



```
PETER            22-6-37
BIORHYTHYM CHART  MONTH 5 82
16384
```



ZX81 Break Even Point

By John H Crabb

THE BREAK even point is a useful financial planning calculation to establish the minimum sales level required to keep a business viable.

At the BEP the firm does not make a profit or a loss. Above the BEP a profit is made for each additional unit sold. Anywhere below is drawn showing area of potential loss, BEP, and profitable areas, all relathe BEP a loss is incurred. The data required are Sales Price, Fixed Costs and Variable Costs. However it is possible to determine Fixed and Variable costs provided Total costs are known at two levels of operation.

The program shown here covers 3 possibilities. (i) required data known; (ii) total costs at 2 levels known as well as sales price, and (iii) insufficient data known.

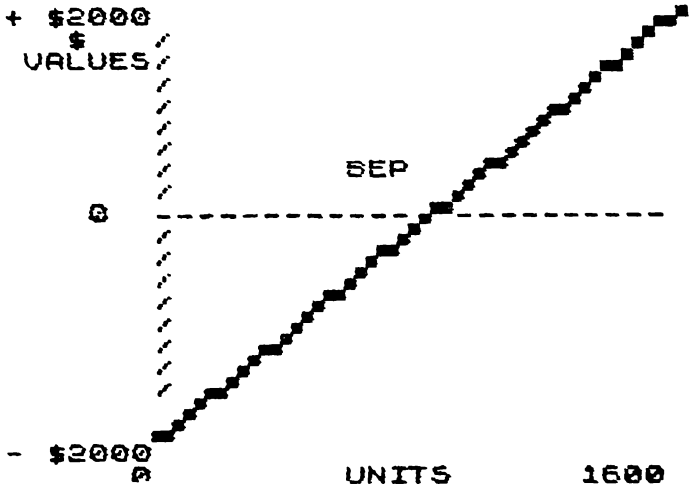
By following prompts, the user arrives at the BEP and the graph ted to the units sold.

The Margin of Safety may be calculated by a simple addition to the program:

```
250 PRINT ""N IS NORMAL VOLUME LEVEL''
260 INPUT N
270 LET M=((N-B)/N)*100
280 PRINT ""MARGIN OF SAFETY = '';M;""/''
```

```
  10 PRINT "ARE FIXED COSTS(F),U
NIT VARIABLE COSTS(V)AND SALES P
RICE(S)KNOWN?"
  20 INPUT X$
  30 IF X$="Y" THEN GOTO 105
  40 IF X$="N" THEN PRINT "HAVE
YOU TOTAL COST DATA(T1,T2)AT 2 L
EVELS(L1,L2)AND SALES PRICE?"
  50 INPUT X$
  60 IF X$="Y" THEN GOTO 82
  70 IF X$="N" THEN PRINT "SORRY
 INSUFFICIENT DATA TO HELP YOU"
  80 STOP
  82 PRINT "INPUT T1,T2,L1,L2"
  90 INPUT T1
  92 INPUT T2
  94 INPUT L1
  96 INPUT L2
  98 LET V=(T2-T1)/(L2-L1)
 100 LET F=T2-(V*L2)
 104 PRINT "V= ";V,"F= ";F
 105 PRINT "INPUT F,V,S"
 106 INPUT F
 107 INPUT V
 108 INPUT S
 110 LET B=INT (F/(S-V))
 112 PRINT "BREAK EVEN POINT IS
";B
 116 STOP
 120 CLS
 190 FOR I=1 TO 17
 192 PRINT AT I,7;"/"
 194 NEXT I
 200 PRINT AT 1,3;"$"
 202 PRINT AT 2,1;"VALUES"
 204 PRINT AT 0,0;"+ $";F
```

```
 206 PRINT AT 7,16;"BEP"
 212 PRINT AT 9,4;"0   ----------
--------------"
 213 FOR N=12 TO 63
 215 PLOT N,2+((N-12)*(21/26))
 219 NEXT N
 224 LET B2=B*2
 226 IF B2<=9999 THEN LET BA=B2
 228 IF B2>=9999 THEN LET BA=2*
BEP
 240 PRINT AT 20,0;"- $";F
 244 PRINT AT 21,6;"0          UN
ITS      ";BA
```




```
ARE FIXED COSTS(F),UNIT VARIABLE
 COSTS(V)AND SALES PRICE(S)KNOWN
?
INPUT F,V,S
BREAK EVEN POINT IS 800


ARE FIXED COSTS(F),UNIT VARIABLE
 COSTS(V)AND SALES PRICE(S)KNOWN
?
HAVE YOU TOTAL COST DATA(T1,T2)A
T 2 LEVELS(L1,L2)AND SALES PRICE
?
SORRY INSUFFICIENT DATA TO HELP
YOU


ARE FIXED COSTS(F),UNIT VARIABLE
 COSTS(V)AND SALES PRICE(S)KNOWN
?
HAVE YOU TOTAL COST DATA(T1,T2)A
T 2 LEVELS(L1,L2)AND SALES PRICE
?
INPUT T1,T2,L1,L2
V= 2              F= 500
INPUT F,V,S
BREAK EVEN POINT IS 500
```

How Critical IS EOQ?

By John H Crabb

THE Economic Order Quantity is a useful tool of management science.

However over the years there have been detractors who have suggested that the EOQ is not so critical as its protagonists proclaim. I have tended to feel there might be some truth in this suggestion but until I recently upgraded my ZX80 to an 8K ROM I did not have the means available to test my feelings.

The EOQ formula is: E=2AP/S where E is the order size; P = Purchase order placement cost; A = Annual quantity used (in units) and; S = Stock carrying costs for one unit for a year.

In an example let us take the Purchase order placement cost to be $10.00 and the Stock carrying cost to be $0.5 per unit with the Annual usage at 5000. What is our Economic Order Quantity based on this data? Applying the EOQ formula on my ZX (Listing 1) I got a result of 447 units.

Just how critical is this EOQ figure — or is there a substantial range on either side of the calculated EOQ which would give almost as satisfactory a result?

Using Listing 2 we get Total costs calculated in the range of order levels of 60 percent to 140 percent of EOQ. The print-out results speak for themselves (Table 1). Admittedly these results are based on only one set of figures for Purchase and Carrying costs so there could be variations which give a different interpretation.

Perhaps other readers would like to experiment with the EOQ management tool and send their results in. □

Listing 1

```
 10 LET A=5000
 20 LET P=10
 30 LET S=.5
 50 LPRINT "E= ";SQR ((2*A*P)/S
```

```
E= 447.2136
```

Listing 2

```
 100 FOR N=6 TO 14
 110 LET E=447
 120 LET A=5000
 130 LET P=10
 140 LET S=.5
 150 LET U=INT ((E*N/10)+.5)
 160 PRINT "TOTAL COST ";U,"$";I
NT ((A*P/U)+(U*S/2))
 170 NEXT N
```

Table 1

	ORDER LEVEL	
TOTAL COST	268	$253
TOTAL COST	313	$237
TOTAL COST	358	$229
TOTAL COST	402	$224
TOTAL COST	447	$223
TOTAL COST	492	$224
TOTAL COST	536	$227
TOTAL COST	581	$231
TOTAL COST	626	$236

System 80 Business

By John Beutel

THIS IS a business program that I have refined over the last 12 months to the stage where it doesn't crash for me at least.

When I first got my computer (System 80 updated with a G.P. 80 Printer) I was unable to secure anywhere a program that would do simple accounting. Yes there were plenty about for several hundred dollars that needed four figure investment for disk drives and the rest as well.

This program works from cassette and it doesn't run into intricate file saving and retrieving procedures that would involve complete changing of bookkeeping methods for a small business.

The program does statements from a list of invoices for approximately 2 dozen customers each month. All of my bookkeeping is done by "Biro" and I find that with this program, time is cut to at least 2/3 on the old method. This together with the fact that printed invoices run at about 9 cents each against a little over 1 cent for a sheet of computer paper, makes for a significant improvement all round.

I have recently upgraded to single disk drive and when I become more proficient in it's use may look into saving some of the figures to disk but frankly can't see that business volume justifies this 'upgrade'.

The expertise required will be rewarding in itself for someone who has trouble coming to grips with this 'simple-to-master' BASIC computer language. □

```
10 CLS:CLEAR 150
20 INPUT"MONTH OF A/C'S TO BE SENT
       (FOR EXAMPLE 'JULY    '82')";A1$
30 INPUT"MONTH OF A/C RENDERED (FOR EXAMPLE 'JUNE')";A2$
40 GOSUB 320
50 GOSUB 610
60  LPRINT CHR$(14)
70 LPRINT"            ";"STATEMENT";"         ";
80 LPRINT A1$
90 LPRINT C$
100 LPRINT"                    ";"DR. NED KELLY P/L"
110 LPRINT"                       THE BLACK STUMP"
120 LPRINT"                       WOOP WOOP 4999"
130 GOSUB 610
140 LPRINT CHR$(15)
150 IF D$="N"  GOTO 220
160 IF D$="Y" LPRINT A2$;"  A/C REND.  ";
170 LPRINTUSING E$;D:LPRINT
180 IF P$="N" GOTO 230
190 FOR A=1 TO P
200 LPRINT"        ";Y$(A);:LPRINTUSING F$;Z(A)
210  NEXT A
220 LPRINT
230 IF O$="N" GOTO 270
240 FOR B=1 TO E
250 LPRINTUSING G$;F(B),J(B)
260  NEXT B
270 LPRINT
280 LPRINTUSING T$;T
290 LPRINT"
  *********"
300 LPRINT:LPRINT:LPRINT
310 GOTO 40
320 E$="                $$$$$$.##"
330 F$="  PAYMENT REC.D        $$$$$$.##"
340 G$="                INV.   ####                              $$$$$$.##"
350 T$="                                                  TOTAL    DR.    $$
#####.##"
360 D=0:K=0:T=0:Z=0
370 PRINT"            STATEMENTS (FOR OUTPUT TO PRINTER)"
380 INPUT"CUSTOMERS NAME ";C$
390 INPUT"   WAS THERE ANY  A/C REND. THIS CUSTOMER ( Y OR N)";D$
400 IF D$="N" GOTO 500
410 IF D$="Y"  PRINT"   AMOUNT A/C REND.";:INPUT D
420 PRINT"WAS THERE ANY P'MENTS REC.D (Y OR N)";:INPUT P$
430 IF P$="N" GOTO 500
440 INPUT"      NUMBER OF PAYMENTS REC.D.";P
450 FOR  A=1 TO P
460 PRINT:PRINT"DATE OF PAYMENT # ";A;"(COMMA) THEN AMOUNT"
470 INPUT Y$(A),Z(A)
480 Z=Z+Z(A)
490 NEXT A
500 PRINT"  ANY INVOICES THIS MONTH (Y OR N)";:INPUT O$
510 IF O$="N" GOTO  580
520 INPUT"            NUMBER  OF INVOICES (THIS CUSTOMER)";E
530 FOR  B= 1 TO E
540 PRINT"    INVOICE # (COMMA)          AMOUNT    FOR ITEM # ";B
550 INPUT F(B),J(B)
560 K=K+J(B)
570 NEXT B
580 T=D-Z+K
590 PRINT"     TOTAL DR. FOR ";C$;"  IS $";T
600 RETURN
610 LPRINT CHR$(8)
620 LPRINT CHR$(28);CHR$(240);CHR$(202);
630 LPRINT CHR$(28);CHR$(240);CHR$(202);
640 RETURN
650 'LINE 60  &  140  & SUBROUTINE  610  SUITS SEIKOSHA  G.P.80 PRINTER
660 'OTHER LINES WILL NEED MODIFYING  FOR OTHER PRINTERS ALSO
```

SAMPLE RUN

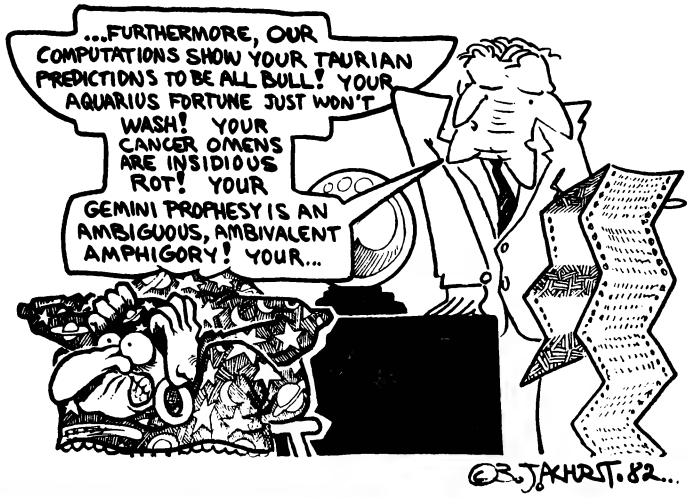
```
                    STATEMENT                    AUG.   '82
RIP. OFFS INC.
                                  DR.  NED KELLY P/L
                                       THE BLACK STUMP
                                       WOOP WOOP 4999

JULY  A/C REND.                  $356.00

      JLY 24  PAYMENT REC.D       $125.00
      JLY 30  PAYMENT REC.D       $175.99

            INV.   123                                    $66.90
            INV.   155                                   $303.50
            INV.   188                                   $199.00
            INV.   244                                   $500.50

                                              TOTAL   DR.      $1124.91
                                                       *********
```



Noughts And Crosses

By Frank Mack

THE following is a game called Cross-Pac, written for the TRS-80 (Level II).

The program is a game of Noughts and Crosses and is designed to allow two people to play one another or for one player to play against the computer.

I wrote the program to help teach myself how to PEEK and POKE. Rather than use PRINT @ nstructions all the time I became adventurous and decided to try POKEs at various stages. Hence the program is a mixture of instructions.

The playing frame (see illustration) may appear to be numbered in a strange way. This comes about from the strategy I originally intended to use before venturing to PEEK at various locations.

You may note it is in the form of a magic square. Each row, column and diagonal adds up to 15. By comparing the sum of these squares taken up by noughts and crosses with 15 I intended to draw up a playing strategy to counteract a row or column being successfully completed.

However by PEEKing at these numbered locations it was easier to determine if two similar symbols were already in the same row, column or diagonal. Rather than re-order the squares (1 to 9 in order) I decided to leave them as is so that others might try to develop their own versions of Noughts and Crosses strategy (it does remind me of my original efforts — so has sentimental value for me).

8	1	6
3	5	7
4	9	2

```
10 CLS:CLEAR2000:PRINT@71," 0000              AND              XXXX":PRINT:PRINT"              NOUGHTS    AND    CROSSE
S    (F. MACK)":PRINT:PRINT"THIS IS THE OLD GAME OF NOUGHTS AND CROSSES. YOU MAY PLAY "
20 PRINT"AGAINST  THE COMPUTER OR AGAINST YOUR FRIEND. MAKE A CHOICE OF THE GAME YOU WISH TO PLAY...":PRINT@600,"TYPE  OF  GAME:" P
RINT@718,"        (1)  YOU    V    FRIEND":PRINT@787,"    (2)  YOU    V    TRS-80" PRINT
30 PRINT@920,"PRESS ( 1 OR 2 )";
40 EE$=INKEY$:EE=VAL(EE$):IFEE$=""THEN40ELSEIFEE<1OREE>2THEN40ELSE!FEE=1GOSUB920
50 IFEE=2GOSUB930
60 REM SET UP SCORE TABLE
70 CLS:PRINT@128,LEFT$(NM$,6);:PRINT@186,LEFT$(NP$,6);:PRINT@194,NM;:PRINT@252,NP;:G=G+1.PRINT@891,"GAME...";G;:RANDOM:DATA71,65,77,6
9,32,79,86,69,82,32,-1:DATA32,87,73,78,83:RESTORE:S=0:T=0:U=0:R1$="1ST ROW":V=0:W=0:G=0:R2$="2ND ROW":A=0:B=0
80 Z=0:R3$="3RD ROW":C1$="1ST COLUMN":C2$="2ND COLUMN":C3$="3RD COLUMN":D1$="LEFT DIAGONAL":D2$="RIGHT DIAGONAL":GOSUB290:IFEE=2THEN
850ELSE310
90 REM DISPLAY EACH MOVE
100 S=PEEK(15631):IFS<60POKE15631,X:POKE15632,YELSE550
110 S=PEEK(15631):GOSUB470:GOTO340
120 T=PEEK(15647):IFT<60POKE15647,X:POKE15648,YELSE550
130 T=PEEK(15647):GOSUB470:GOTO340
140 U=PEEK(15663):IFU<60POKE15663,X:POKE15664,YELSE550
150 U=PEEK(15663):GOSUB470:GOTO340
160 V=PEEK(15887):IFV<60THENPOKE15887,X:POKE15888,YELSE550
170 V=PEEK(15887):GOSUB470:GOTO340
180 W=PEEK(15903):IFW<60POKE15903,X:POKE15904,YELSE550
190 W=PEEK(15903):GOSUB470:GOTO340
200 A=PEEK(15919):IFA<60POKE15919,X:POKE15920,YELSE550
210 A=PEEK(15919):GOSUB470:GOTO340
220 B=PEEK(16143):IFB<60POKE16143,X:POKE16144,YELSE550
230 B=PEEK(16143):GOSUB470:GOTO340
240 Z=PEEK(16159):IFZ<60POKE16159,X:POKE16160,YELSE550
250 Z=PEEK(16159):GOSUB470:GOTO340
260 Q=PEEK(16175):IFQ<60POKE16175,X:POKE16176,YELSE550
270 Q=PEEK(16175):GOSUB470:GOTO340
280 REM SET UP SCREEN FOR GAME
290 XX=15512:FORK=0TO11.POKEXX+64*K,42:NEXT.XX=15527:FORK=0TO11.POKEXX+64*K,42:NEXT.XX=15753:FORK=0TO15:POKEXX+3*K,42.NEXT:XX=16009:
FORK=0TO15:POKEXX+3*K,42:NEXT:POKE15631,56:POKE15647,49:POKE15663,54:POKE15887,51:POKE15903,53:POKE15919,55
300 POKE16143,52:POKE16159,57:POKE16175,50.RETURN
310 X=182:Y=148:N=1.PL$=NM$
320 IFN=1PRINT@975,PL$;"   PRESS ( 1---9 ) FOR 1ST MOVE";:GOTO390
330 REM INDICATE PLAYER AND MOVE
340 GOSUB960:GOSUB940:PRINT@985,CHR$(X)+CHR$(Y),;PL$;" HAS  MOVED";" (",I,")",:FORFF=1TO600:NEXT:IFX=153ANDEE=2THEN640ELSEGOSUB94
0
350 IFEE=2ANDX=183THENPL$=NP$:GOTO380
360 IFPL$=NM$THENPL$=NP$:GOTO380
370 IFPL$=NP$THENPL$=NM$
380 PRINT@985,PL$;" PRESS KEY TO PLAY";
390 A$=INKEY$:I=VAL(A$):IFA$=""THEN390ELSEIFI<1ORI>9THEN390
400 IFN=10THEN620
410 N=N+1:X=X+1:Y=Y+1:IFX=184THENGOSUB460
420 IFX=154THENGOSUB450
430 IFNO10THEN620ELSEONIGOTO120,260,160,220,180,140,200,100,240
440 REM ALTERNATE PLAYER SYMBOLS
450 X=183:Y=149:RETURN
460 X=153:Y=145:RETURN
470 REM CHECK FOR WINNING ROW OR COLUMN
480 R1=S+T+U:R2=V+W+A:R3=B+Z+Q:C1=S+V+B:C2=T+W+Z:C3=U+A+Q:D1=S+W+Q:D2=U+W+B:IFR1=5490RR1=459THENLL$=R1$:GOTO500ELSEIFR2=5490RR2=459T
HENLL$=R2$:GOTO500ELSEIFR3=5490RR3=459THENLL$=R3$:GOTO500ELSEIFC1=5490RC1=459THENLL$=C1$:GOTO500
490 IFC2=5490RC2=459THENLL$=C2$:GOTO500ELSEIFC3=5490RC3=459THENLL$=C3$:GOTO500ELSEIFD1=5490RD1=459THENLL$=D1$:GOTO500ELSEIFD2=5490RD
2=459THENLL$=D2$:GOTO500ELSEIFN=10THEN620ELSERETURN
500 PRINT@968,CHR$(30);:M=0
510 M=M+1:READL:IFL=-1THEN520ELSEPOKE16347+M,L:GOTO510
520 POKE16372,X:POKE16373,Y:FORK=1TO5:READD:POKE16374+K,D:NEXT:GOSUB800:PRINT@0,CHR$(30);.PRINT@960,LL$;:IFX=183THENW=NM+1ELSENP=NP
+1
530 FORTT=1TO300:NEXTTT:GOSUB940:GOSUB1000.GOTO70
540 GOTO610
550 REM TEST FOR VALID MOVE
560 IFEE=2ANDX<153THEN610ELSEIFX=183THENPL$=NM$ELSEPL$=NP$
570 PRINT@0,CHR$(30);:PRINT@25,"ILLEGAL MOVE.... MAKE ANOTHER";PL$;
580 I$=INKEY$:I=VAL(I$):IFI$=""THEN580ELSEIFI<1ORI>9THEN580ELSEPRINT@0,CHR$(30);:GOTO430
590 REM TIME DELAY TO READ INSTRUCTIONS
600 GOSUB940:PRINT@985,"I AM THINKING";:FORTT=1TO300:NEXT:GOSUB870:GOTO400
610 GOSUB870:GOTO430
620 GOSUB940:PRINT@968," NO  WINNER";:GOSUB1000:GOTO70
630 REM TRS-80 STRATEGY
640 GOSUB940:PRINT@0,CHR$(30);:PRINT@985,"I AM THINKING";:FORTT=1TO500:NEXT
650 IFR1=3660RR1=386THEN710ELSEIFC1=3660RC1=386THEN760
660 IFR2=3660RR2=386THEN720ELSEIFC2=3660RC2=386THEN770
670 IFR3=3660RR3=386THEN730ELSEIFC3=3660RC3=386THEN730
680 IFD1=3660RD1=386THEN740
690 IFD2=3660RD2=386THEN750
700 GOSUB870:GOTO400
710 IFT<60THENI=1:GOTO400ELSEIFS<60THENI=8:GOTO400ELSEIFU<60THENI=6 GOTO400ELSE660
720 IFV<60THENI=3:GOTO400ELSEIFW<60THEN!=5:GOTO400ELSEIFA<60THENI=7.GOTO400ELSE670
```

```
730 IFB%(60THENI=4:GOTO400ELSEIFZ(60THENI=9:GOTO400ELSEIFQ%(60THENI=2:GOTO400ELSE680
740 IFS%(60THENI=8:GOTO400ELSEIFW%(60THENI=5:GOTO400ELSEIFQ%(60THENI=2:GOTO400ELSE690
750 IFU%(60THENI=6:GOTO400ELSEIFW%(60THENI=5:GOTO400ELSEIFB%(60THENI=4:GOTO400ELSE700
760 IFS%(60THENI=8:GOTO400ELSEIFB%(60THENI=4:GOTO400ELSEIFW%(60THENI=3:GOTO400ELSE660
770 IFT(60THENI=1:GOTO400ELSEIFW%(60THENI=5:GOTO400ELSEIFZ(60THENI=9:GOTO400ELSE670
780 IFU%(60THENI=6:GOTO400ELSEIFR%(60THENI=7:GOTO400ELSEIFQ%(60THENI=2:GOTO400ELSE690
790 REM GET NAME OF WINNING COMBINATION
800 IFLL$=R1$THENXX=15626:GOSUB820:RETURNELSEIFLL$=R2$THENXX=15879:GOSUB820:RETURNELSEIFLL$=R3$THENXX=16138
GOSUB820:RETURNELSEIFLL$=C1$THENXX=15439:GOSUB830:RETURNELSEIFLL$=C2$THENXX=15519:GOSUB830:RETURNELSEIFLL$=C3$
THENXX=15525:GOSUB830:RETURN
810 IFLL$=D1$GOSUB890:RETURNELSEIFLL$=D2$GOSUB900:RETURN
820 FORK=0TO44STEP4:POKEXX+K,46:NEXT:RETURN
830 FORK=0TO768STEP64:POKEXX+K,46:NEXT:RETURN
840 REM TOSS FOR FIRST MOVE
850 I=RND(9):IFI=INT(I/2)*2THEN868ELSEX=152:Y=144:N=1:PL$=NP$:GOTO220
860 X=182:Y=148:PRINT@28,NN$;" WILL MOVE FIRST ";:FORTT=1TO500:NEXT:N=1:GOTO410
870 IFW%(60THENI=5:RETURNELSEIFS%(60THENI=8:RETURNELSEIFW%(60THENI=2:RETURNELSEIFB%(60THENI=4:RETURNELSEI=RND(9):
IFU%(60THENI=6:RETURNELSERETURN
880 REM INDICATE WINNING RUN
890 XX=15564:FORK=0TO18:POKEXX+60+K,46:NEXT:RETURN
900 XX=15683:FORK=0TO18:POKEXX+60+K,46:NEXT:RETURN
910 REM GET PLAYER'S NAME
920 CLS:PRINT@397,"1ST PLAYER'S NAME";:INPUTNN$:PRINT@525,"2ND PLAYER'S NAME";:INPUTNP$:RETURN
930 CLS:PRINT@397,"YOUR NAME";:INPUTNP$:PRINT@525,"THANK YOU  ";LEFT$(NP$,6);"  FOR THE GAME.  GOOD LUCK";
:FORT=1TO800:NEXT:NN$="TRS-80":RETURN
940 PRINT@960,CHR$(30);:RETURN
950 REM ALTERNATE NAME OF NEXT PLAYER
960 IF EE<2*NN%+183THENPL$=NN$:RETURN
970 IFEE=2*NN%+183THENPL$=NP$:RETURN
980 IFEE=1*NN%+183THENPL$=NN$ELSEPL$=NP$
990 RETURN
1000 PRINT@965,"PRESS ( X ) TO QUIT ELSE WAIT.";:FORFF=1TO500:F$=INKEY$:IFF$="X"THENRUNELSENEXT:RETURN
```

TRS-80 Tennis

By P Wade

IN RESPONSE to the article in the February issue, I decided to send in an item for TRS80/ System 80 owners. No doubt with a little changing the program could run on a ZX80/81. Still, that is up to the owners.

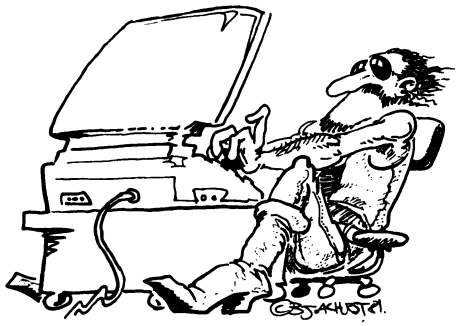
The program is fairly simple. It runs slowly (a problem with BASIC). Still for variation I have made the bat size optional. The program was written before the options, which explains the strange line numbers.

From Line 10 to Line 16 it asks the players for the bat size. The variables M, N, O are set. M and N set the blocks above and below the centre of the bat. O is the reset point.

Lines 20 to 30 draw the outside of the screen. By having them set the ball does not exceed the court. Line 40 uses A and B as reset variables. 50 and 60 set the initial position of the ball. Note that X must be even. That is the reason for the "*2".

Line 70 sets and resets the ball. Line 80 reverses direction. Lines 82 to 88 calculate and print out the score. Line 90 like line 80 reverses the ball's direction, but vertically. Line 100 finds the next position. Lines 110 to 120 then look to see if there is anything in the way, if there is then the ball's direction is changed.

The program then looks at the keyboard to see if any keys are depressed. From Lines 160 to 190 the next position of the bats is calculated. Lines 200 to 230 check to see that the bats are still on the screen. The bats are then moved (Lines 240 to 270) and control passed back to Line 70. □



```
10 CLS
11 PRINT"DEGREE OF GAME(1=EASY TO 3=HARD)"
12 INPUT"CHOICE";K
13 IF K=1 THEN M=2:N=1:O=3:GOTO19
14 IF K=2 THEN M=0:N=1:O=2:GOTO19
15 IF K=3 THEN M=0:N=0:O=1:GOTO19
16 GOTO 11
19 CLS
20 FOR X=0TO127:SET(X,0):SET(X,47):NEXT
30 FOR X=0TO47:SET(0,X):SET(127,X):NEXT
40 A=2:B=1:C=23:D=23
50 X=RND(63)*2
60 Y=RND(47)
70 SET(X,Y):RESET(X-A,Y-B)
80 IF(X=2)OR(X=126) THEN A=-A
82 IF X=126 THEN L=L+1
84 IF X=2 THEN R=R+1
86 PRINT@80,L;:PRINT@111,R;
88 IF(L=21)OR(R=21)THEN 300
90 IF(Y=1)OR(Y=46) THEN B=-B
100 X=X+A:Y=Y+B
110 Z=POINT(X,Y)
120 IF Z=0 THEN 140
130 RESET(X-A,Y-B):A=-A:X=X+A
140 T$=INKEY$
150 IF T$="" THEN 200
160 IF T$="Q" THEN C=C-1:GOTO200
170 IF T$="Z" THEN C=C+1:GOTO200
180 IF T$="P" THEN D=D-1:GOTO200
190 IF T$="." THEN D=D+1:GOTO200
200 IF C=3 THEN C=4
210 IF C=44 THEN C=43
220 IF D=3 THEN D=4
230 IF D=44 THEN D=43
240 SET(8,C+M):SET(8,C+N):SET(8,C-N):SET(8,C-M)
250 SET(120,D+M):SET(120,D+N):SET(120,D-N):SET(120,D-M)
260 RESET(120,D-O):RESET(120,D+O)
270 RESET(8,C-O):RESET(8,C+O)
280 GOTO 70
300 INPUT"AGAIN(Y/N)";Z$
310 IF LEFT$(Z$,1)="Y" THEN RUN
320 END
```

Manhole Mania For The Apple II

By Mike E Bantick

THIS program is an Apple Panic look-alike with one major difference...instead of the monsters falling in the holes you dig, they fill them in and to gain points you must jump into the holes.

