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Special: The Micro Database Explozion ★ Reviews: InfoStar and Dataminder ★ New Tutorial: Getting the best out of dBase II ★ NCC: We visit American biggest computer shows ★

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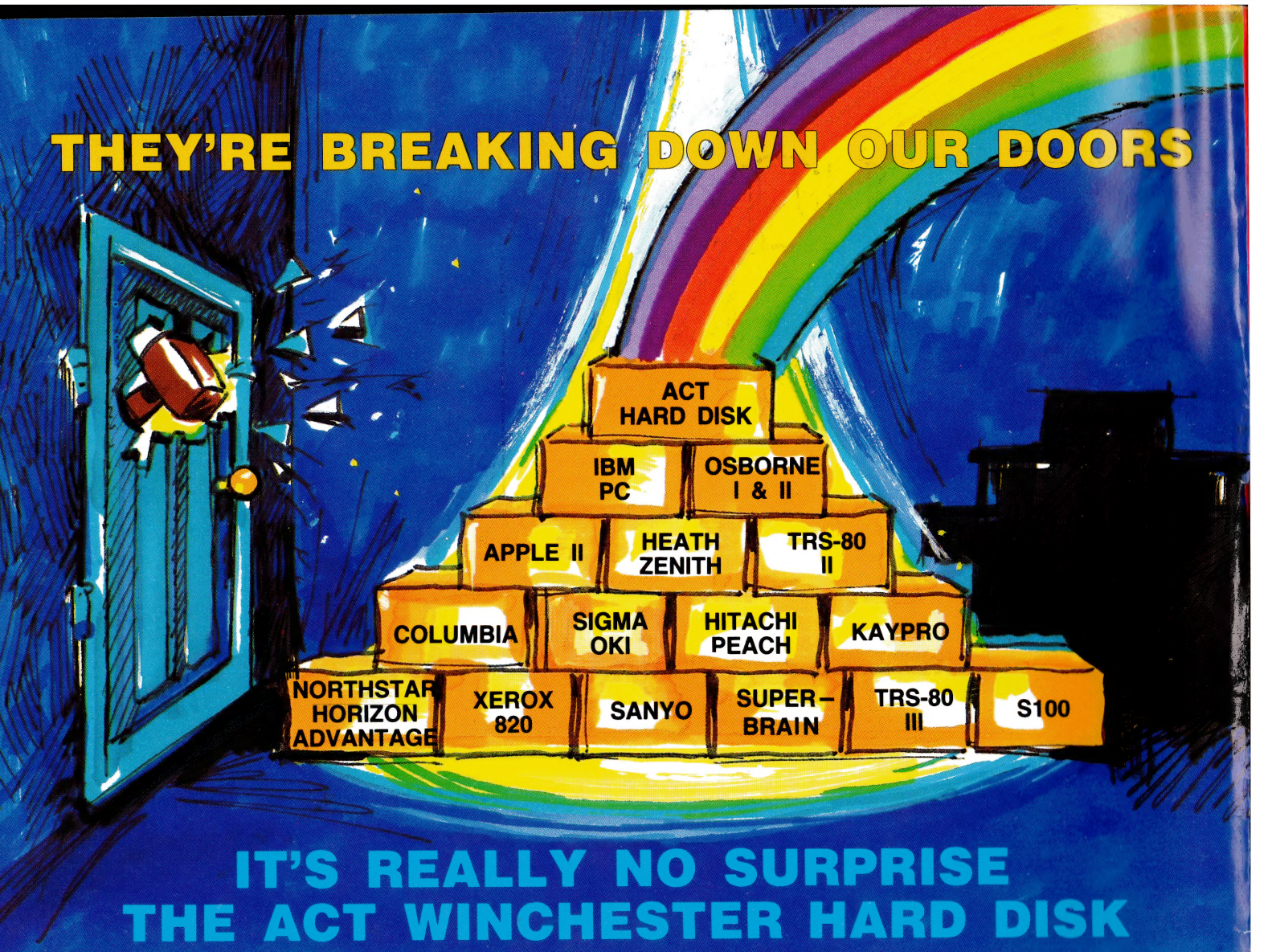
THEY'RE BREAKING DOWN OUR DOORS



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inside your computer

Vol 2, No 12. July, 1983.

special

20
Database Special
An introduction to database concepts, a review of InfoStar, plus the one you've been waiting for: the start of a dBase II tutorial series! Our planned review of Dataminder will follow next month (sorry, we couldn't re-typeset the cake after we ran into problems with the review!).

51
Pocket Programs Liftout
Another free 16 pages of pocket programs, contributed by readers for all of us to enjoy.

92
Annual Index
An index to *YC*'s second year, grouped into useful categories. An invaluable reference, even if you throw your other copies out (you wouldn't, would you?).

news

4
It's Official!
Perhaps now we'll hear fewer false claims: our sales have been audited, and we're the top-selling computer magazine in Australia...

6
Your Computer News
All that's new, innovative, inventive and imminent, in all areas of the microcomputer industry.

90
It's 1984 Already!
Get a poster-size copy of last month's magnificent futuristic cover, complete with 1984 calendar...

features

20
What IS a Database?
Les Bell introduces the concepts of data management in this opener for our special on databases.

36
California Dreaming
Frank Lee speaks of the wonders of the United States' biggest computer exposition, NCC, and details some of the more interesting newcomers.

80
Statistical Analysis
The second, final, installment in John Plummer's display of the Sinclair's more serious capabilities.

84
Let's Go Turing
Jack Dikian explains the theory of the Turing machine, and presents a program to simulate one.

100
Brendan's Birthday
Brendan Akhurst sets out to turn the *Your Computer* birthday party into a computer-controlled cartoon.

reviews

23
An InfoStar Is Born
Micropro's entry in the database market is really a collection of programs. We try them all, and find ourselves impressed.

42
No Frills, Lotsa Thrills
An owner report on the Option II, another well-packaged example of how good a single-board computer can be.

46
Defender Of The Faithful
Owner reports can be the best test – as long as we can get them to stop playing and start writing...

68
Transatlantic Transformation
John Crabb looks at two worthwhile packages for the Sinclair ZX81.

74
NEC's Benchmark
How does the Personal Computer Of The Year process words? With an interesting new package called The Benchmark, that's how...

for beginners

31
dBase II Tutorial
The one many of you have been waiting for, especially now you don't have BASIC For Birdwatchers to play with at night. Discover the inner workings of dBase II, and learn how to get the most out of it.

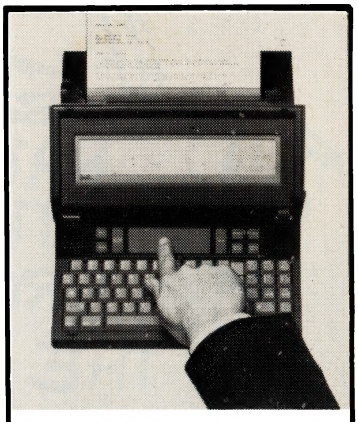
48
Microbee Music
Part two of our series on Microbee sound generation, exploring in detail some of the more unusual applications.

70
Getting Friendly
Jeff Richards continues his series on making BASIC applications as friendly – and useful – as possible.

departments

88
Text File
We've been collecting your mail for a while, but now it's time for you to have your say...

104-110
Popular Systems
Individual columns devoted to the more popular models. This month including TRS-80, CP/M, and ZX81...with the return of a wider range planned for next month.



The Gavilan, an impressive new portable we uncovered at the US National Computer Conference. Read about it and all the other new goodies on Page 36.

We had a lot to celebrate at *YC's* second birthday party (see why on page 4), with a group of staff and contributors. Brendan Akhurst's computerised version appears on page 100.

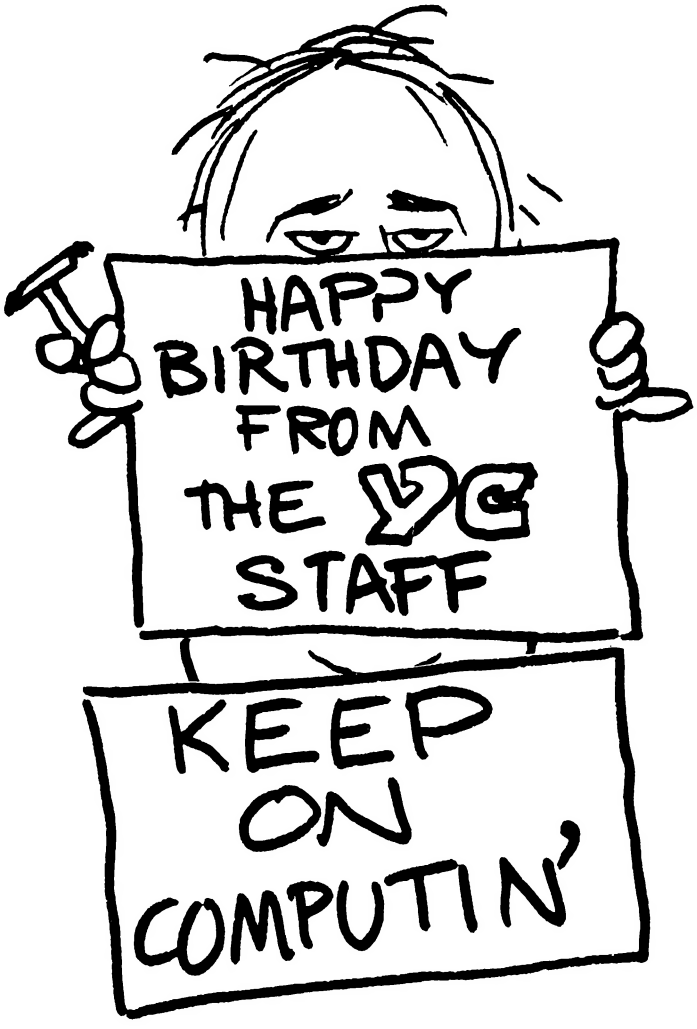
next month

We enter our third year of publication as Australia's top-selling computer magazine – and with big plans to consolidate our position as market leader.

Our logic is simple – provide more value at no extra cost, with new features, extra pages and more programs. See over the page for more details of plans for next month.

We'll also return to our tutorial series on Assembler plus the Introduction To Logic.

editorial



IT'S BIRTHDAY time again for Your Computer *– this is our 24th issue of the magazine (even though it's taken us 25 months to produce them, we prefer to base our anniversaries on a 12-issue year...).*

We have a lot to celebrate, too with some bold new plans for a bigger, more informative and more entertaining magazine.

For starters, we are now committed to running the 16-page Pocket Programs Special at least every second issue – remember, it's added *to the magazine, not included in it.*

And, from next month, you'll see another bonus extension of Your Computer *– we're about to launch our* Business Technology *section, a complete magazine on its own, bound inside our normal issue with all its regular features retained.*

We've long wanted to cover the business market in more depth, but have been loath to do so at the expense of the magazine's obviously popular current style and content. Now we – and you – can have the best of both worlds, at no extra cost!

Talking of cost, we're still pretty proud of the fact that our cover price has never *been increased...*

Finally, we're happy to pass on some good news that we've known for some time, but is now incontrovertible: Your Computer *is officially Australia's top-selling computer magazine. Apparently, this is especially good news to Richard Unpronounceable, our Advertising Manager; we of editorial persuasion want only to ensure this is Australia's (tomorrow the world...) most informative, most entertaining, and most readable computer magazine.*

Apparently you agree, and appreciate our progress so far – thank you – but, as is said often in the micro business, you ain't seen nothin' yet! Just wait and watch for the improvements we have planned, which start next month with the new business section...