Jumping through two or more holes at once scores bonus points...to create the text file (Peach) for storing high scores, use the program:

```
10 D$ = "" :REM CTRL+D
20 ?D$;"OPEN PEACH"
30 ?D$;"WRITE PEACH"
40 ?"000000"
50 ?D$;"CLOSE PEACH"
```

CTRL-Ds should be added to the print statements at lines 1700, 1710, 1740, 1850, 1860, 1870, 1890. □

```
0 TR = 0
10 HOME
20 FOR I = 10 TO 24: VTAB I: PRINT "]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]": NEXT I
30 VTAB 8: PRINT "        # #
40 VTAB 7: PRINT "        # #
50 VTAB 6: PRINT "        ###
60 VTAB 5: PRINT "        ###
70 VTAB 4: PRINT "        ###
80 VTAB 3: PRINT "         #
90 VTAB 2: PRINT "         ##
100 VTAB 1: PRINT "         ##
110 TB = 9
120 VTAB 5: HTAB 13: PRINT "&&&&&&&
130 FOR I = 1 TO 150: NEXT I
140 VTAB 5: HTAB 13: PRINT "       "
150 FOR O = 5 TO 10: VTAB O: HTAB 9 + O: PRINT "&": NEXT O
160 VTAB TB: HTAB 15: PRINT "      "
170 TB = TB + 1: IF TB = 24 THEN 210
180 FOR I = 1 TO 100: NEXT I
190 FOR O = 5 TO 10: VTAB O: HTAB 9 + O: PRINT " ": NEXT O
200 GOTO 120
210 FOR I = 1 TO 24
220 READ N
230 IF N = 1000 THEN 280
240 POKE 769 + I,N
250 NEXT I
260 GOTO 280
270 DATA 173,48,192,136,208,5,206,1,3,240,9,202,208,245,174,0,3,76,2,3,96,0,0,1000
280 RESTORE
290 SU$ = CHR$ (219)
300 HOME :
310 FOR I = 3 TO 6
320 FOR U = 1 TO 39: VTAB I: HTAB U: PRINT SU$: NEXT U: NEXT I
330 PRINT : PRINT "             PEACH    PANIC            "
340 PRINT
350 PRINT "]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]"
360 PRINT "]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]"
370 PRINT "]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]"
380 PRINT "]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]"
390 PRINT
400 PRINT "             ]]  ]]]]  ]]
410 PRINT "              ]  ]]]]  ]
420 PRINT "               ]  ]]  ]
430 PRINT "               ]]]]]]]]
440 PRINT "                 ]]]]
450 PRINT "                 ]]]]
460 PRINT "                 ] ]
470 PRINT "                 ] ]                               ]] ]]
480 VTAB 15: HTAB 29: INVERSE : PRINT "HELP !!!": NORMAL
490 FOR I = 1 TO 100 STEP 4: POKE 758,I: POKE 769,20: CALL 770
495 TN = PEEK ( - 16336):TI = PEEK ( - 16336)
500 NEXT I
510 POKE 34,15
520 HOME
530 PRINT : PRINT : PRINT : PRINT " HAVE YOU PLAYED THIS BEFORE  ": INPUT A$: IF LEFT$ (A$,1) = "N" THEN 550
540 GOTO 740
550 HOME
560 FOR I = 100 TO 50 STEP - 2: POKE 768,I: POKE 769,50: CALL 770: NEXT I
570 SPEED= 100
580 PRINT "  YOU ARE THE SMALL GREY SQUARE AT THE "
590 PRINT : PRINT "BOTTOM OF THE SCREEN... USING THE KEYS "
600 PRINT : PRINT "MARKED I(UP),,J(LEFT),,K(RIGHT) AND    "
610 PRINT : PRINT "M(DOWN)  MANOUVER UP AND DOWN THE      "
620 PRINT : PRINT "LADDERS.  AVOID LIGHT COLOURED SQUARES "
630 PRINT : PRINT "WHICH WILL ATTACK YOU IF YOU ARE ON    "
640 PRINT : PRINT "THIER LEVEL..DIG HOLES WITH THE KEYS   "
650 PRINT : PRINT "MARKED S AND D AND JUMP THROUGH THE    "
660 PRINT : PRINT "HOLES TO GAIN POINTS AND OXYGEN,THE    "
670 PRINT : PRINT "HIGHER THE LEVEL THE MORE POINTS.      "
680 PRINT : PRINT " THERE IS A 66.6% CHANCE OF BEING      "
690 PRINT : PRINT " CAUGHT..A 22.2% CHANCE OF BEING BURIED"
700 PRINT : PRINT "AND A 11.1% CHANCE OF RUNNING OUT OF   "
710 PRINT : PRINT "  OXYGEN
720 SPEED= 255: PRINT : PRINT "ZZZZZZZZZZZZZZ  GOOD LUCK ZZZZZZZZZZZ"
730 GET B$
740 N = 1
750 E = - 16335
760 OX = 1000
770 Q = 3
780 DF = 5
790 HOME
800 H = 1.2
810 GT = 500
820 PT = 5
830 S = 38:D = 20
840 FOR I = 1 TO PT
850 Z = Z + 1
860 IF Z > 5 THEN Z = 1
870 H(I) = (Z * 7) - 4
880 V(I) = INT (30 * RND (1)) + 5
890 NEXT I
900 GR : COLOR= 13
910 HLIN 0,39 AT 39
920 COLOR= 12
930 FOR I = 1 TO 5
940 HLIN 0,39 AT I * 7: HLIN 0,39 AT (I * 7) - 1
950 HLIN 0,39 AT (I * 7) - 2: HLIN 0,39 AT (I * 7) - 3
960 NEXT I
970 COLOR= 1
980 A1 = INT (10 * RND (1)) + 2: VLIN 39,22 AT A1
990 A1 = INT (10 * RND (1)) + 20: VLIN 39,15 AT A1
1000 A1 = INT (9 * RND (1)) + 25: VLIN 24,15 AT A1
1010 A1 = INT (10 * RND (1)) + 5: VLIN 17,2 AT A1
1020 A1 = INT (10 * RND (1)) + 10: VLIN 24,2 AT A1
1030 A1 = INT (5 * RND (1)) + 20: VLIN 31,8 AT A1
1040 FOR I = 1 TO PT: COLOR= 14
1050 PLOT V(I),H(I): NEXT I
1060 IF SCRN( D,S) = 14 THEN 1600
1070 GT = GT - 1: IF GT = 0 THEN GT = 600: GOTO 830
1080 COLOR= DF: PLOT D,S
1090 TM = PEEK (E)
1100 ZX = PEEK ( - 16384): POKE - 16268,0
1110 FOR I = 1 TO PT
1120 IF SCRN( V(I),H(I) - 1) = 1 THEN COLOR= 1:F = 1:GS = 1: GOTO 1140
1130 COLOR= 0
```

```
1140  PLOT V(I),H(I)
1150  IF F = 1 THEN 1170
1160  COLOR= 12: VLIN H(I) + 1,H(I) + 4 AT V(I):F = 0
1170  IF S = H(I) THEN 1210
1180  IF S + 1 = H(I) THEN 1210
1185  IF S + 2 = H(I) THEN 1210
1190  IF GS = 1 THEN GS =  INT (5 *  RND (1)) + 1:H(I) = (GS * 7) - 4:GS = 0:V(I) =  INT (30 *  RND (1)) + 5
1200  GOTO 1230
1210  IF V(I) > D THEN V(I) = V(I) - H: GOTO 1280
1220 V(I) = V(I) + H: GOTO 1280
1230 GL =  INT (2 *  RND (1)) + 1
1240  IF GL = 1 THEN V(I) = V(I) +  RND (3)
1250  IF GL = 2 THEN V(I) = V(I) -  RND (3)
1260  IF V(I) < 1 THEN V(I) = 38
1270  IF V(I) > 39 THEN V(I) = 2
1280 F = 0: NEXT I
1290 OX = OX - 3
1300  IF OX < 200 THEN  INVERSE :DF = 15: GOTO 1320
1310 DF = 5
1320  VTAB 22: HTAB 2: PRINT "SCORE // ";SC: VTAB 22: HTAB 17: PRINT "OXYGEN < ";OX;"   ";O
1330  NORMAL
1340  IF OX < 10 THEN OX = 700: GOTO 1600
1350  IF  SCRNK D,S - 1) = 1 THEN  COLOR= 1: GOTO 1400
1360  IF  SCRNK D,S - 1) = 14 THEN  COLOR= 1: GOTO 1400
1370  IF  SCRNK D,S + 1) = 1 THEN  COLOR= 1: GOTO 1400
1380  IF  SCRNK D,S + 1) = 14 THEN  COLOR= 1: GOTO 1400
1390  COLOR= 0
1400  PLOT D,S
1410  IF  SCRNK D,S + 1) = 0 THEN :S = S + 1:TR = TR + 1: GOTO 1421
1411 TR = 0
1420  GOTO 1450
1421  IF TR > [illegible] THEN TR = 0: POKE 768,80: POKE 769,40: CALL 770:SC = SC + 100
1430  IF  SCRNK D + N,S) = 12 THEN SC = SC + ((40 - S) * 5):OX = OX +  INT (.3 * ((40 - S) * 5)): GOTO 1435
1433  GOTO 1510
1435  FOR I = 60 TO 55 STEP  - 1: POKE 768,I: POKE 769,8: CALL 770: NEXT I
1440  GOTO 1510
1450  IF ZX = 203 AND  SCRNK D + 1,S) < > 12 THEN D = D + 1: GOTO 1520
1460  IF ZX = 202 AND  SCRNK D - 1,S) < > 12 THEN D = D - 1: GOTO 1520
1470  IF ZX = 205 AND  SCRNK D,S + 1) = 1 THEN S = S + 1: GOTO 1520
1480  IF ZX = 201 AND  SCRNK D,S - 1) = 1 THEN S = S - 1: GOTO 1520
1490  IF ZX = 211 THEN  COLOR= 0:N = 1: GOTO 1550
1500  IF ZX = 196 THEN  COLOR= 0:N =  - 1: GOTO 1550
1510  IF  SCRNK D,S + 1) = 12 AND  SCRNK D - 1,S) = 12 THEN 1600
1520  IF D < 1 THEN D = 1
1530  IF D > 38 THEN D = 38
1540  GOTO 1040
1550 PY = S + 1:W = 0
1560  IF  SCRNK D - N,PY) < > 12 THEN W = W + 1:PY = PY + 1: GOTO 1580
1570  PLOT D - N,PY: POKE  - 16268,13:SV =  PEEK ( - 16336): GOTO 1540
1580  IF W = 4 THEN  POKE  - 16268,13: GOTO 1540
1590  GOTO 1560
1600  FOR J = 1 TO 4
1610  FOR I = 80 TO 70 STEP  - 1
1620  POKE 768,I: POKE 769,10: CALL 770
1630  COLOR= I
1640  VLIN S - 2,S + 2 AT D: VLIN S - 2,S + 2 AT D - 1
1645  VLIN S - 2,S + 2 AT D + 1
1650  NEXT I
1660  NEXT J
1670 Q = Q - 1: IF Q = 0 THEN 1690
1680 H = H + .3: GOTO 830
1690  TEXT : HOME : VTAB 5: HTAB 5: PRINT SU$;"  YOUR'E    SCORE   = ";SC;"   ]"
1700  PRINT "OPEN PEACH "
1710  PRINT "READ PEACH"
1720  INPUT TL
1730  IF SC > TL THEN 1850
1740  PRINT "CLOSE PEACH "
1750  PRINT : PRINT : PRINT "                  BAD   LUCK            "
1760  PRINT : PRINT : PRINT SU$;SU$;SU$;"   HIGH SCORE  = ";TL;"       ]]] "
1770  IF SC > 10000 THEN  PRINT : PRINT "    TOPS  SHOULD HAV            E BEEN THE HIGHEST ": GOTO 1950
1780  IF SC > 7000 THEN  PRINT : PRINT "    EXELLENT SCORE    ": GOTO 1950
1790  IF SC > 3200 THEN  PRINT : PRINT "    PRETTY GOOD ROOM FOR IMPROVEMENT": GOTO 1950
1800  IF SC > 1200 THEN  PRINT : PRINT "    NOT BAD  GETTING THERE  ": GOTO 1950
1810  IF SC > 700 THEN  PRINT : PRINT "    FAIR        NEEDS PRACTICE ": GOTO 1950
1820  IF SC < 260 THEN  PRINT : PRINT "    USELESS SCORE TRY AGAIN": GOTO 1950
1830  IF SC > 10000 THEN  PRINT : PRINT "    TOPS  SHOULD HAVE BEEN THE HIGHEST "
1840  GOTO 1950
1850  PRINT "CLOSE  PEACH"
1860  PRINT "OPEN PEACH"
1870  PRINT "WRITE PEACH"
1880  PRINT SC
1890  PRINT "CLOSE PEACH"
1900  PRINT : PRINT : PRINT
1910  FOR I = 1 TO 39: VTAB 15: HTAB I: PRINT SU$: NEXT I
1920  PRINT
1930  PRINT "CONGRATULATIONS YOU HAVE THE HIGH SCORE"
1940  PRINT : PRINT "]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]"
1950  END
```

Apple Shapes Up

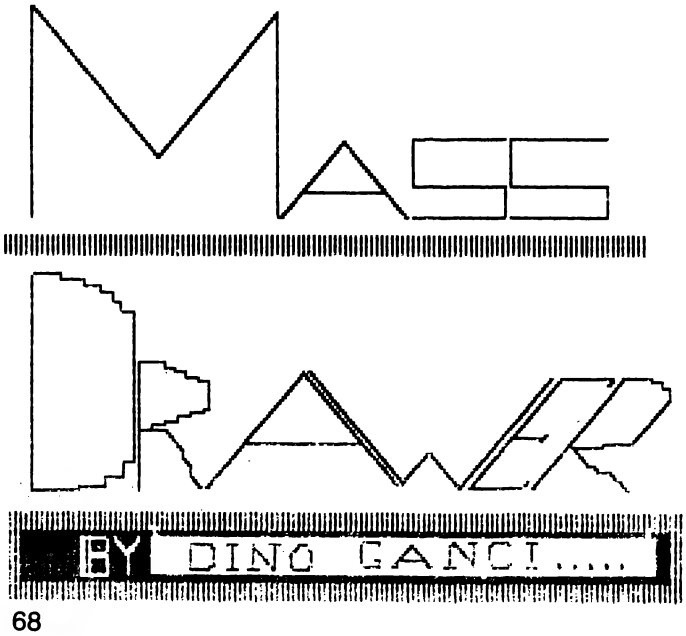
By Dino Ganci

'MASS DRAWER" allows you to draw, alter, bsave and bload pictures. Mass Drawer uses Hires page 2 on the Apple II computer.

The program primarily uses the keyboard to move a point around the screen, although paddle and joystick control is available by pressing 'CTRL-P'.

The enclosed screen dump of the title of the program has been done to illustrate its flexiblity.

```
10  CLEAR
40 WW = 1:PL =  - 1
50 P =  - 16336
60 L = 1
70 M =  - 16384
80  TEXT : HOME
90  VTAB (10): HTAB (10): INVERSE :
    PRINT "MASS DRAWER"
100  PRINT
110  HTAB (15): PRINT "BY"
120  PRINT : HTAB (10): PRINT "DINO GANCI "
125  PRINT : PRINT : PRINT
128  NORMAL
130  GOTO 3180
140  PRINT "0   1   2   3    4   5   6   7"
150  PRINT "-   -   -   -    -   -   -   -"
160  PRINT "B   G   V   W    B   O   B   W"
170  PRINT "L   R   I   H    L   R   L   H"
180  PRINT "A   E   O   I    A   A   U   I"
190  PRINT "C   E   L   T    C   N   E   T"
200  PRINT "K   N   E   E    K   G       E"
210  PRINT "1       T   1    2   E       2"
220  PRINT
230  INPUT "ENTER INTIAL COLOR: ";H
240  IF H < 0 OR H > 7 THEN  GOTO 140
250  HCOLOR= H
260 C =  - 1
270  INPUT "INITIAL SPEED (0-9) ? ";E
280  IF E < 0 OR E > 9 THEN  PRINT  GOTO 270
290  INPUT "ENTER INTIAL CO-ORDINATES: ";X,Y
300  IF X < 0 OR X > 279 THEN  GOTO 290
310  IF Y < 0 OR Y > 191 THEN  GOTO 290
320  INPUT "ENTER COLOR FOR BACKGROUND";BA
330  IF BA = 0 THEN BA = 0: GOTO 420
340  IF BA = 1 THEN BA = 42: GOTO 420
350  IF BA = 2 THEN BA = 85: GOTO 420
360  IF BA = 3 THEN BA = 127: GOTO 420
370  IF BA = 4 THEN BA = 128: GOTO 420
380  IF BA = 5 THEN BA = 170: GOTO 420
390  IF BA = 6 THEN BA = 213: GOTO 420
400  IF BA = 7 THEN BA = 255: GOTO 420
410  GOTO 320
420  HGR2
430  POKE 28,BA
440  CALL 62454
450  REM (<(<(MAIN LOOP)>)>)
460  POKE  - 16368,0
470  IF  PEEK (M) = 75 THEN 720
480  IF  PEEK (M) = 74 THEN 890
490  IF  PEEK (M) = 73 THEN 1070
500  IF  PEEK (M) = 79 THEN  GOTO 800
510  IF  PEEK (M) = 85 THEN 980
520  IF  PEEK (M) = 78 THEN 1160
530  IF  PEEK (M) = 44 THEN 1350
540  IF  PEEK (M) = 77 THEN 1260
550  IF  PEEK (M) = 68 THEN 1440
560  IF  PEEK (M) = 27 THEN 1470
570  IF  PEEK (M) = 67 THEN  GOTO 1500
580  IF  PEEK (M) = 19 THEN 1640
590  IF  PEEK (M) = 32 THEN 1700
600  IF  PEEK (M) = 14 THEN 1740
610  IF  PEEK (M) = 2 THEN 1960
620  IF  PEEK (M) = 12 THEN L = L *  - 1: GOTO 2640
630  IF  PEEK (M) = 6 THEN  GOTO 2680
640  IF  PEEK (M) = 8 THEN  GOTO 3590
650  IF  PEEK (M) = 16 THEN PL = 1
660  IF  PEEK (M) = 18 THEN  GOTO 3050
670  IF  PEEK (M) = 5 THEN 2670
680  IF  PEEK (M) = 9 THEN  GOSUB 2280:
     GOSUB 2390:: INPUT "PRESS <RETURN> TO
     CONT.";XX$: GOSUB 2340
690  IF  PEEK (M) = 5 THEN  END
700  IF PL = 1 THEN  GOSUB 2940
710  GOTO 450
720  REM  ((((((DOWN))))))
730 X = X + E
740  IF X > 279 THEN X = E
750  HCOLOR= H
760  HPLOT X - E,Y TO X,Y
770  IF C = 1 THEN  GOTO 450
780  HCOLOR= 0: HPLOT X - E,Y TO X,Y
790  GOTO 450
800  REM  ((((((((N45E))))))))))
810 X = X + E:Y = Y - E
820  IF X > 279 THEN X = E
830  IF Y < 0 THEN Y = 191 - E
840  HCOLOR= H
850  HPLOT X - E,Y + E TO X,Y
860  IF C = 1 THEN  GOTO 450
870  HCOLOR= 0: HPLOT X - E,Y + E TO X,Y
880  GOTO 450
890  REM  ((((((UP))))))))))
900 X = X - E
910  IF X < 0 THEN X = 279 - E
920  HCOLOR= H
930  HPLOT X + E,Y TO X,Y
940  IF C = 1 THEN  GOTO 450
950  HCOLOR= 0
960  HPLOT X + E,Y TO X,Y
970  GOTO 450
980  REM  ((((((((((N45W))))))))))
990 X = X - E:Y = Y - E
1000  IF X < 0 THEN X = 279 - E
1010  IF Y < 0 THEN Y = 191 - E
1020  HCOLOR= H
1030  HPLOT X + E,Y + E TO X,Y
1040  IF C = 1 THEN  GOTO 450
1050  HCOLOR= 0: HPLOT X + E,Y + E TO X,Y
1060  GOTO 450
1070  REM  ((((((((LEFT))))))))
1080 Y = Y - E
1090  IF Y < 0 THEN Y = 191 - E
1100  HCOLOR= H
1110  HPLOT X,Y + E TO X,Y
1120  IF C = 1 THEN  GOTO 450
1130  HCOLOR= 0
1140  HPLOT X,Y + E TO X,Y
1150  GOTO 450
1160  REM  ((((((((((((S45W))))))))
1170 X = X - E:Y = Y + E
1180  IF X < 0 THEN X = 279 - E
1190  IF Y > 191 THEN Y = E
1200  HCOLOR= H
1210  HPLOT X + E,Y - E TO X,Y
1220  HCOLOR= 0
1230  IF C = 1 THEN  GOTO 450
1240  HCOLOR= 0: HPLOT X + E,Y - E TO X,Y
1250  GOTO 450
1260  REM  (((((((RIGHT)))))))))
1270 Y = Y + E
1280  IF Y > 191 THEN Y = E
1290  HCOLOR= H
1300  HPLOT X,Y - E TO X,Y
```



```
1310  IF C = 1 THEN  GOTO 450
1320  HCOLOR= 0
1330  HPLOT X,Y - E TO X,Y
1340  GOTO 450
1350  REM  (((((((S45E)))))))))))
1360 X = X + E:Y = Y + E
1370  IF X > 279 THEN X = E
1380  IF Y > 191 THEN Y = E
1390  HCOLOR= H
1400  HPLOT X - E,Y - E TO X,Y
1410  IF C = 1 THEN  GOTO 450
1420  HCOLOR= 0: HPLOT X - E,Y - E TO X,Y
1430  GOTO 450
1440  REM  (((((((PLOT-UNPLOT)))))))
1450 C = C *  - 1
1460  GOTO 450
1470  REM  (((((((((HOME)))))))))))
1480  HGR2
1490  GOTO 450
1500  REM  ((((((((((COLOR))))))))))))
1510  GOSUB 2280
1520  PRINT " 0   1   2   3   4   5   6  7"
1530  PRINT "-------------------------------"
1540  PRINT " B   G   V   W   B   O   B  W"
1550  PRINT " L   R   I   H   L   R   L  H"
1560  PRINT " A   E   O   I   A   A   U  I"
1570  PRINT " C   E   L   T   C   N   E  T"
1580  PRINT " K   N   E   E   K   G      E"
1590  PRINT " 1       T   1   2   E      2"
1600  VTAB (24): INPUT "COLOR ?";H
1610  IF H < 0 OR H > 7 THEN  GOTO 1600
1620  GOSUB 2340
1630  GOTO 450
1640  REM  (((((((((SPEED)))))))))))
1650  GOSUB 2280
1660  VTAB (24): INPUT "SPEED (0-9) ? ";E
1670  IF E < 0 OR E > 9 THEN  GOTO 1660
1680  GOSUB 2340
1690  GOTO 450
1700  REM  <<<<<BLINK POINT>>>>>
1710  HCOLOR= 3: HPLOT X,Y
1720  HCOLOR= 0: HPLOT X,Y
1730  GOTO 450
1740  REM  ((((((((((POSITION))))))))))
1750  HCOLOR= 3
1760  FOR T = 0 TO 279 STEP 10
1770  HPLOT T,0 TO T,2: HPLOT T,191 TO T,189: NEXT
1780  FOR K = 0 TO 191 STEP 10
1790  HPLOT 0,K TO 2,K: HPLOT 277,K TO 279,K: NEXT
1800  PRINT "¬";"¬";"¬";"¬";
1810  GOSUB 2280
1820  PRINT
1830  VTAB (24): PRINT "ENTER POINTS ":
      PRINT "¬";"¬";"¬";"¬";:
1840  FOR T = 1 TO 2000: NEXT T
1850  GOSUB 2340
1860  INPUT "NEW POSITIONS (X,Y) ? ";X,Y
1870  IF X < 0 OR X > 279 THEN
      PRINT "¬";"¬";: GOTO 1860
1880  IF Y < 0 OR Y > 191 THEN
      PRINT "¬";"¬";: GOTO 1860
1890  HCOLOR= 0
1900  FOR T = 0 TO 279 STEP 10
1910  HPLOT T,0 TO T,2: HPLOT T,191
      TO T,189: NEXT
1920  FOR K = 0 TO 191 STEP 10
1930  HPLOT 0,K TO 2,K: HPLOT 277,K
      TO 279,K: NEXT
1940  HCOLOR= 3
1950  GOTO 450
1960  REM  (((((((BSAVE)))))))))))))))
1970  GOSUB 2280
1980 D$ =  CHR$ (4)
1990  INPUT "DO YOU WANT TO CATALOG DISK
      FIRST ?";CW$
2000  IF  LEFT$ (CW$,1) = "N" THEN  GOTO 2030
2010  IF  LEFT$ (CW$,1) <  > "Y" THEN  GOTO 450
2020  PRINT D$;"CATALOG"
2030  INPUT "FILE NAME FOR PICTURE ? ";WW$
2040 D$ =  CHR$ (4)
2050  INPUT "PRESS <RETURN> WHEN READY";CC$
2060  PRINT D$;"BSAVE";WW$;",A16384,L8192"
2070  GOSUB 2340
2080  GOTO 450
2090  REM  ((((((LINE))))))))))))))))
2100 X1 = X:Y1 = Y
2110  GOSUB 2280: VTAB (24): INPUT "ENTER
      COLOR FOR LINE : ";LH
2120  IF LH < 0 OR LH > 7 THEN  GOTO 2110
2130  HCOLOR= LH
2140  GOSUB 2340
2150  GOTO 450
2160 X2 = X:Y2 = Y
2170  GOSUB 2280: VTAB (24): INPUT "ENTER
      COLOR FOR LINE : ";LH
2180  IF LH < 0 OR LH > 7 THEN  GOTO 2170
2190  HCOLOR= LH
2200  GOSUB 2340
2210  HPLOT X1,Y1 TO X2,Y2
2220  IF C = 1 THEN  GOTO 450
2230  HCOLOR= 0
2240  HPLOT X1,Y1 TO X2,Y2
2250 L = 1
2260  GOTO 450
2270  REM  H-T
2280  POKE  - 16297,0
2290  POKE  - 16300,0
2300  POKE  - 16303,0
2310  GOSUB 2390
2320  RETURN
2330  REM  T-H2
2340  POKE  - 16297,0
2350  POKE  - 16300,0
2360  POKE  - 16299,0
2370  POKE  - 16304,0
2380  RETURN
2390  REM  ((((((INSTRUCTIONS))))))))))
2400  HOME
2410  PRINT "I------->UP    D-->CHANGE DRAWING MODE"
2420  PRINT "J------->LEFT"
2430  PRINT "K------->RIGHT"
2440  PRINT "M------->DOWN"
2450  PRINT "O------->N45E"
2460  PRINT "U------->N45W"
2470  PRINT ",------->S45E"
2480  PRINT "N------->S45W"
2490  PRINT "CTRL-S-->SPEED"
2500  PRINT "C------->COLOR"
2510  PRINT "CTRL-B-->STORE PICTURE"
2520  PRINT "CTRL-N-->NEW POSITION"
2530  PRINT "CTRL-L-->LINE"
2540  PRINT "<ESC>--->ERASE SCREEN"
2550  PRINT "CTRL-I-->INSTRUCTIONS"
2560  PRINT "CTRL-E-->END PROGRAM"
2570  PRINT "CTRL-F-->SECTOR FILLING"
2580  PRINT "CTRL-P-->PADDLE CONTROL"
2590  PRINT "CTRL-R-->RESTORING FILE FROM DISK"
2600  PRINT "CTRL-H-->DRAW A LINE BETWEEN 2 POINTS"
2610  PRINT "PADDLE BUTTON(0)-->KEY CONTROL"
2620  PRINT "***REM*** AKEY MUST BE STRUCK BEFORE ":
      PRINT "PADDLE BUTTON(0) IS PRESSED"
2630  RETURN
2640  REM  ((((((((((LINESUB.))))))))))
2650  IF L =  - 1 THEN  GOTO 2090
2660  GOTO 2160
2670  END
2680  REM  <<<SECTOR COLORING>>>
2690  IF WW =  - 1 THEN  GOTO 2760
2700  GOSUB 2270: PRINT : PRINT "DO YOU WANT
      TO COLOR A CERTAIN SECTOR?": INPUT D$:
```

```
     IF D$ <  > "Y" THEN  GOSUB 2330: GOTO 450
2710 Q1 = X:Q2 = Y
2720 WW = WW *  - 1
2730  GOSUB 2330
2740  GOTO 450
2750  GOTO 450
2760 Q3 = X:Q4 = Y
2770  GOSUB 2270
2780  PRINT : INPUT "ENTER SECTOR COLOR : ";SH
2790  IF SH < 0 OR SH > 7 THEN  GOTO 2780
2800  GOSUB 2330
2810  HCOLOR= SH
2820  IF Q2 > Q4 THEN  GOTO 2880
2830  FOR YI = Q2 TO Q4
2840  HPLOT Q1,YI TO Q3,YI
2850  NEXT
2860 WW = WW *  - 1
2870  GOTO 450
2880  FOR YI = Q4 TO Q2
2890  HPLOT Q1,YI TO Q3,YI
2900  NEXT
2910 Q1 = 0:Q2 = 0:Q3 = 0:Q4 = 0
2920 WW = WW *  - 1
2930  GOTO 450
2940  REM  <<<<<PADDLE CONTROL>>>>>>>
2950  GOSUB 3030
2960  HPLOT PX,PY
2970  GOSUB 3030
2980  HCOLOR= H
2990  HPLOT  TO PX,PY
3000  IF  PEEK ( - 16287) <  = 127
     THEN  GOTO 2970
3010 PL = PL *  - 1
3020  GOTO 450
3030 PX =  PDL (0) * 1.094:PY =  PDL (1) * .749
3040  RETURN
3050  REM  <<<<<BLOAD>>>>>>>
3060  GOSUB 2270
3070 D$ =  CHR$ (4)
3080  INPUT "DO YOU WANT TO CATALOG THE
     DISK FIRST";WC$
3090  IF  LEFT$ (WC$,1) = "N" THEN  GOTO 3120
3100  IF  LEFT$ (WC$,1) <  > "Y" THEN  GOTO 450
3110  PRINT D$;"CATALOG"
3120  INPUT "ENTER FILE NAME::";FF$
3130  INPUT "PRESS <RETURN> WHEN DISK
     IS IN DRIVE1";ER$
3140  GOSUB 2330
3150 D$ =  CHR$ (4)
3160  PRINT D$;"BLOAD";FF$
3170  GOTO 450
3180  PRINT "THIS PROGRAM ENABLES YOU TO
     DRAW,ALTER,": PRINT "SAVE AND LOAD
     PICTURES ON THE HIRES-": PRINT "SCREEN
     USING THE KEYBOARD AND PADDLES"
3190  INPUT "PRESS <RETURN> :";OO$
3200  IF OO$ <  > "" THEN  GOTO 140
3210  HOME
3220  PRINT "TO MOVE IN THE DIFFERENT DIRECTIONS":
     PRINT "PRESS THE FOLLOWING KEYS--->"
3230  PRINT
3240  PRINT "       U     I     O"
3250  PRINT "        .    .    ."
3260  PRINT "         .   .   ."
3270  PRINT "          .  .  ."
3280  PRINT "           . . ."
3290  PRINT "       J..........K"
3300  PRINT "           . . ."
3310  PRINT "          .  .  ."
3320  PRINT "         .   .   ."
3330  PRINT "        .    .    ."
3340  PRINT "       N     M     ,"
3350  PRINT : PRINT "PRESS -C- TO CHANGE COLOR"
3360  PRINT : PRINT "PRESS CTRL-S TO CHANGE THE SPEED"
3370  PRINT : PRINT "PRESS -D- TO CHANGE MODE OF PLOTTING"
3380  PRINT : PRINT "PRESS CTRL-I TO INSTRUCTIONS"
3390  INPUT "PRESS <RETURN> TO CONTINUE";UJ$
3400  PRINT : PRINT "PRESS CTRL-F TO RECORD
     POINTS FOR ": PRINT "FILLING"
3410  HOME
3420  PRINT : PRINT "PRESS CTRL-L TO RECORD JOINING
     POINTS": PRINT "      FOR LINE"
3430  PRINT : PRINT "PRESS <ESC> TO ERASE FULL SREEN"
3440  PRINT : PRINT "PRESS SPACE BAR TO STOP DRAWING POINT"
3450  PRINT : PRINT "PRESS CTRL-P TO GO TO PADDLE CONTROL"
3460  PRINT
3470  PRINT "PRESS PADDLE BUTTON (0) TO RETURN
     TO ": PRINT "      KEY CONTROL":
     PRINT "      ((NOTE)) A KEY SHOULD BE
     STRUCK": PRINT "      BEFORE THE BUTTON IS PRESSED"
3480  PRINT : PRINT "PRESS CTRL-B TO BSAVE
     PICTURE ON DISK"
3490  PRINT : PRINT "PRESS CTRL-H TO DRAW A LINE
     BETWEEN TWO": PRINT "       SPECIFIED POINTS"
3500  PRINT : PRINT "PRESS CTRL-R TO RESTORE A
     PICTURE FROM": PRINT "      THE DISK
     TO THE SRCEEN"
3510  PRINT
3520  INPUT "PRESS <RETURN> TO RETURN TO
     MAIN        PROGRAM";UJ$
3530  HOME
3540  PRINT : PRINT "PRESS CTRL-N TO ENTER IN
     NEW POINTS": PRINT "     (((REM)))WHEN
     WRITING POINTS": PRINT "      THE SCREEN
     IS ON HGR2 PAGE"
3550  PRINT : PRINT "PRESS CTRL-F TO FILL
     SECTORS WITH COLOR"
3560  PRINT : PRINT "PRESS CTRL-E TO END"
3570  INPUT "PRESS <RETURN> TO START";UJ$
3580  GOTO 140
3590  REM  <<<<< IRREGLUAR PLOTTING>>>>>>>>
3600  GOSUB 2280
3610  PRINT "DO YOU WANT TO DRAW A LINE
     (Y OR N) ?";: GET TR$: IF TR$ <  > "Y"
     THEN  GOSUB 2340: GOTO 450
3620  PRINT
3630  PRINT "ENTER FIRST SET OF CO-ORDINATES
     (X1,Y1)": INPUT J1,K1
3640  IF J1 < 0 OR J1 > 279 THEN  GOTO 3630
3650  IF K1 < 0 OR K1 > 191 THEN  GOTO 3630
3660  PRINT "ENTER SECOND SET OF CO-ORDINATES":
     INPUT "(X2,Y2) ?";J2,K2
3670  IF J2 < 0 OR J2 > 279 THEN  GOTO 3660
3680  IF K2 < 0 OR K2 > 191 THEN  GOTO 3660
3690  INPUT "ENTER COLOR FOR LINE:";LC
3700  IF LC < 0 OR LC > 7 THEN  GOTO 3690
3710  GOSUB 2340
3720  HCOLOR= LC: HPLOT J1,K1 TO J2,K2
3730  HCOLOR= H
3740  GOTO 450
```

MICROBEE

Microbee With Character . . .

By Harry Purvis

THIS PROGRAM is used to assist in the design of special character sets for the MicroBee computer.

The MicroBee uses an 8 dot by 16 dot format for characters. This program draws a grid on the screen using two characters to represent each point, resulting in a 16 character wide by 16 line grid. A cross-shaped cursor is placed in the top left cell of the grid. This cursor is moved about by using four keys — less-than, greater-than, 'L', and space. The cell that contains the cursor can be turned on or off (toggled) using the 'T' key.

As the cells of the grid are turned on or off, the character being designed is printed in normal size beside the large pattern on the grid. This is necessary because although the grid pattern is easier to work with than the small character it usually looks more 'chunky' than the normal size version of the same character.

To assist in keeping track of the cursor, the column and row numbers are printed at the top of the screen.

A list of commands is printed on the screen at the start of the program, and remains there during program operation.

When the character has been designed, the P command is used to produce a list of the 16 decimal numbers that will be 'poked' into the PCQ buffer to generate the character.

If it is desired to change a character that was designed earlier, the 'I' command may be used to enter the 16 decimal numbers and generate the pattern on the grid corresponding to them. □

```
100 POKE 220,16
110 CLS
111 REM
112 REM DATA FOR GRID AND CURSOR CHARACTERS
112 REM
113 REM RECTANGLE TO CONSTRUCT GRID "AB"
114 REM
120 DATA 255,128,128,128,128,128,128,128
130 DATA 128,128,128,128,128,128,128,255
140 DATA 255,  1,  1,  1,  1,  1,  1,  1
150 DATA   1,  1,  1,  1,  1,  1,  1,255
151 REM
151 REM SOLID BLOCK FOR TURNED ON CELL "CC"
152 REM
160 DATA 255,255,255,255,255,255,255,255
170 DATA 255,255,255,255,255,255,255,255
171 REM
172 REM CROSS FOR CURSOR "DD"
173 REM
180 DATA 255,129,129,129,129,129,129,255
190 DATA 255,129,129,129,129,129,129,255
191 REM
192 REM INVERSE CROSS USED WHEN CELL IS ON "EF"
193 REM
200 DATA 254,254,254,254,254,254,254,  0
210 DATA   0,254,254,254,254,254,254,254
220 DATA 127,127,127,127,127,127,127,  0
230 DATA   0,127,127,127,127,127,127,127
231 REM
232 REM PRINT A LIST OF COMMANDS IN CENTRE OF SCREEN
233 REM
240 CURS 20, 3: PRINT "P = Print Data"
250 CURS 20, 4: PRINT "I = Input Data"
260 CURS 20, 5: PRINT "R = Reset Data"
270 CURS 20, 6: PRINT "Q = Quit Program"
280 CURS 20, 7: PRINT "L = UP Cursor"
290 CURS 20, 8: PRINT "  = Down Cursor"
300 CURS 20, 9: PRINT "< = Left Cursor"
310 CURS 20,10: PRINT "> = Right Cursor"
320 CURS 20,11: PRINT "T = Toggle Point"
321 REM
322 REM READ DATA AND 'POKE' SPECIAL CHARACTERS FOR PCG.
323 REM
330 P = 63488 + 65 * 16
340 FOR A = P TO P + 16*6 -1
340 READ X: POKE A,X
360 NEXT A
361 REM
362 REM SET UP ARRAYS FOR GRID INDICATORS, CHARACTER CODES
363 REM AND CONSTANTS, THEN READ AND STORE CONSTANTS.
364 REM
370 DIM D(8,16), B(16), E(8)
380 DATA 128,64,32,16,8,4,2,1
390 FOR A = 1 TO 8 : READ E(A) : NEXT A
391 REM
392 REM INITIALISE ARRAYS AND DRAW EMPTY GRID ON SCREEN
393 REM GOSUB 940 DRAWS ONE CELL OF GRID.
394 REM
400 FOR R = 1 TO 16
410 B(R) = 0
420 FOR C = 1 TO 8
430 D(C,R) = 0
440 A2$ = "AB"
450 GOSUB 940
460 NEXT C
470 NEXT R
471 REM
472 REM POKE ZEROS FOR PCG CHARACTER 'Z' USED FOR DISPLAY
473 REM OF CHARACTER BEING DESIGNED
474 REM
480 P = 63488 + 90 *16
490 FOR A = 1 TO 16
500 POKE P+A-1, B(A)
510 NEXT A
511 REM
512 REM BEGIN WITH CURSOR IN TOP LEFT CELL OF GRID.
513 REM
520 R = 1 : C = 1
530 A2$ = "DD"
540 GOSUB 940
541 REM
542 REM READ KEYBOARD AND WAIT FOR A COMMAND.
543 REM
550 A1$ = KEY$
560 IF A1$ = ""  THEN GOTO 550
570 IF A1$ = "." THEN GOSUB [ 1  0] 670
580 IF A1$ = "," THEN GOSUB [-1  1] 670
590 IF A1$ = "L" OR A1$ = "l" THEN GOSUB [-1  1] 750
600 IF A1$ = " " THEN GOSUB [ 1 16] 750
610 IF A1$ = "T" OR A1$ = "t" THEN GOSUB 830
620 IF A1$ = "P" OR A1$ = "p" THEN GOSUB 890
630 IF A1$ = "R" OR A1$ = "r" THEN GOTO  400
640 IF A1$ = "I" OR A1$ = "i" THEN GOSUB 990
650 IF A1$ = "Q" OR A1$ = "q" THEN POKE 220,111: CLS: STOP
660 GOTO 550
661 REM
662 REM THIS GOSUB MOVES THE CURSOR LEFT AND RIGHT
663 REM
670 VAR (K, L)
680 IF C = L THEN RETURN
690 IF D(C,R) = 1 THEN LET A2$ = "CC" ELSE LET A2$ = "AB"
700 GOSUB 940
710 C = C + K
720 IF D(C,R) = 1 THEN LET A2$ = "EF" ELSE LET A2$ = "DD"
730 GOSUB 940
740 RETURN
741 REM
742 REM THIS GOSUB MOVES THE CURSOR UP AND DOWN
743 REM
750 VAR (K, L)
760 IF R = L THEN RETURN
770 IF D(C,R) = 1 THEN LET A2$ = "CC" ELSE LET A2$ = "AB"
780 GOSUB 940
790 R = R + K
800 IF D(C,R) = 1 THEN LET A2$ = "EF" ELSE LET A2$ = "DD"
810 GOSUB 940
820 RETURN
821 REM
822 REM THIS GOSUB TOGGLES THE POINT AT THE CURSOR.
823 REM
830 IF D(C,R) = 0 THEN LET A2$ = "EF": LET D(C,R) = 1 ELSE
      LET A2$ = "DD" : LET D(C,R) = 0
840 GOSUB 940
850 IF D(C,R) = 1 THEN LET B(R) = B(R) + E(C) ELSE
      LET B(R) = B(R) - E(C)
860 POKE P+R-1, B(R)
870 CURS 40,15 : PCG : PRINT "Z"; : NORMAL
880 RETURN
881 REM
882 REM THIS GOSUB LISTS THE DATA TO BE 'POKED' TO PRODUCE
883 REM  THE CHARACTER AS DESIGNED
884 REM
890 FOR V = 1 TO 16
900 CURS 1,V : PRINT "                    ";
910 CURS 1,V : PRINT [I3 V]; [I4 B(V)];
920 NEXT V
930 RETURN
931 REM
932 REM THIS GOSUB PRINTS ONE CELL IN THE GRID
933 REM
940 CURS 46 + C * 2, R
950 PCG
960 PRINT A2$;
970 NORMAL
980 RETURN
981 REM
982 REM THIS GOSUB IS USED TO ENTER THE 16 DECIMAL NUMBERS
983 REM THAT DEFINE A CHARACTER
984 REM
990 FOR V = 1 TO 16
1000 CURS 1,V: PRINT "                ";
1010 POKE 220,111
1020 CURS 1,V: INPUT " data is ";Z;
1030 POKE 220,16
1040 B(V) = Z
1050 POKE P+V-1, Z
1060 CURS 40,15 : PCG : PRINT "Z" : NORMAL
1070 FOR W = 1 TO 8
1080 D(W,V) = 0
1090 IF Z >= E(W) THEN LET D(W,V) = 1: Z = Z - E(W)
1100 IF D(W,V) = 1 THEN LET A2$ = "CC" ELSE LET A2$ = "AB"
1110 C = W: R = V: GOSUB 940
1120 NEXT W
1130 NEXT V
1140 C = 1: R = 1
1150 IS D(C,R) = 1 THEN LET A2$ = "EF" ELSE LET A2$ = "DD"
1160 GOSUB 940
1170 RETURN
```

Jinglish To Strine

Mrs Joan Mann

THE FOLLOWING program was adapted from a contribution to your magazine by John Beutel in the June 1982 issue (page 68). It was run on my Hitachi Peach MB 6890.

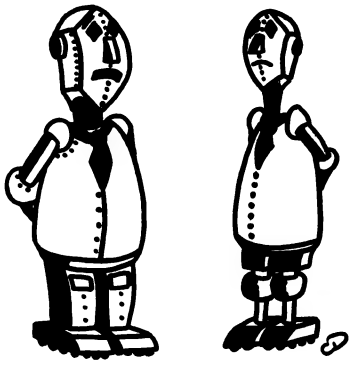
I was inspired to send this contribution because of another Peach user's frustrated scream for help. I heartily agree with his comment about the manual needing to be translated from 'Jinglish to Strine'.

Note: Line 178 is an instruction to put the printer back into the normal print for subsequent printing. □

```
          *    FUEL CONSUMPTION    *

THERE  WAS   9  PETROL STOPS
FILL NUMBER  1  AT  $0.350 PER LITRE COST $14.00
FILL NUMBER  2  AT  $0.410 PER LITRE COST $16.00
FILL NUMBER  3  AT  $0.381 PER LITRE COST $11.00
FILL NUMBER  4  AT  $0.371 PER LITRE COST $12.30
FILL NUMBER  5  AT  $0.425 PER LITRE COST $19.00
FILL NUMBER  6  AT  $0.369 PER LITRE COST $18.00
FILL NUMBER  7  AT  $0.385 PER LITRE COST $23.47
FILL NUMBER  8  AT  $0.345 PER LITRE COST $15.00
FILL NUMBER  9  AT  $0.359 PER LITRE COST $12.80


 374.63  LITRES OF FUEL WAS USED, WHICH COST A TOTAL OF$ 141.57
         THE DISTANCE TRAVELLED WAS  2792  KILOMETERS
 THE CONSUMPTION WORKED OUT AT  7.45269  K.M'S PER LITRE OR  21.0252  M.P.G.
```



"I'm AFRAID I HAD TO FIRE OJI9-6387. HE KEPT PLAYING 'HUMAN INVADERS' DURING OFFICE HOURS."

```
10 CLS:PRINT"           FUEL CONSUMPTION"
12 OPEN"O",#1,"LPT0:"
15 PRINT#1,CHR$(14)"     *  FUEL CONSUMPTION  *"
16 COLOR 6,0
17 PRINT#1,CHR$(15)
20 PRINT:INPUT"HOW  MANY  FILLS  OF  PETROL";F
24 PRINT#1,CHR$(10)
25 PRINT#1,"THERE  WAS  ";F;" PETROL STOPS"
30 A=0:D=0
40 FOR B=1 TO F
50 PRINT"      PRICE PER LITRE @ FILL # ";B
55 INPUT CL
60 PRINT"COST OF  FILL # ";B: INPUT CF
63 Q$="FILL NUMBER ##  AT  $#.### PER LITRE COST $##.##"
66 PRINT#1,USING Q$;B,CL,CF
70 C=CF/CL:A=A+C:D=D+CF
80 NEXT B
90 INPUT"SPEEDO READING @ START OF EXERCISE ";S1
100  INPUT"            SPEEDO @ END OF EXERCISE (LAST FILL)";S2
110 S3=S2-S1
120 PRINT:PRINT"       ON THIS TRIP OF ";S3;" KILOMETERS"
130 PRINT"YOU  USED ";A; "LITRES OF PETROL WHICH COST A TOTAL
                                                  OF$";D
140 PRINT:PRINT"THIS REPRESENTS A CONSUMPTION OF ";S3/A;"K.M'S  PER LITRE"
150 PRINT"WHICH IS EQUIVALENT TO ";(S3/A)*4.54*.6214;" M.P.G."
159 PRINT#1,CHR$(10)
160 PRINT#1,A;" LITRES OF FUEL WAS USED, WHICH COST A TOTAL OF$";D
165 PRINT#1,"            THE DISTANCE TRAVELLED WAS ";S3;" KILOMETERS"
170 PRINT#1," THE CONSUMPTION WORKED OUT AT ";S3/A;" K.M'S PER LITRE OR ";(S3/A)
*4.54*.6214;" M.P.G."
178 PRINT#1,CHR$(18)
179 CLOSE#1
180 END
```

Surviving Typing Errors

By Phil Carter

IT'S NOT hard for a computer to compare two numbers and calculate their difference. But what about strings of characters? If two strings are different, can the computer 'measure' the difference between them?

For example: your program has a list of place names; at some point the user is asked to enter a place name and your program has to check whether the name entered matches one of the names in your list. The user makes a simple typing mistake and enters SIDNEY instead of SYDNEY.

Of course, SIDNEY can't be found in your list, but since only one character was mistyped, you would like some algorithm which tells you that though SIDNEY can't be found, SYDNEY most 'closely' matches it and you can reasonable assume the user really meant SYDNEY.

The Search

Recently, this problem arose in a BASIC program I was writing. The computer had on file a list of around 1400 place names with their latitude and longitude co-ordinates.

The program computes such things as the distance between any two places, all the places within a certain radius of a given place, the places which lie along the straight line between any two places, and so on.

The program was used by children or adults who'd never seen a computer keyboard and they often made simple typing mistakes in entering place names, or they simply couldn't spell (of course, it doesn't have to be place names — surnames, products names or in fact any list

consisting of alphanumeric characters will do, sorted or unsorted).

Given that the user typed a name not on file, I wanted an algorithm that would:

- Tell me which name on file most 'closely' matched the names entered, and
- Tell me the 'degree of closeness'. How close was the match?

On searching through the literature, I was surprised to find how little there is on the subject.

Those that I found did not readily lend themselves to the problem at hand (perhaps I didn't look in the right places — perhaps the solution is well known and I've been re-inventing the wheel). Being left to my own devices, the following algorithm emerged.

1) Using the mistyped entry, SIDNEY, find all its substrings; that is, S, SI, SID, SIDN, SIDNE, SIDNEY and so on — 21 in all.

2) Now go through every town on file and find how many of these 21 substrings can be found anywhere in each of their names. Total up the lengths of the substrings found. This is done so that a long substring counts more towards the total than a short substring. For example, MELBOURNE contains N, E, NE, total=4; ROCKHAMPTON contains N, total=1; RODNEY contains D, N, E, Y, DN, NE, EY, DNE, NEY, DNEY, total=20; SYDNEY contains S, Y, D, N, E, Y, DN, NE, EY, DNE, NEY, DNEY, total=21.

3) Divide the total by the length of the town's name. This is because a town with a long name is more likely to have more matches anyway. This gives, in the above example, Melbourne 0.44, Rockhampton 0.09, Rodney 3.33, and Sydney 3.50.

4) The town with the highest result is the 'closest' match. If the result is greater than an arbitrary threshold (around 2.2 in my programs) then you can reasonably assume that you have found the name that was intended.

```
>RUN
MATCH

ENTER YOUR TOWN'S NAME:SYDNEY

TOWN IS IN LIST.

ENTER YOUR TOWN'S NAME:SIDNEY

TOWN NOT IN LIST.
BEST MATCH=SYDNEY MEASURE OF MATCH= 3.5

ENTER YOUR TOWN'S NAME:MELBOURN

TOWN NOT IN LIST.
BEST MATCH=MELBOURNE MEASURE OF MATCH= 13.3333

ENTER YOUR TOWN'S NAME:BROKEN HILL

TOWN NOT IN LIST.
BEST MATCH=BENDIGO MEASURE OF MATCH= .714286

ENTER YOUR TOWN'S NAME:ADELAIDE

TOWN IS IN LIST.

ENTER YOUR TOWN'S NAME:HOBARTE

TOWN NOT IN LIST.
BEST MATCH=HOBART MEASURE OF MATCH= 9.33333

ENTER YOUR TOWN'S NAME:RISDON

TOWN NOT IN LIST.
BEST MATCH=BRISBANE MEASURE OF MATCH= 1.375

ENTER YOUR TOWN'S NAME:STOP
```

Further Considerations

If memory permits, store your list of names in a string array. It's much faster to process the array than having to read through the file each time.

All names should be stored in the one case — preferably upper case. When the user enters his name, convert to capitals before extracting the substrings from it.

The time it takes the computer to find a 'best' match for a name entered depends on i) the number and length of your list of towns, ii) the length of the town entered by the user — a short name will have fewer substrings, iii) whether the program is being run by an interpreter or in compiled form.

The more towns you have on file to be searched, the less reliable your final match! If you have many names, then you are more likely to have two or more very similar names. For example, Broadmeadows, Broadmeadow and Banksmeadow are on file and the user enters Broadbanks. Which town will be the closest match?

Sample Program

The accompanying program demonstrates the technique.

Lines 1000-1490 constitute the algorithm which is implemented as a GOSUB and should be reasonably transportable. Lines 10-440 are a sample main program which simply asks for a town to be entered and tries to find it in its list. If it can't be found, the 'closest' match is found and a measure of the closeness determined.

Lines 1260-1370 go through the string T$, extract all its substrings and store them in the array W$. However before a substring is inserted into W$, the program first checks that the same substring hasn't already been stored.

This is what lines 1290-1320 are doing. W$ is dimensioned to allow a maximum of 40 substrings to be stored into it. This is purely an arbitrary limit, but line 1350 makes sure we don't try and store more than this limit.

The program was written on a Hewlett-Packard 3000 (no, it doesn't sit on my desk at home).

A few features of HP BASIC which may need explanation are:

- DIM C$(50,20) reserves space for 50 towns of 20 characters each.
- The UPS$ function on line 330 shifts the string to uppercase.
- Substrings. Line 1310 is saying 'does the first J characters of the K'th element of string array W$ equal the J characters starting at position I of the string T$'.
- The POS function of line 1420 looks at the string C$(L) and returns the position within it of the string W$(I). It returns zero if it doesn't occur anywhere. ❑

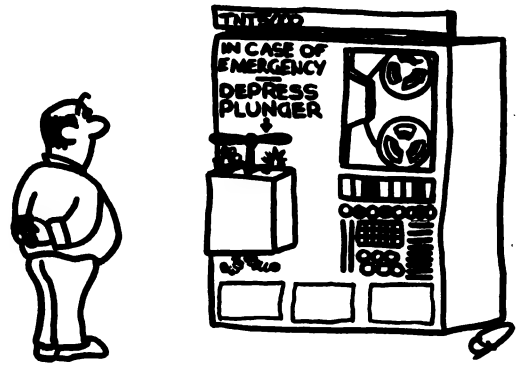
```
 10 REM*****************************************************************
 20 REM*                                                               *
 30 REM* PROGRAM WHICH DEMONSTRATES ALPHANUMERIC MATCHING ALGORITHM.  *
 40 REM*                                                               *
 50 REM* USER ENTERS A TOWN NAME. IF NOT IN COMPUTER'S LIST, THE NAME *
 60 REM* WHICH MOST CLOSELY 'MATCHES' IT IS PRINTED ALONG WITH A      *
 70 REM* MEASURE OF THE 'GOODNESS' OF THE MATCH.                      *
 80 REM*                                                               *
 90 REM*****************************************************************
100 DIM C$[50,20],T$[20]
110 C$[1]="SYDNEY"
120 C$[2]="MELBOURNE"
130 C$[3]="BRISBANE"
140 C$[4]="ADELAIDE"
150 C$[5]="PERTH"
160 C$[6]="HOBART"
170 C$[7]="DARWIN"
180 C$[8]="CANBERRA"
190 C$[9]="NEWCASTLE"
200 C$[10]="WOLLONGONG"
210 C$[11]="BRISBANE WATER"
220 C$[12]="GEELONG"
230 C$[13]="BALLARAT"
240 C$[14]="BENDIGO"
250 C$[15]="GOLD COAST"
260 C$[16]="TOWNSVILLE"
270 C$[17]="TOOWOOMBA"
280 C$[18]="ROCKHAMPTON"
290 C$[19]="LAUNCESTON"
300 T9=19
310 PRINT
320 INPUT "ENTER YOUR TOWN'S NAME:",T$
330 T$=UPS$(T$)
340 IF T$="STOP" THEN STOP
350 PRINT
360 FOR I=1 TO T9
370   IF T$=C$[I] THEN 430
380 NEXT I
390 GOSUB 1000
400 PRINT "TOWN NOT IN LIST."
```

```
 410 PRINT "BEST MATCH=";T1$;" MEASURE OF MATCH=";P1
 420 GOTO 310
 430 PRINT "TOWN IS IN LIST."
 440 GOTO 310
1000 REM*****************************************************************
1010 REM*                                                               *
1020 REM* ROUTINE TO FIND CLOSEST MATCH TO STRING HELD IN T$.           *
1030 REM*                                                               *
1040 REM* VARIABLES PASSED TO THE ROUTINE ARE:-                         *
1050 REM* T$  -  HOLDS THE NAME BEING MATCHED                           *
1060 REM* C$  -  STRING ARRAY WHICH HOLDS ALL THE NAMES                 *
1070 REM* T9  -  TOTAL NUMBER OF NAMES HELD IN C$                       *
1080 REM*                                                               *
1090 REM* RESULTS PASSED BACK TO THE MAIN PROGRAM ARE:-                 *
1100 REM* T1$ -  NAME OF TOWN WHICH MOST CLOSELY MATCHES                *
1110 REM* P1  -  'DEGREE OF CLOSENESS'. LARGER VALUES INDICATE A        *
1120 REM*                          BETTER MATCH.                        *
1130 REM*                                                               *
1140 REM* LOCAL VARIABLES USED ONLY IN THE SUBROUTINE ARE:-             *
1150 REM* I,J,K,L USED AS 'FOR-NEXT' VARIABLES                          *
1160 REM* C1  -  THE NUMBER OF SUBSTRINGS IN T$                        *
1170 REM* F1  -  THE 'DEGREE OF CLOSENESS' FOR THE TOWN CURRENTLY      *
1180 REM*         BEING MATCHED. IF GREATER THAN THE BEST MATCH SO FAR *
1190 REM*         FOUND (P1), IT BECOMES THE BEST FOUND (SO FAR).      *
1200 REM* M1  -  THE RUNNING TOTAL OF MATCHES FOUND FOR THE PARTICULAR*
1210 REM*         TOWN IN THE LIST CURRENTLY BEING PROCESSED.          *
1220 REM* W$  -  STRING ARRAY WHICH HOLDS ALL THE SUBSTRINGS IN T$.    *
1230 REM*                                                               *
1240 REM*****************************************************************
1250 DIM T1$[20],W$[40,20]
1260 C1=0
1270 FOR I=1 TO LEN(T$)
1280   FOR J=1 TO LEN(T$)-I+1
1290     REM IS T$[I;J] ALREADY IN W$?
1300     FOR K=1 TO C1
1310       IF W$[K,1;J]=T$[I;J] THEN 1360
1320     NEXT K
1330     C1=C1+1
1340     W$[C1]=T$[I;J]
1350     IF C1>=40 THEN 1380
1360   NEXT J
1370 NEXT I
1380 P1=0
1390 FOR L=1 TO T9
1400   M1=0
1410   FOR I=1 TO C1
1420     IF POS(C$[L],W$[I])>0 THEN M1=M1+LEN(W$[I])
1430   NEXT I
1440   F1=M1/LEN(C$[L])
1450   IF F1<=P1 THEN 1480
1460   P1=F1
1470   T1$=C$[L]
1480 NEXT L
1490 RETURN
```

BEE Countdown

By Eric Eulenstein

```
00005 REM:"COUNTDOWN", by Eric Eulenstein
00010 CLS
00020 CURS 25,4:UNDERLINE:PRINT"COUNTDOWN":NORMAL
00030 PRINT:PRINT:PRINT
00040 A=INT(RND*11)
00050 T=0
00060 PRINT"You have activated the self-destruct mechanism in this computer"
00070 PRINT"If you wish, you can stop it by typing in the correct"\"number (up t
o 10) which will stop the countdown."\"Please HURRY!!!    THERE IS NO TIME TO WA
STE!!!!!"
00080 INPUT"WHAT'LL IT BE?";X:PRINT:PRINT:PRINT
00090 IF X<A THEN PRINT"TOO SMALL!!!!!!!!":GOTO 120
00100 IF X>A THEN PRINT"TOO BIG!!!!!!!!":GOTO 120
00110 IF X=A THEN 180
00120 T=T+1
00130 IF T=4 THEN CLS:GOTO 230
00140 PRINT"YOUR NUMBER DOES NOT COMPUTE!!!!!!!"\"PLEASE TRY AGAIN"
00150 IF T=2 THEN 210
00160 IF T=3 THEN 220
00170 GOTO 80
00180 PRINT"CORRECT!!!!!!!"\"YOU HAVE SAVED THE COMPUTER!"\"Now go and have a dr
ink of water and lie down for a while."
00190 PLAY16,2,15,2,13,2,11,4,9,5,8,6,6,9,4,15
00200 FOR W=1 TO 2000:NEXT W:CLS:GOTO 280
00210 PRINT"TIME IS GETTING SHORT.....PLEASE HURRY!!!!":PLAY 21,5,18,5,21,5,1
8,5,21,5,18,5:GOTO 80
00220 PRINT"HURRY!!!!!!!THE COUNTDOWN IS APPROACHING ZERO!!!!!!":PLAY 24,3,20,3,
24,3,20,3,24,3,20,3:GOTO 80
00230 CURS 10,8:PRINT "TOO LATE.....START RUNNING!!!!!!!!!":PLAY 24,23,24,23,2
4,23,24,23,24,23,24,23,24,23,24,23,24,23:CLS
00240 CURS 29,7:PRINT "\ *** /"
00250 CURS 28,8:PRINT"---BOOM---"
00260 CURS 29,9:PRINT"/ *** \"
00270 FOR W=1 TO 1000:NEXT W:CLS
00280 CURS 20,10:INPUT "want to try again? (y or n)";Z1$
00290 IF Z1$="Y"OR Z1$="y" THEN 10
00300 CURS 20,12:PRINT"OK, see you later."
00310 FOR W=1 TO 700:NEXT W:CLS
00320 END
```



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your computer

tutorial

Basic For Birdwatchers

Part XIII

This month, Les continues his sojourn with a look at logic...

WE ALL know computers are logical beasts at heart — they can't even add two numbers together, but instead fudge an answer with a bit of ANDing and ORing. Now, in a high level language like BASIC, you don't have to worry about all that, you just write X = Y + Z and the BASIC interpreter does the rest.

Nonetheless, there will be times when you will want to do some logical things, and BASIC does provide some ways for you to do it. First, let's examine what logic is all about.

Logic was invented by the ancient Greeks, and really consists of a set of rules for manipulating and combining statements to make other statements about which we know the truth or falsehood. Basically, there are only about four rules we need to know for what is called combinational logic.

The rules we will use were discovered by an Irish mathematician of the last century called George Boole, and for that reason, they are called Boolean arithmetic.

Firstly, computers know nothing about true and false; they operate internally on zeros and ones. Therefore, what we have to do is define true and false in terms of ones and zeros. Many languages define false as zero and true as one, and this is typically used in assemblers with conditional assembly, macro processors and the like.

Be aware, however, that some languages, notably Pascal, have special variables which can take on the values of true and false (although internally, we're still back to 0 and 1).

The first rule of logic is the NOT rule, which says how the NOT operator works. This simply says that NOT true equals false and NOT false equals true. That seems perfectly simple, and compatible with our everyday experience. Not so simple for the computer.

The computer will perform the NOT operation on every bit which makes up a number, in other words taking the one's complement of the number. In 16-bit binary arithmetic, which is how the computer does its logic, NOT 0 is not 1; instead it is 0FFFF hex, which in two's complement arithmetic is -1. So now we know that NOT 0 is -1, and NOT -1 is 0. So our symbols for true and false must be 0 and -1.

Which one is true and which is false. In fact, false is 0 and true is -1. Actually, when the NOT operator is not involved, the computer will interpret 0 as false and any non-zero number as true. However, if you intend to use the NOT operator, you must make sure you use the right values, as NOT 1 is -2, which is not false. Gee, this gets confusing.

The easiest way to keep yourself straight is to start your programs with the assignments:

```
100 FALSE = 0
110 TRUE = NOT FALSE
```

so that FALSE = 0 and TRUE will be assigned the value of -1 or whatever your computer thinks TRUE should be.

The next rule relates two statements via the AND operator. If A is true and B is true, then A AND B is true, otherwise it is false. So if either A or B or both is false, then A AND B is false too.

This is usually shown in what is called a truth table:

A	B	A AND B
false	false	false
false	true	false
true	false	false
true	true	true

Figure 1. AND Truth Table.

So we see that A AND B is only true if A and B are both true.

The next operator is called OR, and performs a similar function, except that A OR B is true if either A or B or both is true. Here's the truth table:

A	B	A OR B
false	false	false
false	true	true
true	false	true
true	true	true

Figure 2. OR Truth Table.

Finally, there's an operator called XOR (exclusive OR). A XOR B is true only when A or B is true, but not both. In other words, and this is a more useful way of looking at it, if A and B are the same A XOR B will be false, but if they are different, A XOR B will be true. Here's the truth table:

A	B	A XOR B
false	false	false
false	true	true
true	false	true
true	true	false

Figure 3. XOR Truth Table.


OK...THIS MONTH...LOGIC & ERROR HANDLING...
...WITH THE HELP OF MY TWO IRISH MATHEMATICIAN FRIENDS...RIGHT?
...TO BE LOGICAL IS TO BE BELIEVABLE...RIGHT?
ROIGHT
ROIGHT
BOINARY LOGIC...
ROIGHT
ROIGHT ENOUGH
& IF YOU WERE RIGHT ALL THE TIME, YOU'D BE ABSOLUTELY LOGICAL!...RIGHT?
...& THEN EVERYONE WOULD BELIEVE IN YOU 'CAUSE YOU'RE NEVER WRONG & THIS WOULD GIVE YOU POWER!...RIGHT?
...GOOD!..HEH HEH...LISTEN TO THIS...THE 1ST RULE OF LOGIC SAYS THAT NOT TRUE IS FALSE...& NOT FALSE'S TRUE!..RIGHT?
ROIGHT
ROIGHT
...ER...
...ROIGHT..ROIGHT!
ROIGHT!
SO!...IF NOT FALSE IS TRUE & YOU NEVER USE NOT TRUE, YOU'RE NOT WRONG & YOU NEED NEVER BE WRONG BECAUSE YOU'RE RIGHT!..RIGHT?
NOW!...HERE'S MY INFALLIBLE PLAN FOR COMPLETE POWER!
...GREMLINS?..WE GO TO 'YOUR COMPUTER' AS GREMLINS?...
...HMM...
ROIGHT! ROIGHT!
ROIGHT AN' ALL!
OIK!*
WAP
* IRISH FOR 'EEK'
...YEAH...YOU CAN REWRITE THE TRUTH-TABLE PROGRAM ..SPILL COFFEE ON THE KEYBOARD...
...STUFF THE MEMORY DRIVE... ..HIDE THE STICKY TAPE...
OI'VE GOT ME MAGNET READY
BEGORRAH! IS THAT WHUT YER CALL IT?
URGENT DELIVERY YC
Merry Christmas to Your Computer
...THIS..THIS IS...ILLOGICAL & UNBELIEVABLE...WHAT KIND OF OPERATIONS WILL (MASSA) LES BELL PERFORM WHEN HE GETS HIS HANDS ON PUBLISHER WHELAN'S LOGICAL EXPRESS--IONS....WAIT WITH BAITED BREATH, ON TENTERHOOKS, IN ANXIOUS EXPECTATION & AVID ANTICIPATION FOR A MERRY CHRISTMAS & HAPPY NEW YEAR!
©J.AKHURST.82..

Now, how does all this translate into useful programming techniques? First here's the NOT operator, applied to different values:

```
10 A = 0:PRINT A,NOT A
20 A = 1:PRINT A,NOT A
30 A =-1:PRINT A,NOT A
```

When you run this program, you see that NOT works okay for 0 and -1, but not for 1, which is why it's better to use -1 for true. However, 1 will still work for true for the other functions, as this short program will show:

```
10 PRINT "A","B","A AND B","A OR B","A XOR B"
20 FOR A = 0 TO 1
30 FOR B = 0 TO 1
40 PRINT A,B,A AND B, A OR B, A XOR B
50 NEXT B
60 NEXT A
```

When run, this program will generate the truth tables for the remaining operators. As long as the NOT operator is not involved, you're quite safe using 1 for true.

Here's a more 'correct' version of the program:

```
10 FALSE = 0
20 TRUE = NOT FALSE
30 PRINT "A","B","A AND B", "A OR B","A XOR B"
40 FOR A = FALSE TO TRUE STEP -1
50 FOR B = FALSE TO TRUE STEP -1
60 PRINT A,B,A AND B,A OR B, A XOR B
70 NEXT B
80 NEXT A
```

In this case, true is defined as NOT false. Note also that as true is less than false, the FOR statements must have the STEP -1 option to work, otherwise nothing will happen.

Now, all this is leading to the way the IF statement works. Previously we've only used it in tests for equality and similar ways: *100 IF X = 0 THEN 240*.

What the IF statement does is evaluate the conditional expression which immediately follows the IF. If it is true then the rest of the statement is executes, otherwise execution continues with the next statement or the ELSE clause if there is one.

The trick is that it's perfectly feasible to use a boolean expression or a variable as the conditional expression. So *130 IF A THEN 240 ELSE 270* will jump to 240 if A is true, or 270 if it is false. You can also say *130 IF A AND B THEN 240 ELSE 270*, which will jump to 240 if both A and B are true and 270 otherwise.