- Matt Whelan
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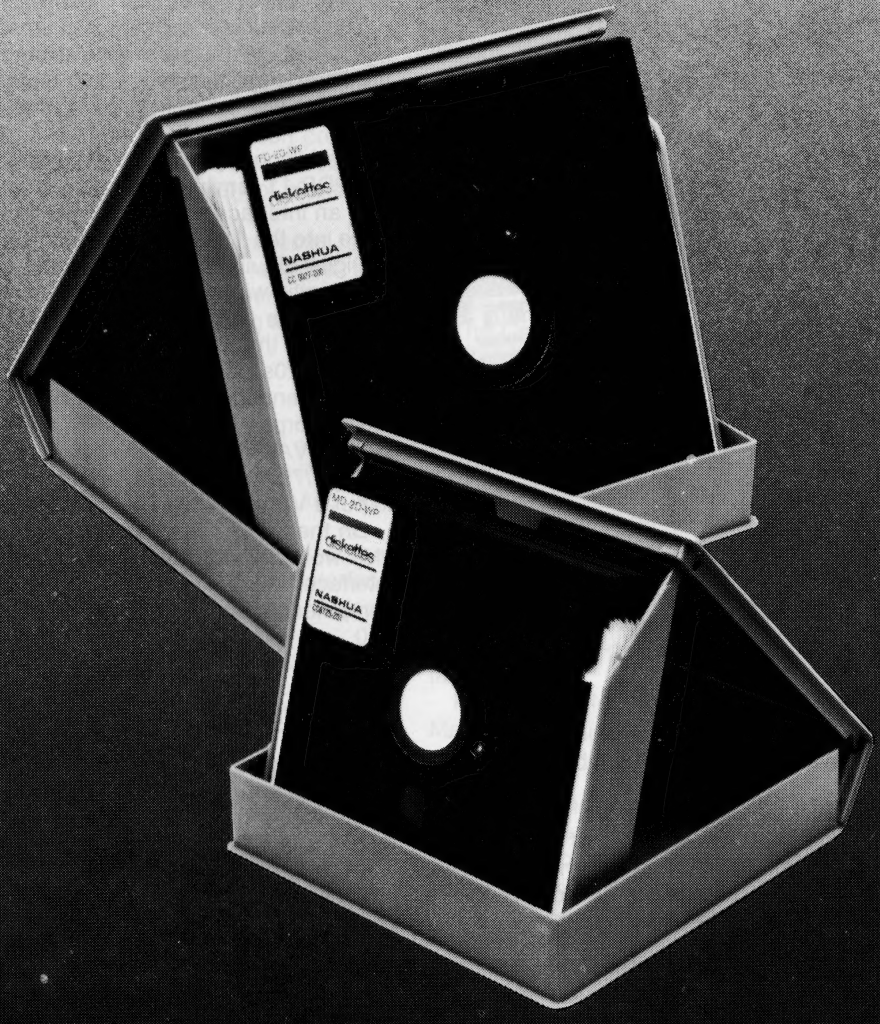
"Quality Circle" Diskettes



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your computer news

NEC's APC, the Personal Computer of the Year.

NEC Extends Warranty

NEC HAS EXTENDED the hardware warranty on its Advanced Personal Computer to 12 months. The 12-month warranty will apply to all APCs already installed in Australia, as well as future sales. □

Computer Conversations

THE BRITISH software firm Albetros has developed a package called Semaphore which, it says, is capable of linking any two computers.

Using disk or tape, Semaphore is loaded like a normal user program into the computers at the two ends of the line; it can be an ordinary dial-up line of any quality. The software has been tailored for the IBM, DEC and ICL microcomputers, as well as the Cifer, Televideo and Rair machines. □

DEC Extends VAX Architecture

THE DIGITAL Equipment Corporation has announced a new extension of its VAX range of 32-bit minicomputers. The new VAXcluster concept allows multiple VAXs to be linked together in a loosely coupled high-speed network by a high-speed bus called CI (Computer Interconnect). The CI bus provides dual 70 Mbit/s bandwidth between the cluster nodes over a distance up to 45 metres.

The cluster configuration is augmented by the new HSC50 intelligent mass-storage controller, which acts as a file server, controlling up to 24 disk and tape drives.

The new software extends the VMS operating system to automatically provide load levelling between the various central processing units and disks, as well as providing automatic fail-over recovery.

An interesting feature of the software is the distributed lock manager, which permits all the processors to share files, as well as allowing remaining processors to free up resources held by a processor which has just failed. Using the common journaling facility, a database can be "rolled back" to a known intact state, and then "rolled forward" on another processor to reconstruct the database.

A checkpointing facility allows "snapshots" to be taken at critical points in a program's operation, so that if it should abort close to the end of a long run, it need not be run from the start but only from the most recent checkpoint.

The VAXcluster concept is claimed to relieve data-processing managers of the responsibility of long-term planning, in the knowledge that their VAX system can grow in simple increments with no need for software translation or transportation.

In addition, special terminal server processors, based on the PDP-11 family, will be linked into the VAXcluster to provide an interface to Ethernet, so that the VAXcluster will integrate into the "office of the future".

Digital Equipment launched this new product at an ambitious Pacific-wide teleconference for customers and the press. During the discussion, some other interesting points emerged: the VAXcluster concept is also available for DEC-System 20s under TOPS-20 and the cluster concept is likely to be extended to the PDP-11 family.

The corporation also confirmed its commitment to extending the VAX family both upwards (machines larger than the VAX-11/782 are under development) and down (the goal is to put a VAX-11/780 into a desktop machine).

On the subject of desktop computers, Digital Equipment is also working on providing a standard operating system user interface, using menus, on the entire DEC range of microcomputers – the Rainbow 100, Decmate II and Professional 300. □

The Computerised Antidote

FASTER TREATMENT of poisoning is now possible through Britain's first computerised poisons information service. Family doctors and hospital casualty units can now use their telephone line to provide a link between a surgery television and the computer's memory bank.

In this way, doctors faced with a sudden poisoning emergency can instantly tap the information service's vast pool of knowledge about toxic substances in common use, as well as details of the best treatment. □

Vector's Hard-Disk Version

A 10-MEGABYTE hard-disk version of Dicker Data's eight- or 16-bit business computer has been released. In addition to the 10-megabyte Winchester hard disk, the Vector 4/40 also has an integrated 13 cm floppy disk with a capacity of 630 kilobytes.

Both CP/M and CP/M-86 operating systems plus GSX-86 graphics software are included as standard equipment.

Priced at $7995, the Vector 4/40 can be used as a stand-alone computer, or as a workstation on Vector's recently announced LINC local-area network.

The system's 16-bit microprocessor is an 8088 for which a large and varied selection of application programs are also being written. In addition to Memorite III word-processing and ExecuPlan II electronic spreadsheet software, Vector also offers a variety of optional productivity software.

For further information, phone Dicker Data on (02) 525-2122 Sydney. □

The Ratepayers' Computer

THE CAMPBELLTOWN (New South Wales) City Council has bought an Apple microcomputer from Seahorse Computers, to be installed in the Campbelltown Public Library for public use.

Citizens of the Campbelltown/Macarthur region will be able to gain hands-on experience with the same type of computer that is being used at local schools, and in a number of local businesses.

Seahorse Computers has also installed an Apple system networked to a 10-megabyte Corvus hard-disk drive, for mass data storage, in St Patrick's School, Campbelltown. The system allows staff to use it for word-processing, lesson preparation and administrative data storage. Students have access to different parts of the Corvus, for use in a variety of classroom areas.

The software available includes English and remedial reading programs, and programs for humanities, science and mathematics classes. Outside normal school-hours, the system is being used by the University of Wollongong for teacher-training. □

Hard-Disk Storage From Corvus

SEAHORSE COMPUTERS has released Corvus hard-disk drives suitable for Apple II, Apple IIe, Apple III, IBM-PC, DEC 180, Intertec Superbrain, NEC, Xerox 820, Osborne and Atari computers.

A feature of the Corvus range of hard-disk drives is that they are available in either standard form or with a mirror interface, which enables the data to be backed up to a standard video-cassette recorder for economical safety back-ups.

An economical expansion chassis unit for the Commodore VIC-20 is also available from Seahorse Computers. It fits into the VIC-20 expansion slot and provides sockets for up to four memory expansion modules or ROM cartridges. The unit is available for $59.95, plus $1.50 postage and packaging.

For further information, contact Keith Stewart at Seahorse Computers, phone (046) 66-6406 Camden. □

The Driver's Manual

THE MOTOR Traders' Association is helping its members sort out the tangle of computer-aid choices by producing a comprehensive guide to the selection and use of the most relevant computer technology.

Developed by David Tow, of the Australian Software Research Centre, the bi-annual guide covers three main areas: selection of hardware and software, comparison and analysis of systems specifically for the motor industry, and updates on new technology. □

The Obsolete Guide

DATA INCORPORATED has announced the publication of a new service designed to speed and simplify obsolete digital integrated-circuit searches. Titled *Discontinued Digital IC*, it indexes more than 17,000 devices that have become obsolete since 1968.

The new book will be published each June, as part of the 27-volume Data Books Electronic Information Series. □

Bulls And Bears

THE SYDNEY stockbroking firm Bridges Son and Shepherd has installed a Panasonic JB3000 microcomputer with software from Amicron Business Systems, to provide information on the daily share market.

A comprehensive list of clients, holding stocks of any share which reacts to market trends, can be immediately contacted. In addition, the system can provide a monthly print-out of holdings, the month-end prices, the value of each holding, and the percentage of the portfolio represented by each holding. □

The Conquering System

A SMALL business/scientific computer retailing at microcomputer prices has been announced by CPM Systems. The Conqueror features 64, 128 or 256 kilobytes of RAM, and can be used by single or multiple users, with MP/M, Turbodos, CP/M 2.2, CP/M 3.0 or the data-logging DOS supplied by the manufacturer.

The Conqueror does not come with a terminal, though the new Hazeltine Esprit II terminal with detachable keyboard is available with the Conqueror label. The system uses slim-line 13 cm double-sided drives. A hard-disk interface is also included.

The dimensions are 150 by 150 by 300 mm, and operation can be on a 12-Volt battery. CPM Systems claims the Conqueror is easy to maintain, as it is on a single card which is simply removed.

The Conqueror comes with dBase II, Spellbinder, Assembler, Debugger, BASIC and many support programs. A complete business package, including accounts receivable, accounts payable, payroll and job costing, is supplied free with the hard disk.

For further information, phone R. Toronyi on (03) 267-4755 Melbourne. □

Advance's Ingenious Software

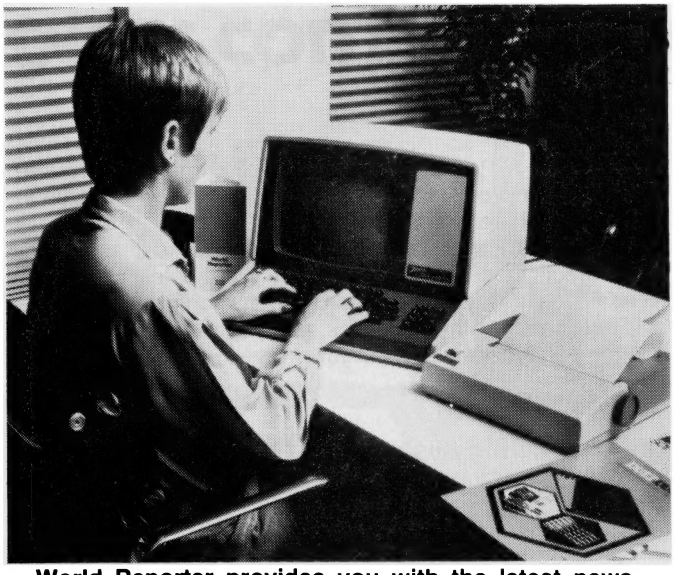
WHEN THE 12-METRE yacht Advance takes to the water in the America's Cup, it will have been assisted by a sophisticated computer software system, rather than man's ability to know the sea.

The system, called OCKAM, has been designed by Price Waterhouse Associates, and records data points such as wind speed/direction and boat speed, which is then computed to enable the helmsman take the best advantage of the prevailing conditions.