This allows the construction of programs like the following section of code for a hypothetical computer-based burglar alarm:

```
260 IF TIME > 20 THEN NITIME = TRUE

      .
      .

730 WINDOW = INP(PORT)
740 IF WINDOW AND NITIME THEN GOSUB 1200:
    REM WARN OF OPEN WINDOW
```

This will warn of an open window after 8 pm (20:00 hours). All kinds of operations are possible using logical expressions. As an example, you might try re-writing the truth-table program to print 'true' and 'false' instead of 0 and -1. □

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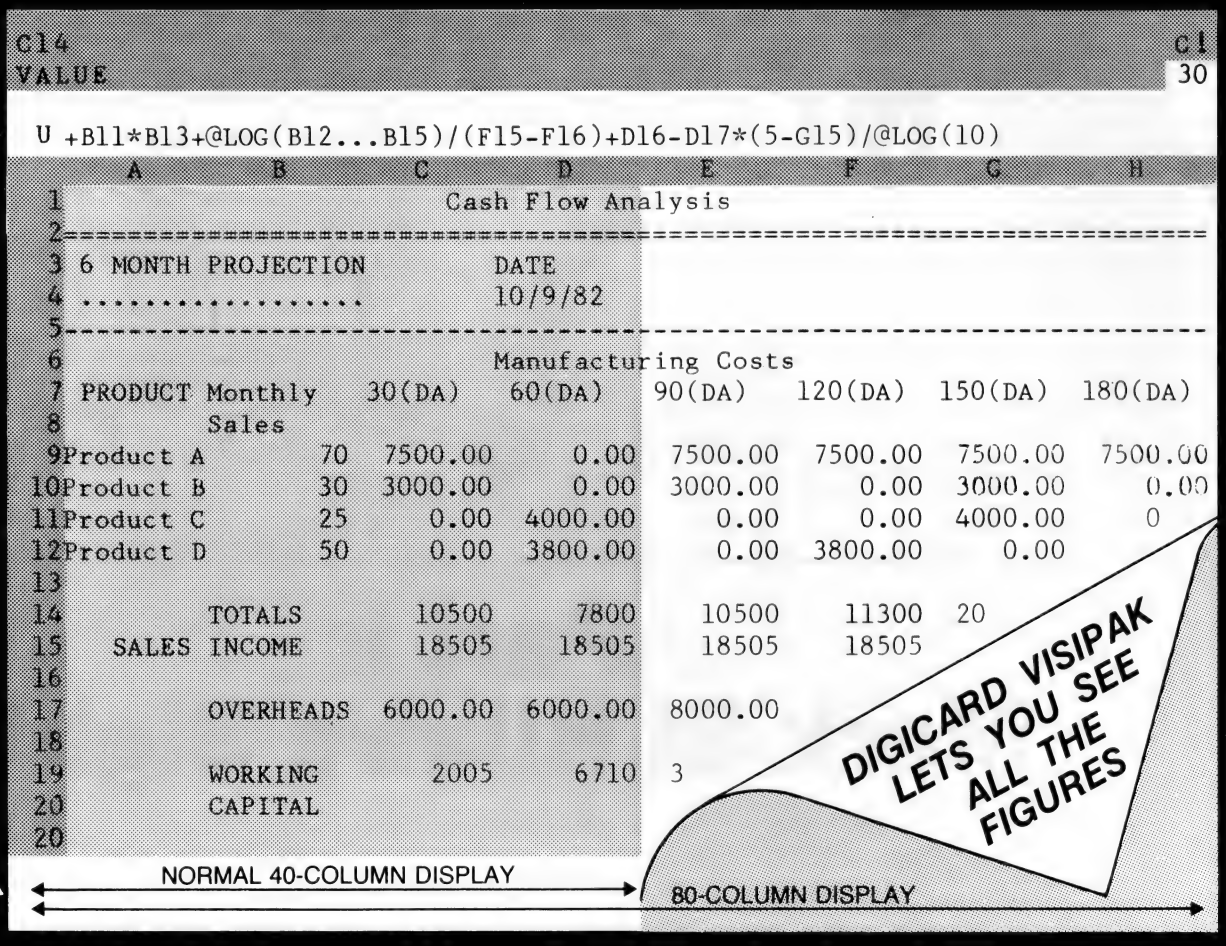

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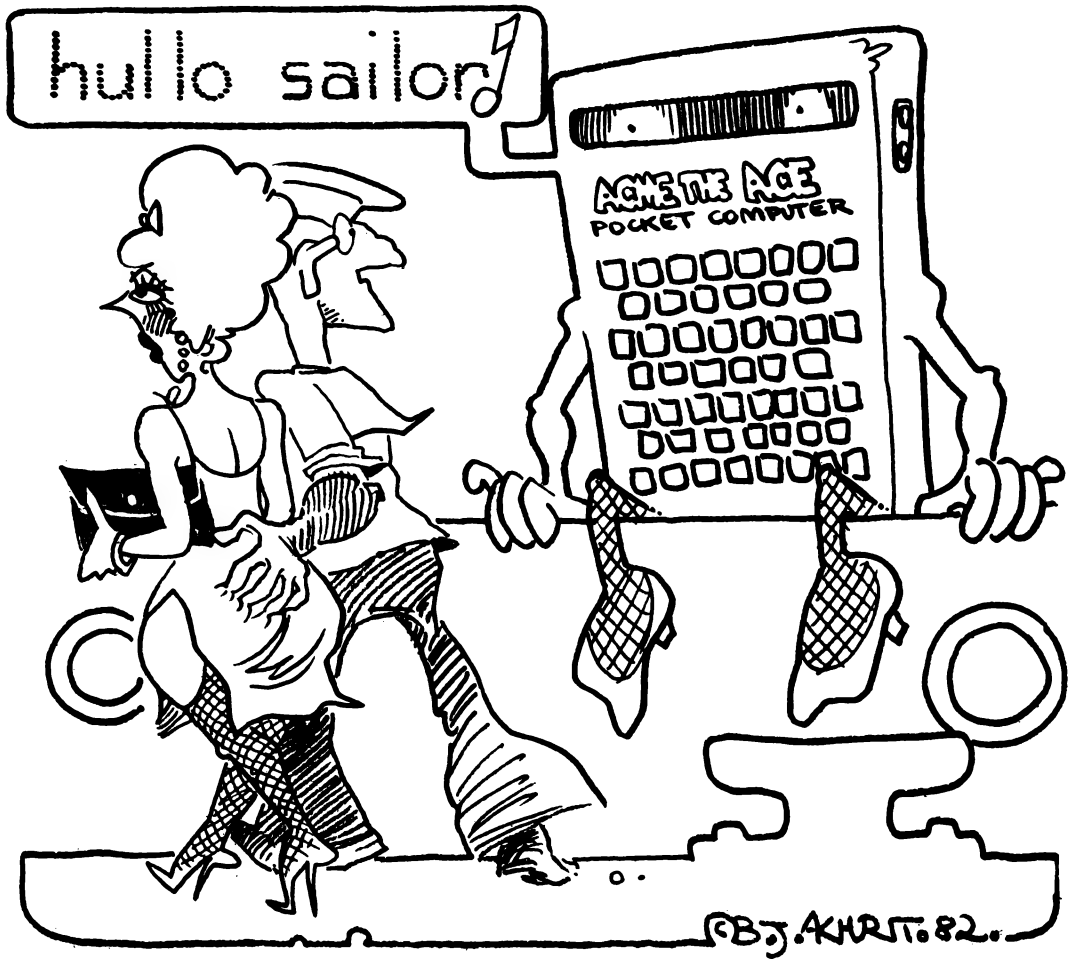
MicroNavigation



Part I: Mark St Hilaire Sights

By Trevor Jones

THIS IS the first of a series of articles with computer programs covering ocean and coastal navigation. The programs have been trimmed to the minimum, bringing them within the scope and memory capacity of the small pocket computer, and making them just as useful to the yachtsman as to the navigator on the bridge of a larger vessel.

The language is lower-level BASIC, to make runs possible on the widest range of computers that can be taken to sea. If you have a machine with advanced BASIC, there will be obvious possible improvements, such as DEF statements. To further compress the memory necessary, REM statements have been omitted.

The aim of the series is not to teach navigation — there are other places and publications to do that — but is to enable the navigator of small or large craft to eliminate lengthy calculations, or awkward chartwork, that often must be carried out under arduous conditions in a cramped space.

The names of variables have been selected as self-evident abbreviations, even to those who only have the minimum knowledge of navigation.

The first five programs will cover the various types of sights and their attendant plotting. Positions can then be calculated without plotting charts or any books of nautical tables. You will only need the Nautical Almanac, an accurate timepiece, a sextant and your computer.

The second five programs will be for coastal navigation. They will include fixes by radar (range or bearing), radio-direction finder, visual bearings, 'running' fixes, Mercator course and distance to a destination, plus the 'day's run' with resultant course and distance made good.

Mark St Hilaire (Intercept) Sights

The standard program runs on just over 1K with a screen output.

In lines 30, 50 and 70, data is entered in degrees, minutes plus decimals, and a compass direction N, S, E, or W. In line 90, data is entered in degrees, minutes and

seconds of arc for the older type of sextant. If you wish to enter degrees, minutes and decimals, as with the more modern sextants, an entry of '0' is necessary for variable S4, or your machine will probably refuse to cooperate any further.

The latitude is taken from your DR position. Declination and hour angle have to be interpolated from the Nautical Almanac in the normal way. Take note of the 'prompt' and ensure that the corrected sextant altitude is the one entered.

Program Run

Lines 100, 110, and 120, convert LA, DE and HA to decimal degrees first, then to radians.

Lines 130 and 140 represent the Cosine formula for spherical trigonometry.

Lines 150 and 160 compare the signs of LA and DE to decide the plus or minus in the formula (the downfall of many student navigators is thus eliminated).

Line 170 is a conversion back to radians, leading to Line 180 — the Calculated Zenith Distance in decimal degrees.

Line 190 yields the True Zenith Distance in decimal degrees.

The comparison in Line 200 leads to the intercept of minutes of arc (nautical miles), in either Line 205 or 220, according to the ancient rule — 'Calculated Greater — Towards'.

Lines 240 to 340 calculate the Azimuth from the fundamental formulae that are used to compile the ABC tables in books of nautical tables. Lines 240 and 250 compare the signs of the elements to decide

STANDARD PROGRAM

```
10 PRINT"MARQ ST HILAIRE POSITION LINE"
20 PRINT"ENTER LATITUDE IN D,M,N OR S"
30 INPUT D1,M1,A$
40 PRINT"ENTER DECLINATION IN D,M,N OR S"
50 INPUT D2,M2,B$
60 PRINT"ENTER HOUR ANGLE IN D,M,W OR E"
70 INPUT D3,M3,X$
80 PRINT"ENTER CORRECTED SEXTANT ANGLE IN D,M,S"
90 INPUT D4,M4,S4
100 LA=π/180*(D1+M1/60)
110 DE=π/180*(D2+M2/60)
120 HA=π/180*(D3+M3/60)
130 ZA=COS(LA)*COS(DE)*COS(HA)
140 ZB=SIN(LA)*SIN(DE)
150 IFA$<>B$THEN ZX=ZA-ZB
160 IF A$=B$THEN ZX=ZA+ZB
170 ZC=-ATN(ZX/SQR(1-ZX*ZX))+π/2
180 CZ=180/π*ZC
190 TZ=90-(D4+M4/60+S4/3600)
200 IF CZ>TZ THEN220
205 IN=(TZ-CZ)*60
210 PRINT"INTERCEPT","-",(INT(IN*10))/10,"AWAY":GOTO 240
220 IN=(CZ-TZ)*60
230 PRINT"INTERCEPT","-"(INT(IN*10))/10,"TOWARDS"
240 IF A$="N" THEN C$="S"
250 IF A$="S" THEN C$="N"
260 AA=TAN(LA)/TAN(HA)
270 BB=TAN(DE)/SIN(HA)
280 IF C$=B$ THEN CC=AA+BB
290 IF C$<>B$ THEN CC=ABS(AA-BB)
300 AZ=ATN(1/(CC*COS(LA)))
310 TA=180/π*AZ
320 IF AA>BB THEN D$=C$
330 IF AA<BB THEN D$=B$
340 PRINT"AZIMUTH","-",D$;(INT(TA*10))/10;X$
350 ME=FRE(X)
360 PRINT ME
370 END
```

VIC-20 Screen Dump Version

```
10 PRINT"MARQ ST HILAIRE POSITION LINE"
20 PRINT"ENTER LATITUDE IN D,M,N OR S"
30 INPUT D1,M1,A$
40 PRINT"ENTER DECLINATION IN D,M,N OR S"
50 INPUT D2,M2,B$
60 PRINT"ENTER HOUR ANGLE IN D,M,W OR E"
70 INPUT D3,M3,X$
80 PRINT"ENTER CORRECTED SEXTANT ANGLE IN D,M,S"
90 INPUT D4,M4,S4
100 LA=π/180*(D1+M1/60)
110 DE=π/180*(D2+M2/60)
120 HA=π/180*(D3+M3/60)
130 ZA=COS(LA)*COS(DE)*COS(HA)
140 ZB=SIN(LA)*SIN(DE)
150 IFA$<>B$THEN ZX=ZA-ZB
160 IF A$=B$THEN ZX=ZA+ZB
170 ZC=-ATN(ZX/SQR(1-ZX*ZX))+π/2
180 CZ=180/π*ZC
190 TZ=90-(D4+M4/60+S4/3600)
200 IF CZ>TZ THEN220
205 IN=(TZ-CZ)*60
210 PRINT"INTERCEPT","-",(INT(IN*10))/10,"AWAY":GOTO 240
220 IN=(CZ-TZ)*60
230 PRINT"INTERCEPT","-"(INT(IN*10))/10,"TOWARDS"
240 IF A$="N" THEN C$="S"
250 IF A$="S" THEN C$="N"
260 AA=TAN(LA)/TAN(HA)
270 BB=TAN(DE)/SIN(HA)
280 IF C$=B$ THEN CC=AA+BB
290 IF C$<>B$ THEN CC=ABS(AA-BB)
300 AZ=ATN(1/(CC*COS(LA)))
310 TA=180/π*AZ
320 IF AA>BB THEN D$=C$
330 IF AA<BB THEN D$=B$
340 PRINT"AZIMUTH","-",D$;(INT(TA*10))/10;X$
350 ME=FRE(X)
360 PRINT ME
370 END
```

VIC-20 Printer Version

```
5 OPEN4,4
10 PRINT#4,"MARQ ST HILAIRE POSITION LINE"
20 PRINT#4,"ENTER LATITUDE IN D,M,N OR S"
30 INPUT D1,M1,A$:PRINT#4,D1,M1,A$
40 PRINT#4,"ENTER DECLINATION IN D,M,N OR S"
50 INPUT D2,M2,B$:PRINT#4,D2,M2,B$
60 PRINT#4,"ENTER HOUR ANGLE IN D,M,W OR E"
70 INPUT D3,M3,X$:PRINT#4,D3,M3,X$
80 PRINT#4,"ENTER CORRECTED SEXTANT ANGLE IN D,M,S"
90 INPUT D4,M4,S4:PRINT#4,D4,M4,S4
100 LA=π/180*(D1+M1/60)
110 DE=π/180*(D2+M2/60)
120 HA=π/180*(D3+M3/60)
130 ZA=COS(LA)*COS(DE)*COS(HA)
140 ZB=SIN(LA)*SIN(DE)
150 IFA$<>B$THEN ZX=ZA-ZB
160 IF A$=B$THEN ZX=ZA+ZB
170 ZC=-ATN(ZX/SQR(1-ZX*ZX))+π/2
180 CZ=180/π*ZC
190 TZ=90-(D4+M4/60+S4/3600)
200 IF CZ>TZ THEN220
205 IN=(TZ-CZ)*60
210 PRINT#4,"INTERCEPT","-",(INT(IN*10))/10,"AWAY":GOTO 240
220 IN=(CZ-TZ)*60
230 PRINT#4,"INTERCEPT","-"(INT(IN*10))/10,"TOWARDS"
240 IF A$="N" THEN C$="S"
250 IF A$="S" THEN C$="N"
260 AA=TAN(LA)/TAN(HA)
270 BB=TAN(DE)/SIN(HA)
280 IF C$=B$ THEN CC=AA+BB
290 IF C$<>B$ THEN CC=ABS(AA-BB)
300 AZ=ATN(1/(CC*COS(LA)))
310 TA=180/π*AZ
320 IF AA>BB THEN D$=C$
330 IF AA<BB THEN D$=B$
340 PRINT#4,"AZIMUTH","-",D$;(INT(TA*10))/10;X$
350 ME=FRE(X)
360 PRINT#4, ME
365 CLOSE 4
380 END
```

Sample Runs

```
MARQ ST HILAIRE POSITION LINE
ENTER LATITUDE IN D,M,N OR S
 38            41            S
ENTER DECLINATION IN D,M,N OR S
 7            30.5            N
ENTER HOUR ANGLE IN D,M,W OR E
 48            0            E
ENTER CORRECTED SEXTANT ANGLE IN D,M,S
 25            49            24
INTERCEPT          -            2.2          AWAY
AZIMUTH            -          N 54.9 E
 26579


MARQ ST HILAIRE POSITION LINE
ENTER LATITUDE IN D,M,N OR S
 12            18            S
ENTER DECLINATION IN D,M,N OR S
 8            45.6            N
ENTER HOUR ANGLE IN D,M,W OR E
 26            9.8            E
ENTER CORRECTED SEXTANT ANGLE IN D,M,S
 56            49            24
INTERCEPT          - 17          TOWARDS
AZIMUTH            -          N 52.2 E
 26579
```

```
MARQ ST HILAIRE POSITION LINE
ENTER LATITUDE IN D,M,N OR S
 39            38            S
ENTER DECLINATION IN D,M,N OR S
 21            53.4            S
ENTER HOUR ANGLE IN D,M,W OR E
 71            39.7            W
ENTER CORRECTED SEXTANT ANGLE IN D,M,S
 27            27            0
INTERCEPT          -            6.5          AWAY
AZIMUTH            -          S 83.4 W
 26578

MARQ ST HILAIRE POSITION LINE
ENTER LATITUDE IN D,M,N OR S
 49            53            S
ENTER DECLINATION IN D,M,N OR S
 1            37.2            N
ENTER HOUR ANGLE IN D,M,W OR E
 29            23.9            E
ENTER CORRECTED SEXTANT ANGLE IN D,M,S
 32            47            24
INTERCEPT          - 8.3          TOWARDS
AZIMUTH            -          N 35.6 E
 26579
```

```
RUN
MARQ ST HILAIRE POSITI
ON LINE
ENTER LATITUDE IN D,M,
N OR S
? 38,41,S
ENTER DECLINATION IN D
,M,N OR S
? 7,30.5,N
ENTER HOUR ANGLE IN D,
M,W OR E
? 48,0,E
ENTER CORRECTED SEXTAN
T ANGLE IN D,M,S
? 25,49,24
INTERCEPT  -
 2.2       AWAY
AZIMUTH    -
N 54.9 E
 26650
```

```
READY.
RUN
MARQ ST HILAIRE POSITI
ON LINE
ENTER LATITUDE IN D,M,
N OR S
? 12,18,S
ENTER DECLINATION IN D
,M,N OR S
? 8,45.6,N
ENTER HOUR ANGLE IN D,
M,W OR E
? 26,9.8,E
ENTER CORRECTED SEXTAN
T ANGLE IN D,M,S
? 56,49,24
INTERCEPT  - 17
TOWARDS
AZIMUTH    -
N 52.2 E
 26650
```

```
RUN
MARQ ST HILAIRE POSITI
ON LINE
ENTER LATITUDE IN D,M,
N OR S
? 39,38,S
ENTER DECLINATION IN D
,M,N OR S
? 21,53.4,S
ENTER HOUR ANGLE IN D,
M,W OR E
? 71,39.7,W
ENTER CORRECTED SEXTAN
T ANGLE IN D,M,S
? 27,27,0
INTERCEPT  -
 6.5       AWAY
AZIMUTH    -
S 83.4 W
 26649
```

```
RUN
MARQ ST HILAIRE POSITI
ON LINE
ENTER LATITUDE IN D,M,
N OR S
? 49,53,S
ENTER DECLINATION IN D
,M,N OR S
? 1,37.2,N
ENTER HOUR ANGLE IN D,
M,W OR E
? 29,23.9,E
ENTER CORRECTED SEXTAN
T ANGLE IN D,M,S
? 32,47,24
INTERCEPT  - 8.3
TOWARDS
AZIMUTH    -
N 35.6 E
 26650
```

the plus or minus algorithm in Lines 280 and 290.

This last section contains some fairly heavy theory. A full explanation can be found in books of advanced navigation theory; the lay-man would do well just to accept the calculation as it stands.

Lines 320 and 330 decide the quadrant for the Azimuth — for example, N 30 E or S 30 W, as in the ABC tables. It is quite feasible to alter the program to produce the Azimuth in 360-degree notation, but this would probably run the small computers 'Out Of Memory', so I have let well alone.

Lines 350 and 360 were for my own benefit in producing this article — by printing out the memory still available, I knew how much the program had used. The ordinary navigator should omit these lines, since they relate only to the VIC 20.

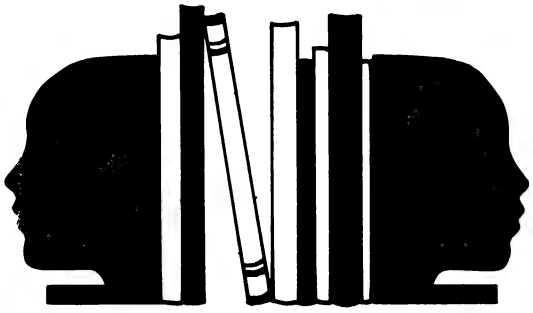
I have included two additional programs to illustrate the types of changes in syntax that may be necessary for a particular machine.

One is for the VIC 20 and has a subroutine in Line 60000 to 60140 taken from the Commodore instruction book for the VIC printer, to give a 'Screen Dump'. The results (complete with truncated lines due to the small screen size) are also shown.

The other is a program for the VIC 20 or a PET user who wants all 'prompts' and results on the printer, instead of the screen, so that they can be filled in the log-book or sight-book.

Careful comparison of the three should make the differences fairly obvious. Future programs in the series will be 'general' only, as the type of change you will need to make for your machine will be similar in every instance.

Bon voyage! □



your computer book reviews

Apple Machine Language

THIS BOOK is a tutorial which uses simple diagrams, comments, flowcharts and explanations to enable the computer enthusiast to gain a basic knowledge of Apple machine language. It is packed with clear demonstration programs throughout its 296 pages in which is included several comprehensive appendices.

Machine language programs execute at about six times the speed of a normal AppleSoft program. Therefore it is excellent for speeding up slow programs by inserting machine language subroutines in them or by writing the entire program in machine codes.

Its major disadvantage is the use of these codes instead of the language most of us are used to, BASIC. Thus the reason for purchasing this book would be to learn these codes and the methods by which they are entered and run.

The book takes you through a 'rehash' of BASIC commands as a thorough knowledge of your Apple is important before proceeding with machine language. It should be also noted that little progress will be made without the basic knowledge of your Apple's day to day functions — running, listing, how to program in BASIC and so on.

Then the BASIC commands, PEEK, POKE and CALL are investigated and a BASIC program is written to enter machine language programs through it.

This is called the Basic Operating System (BOS for short). At this point you are given a brief outline about the way in which information is stored and about binary (base 2) and hexadecimal (base 16) notation.

From this point onwards the book moves quickly through the many machine language instructions and built-in machine language subroutines. After you have graduated from using BOS you are taught to enter programs directly through the system monitor and taught many of its tricks and features.

We then come to the mini-assembler. This section is included in the book as the authors wrote and tested their demonstration programs on the original Apple II which had a built-in mini-assembler, and not on the now popular Apple II Plus systems. This is not a drawback but it may easily confuse those people who easily panic without reading on.

Finally, the book concludes, giving a brief rundown on all four methods of entering programs and of program instructions.

The last twenty pages consist of appendices full of useful data, a summary of instructions and a comprehensive index. The appendices often include page numbers so that the use of certain instructions can easily be revised while programming.

Like most tutorials, a complete summary is presented at the end of each chapter as well as a list of exercises and corresponding answers. This enables programming instructions to be thoroughly learnt before proceeding to the next section.

Unfortunately, the book contains several drawbacks, the major one being the lack of full list of built-in machine language subroutines and associated data which may have been impossible to do because of the sheer number of them.

Secondly, it is preferable to have a computer in close proximity while going through the book so demonstration programs can be quickly entered and executed (people who don't own their own computer take note).

Apple Machine Language is available at many specialist book stores around Australia. However, it is rather expensive at around $18, but if you want to learn Apple machine language, it is quite a useful tutorial aid.

Summing up, this book is excellent for gaining a basic knowledge of how to enter and run machine language programs and/or subroutines however more information is liable to be needed before one can become a total expert at machine language programming.

Even if you're not interested in programming, this book will provide a deeper insight into the full capabilities of your Apple II. Whatever your motivation this book is an excellent tutorial aid to learn the basics of Apple machine language.

Apple Machine Language was written by Don and Kurt Inman and published in 1981 by Reston Publishing Company, Inc. It is available from Computerland Stores for around $18.

— M R Dunmill

55 Advanced Computer Programs In BASIC

OWNING A TRS-80 or a system 80 has its advantages. Thousands of each model have been produced and because of this, software is unlimited.

The only restraint to an extensive library is money. Good programs don't come cheap and one can expect to pay at least $20 for a worthwhile program. The more sophisticated ones can cost a small fortune.

A very reasonable solution to this dilemma is to manually type in programs from a published book. *55 Computer Programs In BASIC* is one such book. It is written for the TRS-80 and all the programs will run without any modification. At $9.95 it would seem a bargain.

I purchased the book with the intention of occupying my spare time constructively. I was pleasantly surprised. .ot only does the book contain a great number of programs, but it is also a wealth of information on the TRS80/Systems 80.

Two lengthy chapters are dedicated to informing the reader of the many special functions the TRS-80 can perform. Most of these functions don't rate a mention in the owner's manual, and can prove to be invaluable information.

There are many suggestions on speeding up BASIC programs, and using memory efficiently. The user is also informed of routines to disable the break key and recover lost programs. There is also a thorough explanation of PEEKing and POKEing, and the mysteries of each are well explained.

A further surprise presents itself at the back of the book. here lies four appendices containing the internal codes for BASIC keywords, the ASCII codes, numeric to base equivalents, and a list of illegal BASIC variables.

The programs in the book fall into three separate categories, and are presented as such. The first section contains miscellaneous programs, mostly of a mathematical nature. The second contains business and personal management programs, and the third section is dedicated to games.

Needless to mention, all the programs I have typed in have been from the third section. Of these programs I have not found any errors in their listings, and they have all run as described.

Each program in the book is well documented. Prior to each listing there is a brief introduction, a description of the game, and a list of all the variables used in the program (numeric, and string). There is also a 'sample run' showing how the program will appear and for those who are keen, a list of variations that can be made to the existing program. The lack of such description is the downfall of many a book written in the same vein.

Typing the programs in is a breeze. The listings are clearly printed and well spaced. Most of the programs committed to cassette within an hour. Not bad for what could cost you $20 a turn if they were purchased!

There is also a certain feeling of satisfaction left after typing in a program manually, one that does not exist when you use a commercial product.

In a way it is an educational process too. As you type you gain a thorough understanding of how the program works. You see how the programmer achieves a desired result, and gain from it.

My only criticism of the book is that some of the programs have an obscure, or very limited application. These programs would better serve as a routine within a larger program, and don't seem to stand by themselves as worthwhile programs. I suppose one has to expect this from a book of this nature, as the fault is not peculiar to this book alone. However, most of the programs are well worth spending the time to type in.

Overall, I'm left with the impression that this book is one of my better purchases. I certainly feel I recovered its cost after typing in the first program, and wouldn't hesitate in recommending it to any TRS-80/System 80 addict. It's $9.95 well spent, if not for the programs, for the technical information inside. □

— Derek Morris

Apple Data Files

Apple BASIC: Data File Programming, A Self Teaching Guide, Leroy Finkel and Jerald R. Brown, John Wiley & Sons Inc., 1982, $19.95

If you are considering an Apple II with disk drives for your home then this book would be a useful addition to your library. On the other hand, if you have had your system for some time and have tackled file creation using the Apple DOS 3.3 manual, the chances are you have already mastered data file programming.

The book is in every sense a self-teaching guide. To gain value from it you need to sit down with your Apple and try the self tests. Answer programs are provided but you may find that your mastery of each chapter comes more from understanding how your programs and those of the authors achieved the same objective without being identical.

Data file programming is the creation, retrieval and maintenance of text files. This may involve such operations as altering a piece of information, adding information, merging two or more files or searching files for particular items.

Applesoft instructions for all these techniques are well set out, as are the differences between sequential and random access files. Illustrated examples cover business inventory, home accounting and budgeting.

My only disappointment is that more time is not spent on teaching the concept of an information system. Data files are only one part of the whole. Applesoft printing and screen control instructions could have taught data presentation and so rounded off the topic of data files.

— David Sharpe

Tandy Graphics

TRS-80 Graphics for the Model 1 and Model 3, David Kater and Susan Thomas, ISBN No 033303, published by Byte Publications, $19.70. Review copy from McGraw-Hill Australia.

I found this book to be the best I've read on the subject of graphics, and in the top three on microcomputing generally.

Why am I so impressed? Probably because, as the authors say, they were writing as 'a labour of love', as opposed to writing for commercial gain. There are many points they need not have imparted, and probably would not have even investigated if their idea was merely to be efficiently productive and make money. An example is the extensive detailing of differences in Model 1 and 3, and not only those pertaining to graphics.

In a number of cases, the reader is given a full run-down on the points for and against a variety of techniques that all accomplish the same end, then allowed to decide which one is appropriate for the case in question. The authors intend their work to 'enhance the impact of your programs'. It certainly does.

I'm sure all levels of knowledge will benefit just by reading, but even more by typing in and analysing the many examples and 'free' routines and programs liberally used to illustrate what is already an eminently readable and understandable text. These examples are not just otherwise useless examples — many of them could be sold as stand-alone utility routines.

Typing in and using the examples aids understanding, but if you don't want to, it is still possible just to read through the textual explanation and refer to the lines of program.

The layout of the book is logical in the extreme.

Chapter One covers the usual introductories, and is the only elementary part in the whole book which can be skipped.

Chapter Two details how the system sets out screen graphics/alphanumerics.

Chapter Three is an extensive explanation of normal BASIC commands/statements. It explains the principle (non-computing) of animation.

Chapter Four explains the use of control codes to move the cursor, and details the ASCII system and how it fits in.

Chapter Five touches lightly on the 'heavy stuff' covered in more detail in Chapter Seven and gives routines using such.

Chapter Six begins machine language with references to combining it with BASIC, converting hexadecimal, storing in strings, sound both in BASIC and machine code.

Chapter Seven finishes Part One with an in-depth coverage of the topics initiated in Chapter Five: speeding-up, arrays, VARPTR, garbage collection, INKEY$, keyboard memory, disabling keyboard/break; really all the deeper points not covered elsewhere.

Chapter Eight starts Part Two with a coverage of graphs, lines and shapes.

Chapter Nine covers statistics; Chapter Ten is about Computer Aided Instruction; and Chapter Eleven shows how to use the computer to produce visual aids — graphs, charts and so on.

Chapter Twelve is about games, and uncovers the secrets of 'staying-power' and animation.

Chapter Thirteen continues animation and explains how to get finer detail, and in practical terms, too.

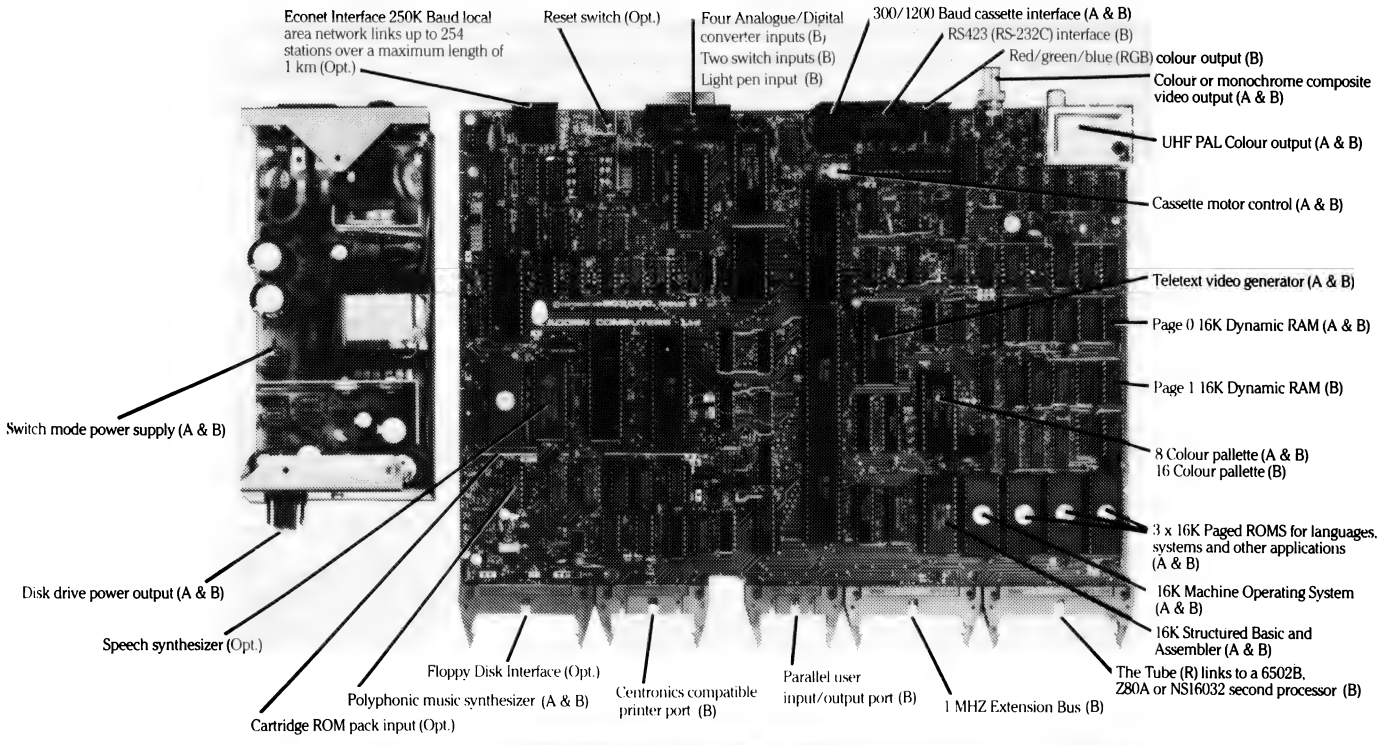
Chapter Fourteen is about art and graphics generation by computer, with or without human intervention. But its not an esoteric exposition — it's actually practical.

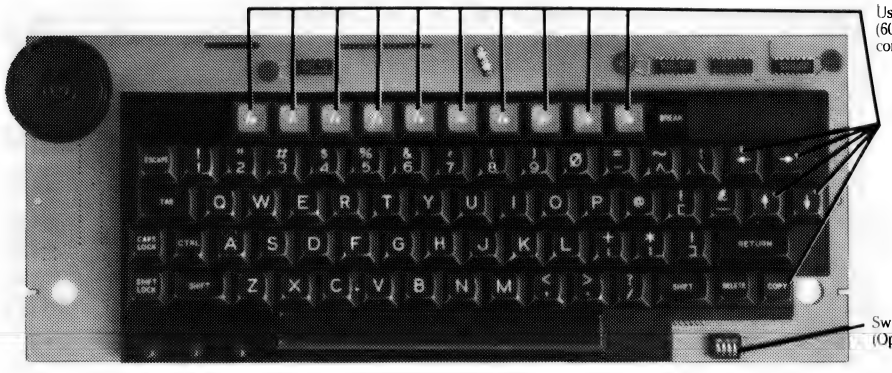
Chapter Fifteen is Part Three with a brief coverage of some of the hardware and software available to make life easier.

Finally, the Appendices: tests on each chapter; screen-dump to print graphics; useful memory locations for Models 1 and 3; Model 3 extra graphics characters; and a reprint of the Tandy video worksheet. □

By Rod Stevenson

BBC Microcomputer –
all the expansion you ever dreamed of, and it doesn't cost a fortune





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Model B = (B)
Optional = (Opt.)

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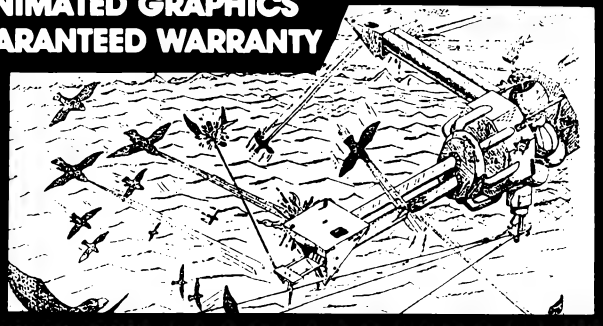

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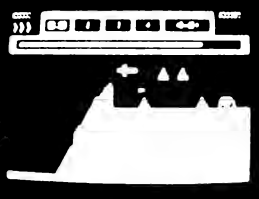
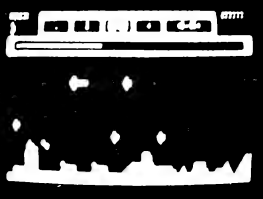


MISSILES!!



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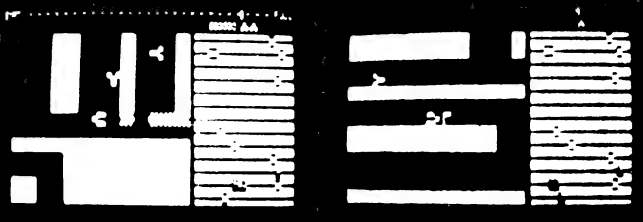

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Taking Care Of Floppies

By Chris Seers

MENTION 'Floppy Disk' to most laymen and they will have little idea of their purpose. However, a growing number of office staff have joined the ranks of those for whom the flexible diskette has become an everyday item, of as little interest as a typewriter ribbon would have been to an earlier generation.

Yet very few of those involved in handling or using floppy disks appreciate their fragility or importance. There is still a general lack of awareness of the way in which floppy disks should be treated — or, indeed, the reason why. People who treat their record collection at home with loving care are often relatively indifferent to the needs of floppy disks, which are far less robust and durable.

The value of the floppy disk is not the cost of the floppy disk itself. It is the cost of the time taken to put the information on the disk.

Five minutes instruction on the care and handling of the floppy disk, and the purchase of a purpose-designed storage system for disks, will alleviate many of the potential problems involved. Certainly, the floppy disk is a highly vulnerable and invaluable repository of information, but, given proper care and attention, its life could be extended to many times that which is currently the national average.

Worse, all too many offices leave floppy disks sitting on the desk, jostling for space with all the other paraphernalia of the modern office, including the occasional cup of coffee.

Storage for floppy disks is something of a joke in many offices. Cardboard boxes, merely meant to be containers or packs for the disks during distribution and at the point of sale, often act as permanent or semi-permanent containers for the floppy disks. The durability of the card board box itself is fairly short, even shorter if its contents are constantly being changed or sorted through, and that very act of sorting can mean that the disks are likely to be bent, scratched or subjected to excessive pressure.

The ideal storage system is one that can grow with the word processor or computer installation. No one wants to change if the system grows, and the ideal system should be just as right for the small firm as it would be for the largest installation. The system should also include the means of allowing staff to keep the floppy disks handy and easily accessible, otherwise they will leave them lying around, which puts the problem back to square one.

Just as important as the design concept are the materials from which the products are made. As most systems centre around some sort of pocket, the materials used in the manufacture of these pockets must be free of the presence of any potential hazard, with a suitable non-static material to minimise the possibility of static-induced errors. The design should also be such that the floppy disk should be protected from pressure as much as possible. Obviously, there must be good dust protection.

Simple, isn't it? Yet it makes the difference between securing the information and placing it at the mercy of any careless act. If one floppy disk can contain the equivalent of 300 A4 typed pages, then surely it is worth several times the protection afforded to a single sheet of paper. □

My First Computer Is An IBM

By Lloyd R Borrett

"BUT WHY do you want a computer?" That's the first question I'm asked by people who see my IBM-PC. You see, I'm employed as a systems programmer, working on large 16- and 32-bit Data General minicomputers, and my workmates can't understand why I want my own computer. After all, I have access to time on computers ranging in size from Data General minicomputers to a large Control Data mainframe.

As for my friends, they find it hard to believe that, after working all week surrounded by computers, I can still bear to be within sight of one outside office hours.

The simplest answer is that access to corporate equipment isn't the same as having your own computer. But as a reader of *Your Computer*, you will already know this plus all the other reasons.

In fact, I hope to use my IBM-PC mostly for work. There are a number of tasks which are best carried out on a small computer, and there are also many programs that are not readily available on larger computers — for example, VisiCalc.

When the majority of people I know think about personal computers, they think about Tandys and Apples. However, these are 8-bit computers; my experience with minicomputers told me long ago that I would require at least a 16-bit personal computer.

I've watched carefully as announcements about 16-bit Z8000, M68000, 8086 and 8088-based computers were made. Clearly, it seemed two types of systems were being produced.

Those based on the Z8000 and M68000 chips are mostly multi-user, multi-tasking systems, similar to the low end of the current offerings from the established minicomputer manufacturers. As a result, they have more 'sophisticated' (read expensive) hardware and peripherals surrounding them.

The 8086 and 8088-based computers seem to be intended for use as single-user, multi-tasking systems. They are not as complex, and are priced within reach of more users.

The IBM-PC is based on the 8088 chip, and has all the features I require at a price I can afford. Yes, I know the Sirius, Panasonic JB3000 and so on are also based on the 8088 chip, but to me the IBM-PC has a lot more going for it.

Mass Production!

IBM is currently producing 3000 personal computers a day, and there is already a complete range of hardware products available from other sources to extend the capabilities of the IBM-PC. While some of these products can be used on the other 8088-based computers, most can't.

To my knowledge, there is no 8088-based computer that is totally software-compatible with the IBM-PC. The large software houses in the United States have geared up to produce software for the IBM-PC, and each day more software is becoming available. Little of this equipment appears likely to be converted for use on computers such as the Sirius and JB3000.

IBM has announced a software package that allows the IBM-PC to communicate with a host computer supporting IBM's Systems Network Architecture (SNA) and emulate the IBM 3270 and 3101 terminals. A large number of the IBM-PCs sold in the United States have been bought by users of IBM mainframes, and even more will be paying careful consideration to the IBM-PC now that it can

communicate with their existing computers.

While other microcomputer manufacturers find it hard to sell their products to 'established' computer users, IBM doesn't. This will inevitably strengthen IBM's domination of the 16-bit personal computer market.

Since the Australian release of the IBM-PC is not expected for some time in 1983, there are at present no 'official' suppliers in Australia. However, there are at least four places at which a system can be purchased:

Cybernetics Research, 120 Lawson Street, Redfern, NSW 2016; phone (02) 698 8286.

Customized Technology, PO Box 461, Ashfield, NSW 2131; phone (02) 799 6373.

CompuThink ustralia, 66 Albert Road, South Melbourne, Vic 3205; phone 03) 699 8555.

CPU Computer Centre, 279Hunction Road, Clayfield, Qld 4011; phone (07) 57 8023.

When I first saw the IBM-PC, my immediate impression was that at last someone had got it right. Nearly all the personal computers I'd seen hadbeen marred by awful keyboards, flickering screens, loudly clunking disk drives, poor documentation and/or brittle plastic cases. Not so the IBM-PC: its keyboard is the best I've used on any terminal, the disk drives are quiet, the system unit is housed in a solid case, and the screen doesn't flicker.

My system has 64 kilobytes of memory, the monochrome display/printer adapter, a disk adapter, two double-sided 13cm disks (total: 640 kilobytes), the IBM monochrome display, an Epson MX-100III printer

The Neat Touches

The system came packed in four boxes, each of which has an inventory checklist to ensure you know exactly what to find inside plus a diagram showing how to unpack (and re-pack) the contents. These little touches are indicative of the planning that has gone into the product.

Three excellent manuals are supplied with the system: a guide to operations, a BASIC manual, and a DOS manual. By following the instructions, you should have no difficulty putting the system together, connecting the parts and getting it started. There is a section which shows how to use the supplied diagnostics cassette (or diskette) to track down any problems, and even a section on how to prepare the system to be moved and set up again.

IBM is using only 16K memory chips, which imposes a limit of 64K on the system board, and in each of IBM's add-on memory boards. This is extremely wasteful of space. Fortunately, there are a number of suppliers who can provide 256, 512 or even 1024K memory on asingleboard, by using 64K chips.

One of my main worries is how long it will be before IBM announces the availability of hard disks. I can already buy hard disks with capacities ranging from 5 to 20 megabytes, but these may not be compatible with products that IBM plans to announce. While many people are prepared to put up with non-standard patches in their systems in order to make use of the newest, greatest version of peripheral available, I'm not. Well, not yet.

The printer that IBM uses in the United States is actually an Epson MX-80. Given that I wanted to use 38cm paper and the bit image mode, the Epson MX-100 III seemed the logical choice. I'm surprised IBM doesn't use the Epson MX-80 F/T with the Graftrax option; for very little extra cost, this printer provides the friction-feed capability as well as tractor feed, the ability to use alternate type fonts, and the printing of screen images.

A common complaint reported in American magazines is that the IBM-PC has too few expansion slots. There are five available, but even with my small configuration I'm left with only three. While the majority of users will never need more than five slots, IBM doesn't have an option for those who will require more. Fortunately, at least one other manufacturer has filled this void, by marketing an expansion chassis that features additional slots, and styling it to complement the IBM-PC.

I intend to add a colour/graphics adapter in order to provide access to the high-resolution graphics capability of the IBM-PC, and to extend the memory capacity to 512K, using half of this as a 'memory disk drive'. Two RS-232C ports will allow me to communicate with other computers, and a clock/calendar facility will ensure the system always knows the correct time.

It Gets Crowded...

If IBM-supplied boards were used, I'd require a total of 11 boards, and still not have the clock/calendar. Thankfully, there are other suppliers who are more innovative, and I can obtain all these functions on just two boards.

It's easy to find advertisements for all manner of multi-function boards for the IBM-PC in American magazines, but detailed product information is harder to come by. However, there are at least four American magazines devoted exclusively to the IBM-PC. I can recommend two: "PC, The Independent Guide to IBM Personal Computers" and "Personal Computer Age, the Definitive Journal for the IBM Personal Computer User".

There are a number of operating systems available for the IBM-PC. IBM's DOS (read MS-DOS or SB-86) is the operating system in use on 95 percent of the systems sold. The UCSD P-system and CP/M-86 are the other two front runners.

For those who require access to existing CP/M-80, there are already add-on

cards available which include a Z80B processor and 64K memory. These cards enable the IBM to run standard CP/M-80 programs.

At present, it seems hard to believe anything other than IBM DOS will dominate the market, but this may change once MS-DOS Rev 2.0 and Concurrent CP/M-86 become readily available.

Concurrent CP/M-86 allows more than one program to be running at the same time. For instance, you could be printing the output of a VisiCalc model while working on another, break to look up a phone number in an on-line telephone directory, and then return to where you left off in the VisiCalc model.

MS-DOS 2.0 will allow printer spooling, but concentrates mostly on improving the user interface to the system. Thus, to some extent the goals of these two operating systems appear to be different. It will be interesting to see which one wins out.

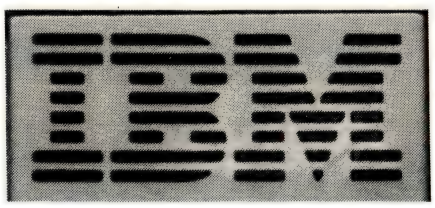
There are very few personal computers which don't provide support for a version of BASIC. The IBM-PC is no exception.

Every system comes with a 40K extended Microsoft BASIC in ROM (read only memory) which IBM is calling 'Cassette BASIC'. As well as the standard features associated with Microsoft BASIC, Cassette BASIC gives you the ability to plot points and draw lines in both the IBM medium- and high-resolution modes, use light pens, joysticks and make sounds through the internal speaker.

The two other levels of BASIC are supplied when DOS is purchased.

Disk BASIC requires at least 32K memory and one floppy-disk drive. It adds a large number of disk input and output options, the ability to store and redraw rectangular areas of graphic images, software support for two extra printers, communications support using a standard RS-232C port, and access to a date and time-of-day clock. Disk BASIC is called by typing 'BASIC' when the DOS prompt is displayed.

Advanced BASIC, which requires at least 48K memory and one floppy drive, adds event-trapping, an advanced music-playing command and some advanced graphics commands. It is called by typing 'BASICA' from the DOS prompt.



Surprising Power

While BASIC was the first programming language I learned, it has been quite a number of years since I'd made extensive use of it. At first, I was surprised by the power and flexibility of the language implemented. None of the versions of BASIC I'd used on a minicomputer had such an extensive range of statements and functions.

All three levels of BASIC force you to separate keywords with a space; this caused some initial problems, as I was used to a BASIC which inserted spaces for me. The versions of BASIC which allow these spaces to be left out entirely encourage the production of unreadable code.

BASIC was originally intended as a teaching language and, to assist the learner, most of the original implementations on minicomputers would check the syntax of each statement as it was input. It's a pity this feature hasn't made it to the IBM-PC, as it has obvious advantages, especially if the user is new to the language.

On IBM-PCs running the DOS operating system, there is support for Fortran 77, Pascal, Forth, COBOL, C, Compiled BASIC and Macro Assembler. At least 128K memory is required if these languages are to be used for program development.

The November 1982 issue of *Creative Computing* carried a full report on these languages, and the figures backed up my decision carry out program development in C. Unfortunately, I don't have a C compiler or the extra memory required, so for the time being I'm making do with BASIC.

After studying the BASIC manual, and running the sample programs, I finally sat down and attempted to program my IBM-PC. I decided to start by implementing the indexed telephone directory program that Les Bell developed for the 'BASIC for Birdwatchers' tutorial in the July edition of *Your Computer*.

Although the dialect of BASIC used by both Les and the IBM were new to me, I didn't have too much trouble in getting the program up and running. Since then, many other programs have followed.

Thankfully, the error messages displayed when things go wrong are very comprehensive, and the BASIC Program Editor, common to all the versions of IBM BASIC, allows for changes to be made much quicker and easier than is possible on some computers.

While the IBM-PC doesn't have any earth-shattering innovations, it also lacks the design problems and flaws that seem to prevail in many other microcomputers. There is every reason to believe that the IBM-PC will become one of the most popular and best-supported microcomputers available. □

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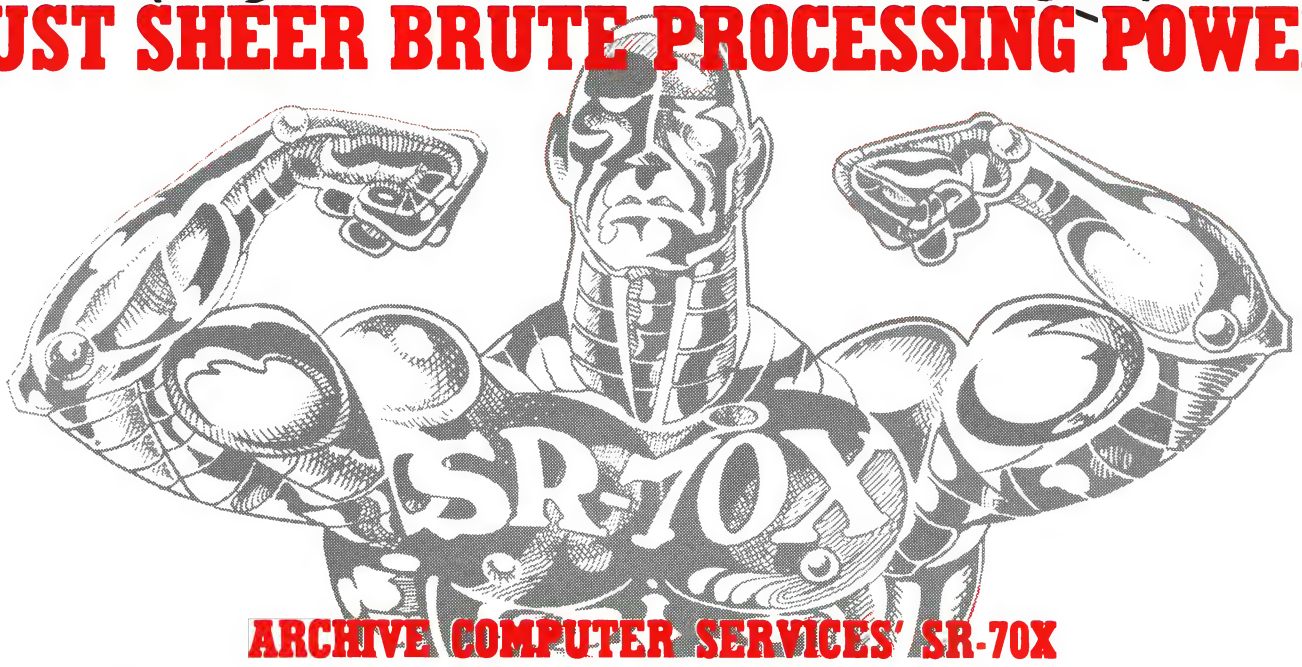

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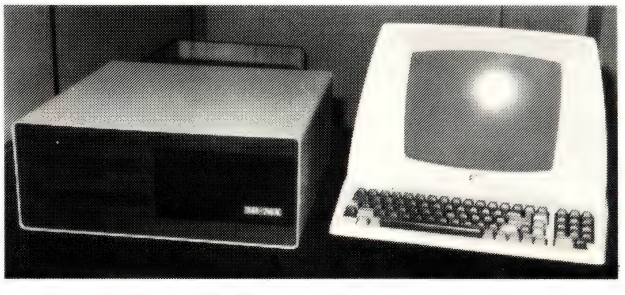

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your computer

Understanding Assembler

tutorial Part IX

Last month's article covered the basics of I/O for a simple monitor program. This month Les continues with a discussion of memory dumping in hex and ASCII...

THE FIRST requirement from any monitor program is to be able to see into memory, and so this month, we shall look at memory dumping as an exercise.

Most microcomputers use hexadecimal numbering to represent 8 and 16-bit values, and despite the well-known advantages of octal (dig, dig!) I shall bow to the sheer mass of public opinion.

How do you convert a number from its internal binary form, into ASCII using hexadecimal? If you're not careful, this can get awfully confusing.

Remember that, as far as the computer is concerned, everything is binary and not hexadecimal. Hex is purely a convenience for the programmer. When thinking about binary values, the programmer groups them into 4-bit 'nibbles' (half a byte), and then converts them into decimal — only where the decimal system runs out of digits, he starts again with the letter A.

The computer can do the same thing. It can isolate a group of four bits, ready to convert it to hex. Next, it can convert that nibble to an ASCII decimal number. Notice that the digits 0-9 have the ASCII values 30H-39H, so to convert a binary number between 0 and 9 to ASCII, we just add 30H to it.

In fact, we can go ahead and add 30H to any 4-bit value, but we must beware of one problem.

Because the digits 0-9 do not immediately precede the letters A-F in the ASCII code, this means that if the binary value before ASCII conversion was in the range A-F (expressed hexadecimally), then it has been converted to ':', ';', '<' '=', '>' or '?'.

We need to adjust the result if this is the case, and this is done by adding the difference between ':' and 'A' (or A-9-1). The whole process is quite simple, and here's the code to do it:

```
; Output a 4-bit value, contained in the lower
; nibble of A, in hex.
h4:
        ani     0fh             ; mask out unwanted nibble
        adi     '0'             ; convert it to ASCII
        cpi     '9'+1           ; if greater than 9, adjust to > A
        cp      hadj
        call    outchr          ; and print it
        ret
hadj:   adi     'A'-1-'9'       ; make up the difference
        ret
```

The first 'and immediate' reduces the bits in the top half of the byte to zero, as otherwise they will upset our addition.

Then we add an ASCII '0' which, you will recall, has a value of 30H. If, for example, the nibble contained 0, then adding 30H will give a result of 30H, which is an ASCII '0'.

Next we check to make sure that the result is not greater than ASCII '9'. If it is, we add an extra 'fudge factor' to bring it up into the range 'A' to 'F'. This is done by the subroutine hadj:. Finally we call a subroutine called outchr, which prints the character in A.

Okay, now we know how to print a nibble in hex, how do we cope with a byte. Is it more than we can chew (ouch!)?

We just do the same thing twice — once for the high nibble, and then again for the low nibble.

The high nibble and low nibble are swapped (or at least the high nibble is shifted down into the low nibble position), so the high nibble is output by the subroutine we just worked out. Before doing the swap, we push the accumulator onto the stack, and now we pop it off and output the low nibble. The code will therefore look like this:

```
; Output an 8-bit value contained in A, in hex
h8:
        push    psw             ; save for later
        rrc                     ; swap two nibbles
        rrc
        rrc
        rrc
        call    h4              ; and output the first
        pop     psw             ; retrieve value and output second
        call    h4
        ret
```

The four 'rotate right' instructions swap the two nibbles; because there are four of them, they might as well be rotate lefts. The last two instructions (call h4 and ret) are redundant if this routine is placed directly above h4 so that control can simply drop through, as we shall see later.

Finally, a trick we shall often want to do is to output a 16-bit value in hex. Generally, 16-bit quantities are dealt with in the HL register pair; they are usually addresses being used for indirect addressing through HL.

This is done in exactly the same way. A routine h16 splits HL into two bytes, and passes each separately to h8. Very simple.

As an example of how these routines are used, here is a short routine which will locate the BDOS entry point and the location of the BIOS jump table in your system. Note that you cannot do this by simply examining memory under DDT, as it patches the BDOS jump to point to itself (to avoid other programs overwriting DDT).

All the code is fairly standard, but notice that almost every routine calls a subroutine twice. The first time it uses a standard subroutine call, but the second time it is arranged that each routine is immediately above the one it calls, and simply runs into it.

Note that this can only be done if your routine ends like:

```
        call    foobar          ; redundant
        ret                     ; also redundant

foobar: mvi     a,zot
        .
        ret
```

You can then rely on the ret at the end of the called subroutine to return control to the subroutine (unshown) that made the original call to the subroutine which called foobar.

Purists may well wish to consign this technique to the dirty tricks department.

Here's the program:

```
        title   'BDOS/BIOS Locator V 1.0'

boot    equ     0000h
bdos    equ     0005h
conwr   equ     2               ; BDOS character out function
pstrng  equ     9               ; BDOS print string function
acr     equ     0dh             ; ASCII carriage return
alf     equ     0ah             ;   "   line feed

        org     0100h
main:
        lxi     d,bdmsg         ; print 'BDOS at' message
        mvi     c,pstrng
        call    bdos
        lxi     h,bdos+1        ; point to BDOS jump
        mov     e,m             ; get lower byte
        inx     h               ; then get higher
        mov     d,m
        xchg                    ; and move it into HL
        call    h16             ; and print it.
        mvi     e,acr           ; print CRLF
        mvi     c,conwr
        call    bdos
        mvi     e,alf
        mvi     c,conwr
        call    bdos
        lxi     d,bimsg         ; print 'BIOS at' message
        mvi     c,pstrng
        call    bdos
        lxi     h,boot+1        ; point to warm boot jump
        mov     e,m             ; get lower byte
        inx     h               ; then get higher
        mov     d,m
        xchg                    ; move it into HL
        lxi     d,-3            ; and subtract 3 to point to
        dad     d               ; cold boot at beginning of
                                ; BIOS jump table

; Output a 16-bit value contained in HL, in hex.
h16:
        mov     a,h             ; output first two digits
        call    h8
        mov     a,l             ; then the last two



; Output an 8-bit value contained in A, in hex
h8:
        push    psw             ; save for later
        rrc                     ; swap two nibbles
        rrc
        rrc
        rrc
        call    h4              ; and output the first
        pop     psw             ; retrieve value and output second

; Output a 4-bit value, contained in the lower nibble of A, in hex.
h4:
        ani     0fh             ; mask out unwanted nibble
        adi     '0'             ; convert it to ASCII
        cpi     '9'+1           ; if greater than 9, adjust to > A
        cp      hadj
        call    outchr          ; and print it
        ret
hadj:   adi     'A'-1-'9'       ; make up the difference
        ret

; Output the character in A as ASCII.
outchr:
        push    h
        push    d
        mov     e,a
        mvi     c,conwr
        call    bdos
        pop     d
        pop     h
        ret

bdmsg   db      'BDOS located at: $'
bimsg   db      'BIOS located at: $'
```

What A Dump

The reason we got involved in this whole area of outputting hex in the first place was so we could dump memory, remember?

Now, there are two primary ways we want to look at memory: firstly, as hex bytes, and secondly, as ASCII characters so we can identify text in the middle of our programs (where ideally it shouldn't be, but most compilers are slack about these things).

We want our dump to ideally have both of these side by side, for comparison purposes, and we also want the addresses displayed down the left hand side of the screen.

We want 16 bytes at a time displayed, and we want the line break to occur right on a 16-byte boundary. Anything else? That's enough for starters, anyway.

We'll write a subroutine which is passed two parameters: the start address in HL and the end address in DE. It can simply start dumping and keep incrementing HL until it is the same as DE, then quit.

Or can it? Each 16-byte block of memory has to be dumped twice, once in hex and once in ASCII. The routine must therefore remember the start address of each line being dumped, so that it can go back to it the second time.

Furthermore, if while dumping in hex it discovers the end of the dump, it can't just bundy off, but must repeat that segment in ASCII.

Rather than explain the routine abstractly it's probably better to comment on the listing bit by bit, so here goes:

```
title   'Dump routine V 1.0'
```

I use the CP/M MAC and RMAC assemblers, which allow the user to specify a title to appear at the top of each page. ASM doesn't have this feature; if you're using ASM, ignore this line.

```
boot    equ     0000h
bdos    equ     0005h
conwr   equ     2
```

These are the standard equates I stick at the top of most programs (actually there's a few more but I deleted them). These are pulled in using WordStar, which a) saves me typing and b) avoids errors.

Notice that boot is never referred to in this program, but who cares?

```
acr     equ     0dh
alf     equ     0ah
tab     equ     09h
```

ASCII character equates, absolutely standard. Here comes the actual program.

There's a main body, which sets up DE and HL for testing purposes before the dump routine under test:

```
        org     0100h
main:
        lxi     h,02B3h         ; point to start
        lxi     d,036Ah         ; point to finish

dump:
        push    h               ; save base pointer on stack
        call    hl6             ; print initial address
        mvi     a,tab           ; and tab
        call    outchr
```

By this stage, we're under way. The first time through, this section of code may print an address that's not a multiple of 16 (actually 02B3H, in this example), but after that, it will always operate on even boundaries.

Whenever dump is jumped to, we are sitting at the beginning of a line, ready to print an address.

```
dl:     mov     a,m             ; get byte from memory
        call    h8
        mvi     a,' '           ; print a space
        call    outchr
```

This section of code retrieves a byte from memory, prints it, then prints a space. Now we move on to the next byte, but before printing it, we check to make sure that we haven't reached the end:

```
inx     h               ; point to next byte
```

```
call    d8              ; have we reached the end?
jm      d2              ; dump remaining ascii
```

Subroutine d8 subtracts hl from de and returns with the sign bit appropriately set. The 'jump on minus' to d2 gets us out of the hex dump loop into the ASCII dump loop. Now we have to check that we haven't reached a multiple of 16. If we haven't, we just keep looping, otherwise we print a space and start dumping ASCII.

```
        mov     a,l
        ani     0fh             ; mask lower bits
        jnz     d1              ; if not zero, keep dumping
d2:     mvi     a,' '           ; else space and dump ascii
        call    outchr
```

Earlier, at the beginning of the line, we pushed HL on the stack. Now we can retrieve it and repeat the dump in ASCII.

The 'ani 7fh' instruction strips off the most significant bit of the character so that it is ordinary ASCII and not graphics. Then we check that it doesn't have a lower value than a space, as that would be a control code and potentially disastrous to our nice neat display. Anything nasty is replaced by a dot.

```
        pop     h               ; get base pointer
d4:     mov     a,m             ; get char from memory
        ani     7fh             ; strip msb
        cpi     ' '             ; if less than space
        cm      d7              ; replace with a dot
        call    outchr          ; output character
        inx     h               ; point to next
```

Once again, we check that we haven't reached the end of the block, and failing that, that we haven't reached the end of a line (that is, address a multiple of 16).

If we have reached the end of a block, the 'return on minus' instruction takes us back to the calling program.

```
        call    d8
        rm
d5:     mov     a,l
        ani     0fh
        jnz     d4
```

If we have reached the end of a line, we output a CR-LF pair and jump round to dump again.

```
d6:     mvi     a,acr
        call    outchr
        mvi     a,alf
        call    outchr
        jmp     dump
```

Here's the subroutines that replace control characters with dots and do the address comparison:

```
d7:     mvi     a,'.'
        ret

d8:                             ; reached end yet?
        mov     a,e
        sub     l
        mov     a,d
        sbb     h
        ret
```

Finally, here are the hex output routines:

```
hl6:
        mov     a,h
        call    h8
        mov     a,l
h8:
        push    psw
        rrc
        rrc
        rrc
        rrc
        call    h4
        pop     psw
h4:
        ani     0fh
        adi     '0'
        cpi     '9'+1
        cp      hadj
        call    outchr
        ret
hadj:   adi     'A'-1-'9'
        ret
```

```
outchr:
        push    h
        push    d
        mov     e,a
        mvi     c,conwr
        call    bdos
        pop     d
        pop     h
        ret
```

Finally, for ease of typing, here's the whole routine:

```
        title   'Dump routine V 1.0'

boot    equ     0000h
bdos    equ     0005h
conwr   equ     2
pstrng  equ     9

acr     equ     0dh
alf     equ     0ah
tab     equ     09h

        org     0100h
main:
        lxi     h,02B3h         ; point to start
        lxi     d,036Ah         ; point to finish

dump:
        push    h               ; save base pointer on stack
        call    h16             ; print initial address
        mvi     a,tab           ; and tab
        call    outchr
d1:     mov     a,m             ; get byte from memory
        call    h8
        mvi     a,' '           ; print a space
        call    outchr
        inx     h               ; point to next byte
        call    d8              ; have we reached the end?
        jm      d2              ; dump remaining ascii
        mov     a,l
        ani     0fh             ; mask lower bits
        jnz     d1              ; if not zero, keep dumping
d2:     mvi     a,' '           ; else space and dump ascii
        call    outchr
        pop     h               ; get base pointer
d4:     mov     a,m             ; get char from memory
        ani     7fh             ; strip msb
        cpi     ' '             ; if less than space
        cm      d7              ; replace with a dot
        call    outchr          ; output character
        inx     h               ; point to next
        call    d8
        rm
d5:     mov     a,l
        ani     0fh
        jnz     d4
d6:     mvi     a,acr
        call    outchr
        mvi     a,alf
        call    outchr
        jmp     dump



d7:     mvi     a,'.'
        ret

d8:                             ; reached end yet?
        mov     a,e
        sub     l
        mov     a,d
        sbb     h
        ret

h16:
        mov     a,h
        call    h8
        mov     a,l
h8:
        push    psw
        rrc
        rrc
        rrc
        rrc
        call    h4
        pop     psw
h4:
        ani     0fh
        adi     '0'
        cpi     '9'+1
        cp      hadj
        call    outchr
        ret
hadj:   adi     'A'-1-'9'
        ret

outchr:
        push    h
        push    d
        mov     e,a
        mvi     c,conwr
        call    bdos
        pop     d
        pop     h
        ret
```

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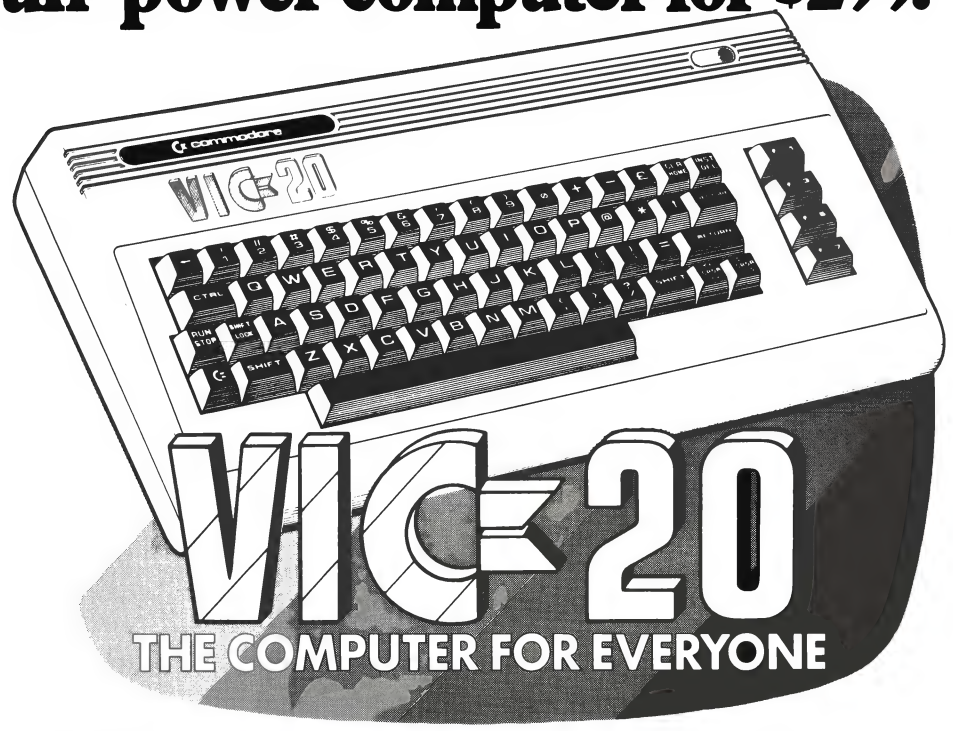

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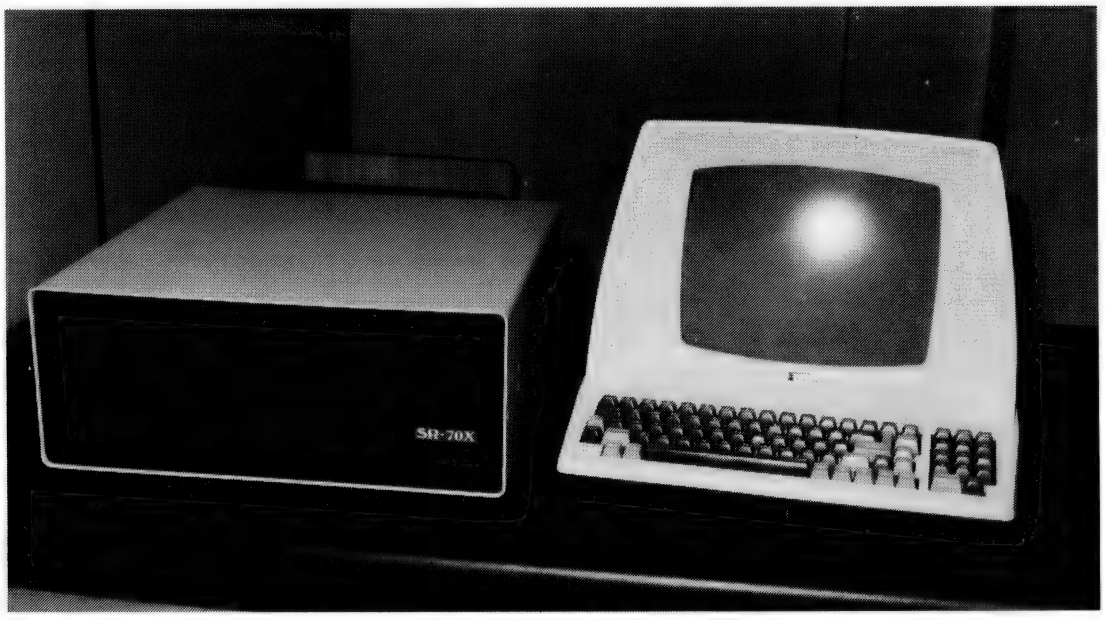
MIVI1461

Single-Board Satisfaction!