The data points are recorded by OCKAM, transmitted to an on-shore computer, analysed by Price Waterhouse Associates-designed software, and used to produce helpful tables for helmsmen and tacticians. □

PDE Is It For Coke

COCA-COLA is using a PDE system, supplied by the TCG Group, for order entry and stock delivery processes in Sydney. The Coke sales representatives are being provided with terminals, into which all orders are entered and transmitted daily to the host computer, an IBM System 34, through an IBM Series 1 processor. Using this system, Coca-Cola says its delivery turn-around time has improved considerably. In addition, transmission time is faster – reduced from a 15-minute call to three or four minutes – and the cost savings on STD calls are substantial. □



World Reporter provides you with the latest news.

The Desktop Reporter

A NEWS SERVICE which brings the latest major international news items to your office desk is being launched in Australia by Software Sciences, a division of Thorn-EMI.

Called World Reporter, the service provides a database of international news that can be accessed at the touch of a button. The information is collected from the text of the BBC's overseas news broadcasts and *The Economist*.

Subscribers can receive the World Reporter service using computer terminals linked to telephone lines, or on most communication-equipped minicomputers.

To extract material from the database, the subscriber dials up World Reporter and, using a series of relatively simple instructions, obtains the latest news in seconds. The information can be displayed on a screen or produced in hard copy from a printer.

For further information or a demonstration, contact Ian Walker on (02) 922-7400 Sydney. □

New Authoring System

A NEW COMPUTER-based course authoring system, released by McGraw-Hill, will allow educators and company training officers to create computer-aided instruction courses after only a few hours on the system.

The Interactive Authoring System, which runs on the IBM-PC, can create multiple pages to either deliver textual information or ask four different varieties of question. The system supports simple colour graphics on the IBM-PC screen, and can also interface to a video tape recorder to deliver more complex material.

Early courses available are orientated toward traditional data-processing training, but the system can be used to develop courses on virtually any topic. The price is $3000 for the authoring system itself, and $500 per copy for the delivery system which allows students to take the courses. □

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XE6780 BACUP

A program to assist you in making backup copies. Allows you to load in a file loaded at 300 bayd and save it again at 200 bayd or 1200 bayd.

$11.95

XE6840 UNDERWORLD OF KYN

Underworld of KYN is an advanced adventure, average playing time to complete the game is about 10 to 12 hours for this reason it is recommended mainly for experienced adventurers.

$14.95

XE6750 FINANCIAL MANAGER

Provides an accurate and clearly formatted record of any financial account, and a cost analysis stated in money amounts and percentages. Two principal applications — Personal Account Monitor and Business Account Analyst.

$15.95

XE6845 SEADOG

SEADOG A war game between two ships from the days of NELSON. You may play against a friend, or against the computer. The game features limited resolution graphics for the war battle sequences. As well as the enemy fleet, you must survive hazzards such as hurricanes, diseases, and your own gun aimers who do not always shoot straight.

$14.95

XE6760 FILEX

Filex is a larger version of Cardex, but handles larger amounts of data, and also is easier to find "the cards".

$14.95

XE6785 PIANO BEE

A program which will hold songs each of 127 notes long. You enter the time and the note via the keyboard. The songs can be saved onto tape and be replayed again later. When it plays the same song back it plots the notes on a musical stave.

$14.95

XE6030 SPACE INVADERS

One of the most popular programmes ever released. This version was written especially for the Microbee.

$14.95

XE6216 SUPER DISASSEMBLER

Into Machine Language? This Disassembler will disassemble any code allowing you to view the contents of any part of the memory.

$19.95

30 day credit accounts are available to Government departments, educational institutions etc. Send us your order on an official order form and we will send you the goods free of sales tax.

FROM MYTEK

MACHINE CODE TUTORIAL

Consists of eight interactive exercises designed for teaching machine code programming and related topics as they apply to the MicroBee computer. Only a general knowledge of the BASIC language is assumed. MACHINE CODE TUTORIAL is designed to bridge the gap between BASIC programming and being able to understand and use typical Z80 manuals.

$25.00

BASIC TUTORIAL

Is a super teaching aid for any classroom. BASIC TUTORIAL is a set of nine interactive exercises designed for teaching Basic to the computer novice. No previous knowledge is assumed. BASIC TUTORIAL uses a unique double screen technique to display both the normal computer output and the tutorial exercises at the one time. This allows the student to use the MicroBee in the normal way, while the tutorial instructions appear in the lower half of the screen.

$20.00

XE6297 ASTEROIDS PLUS

Asteroids Plus is one of the finest high resolution graphic arcade games available for the MicroBee computer. It features 3-D point by point resolution graphics, shields, sound effects, intelligent objects, guided missiles, black holes and a score board. If you enjoy playing computer games, you will be captivated by Asteroids Plus.

$22.50

XE6298 BEE Z 80

This secret code disassembler will disassemble any code sequence. Nothing is illegal. It will allow you to program with codes that no other disassembler can decipher!

$20.00

The White-Collar Guide

A COMPREHENSIVE guide to microcomputers, written specifically for the Australian businessman, has just been released.

The Businessman's Guide to Microcomputers is the result of six months of research and writing by a team of chartered accounts from Deloitte Haskins and Sells.

The 200-page book takes the businessman through a quick course in microcomputers and their applications. It then reviews 11 of the more prominent brands available in Australia, and 25 software packages for financial modelling, database, word-processing and accounting applications.

The main objective of the guide is to "cut through the jargon" and the mass of competing claims confronting the businessman who is considering the purchase of a microcomputer.

The book is not intended as a publication for computer buffs, but rather as an easily comprehensible guide for the business executive new to the subject. It is available from selected bookshops and computer retailers. □

Redesigned Spectrum

THE TIMEX 2000, a redesigned and enhanced version of the Sinclair Spectrum microcomputer, is going on sale in the United States about now. The 16-kilobyte model will cost $US150, while the 48-kilobyte model will be $US200.

The Timex 2040 thermal printer costs $US100. □

Dot?

DOT IS A NEW computer released by Radaro Computer Devices, of 316 Queen Street, Melbourne, 300 (phone 03 67-6638).

Manufactured by Computer Devices in Burlington, Massachusetts, the Dot is a 16-bit machine based on the Intel 8088 with up to 704 kilobytes of memory, integrated screen with high-resolution (1024 by 254) graphics, optional 160 characters per second inbuilt printer, dual 282-kilobyte 9 cm floppies and the MS-DOS operating system.

The machine can run a wide range of applications software, including word-processing, accounting, database management, financial modelling and professional management tools. The price for a fully-loaded Dot is $4995, plus tax. □

Home Computer Service Scheme

A CONTRACT service scheme, similar to that available for colour televisions, is now available to users of the Texas Instruments Model 99/4A home computer.

The scheme, known as the Home Computer Service Club, provides members with low-cost service on the console and peripheral equipment, plus replacement of solid-state software modules.

A small registration fee is paid for each item to be covered. Thereafter, any service required is carried out by Texas Instruments' service centres or authorised service centres at 50 per cent off normal fixed price repairs. □

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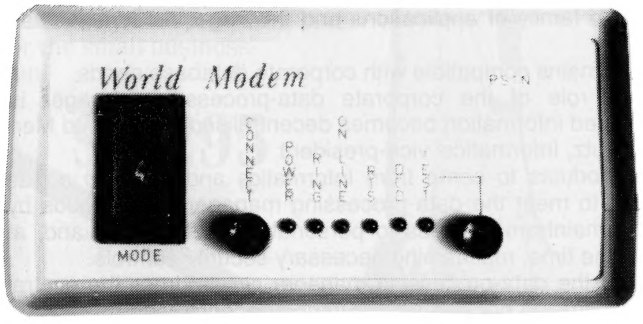
- **Telecom Permit:** C83/37/1014.
- **Compact size:** 190mm D, 138mm W, 71mm H



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Micro-Mainframe Union

THE BIGGEST problem faced by data-processing managers in large companies is how to connect personal computers to the company mainframe. Three questions arise: is it advisable, is it technically possible, and how do we control access?

While data-processing managers will still have to make a policy decision on the advisability of connecting personal computers to corporate databases, the remaining two questions have been answered, thanks to a new joint venture between VisiCorp and Informatics.

The two companies have announced joint development of two new products which will link personal computers with large IBM mainframe systems. The new products will be designed to enable personal-computer users to selectively extract data from IBM mainframe database-management systems in a format compatible with VisiCorp applications software.

The products are VisiAnswer, which operates on the IBM-PC microcomputer, and Answer/DB, which runs on the IBM mainframe.

VisiAnswer provides a user-friendly human interface on the microcomputer, helping the user to formulate queries and select desired data. Then Answer/DB selects and extracts data from any database maintained on an IBM mainframe, summarises the data and downloads it to the microcomputer running VisiAnswer.

VisiAnswer handles all communications with the mainframe and Answer/DB automatically, thereby shielding the users from the complexities of mainframe access.

According to Daniel H Fylstra, chairman of VisiCorp, "The proliferation of personal computers in the corporate environment has led to enormous productivity gains for planners and managers.

"However, it has also helped create a growing data-mangement crisis for those responsible for planning and directing the corporate wide data-processing activity." VisiCorp, through its VisiCalc financial package and the VisiSeries family of business/applications software, has played a major role in the corporate personal computer environment.

"Our customers expect us to be part of the solution to this emerging crisis," Fylstra said. "Our joint development and marketing agreement with Informatics will help ensure that the VisiCorp family of applications and the large VisiSeries-installed
base remains compatible with corporate database needs.

"The role of the corporate data-processing manager is generated information becomes decentralised," explained Merritt M Lutz, Informatics' vice-president.
"The products to come from Informatics and VisiCorp are designed to meet the data-processing manager's new needs by giving mainframe access to personal-computer users and, at the same time, maintaining necessary security controls.

"Now the data-processing manager can address the central site application backlog while offering decentralised users what they have wanted for a long time – personalised availability of data from mainframe databases." The first product to emerge from the joint development programme, VisiAnswer, will link VisiCalc and other software in the VisiSeries to IMS, IDMS, TOTAL, ADABAS and other mainframe databases through Answer/DB. VisiAnswer will operate on the IBM-PC microcomputer and link to mainframe databases using IMS/DC, CICS, CMS and TSO communications monitors.

To provide for privacy, security and controlled access to critical corporate data, Answer/DB allows the database administrator to set up "user profiles", specifying which parts of the database should be accessible to each user. The database administrator could give the personnel manager access to salary data, for example, but could prevent other employees from accessing that information.

Besides providing access control, the profiles allow user-friendly names and descriptions for the data to be defined for each user, which simplifies formulating queries.

Answer/DB provides nearly universal access to the variety of mainframe files and databases, including IBM's IMS and DL/I, Cullinet's IDMS and files accessed by VSAM, ISAM and other standard IBM access methods. It will initially operate under the IMS/DC telecommunications monitor, with CICS, CMS and TSO versions to follow.

The initial versions of Answer/DB and VisiAnswer will communicate with each other using a proprietary asynchronous link protocol. Later versions will incorporate support for IBM bisynchronous (BSC) and systems network architecture (SNA/SDLC) communications protocols to provide total compatibility with large companies' information networks.

The first customer shipments in the United States will be in August. The purchase price of a typical configuration, consisting of an Answer/DB module on a single mainframe and VisiAnswer for 50 personal computers, will be US$45,000.

For further information, contact Datec, 220 George Street, Sydney, 2000. Phone (02) 241-1601. □

Tax-Inspired Comfort

A RANGE of ergonomically designed computer-operator desks and chairs has been launched by Duff Steel Industries. The development of the furniture was inspired by the installation of computers in the Australian Taxation Office, which showed that poorly designed desks had contributed to an injury cost exceeding $1.6 million annually.

It has been estimated that when an operator spends more than 40 minutes at a computer task, discomfort can lead to physical injury. Duff Steel says its new range will help operators eliminate injury due to dimensional misalignments in their computer tasks.