By Bill Bolton



THERE HAS been a recent upswing in interest in single-board CP/M computers. There are several on the Australian market (the Osborne 1 is a notable example), although the type we're interested in here comes from the broader class of SBCs that are readily available as do-it-yourself items as well as complete pre-packaged computer systems.

The Ferguson 'Big Board' is probably the most widely known CP/M SBC of this type, while the challengers include the V-10, the new Big Board 2 and the subject of this review, the Wavemate 'Bullet'.

The SR70X Computer

The SR70X computer system from Brisbane's Archive Computer Services is a complete, ready-to-go computer based on the Bullet board.

It comprises the basic board, two Ye-Data 180 slimline, 20cm, double sided, double density disk drives and power supplies in an attractive, sturdy metal case. The system comes with a ready to run CP/M version 2.2 operating system.

There is also a version called the SR50X which has minifloppy drives, although I have not seen this configuration.

I used the SR70X system for several days, putting quite a bit of programming and word processing work through it. It was then passed between two other users who ran it for a few days and contributed to the review.

After that it was used around the *Your Computer* offices for a couple of weeks. It fitted in well with our existing hardware — and none of the users had any difficulty with the system.

Unpacking It

The SR70X comes sturdily packed with a large binder of documentation sitting in the top of the box.

The first thing I noticed was that the power cord in the box had a 'piggy-back' type plug installed on it...a nice touch, as any computer installation (no matter how small) seems to quickly run out of power outlets, even though the current drawn by each mains-powered component is very small.

I had a quick look at documentation (details later) which briefly covered getting the system running. The SR70X was placed on a desk, plugged into a power outlet and a Lear Seigler ADM-31 terminal.

Inside the front cover of the documentation binder was a plastic envelope with two floppy disks inside it. One was marked as the Master copy of the CP/M operating system disk and the other was marked as a 'use this one' copy — providing two copies of the CP/M system disk is a very, very good idea and will relieve many first time users of the anxiety that goes with having to use their one and only CP/M master disk the very first time they switch on a computer system.

The disk was marked as being set up for a 9600 baud terminal so I was all set to go. I switched on the SR70X, put the disk in the A: drive and closed the drive door; the CP/M sign-on prompt appeared on the terminal and the CP/M system responded normally. It worked first time.

What's On The Disk

The SR70X CP/M-80 has been customised by Archive Computer services in several interesting ways.

The standard CP/M CCP has been replaced with an expanded Z-80 CCP similar to the ZCPR CCP replacement available through the SIG/M Users Group. This CCP provides a number very useful extra features over the standard CCP, including optional paging in the TYPE command and a hex numbering option on the SAVE command...

This CCP also will do an automatic search on the A: drive for a COM file if it cannot be found on the currently logged in drive. This last feature is very significant as it means that you only have all your

commonly used programs like PIP or STAT and so on on a work disk in the A: drive rather than have to have copies of them on all the disks you use.

There is a setup program called 64C6.COM (why didn't they call it SETUP.COM?) which allows a new copy of the CP/M system to be written to a disk. This program allows you to change many of the preset configuration options of the SR70X CP/M system. You can specify a serial or parallel printer, the baud rates for the serial ports, whether to have the standard or extended CCP, whether to automatically start a COM file when the system is cold booted and so on.

Other utilities specific to the SR70X are a copy program called CNV (for Copy 'n' Verify) and a disk formatting program called FMAT. Both of these programs need to have some minor customisation done to set them up for the particular terminal you are using — a simple configuration utility called CONFIG is provided to enable you to easily setup CNV and FMAT for your terminal.

The documentation said the program should run with all Lear Seigler terminals without any need to customise it so I dutifully tried to use FMAT...and was rewarded with a very confused screen display as the FMAT prompts intermixed themselves with the text already on my terminal screen. The documentation was wrong; the more sophisticated Lear Seigler terminals require a different clear screen sequence from the more basic models.

The problem was obvious to me and I quickly made the changes using the CONFIG program but could be very confusing to a new user. After setting up CNV and FMAT I found them to be well though out utilities with good prompts that worked well.

As well as all the standard CP/M utilities and the extras that one expects to receive with any preconfigured CP/M system (such as a copy utility like CNV and a format utility like FMAT), Archive has included a number of very useful utilities from the CP/M and SIG/M user group collections.

The most significant is an online HELP system which describes the other programs on the disk and how to use them. The HELP system also tells you how to generate your own help files. Other utilities supplied include a sorted directory program, a disk editor, a file backup program and so on.

Having utilities like these supplied with a system is a really big plus as they are the kind of programs that can make a CP/M system look much more friendly, especially to a new user. It took me several years of sifting through the great mass of public domain software in the various CP/M user groups to get my current set of utilities together. Through the utilities supplied with the SR70X, Archive has given users of the system a significant head start with CP/M.

The Hardware

The SR70X is housed in an attractive, beige coloured metal box. The top comes off after removing four machine screws and access to the interior components is easy. The two Ye-Data 180 disk drives are mounted to the left of the case while the Bullet board occupies the right.

Behind the drives is the power supply, which is a prepackaged commercial unit with generous ratings. On the back panel behind the power supply are the I/O connectors, reset button and power switch while on the right hand side is a large muffin type fan and a US-style three-pin socket that is switched from the power switch. The SR70X is well ventilated and seems to run quite cool overall. All the internal cabling is neatly laid out and has ample spare length.

The Bullet board provides many facilities. It has a 4MHz CPU and uses mostly Zilog peripheral chips. Two serial I/O ports are provided using a Zilog SIO while a Centronics parallel port and an interface to a hard disk controller are provided using a PIO. The disk controller is a Fujitsu lookalike for a Western Digital 1795 and can support up to four 20cm or 13cm double density, double sided drives.

The board has 128K of dynamic RAM which the supplied CP/M-80 version 2.2 software organises as one 64K block for CP/M, one 16K block for disk Cache buffering and one 48K bock as a small Memory drive. It would be possible to implement a two user MP/M 2 system on the SR70X given suitable software.

Also, the system should be able to support the newly released CP/M-80 version 3 in its full 'bells and whistles' configuration (needing up to 96K of memory), something few other currently available SBCs will be able to do!

CP/M Implementation

The CP/M implementation on the SR70X is very neat, even without the enhanced CCP.

It supports the standard IBM 3740 format single density disk as well as three

Specifications and Report Card

Unit:	SR70X Computer system
Made By:	Archive Computer Services/Wavemate
Processor:	Z80
Clock Speed:	4MHz
RAM:	128K
ROM:	Disk Boot ROM
I/O:	2 software programmable serial ports, 1 Centronics parallel port
Languages:	Any CP/M-80 supported languages
Keyboard/Display:	Any serial terminal of your choosing
Expansion:	IMI hard disk interface
Best Points:	20cm drives, high performance, 128K RAM
Worst Points:	No significant failings

Ratings:	**excellent**	**very good**	**good**	**poor**
Documentation:		✓		
Ease of Use:		✓		
Functionality	✓			
Support:		✓		
Value-for-money:	✓			

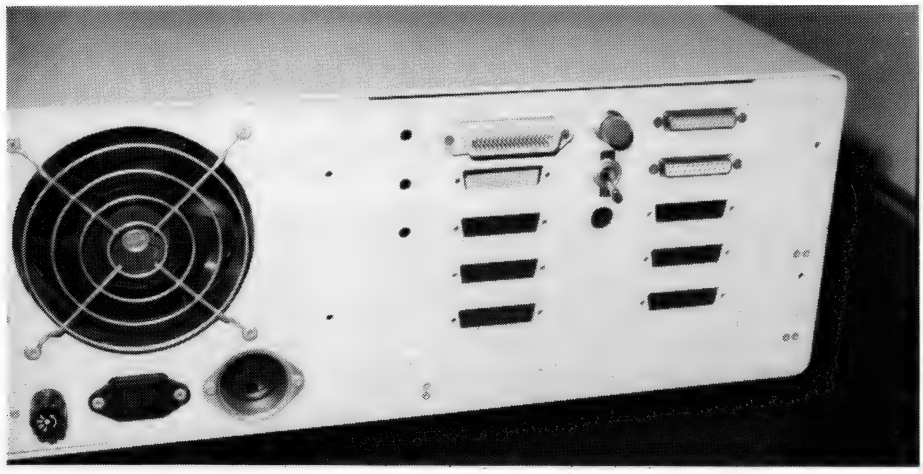
Extras Included:	Enhanced CCP, useful utilities
Review Unit from:	Archive Computer Services, 13 Wagners Rd, Clayfield, QLD, 4011

different double density formats similar to IBM System 34 standard. The double density formats are 256 bytes/sector, 512 bytes/sector and 1024 bytes/sector. The 256 byte format is laid out to be compatible with Godbout/Morrow 256 byte disks. The 512 byte format is unique to the Bullet while the 1024 byte format is compatible T! California Computer Systems (CCS) 1024 byte disks.

The SR70X recognizes the format of a disk dynamically — just put a disk in a drive and hit Control-C to enable the system to recognise the format of the disk next time that disk is accessed. All CP/M double density systems should be able to do this as the software techniques involved are well known but it is surprising the number of systems which need to be told the format of a disk.

I wanted all the double density formats to be compatible with the Godbout and Morrow systems that are used by several *Your Computer* columnists, the editor, and at the office, so I had a look at modifying the BIOS to achieve this. The BIOS source code supplied with the system is neatly laid out, well commented and easy to follow. Of course you will need to have a good knowledge of assembly language programming to attempt BIOS changes but the source code is there if you want to do it.

The BIOS source code is meant for assembly with Digital Research's MAC or



XMAC assemblers and uses the Z80 macro library supplied with those assemblers. MAC/XMAC is not supplied with the SR70X so you will need to buy a copy if you need to reassemble the BIOS; this is unfortunate, yet nearly all the other Z80 based CP/M computers I've ever come across have needed an assembler not supplied with the system to be able to reassemble their BIOSs, so the SR70X is no different from the rest of the crowd in that respect.

I found it easy to modify the BIOS to suit my needs. I only had to change the values in the Disk Parameter Blocks for those disk layouts I wanted to change. I did have some trouble installing the new BIOS as the method used is slightly different from that normally used and is not well documented. Archive definitely needs to fix up that aspect of the documentation.

A phone call soon sorted out what needed to be done, so after reassembling the new BIOS and installing it, I had no trouble in interchanging disks in all three double density formats with those from Godbout and Morrow systems.

The SR70X does not adhere strictly to the IBM System 34 format used by Godbout and Morrow in that does not format Track 0 in Single Density and the rest of the disk in the specified Double Density format. Rather it formats all the tracks on the disk in the double density format. This

is mentioned in the SR70X documentation and doesn't cause any interchangeability problems unless you try to SYSGEN a system onto the system tracks of a disk.

The SR70X can support a mix of 20cm and 13cm disks and though the review unit was not supplied in this configuration I've since had a chance to use another SR70X system which came with two 20cm drives and one 13cm drive. The 13cm drive was set up to use the Osborne 1 disk format.

The owners of that system had an Osborne 1 that was used purely for text entry and needed to be able to transfer Osborne 1 disks to 20cm disks for further text processing and transfer to a phototypesetting machine that only accepted 20cm disks. Initially they were thinking of uploading files with BSTAM at 1200 baud (as fast as the Osborne can normally go) but with their SR70X they can now just PIP files from the Osborne 13cm disk to the 20cm disks and vice-versa....much neater and faster!

Archive has put a lot of work into developing BIOS interfaces for 13cm CP/M disk formats and can supply SR70X systems suitable for use with most of the available 13cm disk formats. The list of formats the SR70X can read is too long to list here, so if you need this facility you should contact Archive for details.

The CP/M system that was supplied with the SR70X had one minor bug in it which was noted in the documentation and Archive is working at fixing it (so at least it is honest about known problems) but otherwise performed well.

A Real Performer

The performance of the SR70X is excellent. The system uses 20cm disks which immediately puts it way in front of minifloppy systems; while the CP/M supplied with the SR70X uses the extended memory of the Bullet board as a disk Cache buffer.

Compared to a Godbout Disk 1 DMA 20cm disk system running with a 6Mhz 8085 CPU, the SR70X was faster for loading files which were sequentially arranged on the disk (generally short files). Files which occupied multiple directory extents or were not laid out sequentially on the disk took longer to load than on the Godbout system. This is due to the nature of the systems — the software 'trick' of Cache buffering gives the SR70X spectacular performance where it can be effective (sequentially laid out files) but is a slight disadvantage under other circumstances, whereas the higher overall performance of the Godbout is achieved by a slightly better DMA scheme and higher CPU clock rate (okay, I know that's a sweeping generalisation, but it will do for the purposes of example).

All in all, the SR70X is performing very well on the disk side of things, coming close in total performance to other 20cm state-of-the-art floppy disk systems.

The console input has a type ahead buffer which is useful for stacking up commands, however at the moment there is no way to flush the type ahead buffer. This means it's impossible to abort any pending commands that may be stashed in the type ahead buffer.

The 48K M-Drive implemented in the extended memory area is too small to be much more than a toy for most applications but it is very useful for editing text files (with the Enhanced CCP it's not necessary to have anything but the text to be edited on the M-drive so quite reasonable blocks of text can be handled in one go).

With a screen editor such as WordMaster or WordStar running on text stored on the M-drive the results are spectacular. It's possible to move from one end of the file to the other almost instantly. The M-drive is implemented as drive M:.

The Documentation

The SR70X documentation came supplied in a large, rugged three ring binder. At the front are the manuals specific to the SR70X and its supplied software with, at the back (taking up most of the space), the standard Digital Research CP/M 2.2 manuals.

The manuals specifically dealing with the SR70X and its software are slim vol-

umes but contain much relevant information with little padding (terse but complete). A copy of the *Osborne CP/M User's Guide* by Thom Hogan — still the best book on CP/M in my opinion — is supplied with all SR70X systems.

Source code for the BIOS and COLD BOOT programs is supplied with the CP/M 2.2 for the SR70X. Source code for the FMAT, CNV and CONFIG programs is not supplied. Even though the source for the FMAT program is not available, sufficient patching information is supplied to allow FMAT to be set up to format almost any imaginable disk layout.

A small circuit diagram of the Bullet board is supplied after the user returns a signed non-disclosure agreement. A larger copy of the circuit diagram is available for a modest copying cost.

Archive's Support

During the course of the review I had occasion to check out a few technical points with Archive (obviously, the staff was aware I was reviewing the machine).

Technical support was good on the whole, but did seem to depend a bit on getting onto the right person. If they didn't know the answer to a query they didn't seem afraid to say so and always followed up with an appropriate answer as soon as they could. To me that last point is very important, I'd rather get a don't-know than a lot of waffle trying to cover up for lack of knowledge.

I made a few suggestion about changes to the documentation and software which have since been incorporated in the SR70X systems that are currently being delivered so Archive is obviously responsive to feedback from users.

The Acid Test

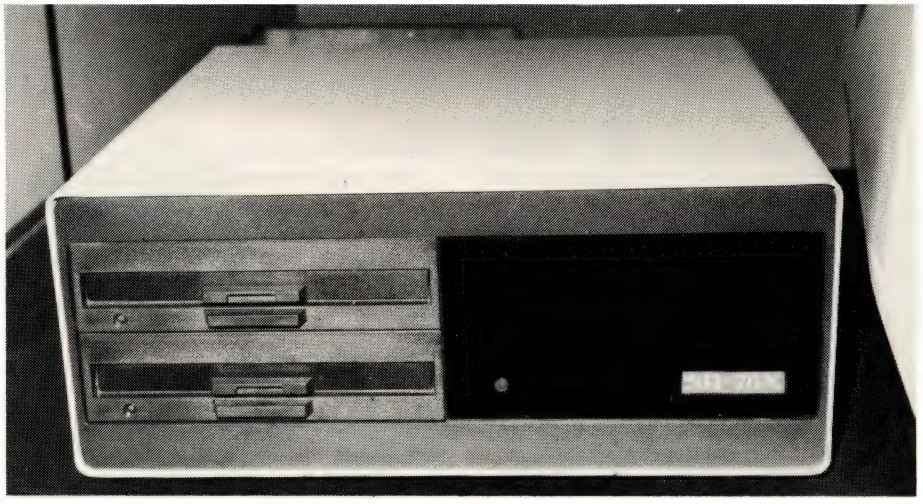
As part of the review I arranged for two other people to have a look at the SR70X.

Richard Berthet is a Senior Technical Officer and works with CP/M computers and other digital systems and was thinking of putting together a CP/M system for his own use.

David James is the owner of a fairly fully optioned TRS-80 system which he uses to run a part time mail list processing business (the needs of the business had outgrown the capacity of the TRS-80). His normal job doesn't involve computers at all.

Richard's Comments

I tried out the SR70X system and was impressed. I decided to put together a system myself based around the Bullet board and a Televideo 910 terminal. I ended up getting a high performance Z80, CP/M, 20cm disk based computer at an affordable price. I would have liked to get an S-100 system but just couldn't afford it now.



Some thoughts for the do-it-yourselfer who will buy the board and put it in a box and hope it goes:

- The Wavemate documentation incorrectly states the two data separator PLL periods as 1us, they should be 0.5us (remember that one!).
- There are pin numbers on all the board connectors except the two RS-232 serial connectors. Logically, if you follow the layout of the other connectors, they can be figured out, but one shouldn't have to do that sort of educated guesswork.
- Despite the previous point anyone with a reasonable level of technical competence should have little trouble in putting together and getting a Bullet based system to run from the documentation supplied.

All else in Bill's review seems to be fair comment, I would recommend a system to anybody...I'm a satisfied customer.

David's Comments

I had previously had little contact with CP/M systems, however the speed of the SR70X system was very impressive. The TRS-80 was getting overloaded with the amount of mailing list work I was putting through it and it promptly gave up the ghost with a memory fault three days after my SR70X arrived (a fit of jealousy?).

I'm convinced dBase II running on the SR70X will take care of my computing needs for quite a while to come.

The other factors which made the SR70X an attractive buy for me were the ready-to-run aspects of the system with the HELP files and extra utilities and the 20cm disks with high capacity and interchangeability with other CP/M 20cm systems.

Making Your Own System

If you are really keen on putting together a system for the lowest possible cost you could just buy the Bullet board with CP/M 2.2, buy the rest of the bits separately and put them all together yourself.

Richard bought the parts and metalwork for his system carefully over several months, keeping a sharp eye out for specials, and reckons he saved around $1000 over the cost of a complete SR70X system...

Finally, let's summarise. The things I like about the SR70X include:

- Value for money
- Performance
- 20cm disks standard, multiple double density formats supported
- 13cm disks concurrently supported in multiple formats
- 128K memory
- Good implementation of CP/M-80
- Extended CCP
- Many useful 'extra' CP/M utilities supplied with CP/M
- Good documentation overall
- Easy to set up for auto-boot into a COM file
- Well commented BIOS and other source code
- Good technical support (when the right person is available)

The things I don't like about the SR70X include:

- Reset button has spongey feel
- Type ahead buffer has no flush capability
- Modified BIOS installation not well documented
- LED on front panel flashes when writing to disk

Interestingly, everything I dislike is readily fixable.

The SR70X/Bullet offers very good performance at a fair price. The delivered systems I've seen show good attention to detail on the part of the suppliers in terms of both the hardware, software and documentation presentation.

I think the SR70X is a good buy in an SBC. Obviously the two other users who contributed to this review thought so too in that they were prepared to put their own money into SR70X or Bullet systems. □

VECTOR 4

VECTOR 4 SPECIFICATIONS

Central Processing Unit:

Processors:	8-bit Z-80B® and 16-bit 8088 (single or multiprocessor operation)
Clock Speed:	5.1 MHz
Memory:	128K Dynamic RAM Standard Expandable to 256K

Video Display:

Screen:	12 inch high contrast green phosphor 20 KHz Horizontal, 60 Hz Vertical
Alphanumeric:	24 Lines x 80 characters High resolution 16 x 13 dot matrix
High Resolution Graphics:	640h x 312v pixels (B/W)
Gray Scale Graphics:	160h x 312v pixels, 16 levels of gray 320h x 312v pixels, 4 levels of gray
Color Graphics:	External RGB Monitor 160h x 312v pixels, 8 colors 320h x 312v pixels, 4 of 8 colors

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Disk Drives:

Type of Disk:	5¼" Floppy	5¼" Winchester
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*rec. retail includes CP/M, printer, excludes sales tax.

Continued from Page 52

able is not assigned a value of zero; instead, it retains its earlier value.

Various options on PUT allow the user to position the printer to a particular line, skip a number of lines or perform a page eject. In addition, the run-time package knows the page length and width, and automatically provides formfeeds (neat printout at last!).

Edit-directed I/O uses format lists to specify exactly how the input or output should appear. Alternatively COBOL-like picture format can be used to describe the data in a field, allowing such tricks as placing the decimal point, suppressing leading zeros, printing a credit sign or minus to specify negative output, and so on. PL/I-80 includes several extensions to this facility which are particularly useful for cheque printing.

Record I/O requires that files be declared to inform the compiler of the file characteristics, and generally is used to read data into structures. It is, on a simple level, broadly similar to random disk I/O in BASIC. PL/I allows considerable flexibility in the management of disk buffers, allowing programs to be optimised to match disk sector sizes on a particular computer.

PL/I is particularly rich in functions. Trig functions are supplied in both degrees and radians, and hyerbolics are also included. There are comprehensive string handling functions, including character translation.

One of the unique characteristics of PL/I is its exception handling capabilities. For example, the ON ENDPAGE condition allows program flow to transfer to a special group of statements which perform a function such as printing a page number. There is no need to count lines — the run-time routines keep track of them automatically.

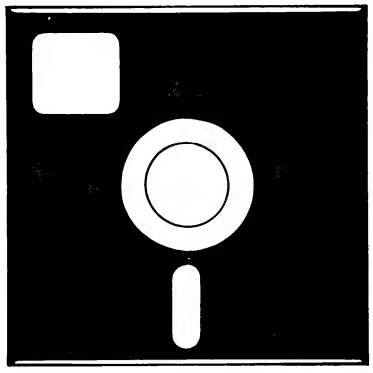
Similar exception-handling code is possible to trap arithmetic errors such as zero divide, file handling errors such as end of file and other miscellaneous errors.

The DR Compiler

The PL/I-80 compiler is supplied on two 20cm floppy disks. The first contains the PL/I compiler itself (root and three overlays), the RMAC relocatable macro assembler, LINK-80 linkage editor, LIB librarian, XREF cross-referencer, and the PLI library of relocatable modules.

The second disk contains a stack of example programs. Some of the examples are decidedly non-trivial, such as a

your computer



SOFTWARE REVIEW

complete chess-playing program, a critical path analyser and others.

There are four manuals in the package. The PL/I-80 Language Manual is the primary reference manual, and would be the major point of reference for experienced PL/I programmers. It is well organised for reference, lacking only an alphabetical index. (Incidentally, the contents pages were produced by a PL/I program which is one of the examples given).

The PL/I-80 Applications Guide is much more tutorial in nature, consisting mainly of explanations of the example programs on the second disk. While an experienced programmer could learn PL/I just from this manual, it should be augmented by a PL/I textbook, of which there are many.

Nevertheless, the examples are useful. There is no better way to learn programming than by example, and most textbooks are either totally devoid of examples or contain ones that are pretty well useless. This manual displays the opposite characteristic.

The examples range from simple polynomial evaluation to network analysis, and each is designed to demonstrate one particular feature of PL/I-80, such as character string processing, list processing or the uses of recursion.

The remaining two manuals cover the MAC/RMAC macro assembler and the LINK-80 linker. The MAC manual again contains examples of considerable depth and range, while the LINK-80 manual is primarily a reference guide. The LINK-80 manual also contains information on the routines in the PLILIB.REL file, which are callable from assembly language routines.

Incidentally, apart from the examples, the second disk also contains source code for direct calls to CP/M and MP/M. Once assembled, these files can be linked into programs to provide a more direct or 'intimate' interface to the operating system.

This is one of the beauties of PL/I — with its richness of data types, structures and functions, one can use it to write functions that otherwise would have to be written in assembler, then use assembly language for critical routines. An example of this process is given here.

The fogindex.pli program was originally written entirely in PL/I, but then it was observed that the program was spending a lot of its time in the loop which moves the four-character word array one character to the left. This was an obvious candidate for re-writing in assembler, and at the same time the vowel comparison and ASCII stripping and upper case conversion functions were re-written in assembler.

The result was approximately an order of magnitude improvement in speed. Tests have shown that PL/I is consistently faster than BDS C by typically 30 percent, particularly once obvious candidates for hand optimisation have been treated this way.

The package can be used to provide some extremely sophisticated code indeed. For example, modules can be separately compiled and then linked to produce overlays which are automatically loaded into memory when required. This allows the creation of programs which are effectively larger than the 64K limit of the '80' class microprocessors.

The ability to link PL/I programs with external functions makes it possible for Digital Research and independent vendors to supply additional facilities such as B-tree file managers, display managers and sort utilities in the form of relocatable object modules which can be linked in when required.

```
fogindex.pli _ written by Les Bell, 11/04/82

Calculates the "Fog Index' developed by the Gunning-Mueller
Clear Writing Institute. The fog index is roughly equal to
the number of years of (US) schooling required to read a
piece of writing. The fog index is the average sentence length
plus the percentage of words having three or more syllables,
all multiplied by 0.4.

Compile using PLI.COM, then assemble FOGASM.ASM using
RMAC and link with LINK FOGINDEX,FOGASM.
```

```
        To run, type FOGINDEX <filename>.
*/
fogindex:
        procedure options(main);

        dcl sourcefile file,
                buff char (254) varying,
                bufptr binary (15);

        dcl (c, v, s, lw, ns, nl, nw, nc) fixed binary static init (0);
        dcl fi fixed decimal (4,2);
        dcl inword bit (1);
        dcl eof bit (1) static init ('0'b);
        dcl vtrue bit (1);
        dcl word char(4) static initial (' ");
        dcl thischar char;
        dcl i fixed binary (4);
        dcl strip entry (char);
        dcl vowel entry (char) returns (bit (1));
        dcl sl entry (char (4));

%replace
        YES     by "1'b,
        NO      by "0'b;

put skip list ('Fog Index Calculator, Rev 1.2');

on endfile (sourcefile) eof = "1'b;

on undefinedfile (sourcefile) begin;
        put skip list ('Usage : fogindex <filename>');
        stop;
        end;

on zerodivide (1) begin;
        put skip list ('No sentences or words in file.');
        put skip list ('Can''t calculate fog index');
        stop;
        end;

open file (sourcefile) stream title ('$1.$1')
        env(b(1024));
```

In addition, PL/I-80 comes with two libraries of functions which perform direct calls to CP/M or MP/M. This provides the facility to write code to do almost anything that assembly language can do, with quite reasonable efficiency. Indeed, Digital Research itself uses it to write utilities such as XLT-86, displacing PL/M for the purpose.

A Language for All Seasons

PL/I-80 is a good all-round language. It has modern control structures, together with a range of data types which cover accounting, scientific and control-type applications. It produces tight code (the compiler optionally produces assembly interlace listings) that runs fast, for a wide range of applications.

If I had to have just one language for program development, this would be the one.

It normally sells for around $500; I got mine from John F Rose Computer Services, in Crows Nest, Sydney. It seems John, knowing a good thing when he sees one, ordered a whole lot of copies, but most of his customers weren't so perceptive, and so he put on a special offer to his regulars. Now they know what they missed! □

```
inword = NO;
do while (~eof);
  get file (sourcefile) edit (buff) (a);
  nl = nl + 1;
  do bufptr = 1 repeat (bufptr + 1) while (bufptr ~>
     length (buff)
     thischar = substr(buff,bufptr,1);
     call strip(thischar);
     call sl(word);
     substr(word,4,1) = thischar;
     nc = nc + 1;
     if thischar = '.' then ns = ns + 1;
     if thischar = " " | thischar = "^M" |
             thischar = "^I' then call wordend;
     else if inword = NO then do
                          /* beginning of word */
             inword = YES;
             nw = nw + 1;
     end;
     if vowel (thischar) then do;
             s = s + 1;   /* count syllables */
             v = v + 1;   /* count adjacent vowels */
     end;
     else v = 0;
     if v = 2 then do;    /* two vowels adjacent */
             s = s _ 1;   /* count as one syllable */
             v = 0;       /* reset vowel counter */
     end;
             /* detect silent "E' or "ED' */
     if index (word, "ED') > 0 & ~
                          (index (word, "DED') > 0 |
             index (word, "TED') > 0) then s = s _ 1;
     if (index (word, "E') > 0 &
                          (index (word, "LE')) = 0)
           then s = s _1;
  end;
  end;

  wordend: procedure;
                                        /* count long words */
          if (inword = YES) & (s > 2) then lw = lw + 1;
          inword = NO;                  /* exit word */
          s = 0;                        /* reset syllable counter */
  end wordend;

          put skip list ('Number of sentences  = ",ns);
          put skip list ('Number of lines      = ",nl);
          put skip list ('Number of words      = ",nw);
          put skip list ('Number of characters = ",nc);

          fi = (decimal(nw,7,2) / decimal(ns,7,2) + 100 *
                  decimal(lw,7,2) / decimal(nw,7,2)) * 4 / 10;

          put skip (2) list ('Fog Index = ",fi);

  end fogindex;
```

Figure 1: PL/I-80 source code for the fogindex program

Software Report Card

Program:	PL/I-80 Compiler (with RMAC assembler)
Made By:	Digital Research
Useful for:	Advanced Programming under CP/M and MP/M II
Hardware Req'd:	CP/M system

Ratings:	**excellent**	**very good**	**good**	**poor**
Documentation	✔			
Ease of Use		✔		
Speed	✔			
Functionality	✔			
Support:	✔			
Value-for-money:		✔		

Price:	$455 including tax (special)
Options:	BT-80 B-tree file access method
Review Copy from:	John F. Rose Computer Services, Crows Nest, Sydney.

```
        public  strip, vowel, sl
;       entry   pl _> char to be stripped
;
strip:
        call    getpl
        mov     a,m             ; get char
        ani     7fh             ; strip msb
        cpi     'a'             ; and convert to upper case
        jc      stl
        cpi     'z'+1
        jnc     stl
        ani     01011111b
stl:
        mov     m,a             ; restore character
        ret
;
;       entry:  pl _> character to be compared with vowels
;
vowel:
        call    getpl
        mov     a,m             ; get char
        irp     char,<'A','E','I','O','U'>
        cpi     char
        jz      rtrue
        endm
        xra     a               ; return zero
        ret
rtrue:  mvi     a,80h           ; return "1'b to PL/I
        ret
```

```
;
; sl moves a four character array left one character
;       entry:  pl _> first character of array char (4)
sl:
        call    getpl
        mov     e,l             ; copy address into de
        mov     d,h
        inx     h
        mov     a,m             ; get character
        stax    d               ; put it back but down one
        inx     h
        inx     d
        mov     a,m
        stax    d
        inx     h
        inx     d
        mov     a,m
        stax    d
        ret

getpl:
        mov     e,m             ; get address of parameter
        inx     h
        mov     d,m
        xchg                    ; address now in hl
        ret

        end
```

Figure 2: source code for the assembly language procedures

Is This On Your Lisp?

Jack Dikian and Grace Theodore present a simple tutorial-like introduction to the Lisp language, with particular attention to the features that best demonstrate the underlying differences between Lisp and the more common languages such as BASIC and Pascal.

LISP, USUALLY considered to be a list processing language, was developed in the late 1950s to aid in the manipulation of symbolic expressions.

Although there is no real Lisp standard — implementations are often user- or manufacturer-dependent — Lisp is the most widely used programming language in the field of artificial intelligence and is becoming increasingly accepted by teaching institutions as an alternative to heavily syntax-typed languages.

Currently microcomputer-based Lisps are written for many systems including TRS-80s, Apples, Cromemcos and so on.

The only way a new language can be learned is by reading and writing it, but before we begin to consider examples of code let us first be introduced to some of the terminology used when describing Lisp.

For example, we already mentioned the phrases 'list processing' and 'symbol manipulation', but what exactly is a list when used in this context, and how is a 'symbolic expression' defined.

Symbols are nothing more than simple non-blank characters which, when grouped together, form words and in turn sentences. In Lisp we call these words Atoms, the fundamental building blocks in all Lisp texts.