For further information, contact (02) 521-8333 Sydney. □

More Commodore Goodies

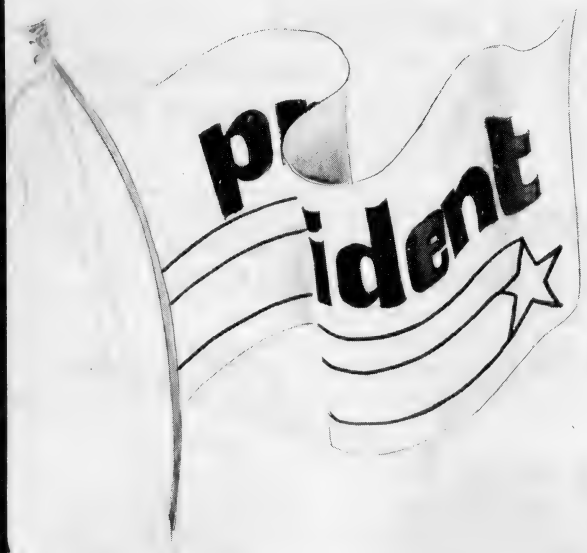
A RANGE OF languages, utilities and games designed by HES Software for the Commodore 64 and VIC-20 microcomputers is now being exclusively manufactured and distributed in Australia by Imagineering.

The range includes HES Writer, a word-processing package; Turtle Graphics, ideal for novices who are learning programming concepts; Forth, the language beyond BASIC; HES MON, for the serious program developer; and Synthesound, a music synthesizer for the VIC-20 only. □

Imagineering Software Guide

IMAGINEERING HAS produced a software buyers' guide, to provide an overview of the company's total product range. An in-depth review of both VisiCorp and MicroPro products is included.

In addition, Imagineering has compiled a monthly "hot list" of software sales, from more than 500 computer outlets of Apple, Atari 400/800, VIC-20 and IBM-PC products. The list is in four sections: business programs, entertainment programs, add on peripherals and accessories and educational programs. □



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Easy is the most apt description for this model – easily portable, affordable, readable and typeable: Sculptured, high-quality keyboard, and weighing just 13 kilos. A free range of software to the value of $2,500 is included.
The Kaypro is CPM-DOS compatible and driven by a ZILOG Z-80™ micro-processor, making it a most popular system for the small business-person.

$3,295
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SUPER POWER

An innovative combination of 10 megabytes of power with perfect portability is what this computer is all about. The hard disk CPM-DOS™ compatible system is suitable for word processing, professional and personal use. Features graphic display and the full range of "ready to go" Kaypro software. What a package!

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KAYPRO 10

THIS IS IT!

WE WILL NOT KNOWINGLY BE UNDERSOLD

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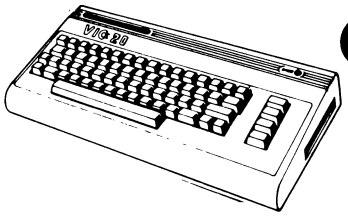

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Plugs Straight into APPLE or WOMBAT
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- Phone for all other 'Compatible' Prices
  (JUST SOME OF OUR SPECIALS)

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* POPULAR BRAND 18mz Green Phosporus $179. BMC 18mHz G'Phos $199. KAGA — Hi Res Colour $399 (All monitors + 20% S/T)

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* VERBATIM DISKETTES 5¼" DISC $31.90 Box of 10 (+20% S/T)
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COMPONENT MEMORY SPECIALS — BEST WHOLESALE PRICES IN AUST.

RAM 2114, 4116 @ 1.25, Eprom 2716 @ 3.89, 2532 @ $4.88+
YES WE'LL TALK ON QUANTITIES OVER 1,000 (Add 20% S/T To These)

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- **SHEPPARTON (As Above)**
  Telephone (058) 21 7155

Deltak's New Training Deal

THE WORLD'S largest supplier of multi-media computer training courses, Deltak, has joined forces with Goal Systems to bring computer-users a faster and more flexible training system.

These new training courses will be based on the Phoenix presentation system, which was awarded the $1 million IPC award.

New and existing Deltak CBT courses will use Phoenix, and these will be available in Australia from July. As a special attraction, Deltak will be making Phoenix available free to its customers to help them run their existing Deltak courses.

For further information, contact Denis Healy on (02) 436-2622 Sydney. □

John Travers

Denis Healy

Victorian Distribution

CROMER PROGRAMMING services has announced the appointment of Travers Software Services of 262 High St, Kew, 3101, as Victorian distributor of the Padmede range of commercial software for microcomputers.

Headed by John Travers, Padmede program modules for IBM and DEC's microcomputers, and all CP/M- and MS-DOS-based micros, will be provided by the company.

Your Computer is currently testing the Padmede packages, so for those interested a full review will appear in a future issue. □

How To Better Your ZX

VENDALE HAS released a special 16-kilobyte RAM pack, X-ROM card and ZON X81 sound generator, designed to further upgrade the Sinclair ZX80 and ZX81 microcomputers.

The RAM pack follows at least a dozen similar products, but offers some exclusive new features. It has been designed to overcome the infamous "wobbling" problem, by clamping to the ZX81 with a special built-in ridge, aided by a resilient spring-effect in the connection socket. The price is $69.50, including postage and packaging.

The X-ROM Card has a built-in autostart ROM. Programs can be run automatically every time the ZX81 is switched on, which will increase ROM-based software, since all software houses are currently very aware of copyright piracy problems. It also has a built-in printer interface and Eprom burner. This card costs $69.95, including postage and packaging.

The ZON X81 sound generator is completely self-contained, and specially designed for use with the ZX81. Standard 16-kilobyte RAM packs and printers can be plugged into the sound unit without affecting normal ZX81 operations. There is a huge range of possible sounds for games, easily added through a few simple BASIC lines. The sound generator is priced at $73.50, including postage and packaging. □

New Ozi Software House

CREATING MORE software for Commodore 64 and VIC-20 microcomputer systems is the aim of Ozi Soft, a new Sydney-based software house.

The latest products include a lightpen for the VIC-20 costing $39.95, and an expansion board priced at $59.95.

In addition, *VICLine*, a magazine written by VIC-20 users, is available by mail order for $5 for six issues, from Ozi Soft, 123 Clarence Street, Sydney, 2000. □

Automatic Bookselling

A BRISBANE-BASED software house, Powell Clark and Associates, has devised a package called Books which is aimed at streamlining commercial bookselling.

The aim of Books is to allow information to flow automatically between such areas as order and stock control, accounting control, and inquiry and reporting.

For further information, phone John Grant on (07) 371-8088 Brisbane. □

The Texas Connection

FULL HARDWARE and software support for Texas Instruments' TI-994A colour microcomputer is being provided by Software Connection.

The TI-994A 16-bit system has support on tape, disk and plug-in cartridge. Educational software and games programs are readily available, plus a teach-yourself-BASIC program.

Joysticks, speech synthesizers and disks are low-priced options. □

More APC Software

NEC HAS RELEASED three software packages for its APC microcomputer. These are a 16-bit Compiled BASIC version of the IMS Ascent accounting packages, Digital Research's colour graphics software, and a wide range of Digital Research's languages and utilities.

For further information, contact Kate Castle on (02) 438-3544 Sydney. □

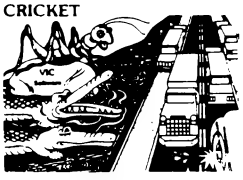
New Authoring System

A NEW COMPUTER-based course authoring system, released by McGraw-Hill, will allow educators and company training officers to create computer-aided instruction courses after only a few hours on the system.

The Interactive Authoring System, which runs on the IBM-PC, can create multiple pages to either deliver textual information or ask four different varieties of question. The system supports simple colour graphics on the IBM-PC screen, and can also interface to a video tape recorder to deliver more complex material.

Early courses available are orientated toward traditional data-processing training, but the system can be used to develop courses on virtually any topic. The price is $3000 for the authoring system itself, and $500 per copy for the delivery system which allows students to take the courses. □

CRICKET



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ATARI SOFTWARE CARTRIDGES

Packman, Star Raiders, Galaxians, Defender, Centipede, Space Invaders, Asteroids, Missile Command, Pilot with Turtle Graphics, Computer Chess, Music Composer, Basketball, Super Breakout, Video Easel.

AND NOW MOON BASE 10

Talk to and hear your Earth base while fighting on Jupiter's moons. A new super fast, high action, adrenoline pumping space game.
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- Full size typwriter keyboard
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- TV Modulator interface
- Game cartridge slot
- Music Synthesizer
- Smart Peripherals

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We already have an enormous range of Commodore 64 Software including adventure games, action space games, word processors, educational and business programs.

The Largest Range of Vic 20 Software in Australia

LLAMASOFT UK

NEW

ANDES ATTACK
As a star warrior of the Galactic Fleet your mission is to guard LLAMAS who are under attack by the Alien Xygar Life Forms. In emerencies use your precious smart bombs.
Requires VIC-20 with 8k expansion and joystick.
On Cassette

ABDUCTOR
Guard your humancids from the Abductors flying in crazy loops! Your humanoids look worried. Get blasting!
Written in machine code. For the unexpanded VIC-20 with joystick.
On Cassette

GRIDRUNNER
You are the Gridrunner. Your mission is to destroy the Gridsearch Sqads and the pods. But beware of the deadly X-Y zappers.
Written in machine code. Hires colour graphics for the unexpanded VIC-20 and joystick.
On Cassette
Also available for the Commodore-64.
(Please specify version)

TRAXX
Your mission is to capture squares for points. When pursuers flash eat them for bonus. Capture the 4 corner squares to make pursuers flash.
Written in machine code. Requires VIC-20 with 8k expansion and joystick.
On Cassette

CREATIVE SOFTWARE

Choplifter	$54.50 (Cart)
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Sydney's own VIC specialist

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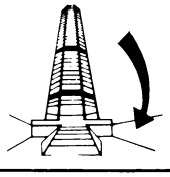


Shop C4, M.L.C. Centre
Martin Place
Sydney. 235-2971

Full Of Computers

A 10-MONTH study, just completed in Britain by a team of architects, space-planners and office-automation consultants, shows that many office buildings are ill-equipped to handle the growing army of sophisticated machines. These machines need an abundance of power, as well as cooling facilities and a clean-air environment.

The study was sponsored by 10 organisations which share an interest in the impact that 'information technology' will have on the shape and function of office machines. The result is a mammoth seven-part report that presents a detailed review of the pitfalls involved in introducing the new technology to unsuitable buildings.

Despite the claims of equipment manufacturers that electronic machines will save office space, the report maintains that these systems will not become smaller, but in fact larger. As a result the average size of the individual workspace in an office will increase by as much as 50-100 per cent.

This report is for sale, costing $8500, which includes a two-day consultancy to relate the report to the buyers' own situation. A management summary is also available for $340.

For further details write to EOSYS Ltd, Clove House, The Broadway, Farnham Common, Slough SL2 3PQ, England. □

Computerised Odds

IN CONJUNCTION with Plante and Association, CompuStat has produced a Race Odds program for the Sharp PC-1251 and Apple II microcomputers.

The program takes horse Weight Ratings, and with details of the particular race, converts them to the final true odds for the punter. A companion program has been released for use at the track, to calculate single and multi-bet returns.

Other new programs from CompuStat for the Sharp PC-1251 include a pocket spreadsheet plotter costing $24, a name/address/phone filer also for $24, a diet analyser costing $39, and a pocket spreadsheet for $24. For further details contact CompuStat, PO Box 52, Seaton, 5023. □

Fighting Over The Airwaves

APPLE COMPUTER has launched its heaviest-ever advertising campaign in Sydney and Melbourne, with television commercials and colour spreads in magazines and the national press.

The Apple commercials are a retort to Digital Equipment's recent television campaign, which depicted a young girl, smiling while using a whole variety of advanced and simple programs – so simple, even a child can use it...

Apple's tack is that we all know children can use computers, but here finally is a machine that makes it simple for adults. □

Menu With A Difference

STERLING SOFTWARE has introduced REMPAC, a restaurant management package designed to assist the restaurateur in the many time-consuming and monotonous documentation tasks necessary in the normal operation of a restaurant.

REMPAC runs under the CP/M 2.2 operating system, and requires a minimum of 64 kilobytes of memory, a standard 80 columns by 24 lines screen, dual disc drives, and at least a parallel printer port and a serial communications port.

The program performs the important documentation tasks necessary during a normal restaurant trading session:

Maintaining a record of the menu, including prices, ingredient costs, preparation area (kitchen/bar), and classification (lunch, or dinner) of each item.

Maintaining a record of the orders placed for each table.

Printing of kitchen and bar requisition orders in response to entered table orders, either at the computer station, or at remote printers in the kitchen and/or bar.

Printing detailed customer accounts.

For further information and a demonstration of REMPAC, contact Sterling Software at (03) 754-7690 Melbourne. □

Unipart's Uniting Part

NEARLY 100 car-product dealers have been offered the chance of joining what is planned to be one of the largest personal-computer networks in Australia.

Specially adapted to Unipart requirements, the system comprises an Apple III with single-disk drive, Corvus hard-disk storage unit, monitor, printer, modem, cash drawer and communication card enabling it to connect to Unipart's mainframe computer. Also included is a stock file of about 4000 products, to which the dealer can add or delete as necessary.

The dealer need only enter a spare-part number, and the Apple immediately describes the part, its price, location and the quantity in stock or on order.

The Apple system also provides dealers with reports on inventory and sales. It has facilities for client discounts and Bankcard limits, and passwords to restrict unauthorised staff from tampering with confidential information. □

Taking To The Water

SEAHORSE COMPUTERS, the Macarthur (New South Wales) region's leading computer service, has taken over the dealership formerly run by South Coast Computers, of Wollongong.

Seahorse supports a wide range of quality systems, including various CP/M-based computers, the Apple IIe and Apple III systems, the Osborne portable computer, Commodore computers, Epson, Anadex, Qume and Diablo printers, and Hewlett Packard and Watanabe plotters. □

The BBC Does It Again

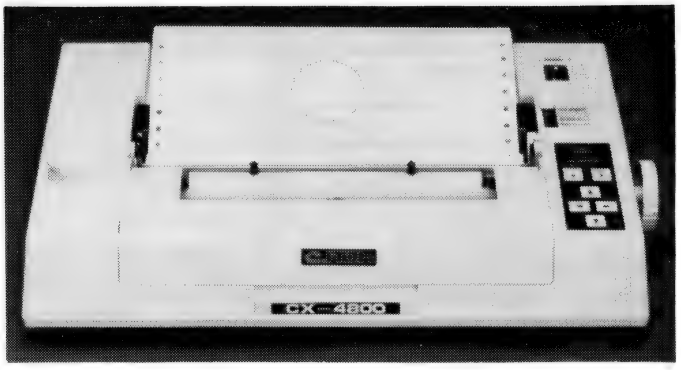
A SECOND series of 10 25-minute television programmes, giving an introduction to microcomputers for both adults and children, has been made by the British Broadcasting Corporation.

The highly successful first series, "Making the Most of the Micro", attracted worldwide sales for BBC Enterprises. This practical guide to computers – what they do and how to work them – has been bought for educational and training purposes by schools and organisations all over the world.

In its original form, the series comprises part of a whole programme package, which also includes software on audio cassettes or floppy disks, a book in 10 languages, a correspondence course containing all the topics covered in the series,

and a referral service for students who need advice.

The BBC Micro personal computer can be used independently of the series and, with the addition of accessories, be adapted for complex professional applications. □



The Cheapskate's Plotter

PRICED AT less than $1000, C-Itoh's new CX4800 plotter, designed for use with microcomputers, incorporates print functions and provides a flexible tool for a variety of business applications, including the production of graphs. The CX4800 incorporates a variety of intelligent commands, enabling production of circles, arcs, curves and lines, and a full character set, including special symbols and Greek letters.

Automatically changeable pens provide four-colour output. The plotting speed is 12 centimetres a second, and a continuous-paperfeed facility allows unattended operation. A standard parallel interface and optional serial interface enable easy connection to the computer.

The plotter is programmable under BASIC as a line printer, linked to a microcomputer.

For further information, contact Mike Barraclough at the TCG Group on (02) 699-8300 Sydney. □

Dial-Up Information

PARIS RADIO Electronics is providing a dial-up information service for users of 6800, 6809 and 68000 computer systems. The service can be accessed by a 300-baud modem link between 5.30pm and 9.30am weekdays, and 24 hours on weekends and public holidays.

Initially, the service will include a complete listing of hardware and software available; a bulletin board is currently being developed. The service is running on an SWTPC 6809 multi-user system running UNIFLEX.

To log on to the service, dial (02) 344-9111, and simply type "infocentre". □

Need A New Brain?

DESPITE DIMENSIONS of 280 by 150 by 50 mm, the New Brain microcomputer, made by England's Grundy Business Systems, is based on an advanced eight-bit microprocessor and provides, as standard, 32 kilobytes of RAM plus 29 kilobytes of ROM.

With plug-in modules, memory can be expanded to give a further 64, 128, 256 or 512 kilobytes of RAM.

Two versions of the New Brain are offered: Model AD features a 14-segment vacuum fluorescent display of large blue-green letters, numbers and punctuation marks, which is slightly tilted for ready visibility. Model A is without the display.

Both models are supplied complete with an external mains power supply, leads and user's handbook.

The New Brain has a standard QWERTY typewriter board, and a total of 512 characters can be generated. A high-resolution display of up to 250 dots vertically by 640 dots horizontally may be mixed with a separately scrollable character mode display. □

Soaring Sales

APPLE COMPUTER has reported a 74 per cent increase in net sales, and a 73 per cent increase in net income for months February-April 1983, compared to the same period last year. Worldwide sales grew to a record US$228 million from US$131 million last year, and net income increased to US$23.9 million, from US$13.8 million.

Apple has attributed this success to the introduction of the Apple IIe in January this year, and the standardisation of the Apple III's configuration making the system capable of accommodating more sophisticated software. □

Spectra's Streaming Software

THE MINICOMPUTER industry's first "streaming" software, designed for use with the Digital Equipment Corporation's PDP-11 minicomputers, is now available from Spectra Logic.

Called Spectra Stream RSX, this new stand-alone streaming software allows the continuous transfer of data from disk to tape. This program has both "start/stop" and streaming 13 mm formatted tape drives. □

The Four-In-One Access Package

ACCESS DATA has released a microcomputer complete with printer, modem and electronic typewriter.

The Access computer features 64 kilobytes of main memory, high-speed dot-matrix printer with a variety of software- controlled fonts, internal modem and built-in acoustic coupler, double-density 13 cm disk drives and leather carrying case. The total system weighs 75 kg.

A set of four Perfect Software programs is available, covering word-processing, spelling, data-base management and electronic spreadsheet. The operating system is CP/M.

The price of the Access computer is $3948, including tax.

For further information, contact Access Data, phone (02) 922-2577 Sydney. □

New Personal Computers

TELEVIDEO has introduced two new microcomputers, the TS803 and the TS1603. The TS803 is CP/M-compatible, while the TS1603 offers both CP/M and MS-DOS. A graphics package is standard on the TS803, and optional on the TS1603, with a high resolution of 640 by 240 pixels. The TS803 is Z80A-based and comes with 64 kilobytes of RAM, upgradeable to 128. The TS1603 is 8088-based and comes standard with 128 kilobytes, upgradeable to 256. □

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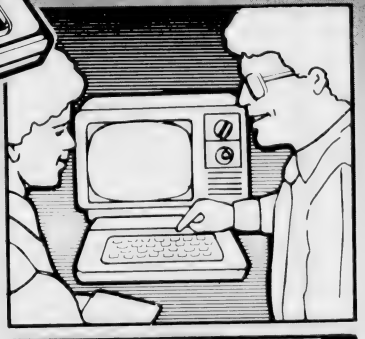

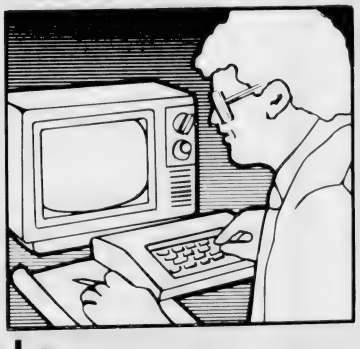

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Atari Withholds 1200

IN AUSTRALIA last month for an education conference, the Atari Corporation's international marketing manager for software, Nancy Garrison, admitted that Atari had an image problem: most people see Atari as a games-computer manufacturer.

However, Garrison said that recent personnel changes at Atari had strengthened the company's approach to the education market, most notably the appointment of former Xerox researcher Alan Kay as chief scientist. From now on, Atari will be down-playing the game-playing image.

In line with this, Garrison revealed that the Atari 1200 XL, the company's latest machine, would not be released in Australia. Instead, Australia would be offered a new range of more powerful machines, which will be released at the coming United States Consumer Electronics Show. The new machines will be rather more business-orientated, to the extent of even running the CP/M operating system.

In addition, Atari is expected to make announcements shortly about a move into the telecommunications business. Apparently, Atari has been dropping heavy hints about this for some time, but will not comment on the nature of the venture. However, there is speculation that Atari could be planning to take on Telenet and Tymnet in the packet-switched network business. □

Multi-User Micro Systems

VECTOR GRAPHICS has launched three new multi-user microcomputer systems with a choice of five-, 10- or 32-megabyte Winchester disks.

The new Vector 5E systems feature a 6 MHz Z80B processor which speeds up operation by 15 to 25 per cent over earlier 4 MHz units. In addition, read/write memory has been expanded to 128 kilobytes, which provides 56 kilobytes per terminal for user applications. □

Cromemco Chases IBM

CROMEMCO HAS released a new RPG II compiler for its systems, in an attempt to attract IBM customers. The Cromemco RPG II compiler has passed industry standard validation tests, and it is claimed a complete multi-terminal Winchester disk-based system can be assembled for less than half the cost of an equivalent IBM System 34.

Cromemco has also announced new 21-megabyte Winchester disks which will sell at the same price as earlier 5.5-megabyte devices. For further information, contact Insystems on (03) 690-2899 Melbourne or (02) 439-3788 Sydney. □

Sigma Data Discounts

SIGMA DATA has dropped the price on its Sigma/Oki if800 from $5250 to $4390 (plus tax) and has bundled in a selection of software from Micropro: WordStar, MailMerge, SpellStar and CalcStar. When first released, less than a year ago, the same machine was priced at just under $7000!

Sigma is backing this promotion with heavy advertising, and has put together a particularly attractive package for dealers.

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What IS a Database Anyway?

First of all, what is a database? Les Bell sets out to provide some of the answers...

DATABASE management systems have been around since the early seventies. Only recently, however, have they started to become commonly available for microcomputers and personal computers.

In this article, I shall set out to review what database management systems (DBMS) are, why they came into existence, their advantages over more conventional languages, and how they work. Much of the material in this article will directly relate to dBase II, which is the most popular micro DBMS, although much of the reasoning applies equally well to FMS-80, Condor 20, MDBS, InfoStar and other systems.

In order to understand the operation of database systems, it is necessary first of all to be familiar with the underlying concepts of computer data files and methods of organising data in those files.

Data is simply raw information. It may consist of numbers, alphanumeric strings, codes or anything else that can be represented on some form of storage medium, be it tape, disk or magnetic bubbles.