Atoms have many interesting properties, some of which are maintained by the interpreter (automatic) while others are assigned to by the user. An important example of a controllable (user modified) property is the APPLY VALUE. This is what the Atom evaluates to when evaluation is carried out; it is something similar to 'variables' in other languages.

Evaluation can be discussed later, but for now it should be noted that Lisp interpreters operate by continuously outputting the evaluation of expressions read.

There is in all Lisp implementations at least two more data types, namely the Lists and Integers, although some Lisp interpreters also support floating point numbers (Reals), character strings, and even arrays.

When using an interpreter which does not support the latter types, it has been our experience that the basic data types of Lisp will allow most other data items to be emulated; However, this is achieved at the expense of both memory and execution time. Integers, like Reals, behave like most integer/real types of other languages and it is adequate to note here that most (if not all) arithmetic operations exist in Lisp.

A List is a collection of the data items mentioned above; that is, Atoms, numbers, and even other Lists; they are all valid elements of a Lisp List. Elements of Lists are separated by printable blanks and enclosed by parentheses. The following are examples of some List configurations:

```
( VAX CYBER IMLAC HEATH )                    a list of atoms
(( APPLE PEACH) ( ORANGE   PEAR ))           a list of a list of atoms
( A_VALUE  32  46.2     ANOTHER 46.2 ) mixed list of atoms and numbers
( UNIX
CROMIX
CPM
FLEX DPC )                        a list of atoms separated by newline.
```

It should become apparent from the above examples that Lists can be mixed and, more importantly, nested in hierarchical groups to form the basic structure of the Lisp text; it should also be pointed out that Lists are sequentially accessed (that is, the first element is easily retrieved while others require a little bit more work).

So symbolic expressions can now be thought of as a collection of all the data types defined above.

Evaluation of Atoms and Lists will be discussed in more detail after we introduce some of the basic Lisp functions in an attempt to start the ball rolling.

We mentioned Lisp supported most arithmetic operations — the following functions are only some examples. At this stage special attention should be given to both the List structure and the location of the basic operators.

```
<> (times 10 2)          multiplication operation
   20

<> (quotient 10 2)       division operation
   5

<> (sqrt 4.0 )           square root
   2.0

<> (times ( quotient 10 2 ) (plus 1 3))
   20
```

The Last example should be read as a list of three elements with 'times' being the first, (quotient 10 2) the second, and (plus 1 3) the third; this should also emphasise the point that lists can be made up of other lists.

Manipulating Symbols

Let us now look at functions which manipulate symbolic expressions.

We mentioned that Lists were sequential and work had to be done to retrieve the second and further elements; but retrieving elements isn't the only requirement of a symbol manipulator, as 'procedures' such as appending and constructing Lists out of other list arguments is also of prime importance.

The following intrinsic functions form the principle tools in achieving this.

```
<> (car '(Athena Susan Lee))
   Athena

        "car" returns the first element of a
                list argument.
```

```
<> (cdr '(George Greg Don))
   (Greg Don)

        "cdr" returns all but the first element
                  of a list.

<> (append '(cs1 cs2) '(cs3 hons))
   (cs1 cs2 cs3 hons)

        "append" joins the elements of all
                   list arguments.

<> (list '(first second) '(third fourth))
   ((first second) (third fourth))

        "list" makes a list out of its arguments.

<> (cons 'A '(B C))
   (A B C)

        "cons" constructs a new list with the
                  first elementfrom the first
                  argument and the remainder
                  from the second.

<> (reverse '(one two))
   (two one)

<> (reverse '((one two)(three four)))
   ((three four) (one two))

        "reverse" has the obvious effect of
                  changing the order of the
                  elements, note however that
                  "reverse" has control over the
                  highest level of nesting.
```

Getting back to the business of evaluating Lists. Evaluation of a List may be regarded as a function call, with the first list element acting as the function descriptor and the remaining elements forming the arguments. The value of a List is therefore dependent on the first element.

Most examples in this article and indeed Lisp in general are simple variations on this theme.

For example consider the expression:

```
<> (print 'hello )
hellohello
```

When control considers the List, it will find that the first element is an Atom which does not require any special attention (only a few Lisp functions require a different sequence of operations).

It will then evaluate the remaining elements as arguments to an as-yet 'unknown' (so far it only knows that it is not a special case) function. The first element, print, is then applied on the evaluated arguments.

You may of noticed that a single quote mark prefixed some arguments while not others in the above examples. The quote mark is a shorthand notation for the function 'quote'; that is, (car '(A B)) is really (car (quote (A B))) and is necessary to let the interpreter know that the expression following it is to be taken as a literal.

The next example should help in clarifying this point.

```
<> (print 'hello)
hellohello

<> (print hello)
ERROR ( interpreter dependent )
```

The error comes about because Lisp interpreters have a very strong tendency to try and evaluate everything the user types. Since the Atom 'hello' was not given an apply value and a default does not exist, evaluation will quickly fail.

Let us now briefly look at how we may give Atoms their apply values (assign values to them) before we continue with List evaluation. Lisp provides two built-in functions to achieve this process.

One is the function setq, which is used to assign the evaluated value of the second argument to the first, without evaluating the first. For example:

```
<> (setq carname 'holden)
holden

<> carname
holden

<> (setq cartype carname)
holden
```

The second is the function set: set will assign the value of the second argument to the value of the first and, by 'side effect', achieve the property desired.

Set will, however, evaluate the first argument and hence the quote mark is used again.

```
<> (set 'one 1)
1
<> one
1
```

Unlike other languages, any item from any of the data types can be assigned to Atoms using the above functions.

Continuing with List evaluation, we have so far considered built-in functions and how they can be used to write various bits of simple code, but to really get the most out of Lisp, it will be necessary to look at how functions can be defined to meet the user's needs.

A Lisp function has the following syntax:

```
(def <function name>
    ( <parameter list> )
        < function body > )
```

Unlike the more common variable scope conventions such as those found in Pascal, Fortran and C, Lisp treats its variables in a rather unusual way.

This is particularly evident when considering the formal parameter list of the Lisp function. Let us assume that we need a function to find the square of a number. The code may look like this:

```
( def square (x)
   (times x x))
```

The Lisp interpreter will determine whether or not x was given a value before the function square was called.

If x was given a value, then this value is copied elsewhere so that the value of the actual parameter can be temporarily assigned to x. The function body is then evaluated using this value for x before x's initial value is restored. Note x will have no value after square is called if no value was given to it previously.

More generally, most Lisp interpreters use an association list (better known as the A-list), a software stack that holds variable bindings (that is, variable values).

The A-list is searched when the value of the atom is required. This allows the existence of local atoms with respect to functions. The functions bind their atoms before evaluating them, and remove the binds when the function is evaluated.

You might have noticed, or soon will notice, that keeping track of the number of parentheses needed to match the left parentheses can get a little out of hand, particularly when a poor program layout is used.

For this reason, most Lisp interpreters provide a facility to aid in typing enough closing parentheses to avoid errors. Often this is achieved by ignoring all closing parentheses following the one that matches the first opening parenthesis. Our interpreter will accept one right square bracket to match all left parenthesis.

Smooth Operators...

Lisp provides Logical and Relational operators through a general class of functions called the Predicate.

A Predicate is usually a function that returns a logical value, more specifically it returns a T for true or NIL for false. Let us see how these function calls can provide some of the relational operators.

```
(equal fascism capitalism)
NIL
```

Equal takes two arguments and returns a T or NIL depending on whether the arguments are the same when evaluated.

```
(greaterp 10 9 8 7 6)
T
```

Greaterp takes any number of number arguments and returns T if the list is found to be in an descending order.

```
(lessp 6 7 8 9 10)
T
```

Lessp takes any number of number arguments and returns T if the list is found to be in ascending order.

The logical operators are also function calls with the following names:

```
(and <expression1> <expression2>.....)
```

And takes any number of expressions

as arguments and evaluates them left to right. Like C, The Lisp 'and' will stop evaluation if it encounters a NIL. The expressions are assumed to return a T or a NIL.

```
(and T T)
T
(and T NIL T)
NIL

(or <expression1> <expression2>....)
```

Or takes any number of expressions as arguments and evaluates them left to right. Again, the Lisp 'or' behaves like C (the twin vertical bars symbol), where evaluation is stopped when a non-NIL value is encountered.

```
(not <expression>)
```

Not takes one expression argument and returns T if the expression evaluates to NIL.

Control Structures

The simplest Lisp control structure is the sequential evaluation of a series of expressions. For example:

```
( setq x 3) (times x x)
3
9
```

The conditional control structure, such as that of the Pascal 'if then else' is provided by Lisp in the form which resembles more the case statement of the same language. The branching function COND has the following syntax.

```
( cond ( <expression1>..<outcome1>)
       ( <expression2>..<outcome2>)
       .
       .
       ( <expressionn>..<outcomen>))
```

COND takes any number of list arguments, each of which are composed of an expression to be tested and an outcome return (result).

These expressions are evaluated sequentially until a non-NIL value is encountered. The evaluated outcome-element of the last non-NIL expression is returned to cond. If all expressions evaluate to NIL then the value NIL is assigned to cond. If the expression whose evaluation returned non-NIL is made up of a single element, then cond will be assigned the evaluated value of that element. Here is an example

```
(def condexample(x)
     (cond (( equal x 0) print '0)
           (( equal x 1) car '(a b c))
           ( T           plus x 1 )))
```

In the above example, if x was not equal to 0 or 1 then the last element of the third list will have been evaluated, that is cond will have been assigned the value of (plus x 1) since T is equal to itself and is always true.

Recursion And Iteration

I assume here the reader is familiar with recursion and only point out that Lisp is particularly suited in expressing recursive solutions.

The following examples are only intended to demonstrate the similarity between recursion in Lisp and any other language.

```
( def MEMBER (symbol place)
      ( cond (( null place ) nil )
     (( equal symbol ( car place )) t)
              ( t ( MEMBER symbol ( cdr place )))))
```

The above function will return T if 'symbol' is found in place. Null is a built-in function which returns T on an empty argument.

```
(def search_and_kill ( symbol place)
       ( cond (( null place) nil )
      (( equal symbol (car place ))
                    (search_and kill symbol
                          (cdr place)))
             ( t (cons ( car place)
                 (search_and_kill symbol
                       (cdr place ))))))
```

The above function will search place and remove all occurrences of symbol.

Iteration is also supported by Lisp and often used when execution speed is an important consideration. Lisp provides its iterative structure in a way that easily replaces recursive structures.

The function Mapcar is used to provide the iterative process. Mapcar allows a function (both user-defined and built-in) to be applied on a list of arguments over and over again. For example:

```
        (mapcar 'abs '(1 -2 -3))
(1 2 3)
```

The Environment

The familiar approach of having a separate development environment as well as an execution environment is usually nonexistent when working with Lisp.

Rather errors are checked during program evaluation, and evaluation is stopped with an error message when an error occurs. The trace function can be used to arrange for entry and exit information to be printed for a function argument.

The print and read functions are used for communication, we have seen how the print function is used to write to the standard output (terminal). The read statement is used to supply data to the program and where this statement is encountered, evaluation will stop for input.

Input is not evaluated, but is assigned to the Atom read:

```
(read) index
index
```

Here the user typed 'index' and the value of read became index.

An Ideal Language

Lisp's simplicity, together with its increasing availability for both micros and mainframes, makes it an ideal language to learn.

We feel people interested in machine intelligence will find Lisp essential — a very large percentage of programs written to act intelligent, or rather seem to act intelligent, are in Lisp.

This article has touched on a few aspects of the language. For further reading we are biased towards LISP by Winston and Horn (Addison-Wesley). □

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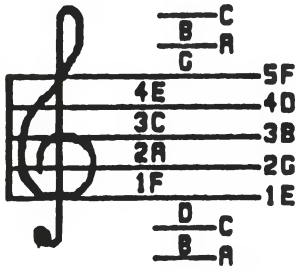

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Tracking The Cash

Keeping track of cash is the number one priority for most small businesses, writes Les Bell. The trouble is that many of the commercially available accounting packages are too big or too complex — but here's one that isn't...

LIKE MOST engineers, I'm a fairly numerate sort of person. I own a couple of programmable calculators, and feel quite at home with sophisticated mathematical techniques. Yet like many people, if you put a dollar sign in front of the numbers, I'll go weak at the knees.

That's how I found an accounting course I did recently. I tried and tried to do trial balances, but could never quite master double-entry book keeping. Despite consoling myself with the thought that you can't expect much from a system invented by a fifteenth-century Italian, I found the accrual concept and financial ratios just as tricky.

I find computer-based accounting systems great — and I suspect others must think the same way. The computer knows all the rules of book-keeping; all the operator has to know is when to enter what information, and that's largely a matter of knowing what an invoice is, as opposed to a cheque stub — something I think I can cope with.

That's why I was particularly interested in the Software Solutions Cash Flow System. Rather than being a component in a full-sized accounting system with general ledger, debtors, creditors and a number of other accounting facilities, this system is purely designed to handle cash flows.

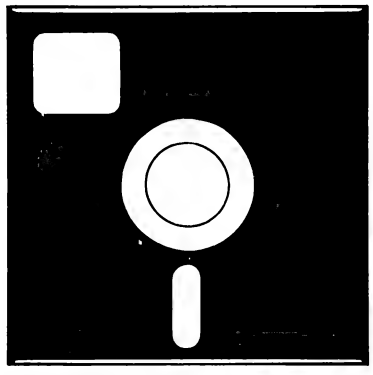
This is the most important function in a small business. Sixty percent of small businesses fail in the first five years, primarily because of poor financial management. The success of the small business depends upon the owner's skills in planning, managing and meeting financial objectives.

The major difficulty for many small businesses is maintaining cash flow. This involves keeping track of cash coming into and out of the business, generally on a day-to-day basis. The trouble is that this takes quite a bit of time and effort, and the small businessman is apt to feel that other, revenue-generating, tasks are more important.

The Cash Flow System basically records the same information as a set of manual accounts: the date of a transaction, name, amount, invoice, order and/or cheque number, balance, column dissection and due date. The beauty of the CFS is that it does this in a very similar way to a manual set of books so that businessmen, who often don't have time to catch up with the latest accounting techniques, can still refer to standard books if necessary — not that it should be!

The major difference from a set of paper accounts is that the CFS maintains an extra field for every transaction; the balance field. This is initially set equal to the amount for a creditor or debtor as entered, and is then updated whenever an entry is made in receipts or payments. If an invoice is paid in full, the balance will be zeroed, but it may be greater than zero, indicating partial payment or less than zero, indicating overpayment (a wonderful word, I like that!).

your computer



SOFTWARE REVIEW

The four major functions of the system allow the entry of information relating to creditors, payments, debtors and receipts. In addition, entries can be changed, printed, totalled or searched for. For example, a purchase is entered in the creditors file, with its order number, column dissection, date and other information. When a payment is made, it is entered in the payments file. This automatically adjusts the balance in the matching creditors entry. A similar process applies to debtor entries.

Several features make data entry easier. For example, when entering payments, cheque numbers are automatically incremented, while the date is preserved from previous work. When creditors are entered, the order number is automatically incremented.

Index files are automatically constructed to enable fast searching, and this imposes the (fairly trivial) limitation that changes to sequences such as cheque numbers should be kept to a minimum or the index file will fill quickly.

Once the information has been entered, it is time to start doing things with it. Four groups of reports are possible.

First, there's reports produced by the search function of the creditors, payments, debtors and receipts functions. This allows listing of selected information from the various files. For example, a report can be produced showing all invoices sent to a particular customer, or just those with non-zero balances.

The Total Columns function will total up the transactions and provide a dissection of the column totals for the column being worked on.

The Present Cheques function allows reconciliation of a bank statement with the cheques entered into the system. First, cheques itemised in the bank statement must be marked as presented in the system's files. Following this, the system will produce the balance of unpresented cheques, and this report can be sent to the printer.

However, perhaps the most interesting feature is the Forecast function. This uses the debtors and creditors files to forecast a balance for one or more dates in the future. Normally, a pair of matching files would be set up to provide a forecast of creditors against debtors, but they can be analysed independently.

After specifying an initial balance, a daily, weekly, monthly or specific date forecast can be made and listed. In addition, the balance can be graphed to provide a better means of grasping a pattern. There's nothing better than a line moving from bottom left to top right!

All files are password protected, and the system itself is serialised. It is possible to set up a single drive system, but two drives are obviously much more practical. A 20cm single-density disk has a capacity of about 3,800 entries, while a double-

sided double-density one has a capacity of more than 18,500 entries.

The system also provides a number of utilities for functions such as creation of back-up files, directory display, file erase and others. In addition, there's also an installation menu, which allows the system to be customised for a particular terminal, computer and printer.

The documentation supplied with the system is excellent. Not only are there full instructions for operation, but there's also background information on how the system works, together with some info on file structures.

Additional information includes sample reports, installation information, and a glossary.

The program will run on any Z-80 based system with at least 64K of memory, CP/M, CDOS or SDOS operating systems, at least one floppy disk, 80 by 24 terminal and a printer. A version is available for MS-DOS.

The package is available from Software Solutions, 11 Ormond Road, Elwood, Vic 3184. The creditors and debtors costs $330, payments $270, receipts $220 and forecast module $180, all plus sales tax, insurance and postage. A discount of 10 percent applies on the purchase of a complete system, and a demo kit comprising a full manual and restricted function version of the system is available for $67. □

Software Report Card

Program:	Cash Flow System
Made By:	Software Solutions
Useful for:	Small business cash flow management
Hardware Req'd:	CP/M system with 64K RAM

Ratings:	**excellent**	**very good**	**good**	**poor**
Documentation	✔			
Ease of Use	✔			
Speed		✔		
Support:	✔			
Value-for-money:	✔			

Extras Included:	N/A
Options:	N/A
Review Copy from:	Software Solutions, 11 Ormond Road, Elwood 3184.

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YC 18

your CP/M computer

By Bill Bolton

AT LONG last, it's out! Version 3.0 CP/M has been launched in the US.

Two different versions of CP/M-80 3.0 will be available. The first will include bank switching capability that works with 8 bit systems which support extended or banked memory beyond the usual 64K limit. Each additional bank will be supported in 32k increments with a theoretical limit of 16 banks each effectively having 60K available. The typical supplementary memory system will consist of 96K to 128K.

The bank switching support will allow 8 bit machines to run more complex applications programs and allow them to run faster by using a buffer to hold data that would normally remain on disk. For systems that don't have the extended memory capabilities (such as most SBCs) a second version that will fit in 64K will be available. Both versions will have graphics support (but don't ask what type yet, I don't know).

The error handling has been improved along the lines of MP/M 2 and will allow trapping of returns from system error conditions. A HELP facility similar to that provided with CP/M-86 is also there.

Other new features include time and date stamping on files, password protection, record locking, partial close, hashed directory access, least recently used sector buffering, multi-sector disk access I/O primitives, a BDOS free space function call, chained program execution through a BDOS function call, a system control block, direct BIOS call through a BDOS function call, program and overlay loading, BIOS I/O level device assignment and resident system extensions. Blocking is performed in the BDOS rather than the BIOS (a major source of problems in the early implementations of 2.2) and the CCP now supports multiple commands on the same command line and conditional command execution of a second command.

As I predicted in this column quite a while ago many of the features introduced in MP/M 2 have also appeared in CP/M 3.0. The new version is upward compatible from CP/M 2.2 and as I understand it at the moment all 2.2 programs should execute correctly under 3.0.

The system size of version 3.0 is larger than for version 2.2. Whereas a typical 2.2 system took up 5K to 8K of memory, a 3.0 system will occupy 9K to 12K. The banked version will, however, give you a larger TPA by putting quite a lot of CP/M into the extended memory. In this configuration the TPA may be up to 62K.

The retail price is $US250 but a reduced-cost upgrade will be available to 2.2 users. It will probably be some time yet before you will be able to buy CP/M 3.0 preconfigured for your favourite hardware.

CP/M '83 should be all the more interesting with this new version of CP/M-80 to contend with. The *Your Computer* tour is full up now but you might still be able to make your own way there...

Software Piracy

There is an ongoing argument in the microcomputer industry about software piracy/theft. One correspondent in several US magazines has likened the approach of the various suppliers to that of the English and Spanish during the great days of sailing ships when they battled to dominate the New World and each other. Piracy (you know, the real pirates with eye patches, wooden legs, jolly rogers and the rest) were a problem to both the English and Spanish.

The English built fast, light ships to outrun the pirates while the Spanish built slow, heavily armed ships to outfight them.

In the end the fast and light approach was more successful. In the software world this translates to the suppliers who hem their products in with very restrictive licensing agreements and copy protection schemes (the heavily armed approach) and those who aim to provide superior support and ongoing product development (the fast, light approach).

The heavily armed software suppliers seem to spend a great part of their effort in trying to stop the pirates by defenses and this adds to their costs and slows down product development. The fast, light suppliers make software piracy unattractive by the level of support they offer to the users and by the continuing enhancement in performance of their products.

It seems to me that the light, fast approach is bound to be the winner (as it was with sailing ships). Who wants to use an out of date product with no support, even if it cost nothing (there's no such thing as a free lunch anyway). Of course the real world isn't as simple as the example drawn above but perhaps you can see what I'm getting at; what do you think?

The other point about piracy is that the software industry needs to get its act together much better. I'm sure that a lot of users get involved in petty piracy just to avoid being 'ripped off'. Nearly every CP/M user that I meet has at least one program they purchased where the advertising turned out to be better written than the program!

Another Book on C

Yes, its really true, there is now another book on the C programming language (that makes three). *The C Puzzle Book* by Alan R Feuer, published by Prentice Hall 1982 (ISBN 0-13-109926-4), is a complementary book to *The C Programming Language* by the same publisher. The book consists of many 'puzzles' in the form of C language statements which the reader is encouraged to examine and determine what they do. This is an excellent technique for improving your understanding of a language and certainly takes you into nearly all areas of the language.

Learning C may be divided into three steps:

- Understand the language syntax
- Know what meaning compiler will ascribe to properly formed constructions
- develop a programming style fitting the language.

The puzzles in this book are designed to help the reader through the second step. They will challenge the reader's mastery of C and lead into seldom-reached corners, beyond reasonable limits and past a few open pits. In short, they provide the reader with an insight into C that is usually only gained through considerable experience.

Alan Feuer is from Bell Labs at Murray Hill, NJ so I guess he must have been into some of those 'seldom-reached corners' quite a few times. He certainly has created a fascinating and unique book. A friend brought my copy back from London; I haven't seen it in the bookshops here but then I haven't looked that hard for it, so I can't really say whether its locally available yet.

Local M-Drive

It's easy to get carried away with what is developed and implemented overseas... but it's nice to see Australian companies keeping up with the leading edge of hardware and software development.

GED at Gladesville, in Sydney, has implemented and M-Drive on its System-85 CP/M single board computers and also to act as local high speed storage for the 'Centinet' network workstation.

The M-drive is intended to operate as a high performance disk drive replacement. It is a 512K memory array with an internal sequential address generator, coupled to the host computer as a set of I/O ports. It requires a multi-port parallel interface as a subset of that used for a Micropolis series 1220 Winchester disk.

When correctly used, the M-drive reduces disk overhead to a small number of microseconds per access. The resulting increase in system throughput is dependent on the Disk/CPU usage pattern of the program being executed. In program production edit/assemble GED has achieved, over several months, sustained increases of four times that of rotating media disks. The GED M-drive has parity generation and check hardware implemented on it. The M-drive will report errors with a status return similar to rotating media disk systems.

GED has some other interesting developments in hand and is certainly employing productive and innovative technology in its computer systems. Good on yer Oz!

RCPM News

The new SIG/M volumes up to 75 have arrived and are now available for downloading by request. Volumes 72 through 75 are Australian programs collected off the Software Tools RCPM system.

SIG/M is now up to volume 80, including further volumes of Australian software. I'll be getting those new volumes soon. CP/M UG is now up to Volume 90; the new volumes are on order as well. The CP/M UG in the USA may be going into hibernation for a while (again); I'll let you have more details if that happens. It must be close to time for another release of BDS C UG volumes, I'll be checking that out while in the States for the Comdex exhibition in Las Vegas.

The RCPM system has now logged over 3000 successful connections since May, not bad for a small, free, single-user system!

Best wishes to all of you for the Christmas season. The best Christmas present you could give me is to spend five minutes of your time thinking about the true meaning of Christmas (and I don't mean pine trees, presents and Santa Claus...). □

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your OSBORNE computer

By Greg Stringer

DURING THE past month I have had the opportunity to evaluate Osborne Australia's new 10 megabyte Winchester hard disk drive.

My immediate reaction was one of 'how nice it is to be back dealing with a real computer again'.

Having worked for twelve years with mainframe and mini computers, five years ago I was astounded and fascinated by what was happening with these new 'microcomputer evaluation kits' as they were then.

When such a micro came out with it 'all together' and with the unlikely name of Apple, I was sold — or I should say my car was sold — and I started my strange odyssey with microcomputers. The affair has always been highlighted by the feel for what hidden potential there was trapped inside these tiny plastic boxes.

As with most love affairs, shortcomings that became obvious were more than compensated for by the remarkable potential offered for real personal computer power at such a low cost. The fact that one had to wait two or three seconds for a screen enquiry that required disk access — well that is only to be expected...and so on.

Now that has all changed — the micro has truly come of age. What I mean is that it is now realistic for an individual to process or manipulate quite reasonable amounts of data and information with the same response time as one would expect on a much larger computer or terminal.

I don't mean to suggest that the micro will ever replace the truly mammoth databases of today's generation of mainframe computers but, on an individual or small business level, the age of meaningful and quick, affordable computer power is here.

Easy Set-Up

The set-up procedure for the hard disk was fairly straightforward and, once the hard disk had been formatted and a suitable boot disk configured (about 20 minutes work) the Osborne took on a totally different character. The biggest impact operationally was the total lack of concern for storage.

The fact that I can use my database software to manage my mail lists and then pass straight into Wordstar or Mailmerge makes a big difference to overall throughput. Development time also is reduced by having on-line all the utilities needed to assemble program source code and then jumping straight through and compiling, without the need for housekeeping or disk swapping.

Programs like DBase II that may require two or three seconds to generate error messages, are now only held up by the time it takes to display the information on the screen.

Operationally the hard disk behaves like two five-megabyte drives and has the designations addresses A and B. Disk addresses C and D are for future hard disk expansion, as the onboard floppies use E and F.

The autostart facility can be implemented by using SETUP to enter the program name you wish to use first on function key zero of the boot disk.

The internals of the drive consist of a Seagate head/disk assembly (this is the sealed part of the unit that holds the actual hard disk and driver mechanisms) and an Australian controller card. Savage competition in the States and Europe has seen the prices of hard disks plummet to a level where consumers like ourselves can afford it.

The unit proved tolerant of movement and all the other forbidden activities that are associated with hard disk systems. The fact that an extended warranty contract can be undertaken with Osborne overcomes a lot of the logistical problems in moving to Winchester technology for most business and personal applications.

The Osborne is a portable beastie. Although the Winchester drive is not the sort of thing to be thrown into the back seat of the family car it does make a more than useful home-base peripheral. Like your printer it extends the usefulness of your Osborne system.

By now you will note that I am wrapped. I suppose I should intervene with bench mark test showing an n-percent rise in data access time and an overall increase of x-percent in productivity. You can go to your local dealer for that kind of blurb. What I will say is that if you want to get your hands on real personal computer power, get hold of a Winchester drive and fly.

Supercalc Questions

In this month's mail bag I have received a few requests on how to print Supercalc models in the condensed print mode. You can do this by using the Install program that comes with the Supercalc diskette.

Use option C to 'Edit Printer Initialisation String' and enter the string xx xx, which represents the hex value of the character sequence you need to type to generate condensed print on your printer; for example, '0F' for the Epson.

This means, however, you will have to create a Supercalc Boot disk for every different print format you wish to use.

If anyone has come up with a method of entering control command sequences in an actual screen cell, I would love to hear from you.

Itoh Interfacing

As promised, I will continue a series on various printer interfacing requirements as started last month.

The following details on the C-Itoh 8510 printer were sent in by Trevor Bird of Ermington. Several people wrote in with information on the Itoh...but Trevor's material was the first to hit the desk: In order to make the best use of the C-Itoh 8510A Dot Matrix Printer with Wordstar on the Osborne 1, it is desirable to modify Wordstar so the you can call various print functions to improve the layout of your text. The following functions are enabled by the command codes defined below:

```
^P^N Standard Print Font: Pica _ 10 c.p.i.
^P^A Alternate Print Font: Elite _ 12 c.p.i.
^P^W Compressed print: 17 c.p.i.
^P^Q Enhanced Print (ie. double width print)
^P^R Standard Line Spacing: 1/6th inch
^P^E Sub/Superscript Line pitch: 8/144th inch
^P^Y Printer Incremental Print Mode Toggle ON/OFF

^1 Start Subscript
^2 End subscript
^3 Start Superscript
^4 End Superscript
^0 Continuous Reformatting
```

Modifying Wordstar

To enable the above functions it is necessary to modify Wordstar using:

- The INSTALL program included on the CP/M UTILITY diskette to set the printer locations to:

```
PALT:    03,0F,1B,45              (^P^A)
PSTD:    03,0F,1B,4E              (^P^N)
ROLUP:   03,1B,72,0A
ROLDOW:  03,1B,66,0A
USR1:    01,0E                    (^P^Q)
USR2:    03,0F,1B,51              (^P^W)
USR3:    04,1B,54,30,38           (^P^E)
USR4:    04,1B,41,1B,66           (^P^R)
RIBBON   02,1B,5B
RIBOFF   02,1B,5D                 (^P^Y)
```

- The SETUP program included on the CP/M SYSTEM diskette to set the following FUNCTION KEYS:

```
FUNCTION KEYS       CONTROL CODE TO BE KEYED IN:
^1                   ^P^Y^P^E^P^V
^2                   ^P^V^P^R^P^Y
^3                   ^P^Y^P^E^P^T
^0                   ^Q^Q^B
```

Using Printer Functions

Print Format Selection: Selection of the desired print font is made by using the Ctrl-P-N, -A, -W and -Q commands within the normal course of developing a text file under Wordstar. Note that when the printer is switched on it will normally be set for 10 cpi.

Enhanced or Double Printing: Enhanced or double width printing is toggled

ON by using the Ctrl-P-Q command at the start of the text that is to be printed double character width. To clear the double width command it is necessary to convert to a print font other than that which had been in use, then use the appropriate command to return to the font that was being used.

For example if you are using the normal 10 cpi font and invoke enhanced print using Ctrl-P-Q, to return to normal font the command sequence Ctrl-P-A-Ctrl-P-N is used. (I have no idea why this change in font is necessary but it appears to be the only way to make this work satisfactorily.)

The actual double width print OFF toggle is imbedded in the font selection command code.

Note when using the enhanced printing that only half the line can be used on the VDU or you will overrun the edge of the paper!

Subscript/Superscript Functions: The C-Itoh 8510 printer has a large number of software controllable functions, and because of this it is necessary to combine a number of standard Wordstar commands — there is insufficient space within the Wordstar hex tables to fit all the control codes required.

This can be seen by inspection of the Function Key codes defined above. To simplify matters the various commands are merged into single commands using the Osborne function keys for the start and end of subscripts and superscripts as required during the typing of a text file.

Continuous Text File Reformatting: Continuous text reformatting can be initiated from any location in a text file by the use of the Osborne function key Ctrl-0. This will commence the reformatting from the cursor's current location.

If you wish to reformat from the beginning of the file precede this command with Ctrl-Q-R.

Proportional Print: Unfortunately there are insufficient user definable codes available in the Wordstar hex tables to accommodate all the options available on the C-Itoh 8510 printer so it was not possible to include proportional print in addition to the other fonts. If you desire it, you can include it by either deleting one of the other fonts set up using PALT: USR1: or USR2: or the line pitch commands in USR3: or USR4:. The requisite hex code to be installed is *03,0F,1B,51*.

Note if you decide to delete the enhanced print function you can delete the 0F code from the various print font command hex codes and make the first hex word 02; for example, the proportional print code would be 02,1B,51. □

You Dummies!

ON PAGE 91 of the September issue of *Your Computer* I was interested to read a favourable review of one of my games for the ZX80-8K/X81, Star Battle.

Good reviews of one's software are always welcome ... but didn't you forget something? I would have been one of the few readers aware that this was a Gloster Software product, or even, indeed, that it was for the Sinclair ZX computers! Many would have assumed it to be for the PET by its placement.

Perhaps in a future issue you would be good enough to fill in these gaps. At the same time you might mention that I have a new game coming out called ZX Space Trek. It is based on the starship v klingons plot, but features action graphics (firing, explosions and the like). I features fuel docking, radar scanning maps and inter quadrant travel.

Incidentally, I am rather intrigued by the emphasis your magazine, and other publications including user club newsletters, are placing on the game packs of Gloster Software rather than the utility packs, in particular the utility pack DATA PACK. When I set out to market ZX software, Sinclair's Australian importers told me the demand for DATA PACK would be limited, most ZX owners prefer games.

Yet DATA PACK has sold as much or more copies than all the game packs together! With DATA PACK, the user can pass data on to subsequently loaded programs, save and load data files during program operations, join seperate programs together, re-number program lines, delete large blocks of program lines, and now, the latest addition, VERIFY that a program has saved correctly BEFORE it is lost from RAM. I would be happy to supply a review copy if anyone is interested, but please note that earlier versions have less options, and the instructions have just been revised and improved.

GEOFF GLOSTER
Melbourne, Vic

Tough Games

AN article in the September issue struck a chord with me. I have bought games and then abandoned them after butting my head against the wall so often. It is easy to write a hard game expecially if you don't have to give the answer.

With Pyramid all I seemed to get was a corridor going east. Not much of a maze. Could you pass on the 'few hints' you mentioned. Likewise with Asylum I get nowhere. It gets boring just trying combinations of the vocabulary. Also if you aren't up on what's trendy in jargon. In Asylum you have to pick a lock with the pin from a hand grenade. There are few real world grenades that are not activated by this action (you might get away with it using a WW2 Japanese grenade) — so much for fashionable jargon.