It is important to be aware that data has no meaning: reading a sector of a floppy disk might reveal the data 'DHS,23.56,7691,47,105.54,4002.50'. What does this mean? As it stands, nothing. It is only when the information is placed in context that it begins to make sense. For example, if we know that the sector is part of a file maintained by an invoicing system, we might be able to deduce that the customer with code DHS had a current balance of $23.56 before buying 47 of product code 7691, and so on.

Notice that even this information is not especially significant. A manager using the computer system might ask 'What is the trading history of DHS? What is their credit standing?'. And the raw data is of no help in this regard.

When data is placed in context, then it becomes information – it is informative, it tells us something. Raw data is meaningless.

Files are simply collections of raw data, written onto a storage medium by some sort of program. In general, the program knows what a particular datum represents by virtue of its position in the file. The file does not contain information, like 'The money owed to us by XYZ Company is $598.40'. It does not even contain helpful reminders like 'Balance = $598.40'. It simply contains a sequence of raw data, like 341.87,610.00,598.40.

Each section of related information in the file is termed a record. Take a simple inventory file, for example. The data it would need to store might be product code, description, quantity in stock, back order quantity and re-order level. Let's first examine how this file might be created using Microsoft BASIC-80:

```
100 REM INVENTORY FILE CREATE PROGRAM
110 REM
120 REM VARIABLE DEFINITIONS
130 REM I$ = ID CODE                D$ = DESCRIPTION
140 REM S$ = STOCK ON HAND          B$ = BACK ORDER QUANTITY
150 REM R$ = RE-ORDER QUANTITY
160 REM OPEN FILE
170 OPEN "R",1,"INVENT.DAT"
180 FIELD#1,5 AS I$, 30 AS D$, 2 AS S$, 2 AS B$, 2 AS R$
190 INPUT "ID CODE";I1$
200 IF I1$ = "END" THEN 270 ELSE LSET I$ = I1$
210 INPUT "DESCRIPTION";D1$:LSET D$ = D1$
220 INPUT "STOCK ON HAND";S#:LSET S$=MKI$(S#)
230 INPUT "BACK ORDER QTY";B#:LSET B$=MKI$(B#)
240 INPUT "RE-ORDER QUANTITY";R#:LSET R$=MKI$(R#)
250 PUT 1
260 GOTO 190
270 PRINT "ENTRY COMPLETED"
280 CLOSE: END
```

There are several points to note about this program. First is the definition of the variables; these definitions only apply within this program. To illustrate that point, here's a program which will print the contents of the same file, only it uses totally different variable names:

```
100 REM INVENTORY FILE DUMP PROGRAM
110 REM
120 REM VARIABLE DEFINITIONS
130 REM A$ = ID CODE                B$ = DESCRIPTION
140 REM C$ = STOCK ON HAND          D$ = BACK ORDER QUANTITY
150 REM E$ = RE-ORDER QUANTITY
160 REM OPEN FILE
170 OPEN "R",1,"INVENT.DAT"
180 FIELD#1,5 AS A$, 30 AS B$, 2 AS C$, 2 AS D$, 2 AS E$
190 FOR I = 1 TO LOF(1)
200   GET 1,I
210   F# = CVI(C$)
220   G# = CVI(D$)
230   H# = CVI(E$)
240   PRINT A$;"  ";B$;F#;"  ";G#;"  ";H#
250 NEXT I
260 PRINT "END OF FILE"
270 CLOSE: END
```

In this case, rather than trying to make the variable names in any way symbolic, I simply used the letters from A to I. If you try this pair of programs, you'll see that this makes absolutely no difference – but it does make it difficult for a programmer, working on these programs, to remember what variable name refers to what item of data.

Next, notice this line in both programs:

```
180 FIELD#1,5 AS I$, 30 AS D$, 2 AS S$, 2 AS B$, 2 AS R$
```

This line tells the program how long each item of data is: 5 bytes for the product ID code, 30 characters for the description, 2 bytes for each of the stock on hand, back order and re-order quantities.

If the two programs had different FIELD statements, the result would be disaster, as they would progressively get out of step and read the wrong data. It is the programmer's responsibility to ensure that programs agree on the data layout of shared files. The information about file layout is not in the files themselves, but in the programs that use the files – a key point.

Each file consists of multiple records, and each record contains multiple fields, as defined by the FIELD statement. A record contains a set of related data pertaining to one stock item, one transaction or whatever. Each field is one item of data within that record – an ID code, quantity, balance or other data.

File Organisation

All files are alike as far as these basic concepts go. However, as our needs become more realistic, it emerges that there are several ways of organising files. The two basic types of file organisation are sequential and direct.

In sequential access, records are accessed in order, from the beginning of the file to the end. In order to make this form of access more acceptable, records are usually maintained in alphabetic or numeric order on a key such as surname or product ID. Because records follow in sequence, they can sometimes vary in length, so that each record starts where the previous one ends, typically using delimiters such as commas or carriage returns to mark the boundaries between fields and records.

In direct access files, the system is able to move directly to and read or write any record in the file. Because the computer's operating system must be able to calculate the position of the nth record, all records must be the same, fixed, length. Thus, if records are l bytes long, the nth record is positioned l*(n-1) bytes from the beginning of the file. Di-

rect access files may or may not be maintained in alphabetical order.

Here's a very simple example. Consider the problem of maintaining a set of debtors' accounts for a small company. Suppose we have 500 customers and that the most active of these places orders daily, while the quietest orders monthly. We need to be able to look up any customer's balance on demand. Here's one conceivable file organisation using direct access files:

```
Customer Name                  25 bytes alphanumeric
Street Address                 25 bytes alphanumeric
Town                           20 bytes alphanumeric
Postcode                        4 bytes alphanumeric
Order  1 description           30 bytes alphanumeric
Order  1 amount                 4 bytes floating point
Order  2 description           30 bytes alphanumeric
Order  2 amount                 4 bytes floating point
Order  3 description           30 bytes alphanumeric
Order  3 amount                 4 bytes floating point
        .
        .
Order 28 description           30 bytes alphanumeric
Order 28 amount                 4 bytes floating point
-------------------------------------------------------
Total record length          1026 bytes

times 500 accounts          ~ 501 Kbytes
```

That's bigger than most 13cm floppy disks. But more importantly, well over half the space in that file is wasted. The vast majority of customers might place only 4 orders a month, while we have reserved space for 28. That means that in many records 816 bytes are wasted. There has to be a better way!

And there is. Instead, we have one file containing the name and address information for each customer, plus a pointer value, which we'll explain in a moment. Then we create a second file, which contains all the order information for all the customers. Each record contains the order description and amount, plus another pointer. How do we tell which orders are for which customers? That's where the pointers come in.

We now have two files, organised like this:

```
Customer File

Customer Name                  25 bytes alphanumeric
Street Address                 25 bytes alphanumeric
Town                           20 bytes alphanumeric
Postcode                        4 bytes alphanumeric
Pointer                         2 bytes binary word
-------------------------------------------------------
Total record length            76 bytes

times 500 accounts            ~38 Kbytes

Order File

Order description              30 bytes alphanumeric
Order amount                    4 bytes floating point
Pointer                         2 bytes binary word
-------------------------------------------------------
Total record length            36 bytes

times 5000 orders / month     ~180 Kbytes
```

The total for the two files is only 218 kilobytes. Now look at Figure 1, which shows the way the pointers work. The pointer for the first customer's record is the number of his first order record in the order file. Its pointer, in turn, is set to the number of his second order, which in this case is the third record in the order file. It, in turn, chains to the fifth record of the file.

A similar approach shows that the second customer has placed two orders, located in records 2 and 6 of the order file. Customer number three has also placed two orders.

Now, while, at a stroke, we have saved 300 kilobytes of file space, we do have to pay a price. Firstly, although we can locate all orders placed by a given customer, we cannot easily find the customer who placed a particular order.

Similarly, the pointers form a rather tenuous thread linking various parts of the file system together. If any of the pointers is accidentally damaged, a part of the file is lost to us, and with this simple file structure, there is no way of restoring it short of recreating the file from scratch.

In practice, a commercial system would get around both of these objections by providing links in both directions, allowing tracing of a particular order to a customer, as well as providing redundant links which will enable reconstruction of any broken pointers.

A modification of this technique allows each record to contain multiple pointers in what is called a tree structure. By using trees, it is possible to artificially overlay, say, alphabetic ordering on an otherwise random file.

At Last, The Database

Until the early seventies, most programs were written using these techniques. However, there are a number of problems associated with this way of doing things.

First, data associated with a particular account is scattered across several files, and often cannot be accessed without knowing the particular key (in the example above, customer name). It is difficult to work out what data, where, relates to what else, and it is difficult to create a set of files and logical file structure which meets realistic needs and yet is simple enough to understand.

Second, the easiest way to meet access requirements is often just to store the same data repeatedly in several files. The result is a lot of expensive wasted disk storage.

Third, the data formats used by different programming languages and utilities are often incompatible, and as we have seen above, it is up to the programmer to remember what data goes where and in what format.

Fourth, these kinds of large systems in the real world have a habit of growing like Topsy. As they do so, it becomes more and more difficult for the programmer to remember all the variable names and data formats and other peculiarities such as file relationships. And if a file structure is changed, then all lines, in all programs which use the file must also be changed – often a mammoth task.

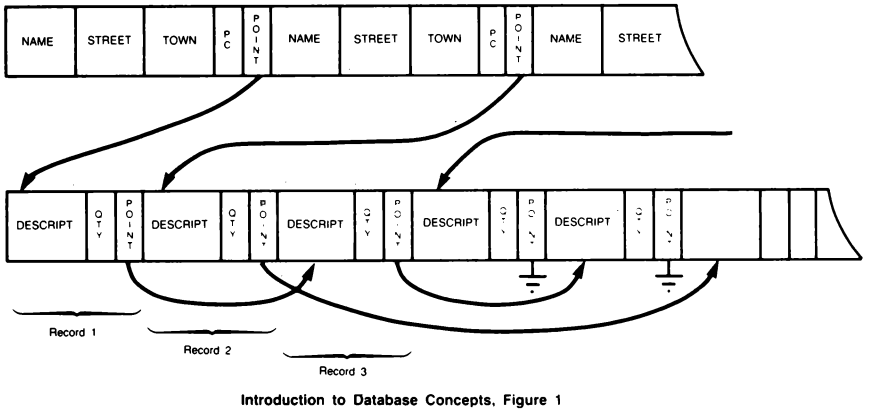
Finally, data in the files is completely raw and has no meaning; we cannot tell what each field represents – even if we can identify where a field begins and ends.

The database management system provides a solution to this situation.

A DBMS completely manages the storage of data, with no need for the user to know how it organises it. The user need not know how many bytes are devoted to a particular field (although he can originally specify this) or where it is located in a record. He need only know that a field called name contains the customer name.

This property is called data independence. If a user decides that he would prefer data presented in a different format, then a simple command to the DBMS will result in data being reformatted. This is possible through a unique facility which is not provided in conventional programming languages – that is, information about the record layout, including field names, types and sizes, is embedded in the database, and is available to all programs using it.

This information may be stored in a separate file, as in FMS-80 or InfoStar, or may be stored in the first few hundred bytes of the database file itself, as dBase II does. The result is that the user (and his programs) need know nothing



Introduction to Database Concepts, Figure 1

of the actual database layout, and changes to the database organisation will not affect the running of the programs.

Two distinct classes of database system are available: those which simply provide a sophisticated file access method, such as TCTAL on mainframes or MDBS on micros; and those which also incorporate a special language which may be used to manipulate the database, query it and provide reports – such as FMS-80, Condor 20 and dBase II.

Within each of these groups, there is a further subdivision into two major database models: hierarchical and relational. The hierarchical model corresponds basically to the simple example given in Figure 1, where each order is part of a list which belongs to a master record.

It suffers from the same problem mentioned above: that all orders for a particular customer are easy to find, but that all customers who have purchased a particular product are difficult to discover. Note, though, that if orders were chosen to be the master file which links to the customer file, the reverse would be true.

This basic limitation means that this model is not good for representing one-to-many or many-to-many relationships. However, for many-to-one relationships (like many orders to one customer), it is obviously well suited.

The relational model, despite the name, has nothing to do with the relationships between data items. In fact, the term relation is another mathematical name for a table. Consider the example above, expressed as a table:

Cust No	Name	Street	Town	Postcode
C1	J Brown	10 Albert St	Mosman	2088
C2	H Smith	114 Kirk Rd	Bankstown	2200
C3	L Wentworth	67 Boston St	Sydney	2000

Cust No	Description	Amount
C1	20 widgets	$85.00
C2	45 grommets	$1.35
C1	30 Widgets	$130.00

By creating two relations, we can view the columns as fields, and the rows as records. The records are accessed by key; in this case customer number. The relational model is purely an abstract mathematical concept, and in practice, relational databases have to rely upon pointers and indexes in order to physically construct the database. However, it would be possible to build a true relational database using a contents addressable memory, which, although it is horrendously expensive, is an approach being investigated by ICL for its next generation of mainframe computers.

In the meantime, bear in mind that there is no such thing as a true relational database running on microcomputers – at best, a system will hide the pointers which make it a hierarchical database, but usually micro databases simply provide data independence, leaving it to the user to implement pointers as he would in any language, like the BASIC example above.

Commercial DBMSs

In this article, the discussion is confined to microcomputer software products, so I look elsewhere for coverage of mainframe products such as TOTAL or IBM's IMS and DL/1.

Condor Series 20 is a relational database which is available in three levels. The full system offers a wide range of file management and transaction processing capabilities. Like most micro DBMSs, it includes a report generating package.

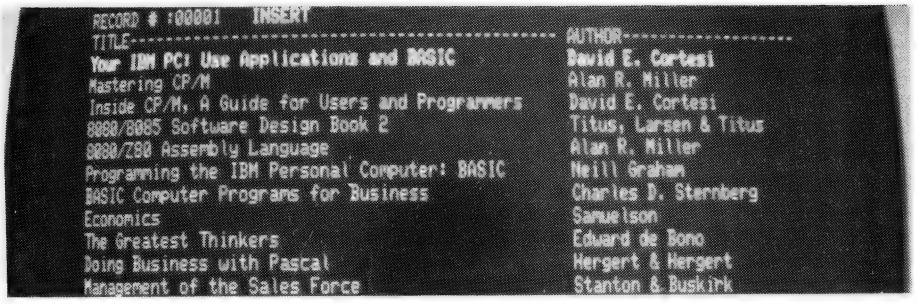
FMS-80, from Systems Plus, would have to be regarded as a relational database system in comparison with other systems which make that claim, but its name actually stands for File Management System, which is much more realistic nomenclature. Primarily menu-driven, it incorporates a data manipulation language called EFM, which can be used to generate extremely sophisticated applications indeed.

dBase II is the most popular microcomputer DBMS. Based on a relational model, it features a range of transaction processing and reporting capabilities, and incorporates its own, nameless, language. While dBase incorporates a number of sophisticated concepts, it falls down in its actual implementation, particularly in regard to documentation, which simply omits many of the features of the system. Indeed, for a long time, I was convinced that I must be missing something about the package. My self-confidence was recovered as people started pointing out the deficiencies of the documentation!

MDBS is actually a superset of the hierarchical model – termed a network database – and is primarily an access method for use from within other programs. It is possibly the most sophisticated of the packages mentioned here, and is certainly the most complex, if the documentation is any indication. It is also the most expensive DBMS package available for micros.

TIM III, from Innovative Software, runs on both the IBM PC and CP/M-based machines. It is a menu-driven system with extensive help screens, and is one of the simplest systems to use.

Many other database systems are available, both on micros and mainframes. However, the basic principles remain the same, and they all share two common concepts: the information about file structure is known to all programs that use the database, and the system provides a report generator program which can be used with virtually no programming knowledge. □



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Writing programs to run a business is not everyone's idea of a good time. Here, Les Bell examines a non-programmer's alternative for database applications...

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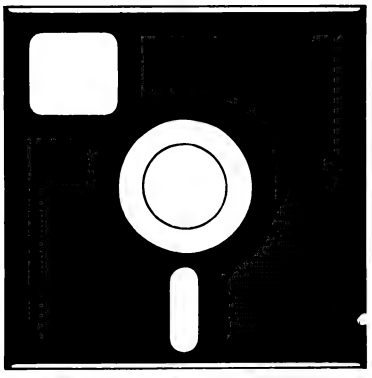


SOFTWARE REVIEW

FIRST OF ALL, there's really no such thing as InfoStar. It's two products bundled together in one package, to make them easier to buy. But the two products are really complementary to each other, and together form a quite comprehensive database management system.

The first software package is DataStar, which has been available for a few years now, and is an extremely comprehensive data entry program with more extensive facilities than are found on most mainframes. The other half of the new package is ReportStar, which is a report generator program with more features than you can poke a stick at. Let's look at them separately first.

The First Two Quarters...

DataStar is really two programs also. Forms (which are not just forms but also describe the database structure) are created with the Formgen program, and then filled in with DataStar proper.

The operation of the programs is reminiscent in many ways of the other 'Star-series' packages like WordStar. The top of the screen is occupied by a menu of commands which generally take the form of control keys.

Creating a basic form is very simple. The cursor is moved around the screen with the usual WordStar control keys, and prompts filled in. Fields are created by entering underline characters. Simply moving the cursor to a field and entering control-K will make that field a key field which is used for the creation of an index file.

That's simple enough, but there area huge range of options which can be applied to the various fields to markedly increase the power of the package. By moving the cursor to a particular field and pressing control-R, the user can then set a number of attributes for that field. It is these attributes that make DataStar such a uniquely powerful package.

Fields can be given different order numbers, which will affect the order in which they are filled in by DataStar during the data entry phase. The entry order can be different from that used for calculation or verification. In addition, key fields can be ordered from major to minor keys. Furthermore, a tie breaker key can be created by DataStar in order to differentiate between otherwise identical keys (like the multiple J. Smiths, for example). Otherwise, duplicate keys can be refused by the system.

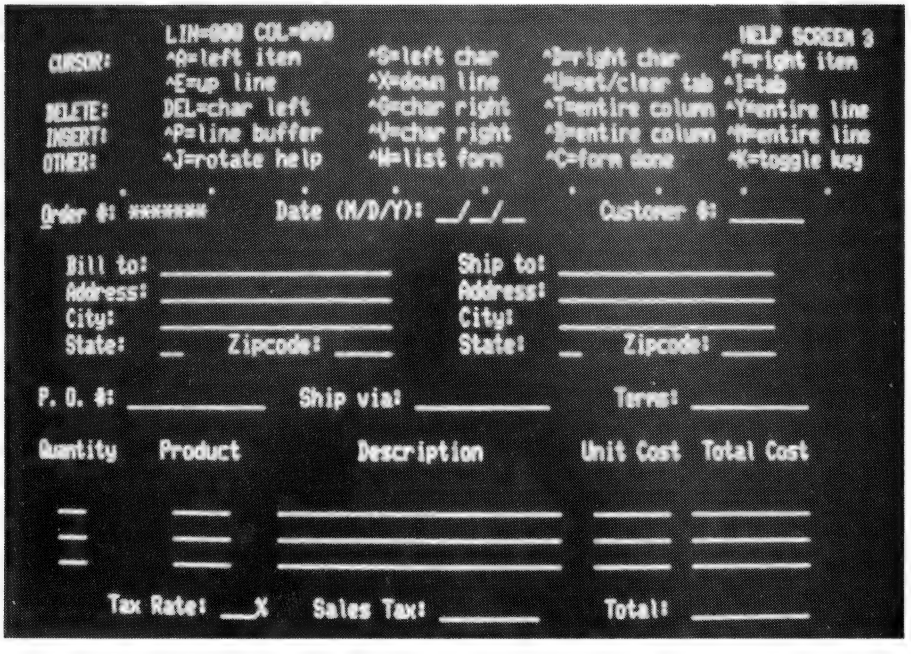
Not only may a field be entered by the operator, it may also be derived by one of two methods: it may be calculated from other fields and constants, or it may be looked up in an external reference file, by using another field as an index into the file. A derived field may optionally be overwritten later by the operator.

Calculations can involve either numeric or string processing. A full range of arithmetic operators is provided, including exponentiation, and the string operations can be substring extraction and concatenation.

Fields can be flagged as *required*, which means that a null entry will be called to the operator's attention at validation time and the record cannot be stored.

Fields are normally left justified, but can be set as right justified. Optionally, fields can be padded to their full length with any character (such as * for cheque printing), and the pad characters can be either for display purposes only or for storage also, creating fixed length fields. Fields may also have an optional floating character, generally '$' at the beginning or end of the data.

Following data entry, fields may optionally be verified. This is done by one of three methods: sight, retype or list. Sight verification simply requires the user to confirm that what is on the screen is the same as on the original input document. Retype is more sophis-



ticated: it blanks out the field again and requires the operator to re-enter the data for comparison against the first entry. If the two match, all is well, otherwise, the system will ask the operator to re-enter the data twice more for confirmation.

List verification is best where a small number of entries is possible, such as valid salesman initials. In this case, a separate file, containing the salesmen's initials is read in, and the data entry is compared against the list to ensure that data entered is matched with the list. A short list may be maintained in memory at all times, otherwise DataStar will read the list from disk every time. The list could be a field from another data file: for example, a customer master list.

Another form of verification that can be applied to numeric input is range checking; for example the month field of a date can only take on a range of 1 to 12. Formgen allows the user to specify a minimum and maximum field value, and DataStar will flag values outside this range as an error.

The creator of a form also has considerable control over the entry and content of a field on a character by character basis, using an edit mask. The mask specifies the permissible characters in a particular position; either alpha, upper case, lower case, alphanumeric, punctuation marks or other combinations may be allowed, with further operations such as automatic upper case folding, or automatic copying of contents from the previous form (particularly useful with date fields). DataStar can also automatically increment a field, which is useful for sequential numbering of forms.

Now, bear in mind that all of these options are set as a result of user responses to prompts, and no programming is involved. One particular difficulty with this situation is the lack of documentation. At least with a program, the listing shows what is happening.

DataStar gets around this very neatly indeed, by printing out a five-page report showing the form layout, filling order, range checks, entry and content control masks, all the field attributes and derivations, and the calculations. The result is among the best automatically-generated documentation I've seen.

DataStar is really quite easy to use for data entry and retrieval. For basic data entry by untrained personnel its help screens and, in particular, the validation system make it better than any other system on the market. More sophisticated users will appreciate the range of editing commands and options.

For high speed data entry, it is possible to key into batch files, leaving the validation process until later, when the batch file will be used to update the master.

Forms can be retrieved either in data file order, in key order, or by key via the index file. In addition, it is possible to create a selection mask which allows retrieval of, for example, all those accounts showing a balance of greater than $1000.

The data files produced by DataStar are, of course, compatible with ReportStar, but are also standard Microsoft BASIC sequential files which can be read by any BASIC program. Other languages can read the files too, of course, such as COBOL, PL/I or even dBase II, for which DataStar would make a very nice front end. DataStar's validation techniques and simple form layouts tend to make dBase look rather sick.

The DataStar manual has two sections: one for training and a reference section which will be of more use to the serious creator of new forms. The training guide makes use of example data sets provided on the distribution diskette, and one of the examples, an order form, provides a good demonstration of many of DataStar's features, including retype validation, list validation and lookup of product descriptions and prices from external data files.

Creating forms is not difficult, and the training guide provides some examples, as well as suggested applications, such as advertising agency traffic management, course and seminar registration, job scheduling, construction job costing and others.

And Now, Here's ReportStar

The other half of this dynamic duo is ReportStar, a somewhat larger set of programs designed to juggle files like you would hardly believe.