As the price of these games are approaching that of video tape films (super graphic!) perhaps the makers should interface with their public. The games should entertain not enrage.

Can you help me (and my three children) in the escaping and searching of the mazes of Pyramid and/or Asylum?

W W SWEET
Morwell, Vic

No-News BBC

I WAS rather surprised to read a comment in your July issue that the BBC computer was well publicised.

Some short reviews of it have been published in Australian magazines. Apart from two reviews I've read nothing about it.

Anyway, based on some enthusiastic comments by staff members of the Elizabeth Computer Centre in Hobart, I ordered one myself amd managed to squeeze a 32K model A out of the local dealer early in June. I'm told I will be able to get my disk and printer interface fitted in a few weeks time — when they arrive.

I'm quite pleased with the machine.

As the machine has been recently supported by at least two State Education Departments (possibly three by now) it looks like becoming as popular as the Apple in Australia.

The BBC is a British machine, and I understand has been available in Britain for some time. Thus I would assume that some interesting information and software is now making its appearance over there.

I wonder if *Your Computer*, in view of the BBC's impending popularity on the education scene, would be able to investigate this matter, and perhaps in the near future consider a special section for this computer.

N A ALLEN
St Helens, Tas

your APPLE computer

By Peter Sandys

WITH HOLIDAY time just around the corner, I thought you might enjoy the chance to do a computer-related crossword.

I created the one on this page using Crossword Magic — I won't tell you how easy this program makes it, in case you think I've been holidaying myself.

Christmas Games

Traditionally this is the time for an influx of game programs for the Apple, and this year the tradition continues.

I don't have time (or space) to review all the games, but I thought you could make use of these details — I have outlined each one briefly and have given it a rating.

A2-PB1 Pinball; Night Mission. Another pinball program, possibly the one I enjoy most.

It can be modified by the user in areas like ball speed, flipper strength and so on. Rated 12th in the USA in September. Rating — very good.

Type Attack, by Sirius. It's a very interesting program for those who want to learn touch typing but get bored easily. Rating — good.

Mouskattack. A very catchy name and fun to play. It's similar in principle to Snack Attack/Pacman except instead of eating dots you lay pipes in a maze.

I prefer this type of approach, although it may be too similar to Pacman for those who have limited cash and want variety. Rating — good.

Firebug, by Muse. You have a snake-like creature that moves around the screen setting fire to the maze.

Maybe it grows on you (sets the world on fire?) but my first impressions were not favourable. Rating — poor.

Serpentine, by Broderbund. Such is the magic of Broderbund...I would never have continued past the first play, but the nagging thought in my mind was that surely a Broderbund product would be better than that.

I continued to play, and found it grows on you more and more. Rating — very good.

The Arcade Machine. More of a game design tool than an actual game. You can define shapes paths and action so that you can create any game you like. Rating — excellent.

Germany 1985, by Strategic Simulations. This is a new game by Sydney programmer Roger Keating.

It's set in Germany, where Russia and The US do battle. Exceptionally good graphics and a real challenge. It is the standard that is expected of Roger Keating. Rating — very good.

Money Munchers, By Bob Bishop. A sort of Pacman-style game with a twist — you need to collect the money bags left lying around. Your score depends on the amount of money collected. Rating — good.

80-Column Cards

Currently there are a number of these cards world wide. In Australia there is the Vision 80 and the Digicard, both excellent products compared to the US versions.

Now there is a third card, the ESP 8024. It does not have the features of the existing cards but is considerably cheaper, retailing for $255.

The quality of manufacture seems good, and the distributor is actively creating drivers for programs that need modification for 80-column display. The card supports standard Pascal and CP/M. Zardax users have already been catered for with a driver supplied on a utilities disk.

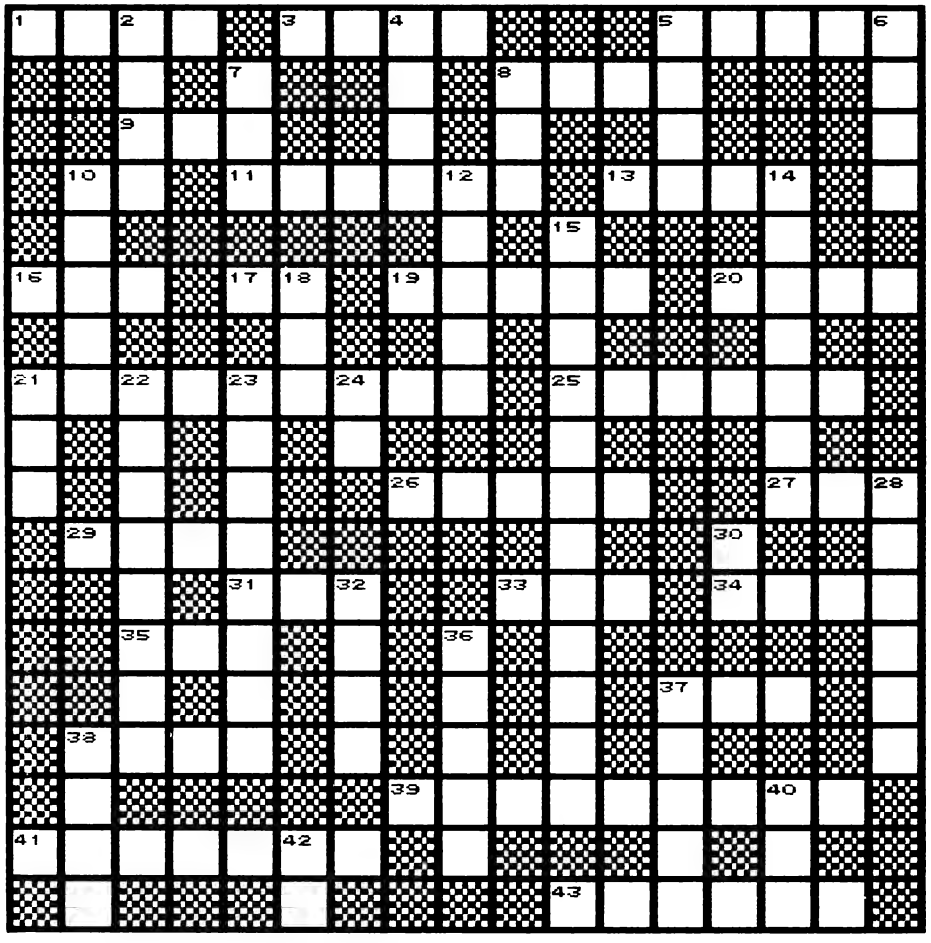
Which do I prefer? It depends on my location and use as well as my bank balance. I see a place for each card...

Readers Comments

In the last issue under the pocket programs section Ian Chia made the comment that he would like this column to give more tips hints and so on. He backed his criticism with some hints of his own.

I welcome his points and I will endeavour to include information I have collected.

Any correspondence relating to gripes, suggestions and bouquets are essential for me to provide the information best suited to you. □

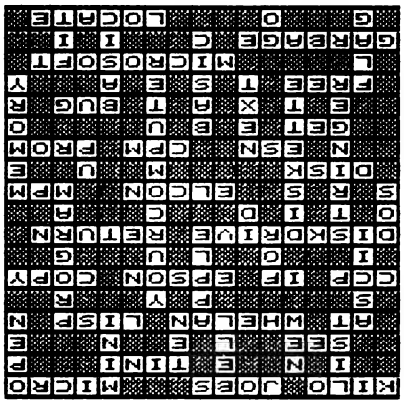


ACROSS CLUES

1. 1000
3. APPLE FOUNDER SURNAME
5. SMALL COMPUTER
8. FORMAT DISK (REVERSE SPELLING)
9. TO LOOK
10. PRINT ..
11. Y/C MAKER
13. LANGUAGE
16. CONSOLE COMMAND PROCESSOR
17. .. THEN
19. TOP PRINTER
20. LOCKSMITH
21. MECHANICAL ASSEMBLY FOR READ DISKS
25. ENTER KEY
26. APPLE DISTRIBUTOR
27. MULTIUSER C/PM
29. STORAGE MEDIA
31. PUBLISHER INIT
33. CONTROL PROGRAM FOR MICROPROCESSORS
34. PROGRAMMABLE CHIP
35. ONE KEY INPUT
37. GLITCH IN PROGRAM
38. FRE(0)
39. BASIC INTERPRETER MAKER
41. WASTED SPACE
43. FIND

DOWN CLUES

2. SEE PROGRAM
4. CHR$(7) OR PROLIFIC Y/C AUTHOR
5. BIGGER THAN AN APPLE
6. DO BEFORE READ FILE
7. CLEAR MEMORY
8. DECIMAL
10. STANDARD FOR CHARACTER INTERCHANGE
12. BEST COMPUTER
14. INSTRUCTIONS FOR COMPUTER
15. THIS MAGAZINE
18. .. NEXT (LOOP)
21. 3.3
22. OLD APPLE COLUMNIST NOW WRITES FOR OSBORNE
23. WHAT YOU USE IN DISK DRIVE
24. USER IDENTITY
28. SPACE AVAILABLE
30. POWER ..
32. FOR .... (LOOP)
36. C.....
37. LANGUAGE
38. ON OR OFF
40. IF NOT ENOUGH MEMORY THE PROGRAM WILL NOT ...
42. .. TO (LOOP)



By Rod Stevenson

I USED the heading "Memory Size" in an earlier column, but it ended up in the wrong place — here's what went with it:

It seems there's a vast lack of understanding of the whole question of how machine code and BASIC can co-exist in memory without either interfering with the other. The level 2 manual doesn't even attempt to clear it up, and I've yet to find a proper explanation of it all in the one place. So here goes...

BASIC normally resides at the bottom (low numbers) of memory — 42E9H/17129D. It will extend upward from there for however big the program is, then use space above the end of the program for various operating needs.

Starting at the top (high numbers) of memory and going down are two very important areas to accept the need for. The first (from the top) is the string space; used by BASIC for working on strings, the actual size needed having been set aside by the CLEAR statement in the first lines of the program — the default value is 50. The second is the stack; used by BASIC for actually running the program and, therefore, taken completely out of the control of the BASIC programmer. The actual mechanics are that the operating system will locate its stack immediately under the declared string area.

So it's apparent that the only place to reserve memory is at the very top (high numbers) of memory, using memory for as far down towards the bottom (low numbers) of memory as specified. Immediately under this will start stack space. And this is exactly what happens when you answer the Mem Size (first Ready on a System 80) question. What you are actually doing is telling the operating system where to start its string space from, leaving it to the program line containing CLEAR (or the default value 50) to tell it how much to leave before starting its stack area.

Incidentally, the reason for my continued qualification of top of memory with the mention of high numbers is that there seems to be a degree of confusion about which is top and which is bottom. High memory is with high numbers (32000+), low memory is with low numbers (0000+). It doesn't refer to the way a memory map might appear on a page — this varies with the artist.

A better way to protect memory than to depend on answering the Mem Size is to make BASIC do the protecting. All that's necessary is to POKE the top of memory pointer with the relevant number to convince BASIC there's less memory in the machine than there actually is.

It's necessary here to delve a little into the mathematics of memory-addressing. What has to be done is separate the address into its Most Significant Byte (MSB) and Least Significant Byte (LSB). This is because it's possible to address only one byte of memory at a time, and since a single byte will hold only two digits, every memory address must use two bytes for its location.

If the address is given in hexadecimal (4 digits, possibly including alphanumeric characters A to F), things are considerably simplified. The first two digits will be the MSB, the last two digits the LSB. All that remains is to convert each into decimal divided by 256, the LSB being what's left. Or, in 'computer-ese':

```
MSB = INT(ADDRESS/256)
LSB = ADDRESS - (MSB * 256)
```

Simple, wasn't it? The address will always be given you, either as a start address (not necessarily the same as the entry address) or as the address to protect memory.

Having obtained the MSB and LSB, all that's necessary is to tell the operating system what it is — in effect, to tell it that is the top address it can use for its BASIC program. But even here there is the extreme exact logic of the computer to consider. For if you use this method and directly tell it what is the highest location it's to use for BASIC, it will do just that — use up and to including that address. However, when you tell it by Mem Size, it actually allows for your intended meaning that your machine-code will start there! Which means: deduct 2 before converting the address into MSB and LSB.

The actual line to reset Mem Size will be:

```
10 POKE 16561,LSB : POKE 16562,MSB
: CLEAR 50
```

The CLEAR is the same CLEAR that clears string space and resets variables. It must be followed by a number indicating string space to clear. It is to reset the various other pointers kept by the operating system, since we've actually only reset one of them, but do, in fact, want all the others to follow the change.

Having protected memory, it should now be clear that there's a 'hole' left above BASIC space and below top of memory into which can be put a machine-code routine, which will not be over-written or in any way interfered with by BASIC. However it's done, the contents will remain totally independent from the BASIC program, but able to be jumped into from BASIC if desired, or simply to be used as a utility program (for example, to renumber/merge). And, of course, it must be apparent that a whole number of various utilities can be kept in memory together and jumped into and out of as required.

If a machine-code program is to be loaded by System (which is likely if it's a sizeable one), the System load is usually done first, but it doesn't really matter so long as the BASIC does contain the memory-protected line mentioned above.

System Tapes

Having spelled out what Memory protection is all about, it might be as well to say what System Tapes are. Simply, they are programs written in machine-code. They cannot be loaded as if they were a BASIC tape, nor can they be listed. It is necessary to type only the first letter of the name of the program, but if you do choose to type the whole name it must be correct. And the machine will not search through a tape until it finds the right System named, as it will with BASIC.

It seems to me that it is assumed the would-be user of machine-code programs will know quite a bit more about the machine than does the user of BASIC programs. This is clearly an unwarranted assumption. But the answer is to find out what knowledge you lack, so perhaps in this way it is of benefit.

I've come across a number of manuals and books which wrongly give the format of a System tape. It should be: A5 sync byte; 55 System header; 6 byte name; 3C block header; one byte indicating block length; LSB of address of block in memory; MSB of address of block in memory; block of data; one byte checksum; the sections from 3C repeated until the program is finished; 78 end code; LSB entry address; MSB entry address.

To check the truth of this, use TRCOPY and look at the contents of the tape on the screen or printer.

Indeed, TRCOPY is a very good utility for copying System tapes (as well as all formats). Although it is a little more expensive than some, it does have the facility of letting you check what is on a tape — a great boon if the tape is faulty and you want to know why.

Regulars will recall that a few columns ago I delved briefly into the area of Random numbers. Too briefly it seems, for a few. What I was using X-Lotto for was to illustrate how simply the random number generator can be used and the results

checked and printed out.

I've been pleased to receive correspondence pointing out that my method of checking was not all that it could have been, though there were no complaints about the actual programming. My belief is that any 'fiddling' with the results of the random generator will render it less random, and it's only that X-Lotto requires that the same number not be entered twice in the one game that warrants any 'fiddling' at all.

But I do see the whole area as a pure mathematical one, and quite beyond me!

USR(0) Assumptions

USR is yet another area where it seems assumed the would-be user of machine-code programs will be born with the knowledge of its use, and there's no need at all for a proper explanation.

The mechanics of its use are that the address of the machine-code must previously be POKEd into 16526-7 so that, upon encountering the X=USR(0), the operating system will know where to go.

The 0 is a 'dummy' variable used to pass up to two bytes from the machine-code, and the X is also a 'dummy' variable used to receive up to two bytes from the machine-code to BASIC. Of course, to use these, the machine-code must be written to do so: the dummy 0 will put the information into HL registers if a CALL to 0A7F is made immediately on entering the machine-code. To return the value to BASIC, the information must be put into HL and JumP to 0A9A instead of RETurning, as normal.

Of course, this is not the only way of using machine-code from BASIC. The one I commonly use is to put an intercept into the keyboard-scan at 4016, so that the operating system will jump to my routine every time it scans the keyboard. The effect of this is to interrupt whatever is happening, do whatever the machine-code instructs, then return to what it was doing before.

Yet another is to use one of the Disk BASIC command entry points for putting the address to jump when the command is encountered in BASIC, instead of the usual L3 error message. All the relevant addressed are contained in the Level 2 ROM Manual previously reviewed here. And, yes, Disk users can still use this technique, although at the loss of one of the disk BASIC commands.

What is often overlooked is that although level 2 BASIC has only one USR call, a new one can effectively be created by POKEing a new jump-address just prior to calling the USR function.

Software Modifications

I've previously mentioned details of various modifications necessary to TRS programs to make them compatible with System 80s, because of the differences in tape and printer interfaces. Now I'm able to advise that these can be bought 'custom-done' by describing your particular needs and system configuration to: John Ross, 12 Lindley Road, Greenacres, SA 5086.

John seems to be doing this more as a service than a profit-making venture, as he's asking only $5 per 'fix' to cover return postage and cassette with the patch if required. To avoid a lot of tedious detail here, I suggest those of you crying out for such help should contact John and determine between you what's required. □

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FREE CLASSIFIEDS: are for readers only, not commercial organisations. Classifieds of 20 words or less accepted free of charge; for classifieds of more than 20 words the first 20 words are free, then it's 20 cents a word.

Send it to *Your Computer* Readers' Classifieds, PO Box 21, Waterloo, NSW 2017.

Vic 20: + Datasette + Joystick + 4 games + 3 manuals. 7 months old. Immac. New $600 — Sell for $480. G Moten. Bh (049)32 8377 or ah (049) 33 7363.

Wanted: Stringy floppy or matrix printer for Tandy TRS80 Model 1. Phone Richard on (02) 869 8149.

Atari 400/MicroBee 32: programs wanted. Write to 53 Chirnside Ave, Werribee, Vic 3030 and include your phone no.

Wanted: Dick Smith black and white monitor, for $80. Must be in good condition. Needed urgently! Phone Cameron Marks on (02) 997 2172.

For Sale: Tandy TRS80 Colour Computer, (16K) with Philips tape recorder and leads $550 o.n.o. Phone (055) 724729 ah.

For Sale: VisiCalc program complete with documentation. Seldom used. Sell for $200.00. Phone T. Rimmer (02) 949 1496.

Archives III: Z-80 Microcomputer with 5 Megabyte Winchester Hard Disk, $8000. Adler SE-1030 Daisywheel Electronic Memory Typewriter as Printer, $2500. Canon Np-210 Dry copier. Takes ledger and A3 size paper, $3000. All goods still under warranty. Prices negotiable. Will sell separately. Devonport (004) 24 3330.

Sell: Atari 400, 32K with recorder, manuals, programming books and software. $850 o.n.o. Phone Ken (02) 683 3383.

17 1K ZX81/ZX80 8K games: Luner Lander, Derby, Suicide, Adventure, etc. Listing $13, Cassette $17. Phone (02) 560 7050.

PC 1500 Portable: Your personal portable pocket computer pack with real computer power. Has 8 bit C MOS CPU, Powerful BASIC Memory — 16K Byte ROM, expandable from 3.5K Byte to 11.5K Byte RAM. And 4 colour data/graphic print out with optional graphic printer/cassette interface CE150. Six user programmable keys with 18 stored phases. Battery or mains power. Phone (02) 600 8222, 22d George Street, Liverpool, 2170.

ZX Printer: $140, 16K RAM for ZX81 $110. Both new, tested only. Phone (08) 339 3924.

MicroBee owner: at Waverton N.S.W. wants to share programs and experience with others in vicinity. Phone (02) 92 6408 after 5.30 pm.

Wanted: BASIC Compiler and right to market. Ian (02) 438 4806.

Vic 20 Software: New from the U.S.A. Including Star Wars $10, Othello $10, Target Zap $10, Radar Escape $14, Gobblevaders $14, Path Finder $14, Tail Gunner (requires expander) $14, 10 great programs $12, Soft Toys Attack $14, Games & Graphics Editor $20. Send cheque or money order to Amazon Software Distributors, PO Box 219, Caulfield East, 3145, Victoria. Ask for our free catalogue. (Dealer enquiries welcome.) Programmers wanted.

Vic 20 Owners: Make $$$ out of your own programs. Specialist software company will reproduce,and market them, and pay you a percentage of the profits. For details send S.S.A.E. to Amazon Software Distributors, PO Box 219, Caulfield East, 3145.

Apple II: Europlus with sculptured monitor, 16K RAMcard, softcard, disk drive, and tape archiving. $3000. (03) 20 2150 ah.

Vic 20 Programs: Send S.S.A.E. for free list, listing and 'Combat' corrections, to R Kube, McCutcheon St, Waikerie, SA, 5330.

ZX81: 16K RAM, Mains Adapter, manuals, leads, $250. Ph (03) 6163351 bh only, ask for Michael Haughton.

Turtle Program: (Vic 20 16K Disk) $18. Write to 3/2 Johnson Street, Birchip, 3483.

Apple II: Software going cheap. All types, good prices. Phone (02) 92 8504 after 4.00 pm.

Sharp PC 1211: Pocket computer plus cassette interface/printer, instruction/applications manuals, charger/plugpack. $285. Phone (03) 878 8895.

ZX81: Complete. '30 programs for ZX81' + 'Complete ZX81 BASIC Course'. Games + education cassettes. About 100 programs on tapes or paper, heaps of important information, 15 computer magazines, AZUA membership, plus cassette recorder. Selling for only $250. Michael (02) 669 3903 (after 4 pm).

Peach ROM Notes: details on Screen, Keyboard and File Handling; Useful ROM Jumps; Bugs and Fixes; Implementing New Commands, BASIC and System Work Areas; etc. $28 B Rossell, PO Box 70, Weston ACT, 2611. (062) 88 5061 ah.

TRS80: Model I Level II, 48K, upper and lower case with descenders, (CTR-80 with sound) plus assorted software. Exc. condition. $800.00 Phone (02) 358 3033.

Wanted: System 80 or Sinclair ZX81 with some programs included. Phone Tim on (087) 25 4196 between 6-8 pm.

The W.A. ZX Users Group: commenced operations in September. For further information, ring Phil Taylor on (09) 328 4111 (bh) or (09) 328 8111 (ah).

Atari 400: Cassette recorder, joystick, BASIC and Missile Command. To best offer. Phone 877 4356 after hours.

For Sale: Two reliable hard working Anadex DP9501 (2K Buffer). Printer $995 each. One Rutishauser single cut sheet feeder for Diablo RO630 at 50% off R.R.P. $825 + tax. Steve Mitchell (02) 358 3011.

ZX80/81 Books: Mastering Machine code ($6); Understanding Your ZX81 ROM ($8); 30 Programs — For ZX81 ($6) — For ZX80 ($4); ALSO ZX-Chess ($15). Phone (03) 419 5862.

Sell: Apple Versawriter Graphics Tablet $200, TI59 Printer $150, DREAM 6802 Computer $100, KTM-2 Terminal $256, All VGC. Phone (071) 79 7302.

For Sale: System 80 Blue Label Plus. Software and manual. Also magazines and BASIC programming book. Must sell. $540 o.n.o. Geoff Boyd (02) 211 1588 (work) — (02) 300 9409 (a/h).

ZX81: 15 Programs. Set $10.00. Catalogue $2.00. Cheques/Postal Order. Poseidom Software, 72 May Street, Preston, Melbourne, 3072.

How To Buy A Personal Computer: This book explains what you need to know and give comparisons of 24 popular PCs. Send $3.95 Chq/MO to OZWAY Consultants, PO Box 1639, Nth Sydney, 2060.

How To Make Money From Your Microcomputer: This book explains how to:- Develop and sell your software, Develop and sell your hardware, Sell systems as a consultant... Plus many more great ideas! Send $22.50 Chq/MO to OZWAY Consultants, PO Box 1639, Nth Sydney, 2060.

ZX81: 16K RAM, manual, game, 4 books. Sell $250. Phone (02) 707 4994. Ask for George.

ZX81 Programs: Tape 1 — Home/Personal Loan Calculator with Amortisation. Noughts and Crosses against the computer $8. Tape 2 — Hangman, Lotto Predictions, Noughts and Crosses for 2 players, Mastermind and many more $8. T Arnoldi, 5 Stafford Court, Leeming, Perth W.A., 6155.

OSI C48: 8K, 300/600 baud, 1/2 mHz, colour, sound. Over $300 software. Cost $1000. Sell $550. B&W monitor $50. Write: Peter Meulman, 3/29 Vine Street, Ascot, 4007.

For Sale: ZX81, 4 program books, 12 cassettes including ZX Invaders. $200. See Gray Thompson, 3 Hopgood St, Melville, W.A. 6156.

Super 80: Sound generator kits now available. Simple kit lets your programs have sound effects. Future programs will be released to suit the kit. Kit + Sound demo program on cassette only $9.95 + $1.00 p/p. Send cheque, money order to - G Georgiou, 140 Doncaster Ave, Kensington, 2033.

TRS80: System 80 software. Eliminator, Star Fighter, Star Flite, Penetrator, only used once, $80.00 the lot. (02) 807 6768, Mark Gosbee.

Floppy Disk Drive: Power supply. 5v@3A, -5v@0.7A, 24v@2.8A. Open frame, compact, with harness for 2xSA800. $100. (07) 376 3323.

HEARD ON THE BUS

By LEON YENDOR

GOOD graphics displays on computers of any size are something I can find to be quite astounding without really appreciating how they are achieved. There is some hardware and software about that can really put on a great show and although there are always great advances coming onto the market impressive displays are not really a recent phenomenon.

The reason that I have never been able to get into graphics is that there have been no standards to ensure portability of programs to machines other than the one on which the software was developed and when you are called upon to work on a wide variety of machines the time taken to learn the rules for a totally different display is just too great for it to be feasible for me.

One would have thought that microcomputers might have been the new ground where a standard would emerge but this has not been the case and anyone needing graphics on a micro would be best advised at present to use a graphics terminal like those from HP or Tektronix and thereby make the driving software portable.

There are some very fancy displays around built into some of the new micros particularly those from Japan but until programs to drive them run on many brands without more than an install program to do the necessary mods, I'll opt out of them.

At present it seems that SIGGRAPH, the body working for a US standard for graphics, has faltered somewhat and that the European ISO standard is more likely to be adopted. With this in mind Digital Research is providing an extension to the CP/M family of operating systems called GSX to provide an interface between applications programs and the graphics hardware. This will allow use of the GSS packages originally developed by Graphic Software Systems of Oregon.

At present these include a 2D subroutine library which appears compatible with ISO proposals, a plot library to handle

line and bar graphs and pie charts, and an emulation of the Tektronix 4010 terminal for computers with graphics hardware.

As the founder of Digital Research, Gary Kildall, has taken a keen interest in graphics since his company's operating systems division is now in stable production, we can expect to see considerable effort from DR to make its packages the de-facto standard for graphics on micros. It will certainly mean that an applications writer will not have to totally write the interface for every machine on which his programs are to run.

Maybe now I'll be able to do something with graphics and when applications writers find a wider market without the hassle of a rewrite we'll see something better than games running on some of the high resolution displays fitted to the up-market single user machines already available.

Terminal Disease

There is a standard for control codes and escape sequences for VDU's. It is called X3.64-1979 and is the work of the American National Standards Institute and is ranked generally as about as useful as the same organisation's standard for the Basic programming language.

I can only think of a couple of manufacturers making terminals which support it and they hardly trumpet the fact. One I can think of has a switch to select ANSI mode as an option and most of its terminals are running with that switch off.

It seems that the standard attempted to please every terminal manufacturer by not imposing any codes used by another brand. This is cloaked by the insistance upon terminating characters in escape sequences, ostensibly to allow variable length command strings. Well the terminal I use to do this writing manages to handle variable length sequences with a very simple one-chip micro intended for industrial control and certainly doesn't need some extra redundant character to waste time doing nothing.

Oh yes, I'm still in favour of standards but there are two requirements to be met before a standard is effective. One is that it be defined clearly and the other, perhaps most important is that it be widely accepted. Think again, ANSI, we don't expect the terminal selection menu for Wordstar to shrink in the near future as a result of your present 'standard'.

Magazine Update

Last month I gave details of a number of magazines which might prove of value to readers. Peter Iliffe of Archive Computer Services has pulled some strings and claims to be able to give a better deal on subscriptions to Dr. Dobbs' Journal. More details from him on (07) 262 2911.

Sol Libes would also like to have us know that Microsystems is now published by the giant Ziff Davis company and apart from the smartened up appearance we can expect bigger issues and perhaps soon a change to monthly issues. □

your ZX81 computer

By David Brudenall

THERE HAS been some speculation in recent months concerning the future of Sinclair computers in Australia, or at least, the importing of Sinclairs.

Rumours have been flying around about Sinclair Australia (a subsidiary of Barson Computers) no longer importing the ZX81. If it isn't, who will? Perhaps Sinclair UK is thinking of starting up its own Australian branch?

There's another rumour of a less than $A150 ZX81 here around Christmas/New Year — the Timex ZX81? As I've mentioned before in this column the Timex (yes, the same bunch who make watches) micro is basically a ZX81 with a different name and 2K of RAM, not the 1K we've all come to know and hate. The Timex is also cheaper...

It seems that the 8K ROM is no longer available in Australia as an upgrade for the ZX80 — Sinclair has at last decided to forget about the 50,000 ZX80 owners! It's Sinclair UK, not Sinclair Australia, which doesn't want to support ZX80 owners, evidently. Rumour has it that Sinclair Australia was unsuccessful in ordering more 8K ROMs from England. Sinclair UK's attitude toward ZX80 owners is hardly commendable. Shame, Clive, shame!

Even though Sinclair is still going to sell the ZX81 as the Spectrum's little brother, I doubt it will still be selling the ZX81 this time next year. I could be wrong, but when Sinclair discovers the Spectrum is stealing the show it will discontinue the ZX81 and concentrate only on the Spectrum. That is, until it brings out the next Sinclair micro.

Australian Software

On the Australian software scene, Gloster Software (GPO Box 5460cc, Melbourne 3001) has announced a household management program for the ZX81.

The program ('Household Management Pack') budgets, suggests how to maximise investments, and also has a 'planner diary generator' which allows the family members to 'keep track of each other's activities and avoid engagement clashes'. Another new Gloster Software release is a ZX81 moving graphics game called 'ZX Space Trek' — yes, another Star Trek variation. Nevertheless, it sounds okay and isn't too expensive at around $15. ZX Space Trek is the first Gloster Software ZX81-only program — all the rest work on an 8K ROM ZX80 or ZX81. With any luck there will be reviews of these products in the months to come.

Quickie Software Reviews

Gloster Software's 'Casino'. This cassette is a set of four individual programs: Poker Machine, Sudden Dice, Five Cards, and Chuck-A-Luck. All four programs use a nifty one-line PEEK to discover if the computer in use is an 8K ROM ZX80 or ZX81, so the programs can utilise moving graphics if the computer is a ZX81, while still remaining compatible on the 8K ROM ZX80.

Poker Machine is very entertaining on a ZX81 — the simulated 'spinning reels' are excellently programmed. We demonstrated this program on a ZX81 at the AZUA stand at the microprocessor convention in Canberra in August and we pulled quite a crowd! It was extremely popular with the kids, not to mention some of the adults! However, the 'spinning reels' are lost on the 8K ROM ZX80 because of the lack of the SLOW function, so the program loses 80 percent of its entertainment value.

Sudden Dice is a dice game where the player has to keep his/her dice total ahead of the computer's. At each roll, the player must decide whether to roll or stop — if he/she rolls a throw the same as a previous throw his/her score is automatically returned to zero! The program displays the throws so far obtained in a turn, which is a nice feature. The ZX81 version features simulated 'rolling dice', which make the program interesting visually. Again, these moving graphics are not implemented with 8K ROM ZX80s. This program requires much more thought than Poker Machine, so is more entertaining (probably) in the long run. However, Sudden Dice's graphics aren't as nice as Poker Machine's. On an 8K ROM ZX80 this is a far better program than Poker Machine.

Five Cards is a game of pure luck, but its intelligent use of graphics makes the game worthwhile for its novelty value anyway. As each card appears it 'overlays' the previous one — it looks quite impressive when first seen! The program itself isn't incredibly absorbing so would fairly quickly become boring once the novelty value of the card display has worn off. The graphic display is similar for both the ZX81 and the 8K ROM ZX80.

Chuck-A-Luck is a competently produced version of the simple dice game. It features a large dice display which would immediately lend itself to being a good game for young children — something to keep them occupied with, anyway! This game has about the same appeal with a ZX81 or 8K ROM ZX80.

So there you have it — Gloster Software's 'Casino'. The best games on it are Poker Machine and Sudden Dice (Poker Machine for it's graphics and Sudden Dice for the need of 'strategy'). The cassette is really worthwhile only if you have a ZX81 — the games (Poker Machine especially) are not nearly so impressive on an 8K ROM ZX80. Summing up then, I would recommend this cassette to someone with a 16K ZX81, who enjoys frivolous games and/or has young children. It's not overpriced at $14.90.

Another program I have had a look at is Bob Mill's 'ZXwords' word processor for the 16K ZX81 or 8K ROM ZX80. Initial impressions are favourable, although there is the question of usefulness of a ZX word processor, especially with the off-putting aluminium coated paper! More on 'ZXwords' in the next *Your Computer*.

Going back to the ZX Spectrum for a minute, it seems that productions problems have caused a six-month delay in despatch of Clive's latest gizmo. No wonder the ZX Microdrives are taking their time to appear! It looks like it'll be some time before the Spectrum reaches Australia (it'll probably get here about the same time Clive announces his next micro).

Again, here is the brief blurb from the Australian ZX Users' Association (look in previous columns for more info on AZUA, and/or send a 40c stamp to the address below for an introductory newsletter and membership form).

AZUA, 19 Godfrey Street, Campbell, ACT, 2601.

By the way, any comments or suggestions for this column would be greatly appreciated, as would ZX software for review purposes. If you are at all involved in the retail or production of ZX software/hardware why not drop me a line as well? Send all mail to the AZUA address above. □

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*Although the greatest care will be exercised with contributions, no responsibility can be accepted for the safety or return of any letters, manuscripts, photographs or other materials supplied to *Your Computer* magazine. If return is desired, you should include a stamped, self-addressed envelope.

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