The major files involved are, of course, the .DTA and .NDX files created by DataStar, as well as the .DEF form definition files from Formgen, which tell ReportStar the organisation and format of the data in the .DTA files in addition to field names and other information.

Like Formgen, ReportStar uses a program called Rgen to generate a report specification file, with suffix .RPT. Rgen will only generate a simple report, with fields across the page and totals at control breaks, rather like the report generator function of dBase.

However, while dBase requires the user to start writing programs in order to produce more sophisticated reports (for example, with fields laid out down the page), ReportStar simply requires the user to lay out the format of his report, rather as though he was using WordStar.

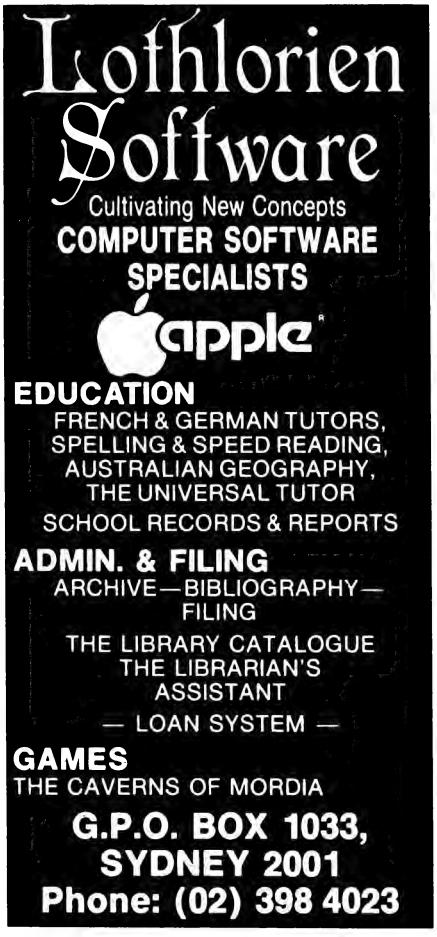
This is done using a program called Redit, which can either create a report from scratch, or, less tediously, modify one already created by Rgen. Redit behaves rather like WordStar, with similar cursor movement commands and functions.

The first column of the report is analogous to the Vertical Forms Unit of a large chain printer; it specifies whether particular lines should be printed each page, once per report, at a particular level of control break, or not at all, but simply used for calculations internal to the report.

The concept of a control break is a difficult one for many people to grasp; if you understand programming and the concept of using a FOR-NEXT loop to print multiple lines of data under a heading, then the idea of control breaks is just an extension of this.

But for the non-programmer who is using InfoStar precisely because he wants to avoid this kind of nonsense, the control break concept may well be an elusive one.

The report is made up of precisely the same layout techniques as Formgen uses: draw underlines to indicate fields and use the control-R command to enter various attributes. Fields can be loaded from files, from operator input, or calculated. They can generate particular control breaks, so that if, for example, you are printing a report from a file of orders, whenever the order number (the key) changes value, this generates a control break, causing sub-totals to be calcu-



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KEYBOARD TYPE	T	T	M	T	T*
BASIC BUILT-IN	STD.	STD.	OPT.	STD.	STD.
COLOR GRAPHICS	YES	YES	YES	YES	YES
MOVING GRAPHICS	YES	YES	YES	NO	NO
MUSIC	YES	YES	YES	YES	BEEP
SPEECH SYNTHESIZER	OPT.	OPT.	NO	NO	NO
DISPLAY SIZE	40/24	40/24	40/24	23/22	32/24
ROM PACKS	OPT.	OPT.	OPT.	OPT.	NO
MAXIMUM MEMORY	67K	52K	48K	32K	48K
DISKS	OPT.	OPT.	OPT.	OPT.	?
RS-232-C (SERIAL)	OPT.	OPT.	OPT.	OPT.	NO
PRINTER (SERIAL)	OPT.	OPT.	OPT.	OPT.	?
PRINTER (SPECIAL)	OPT.	OPT.	NO	NO	OPT.
TYPE OF BASIC	ANSI	ANSI	ATARI	MS	MS
PASCAL	OPT.	OPT.	NO	NO	NO
CASSETTE PORT	STD.	STD.	SPEC.	SPEC.	STD.
FORTH	OPT.	NO	NO	NO	NO
JOYSTICK BUILT-IN	YES	NO	NO	NO	NO

8K* = DEPENDS ON GRAPHICS MODE
T* = NO REAL TYPEWRITER KEYBOARD
? = IN DEVELOPMENT
ANSI = AMERICAN NATIONAL STANDARDS INSTITUTE (HAS ENHANCED GRAPHICS DEVELOPED ALONG WITH THE LOGO LANGUAGE)
MS = MICROSOFT BASIC
OPT. = OPTIONAL
STD. = STANDARD
SPEC = REQUIRES SPECIAL CASSETTE FROM MANUFACTURER

lated and printed, or some other action.

Again, like DataStar, fields can be masked and edited into appropriate formats. Furthermore, text can be enhanced by the use of control characters just like in WordStar, so that placing, say, control-S's, around a word will cause it to be printed with underlining.

Similarly, dot commands can be placed in the text to offset the page, adjust the page length and so on; generally, the commands are the same as those for WordStar.

Once a report layout has been edited, the user can exit Redit and either chain directly to, or later run, the Report program proper. This will ask for any input the form requires at run-time – say, the date – and will then write the report out to the printer or disk.

The entire package is extremely ingenious. It could virtually be said to be a fourth generation language, as it does not require the user to specify how the report is to be produced, merely what is to appear where. In other words, it is entirely non-procedural.

The feeling one gets is rather like that of using VisiCalc. One knows there is a program doing the work, but all the user has to do is place figures and relationships in the right places and everything will come out right. One never has to worry about loops and conditionals and so on.

The logical structure of ReportStar is remarkably internally consistent – it works the same way throughout, and one never gets the impression that certain commands might be 'band-aids' or later add-ons.

Put It All Together

The whole InfoStar package really is quite remarkable in that it can perform some extremely complex file manipulations without the user having to write any programs whatsoever.

One final part of the package is FormSort, a sort program which picks up all the field and index information it requires from the form definition file, and can sort, reindex and merge datafiles. It will not be needed often, but provides several additional facilities, particularly when used with other MicroPro products such as MailMerge.

InfoStar files form – as far as I can make out; the documentation is very non-technical – a true relational database; at least, as far as the user is concerned. Each form definition establishes a relation, which is stored in the form of a sequential file with an additional index file for access.

The verification features of DataStar are able to use the relations for list verification and for lookup of customer names and addresses; this is done through the index files, which provide the only forms of hierarchical links in the system.

ReportStar provides the ability to list, summarise and perform further calculations on the data files. While the report formats are not as sophisticated as could be obtained with either a general-purpose language or a specialised database-manipulation language, they are certainly sophisticated enough for most business purposes and require no programming whatsoever – at least in the traditional sense.

From my brief exposure to InfoStar, I can see several areas where it is clearly superior to most of the database packages on the market: firstly, it requires no conventional programming; secondly, DataStar provides more sophisticated forms design and especially good data validation on input; and thirdly, the report layouts can be more sophisticated than other packages can achieve without going to tricky programming.

It's hard to see where InfoStar might run out of steam; certainly systems like dBase can be extended virtually ad infinitum by writing more and more programs. On the other hand, InfoStar files

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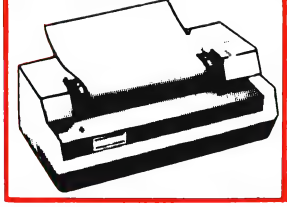

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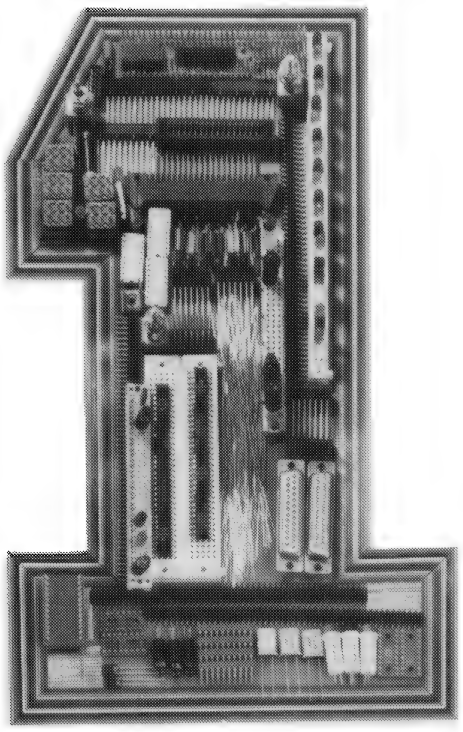

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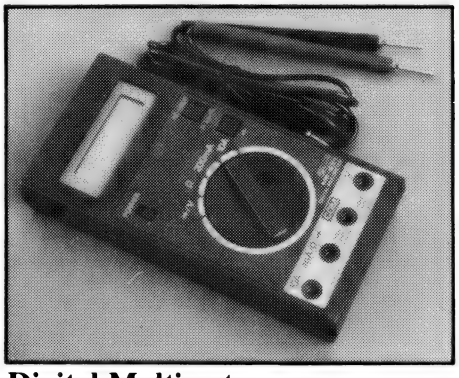

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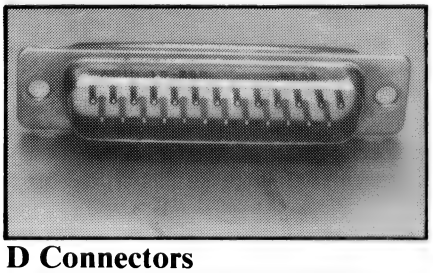

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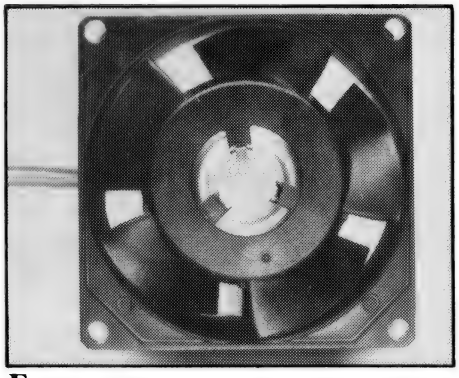

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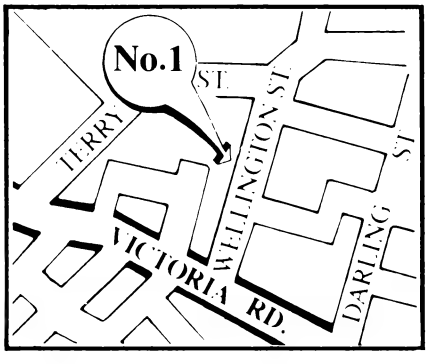

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can be manipulated by even quite simple BASIC programs. I haven't tried InfoStar with very large files, and so can't report on the impact of file size on the speed of its indexing.

The documentation is very good, certainly better than the early WordStar manuals. Good use is made of graphics, and the system is supplied with demonstration files and examples in the training guides. This is the only area where I struck difficulty; on my first run through the Rgen examples I found that the screens I got did not match the manual, causing a bit of confusion.

In addition, due to extensive revision and rewriting, some of the page numbers do not match up; instructions to 'see page xx' should be interpreted as 'see page xx +/- 3'. That's only a minor inconvenience, however.

All in all, then, InfoStar is a very nice package indeed which is especially suited to non-programming users who want to create their own databases, perhaps based on existing forms. It represents very good value, and when combined with other Micropro products, such as WordStar, MailMerge and CalcStar, can form the foundation of a very sophisticated office procedures system indeed.

With the release of MicroPro's integrated software system, StarBurst, later this year, we can expect very interesting innovations indeed. □

```
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                FIELD NUMBERS

Order #: ______1      Date (M/D/Y): _2/_3/_4      Customer #: ______5

   Bill to: ____________________6      Ship to: ____________________11
   Address: ____________________7      Address: ____________________12
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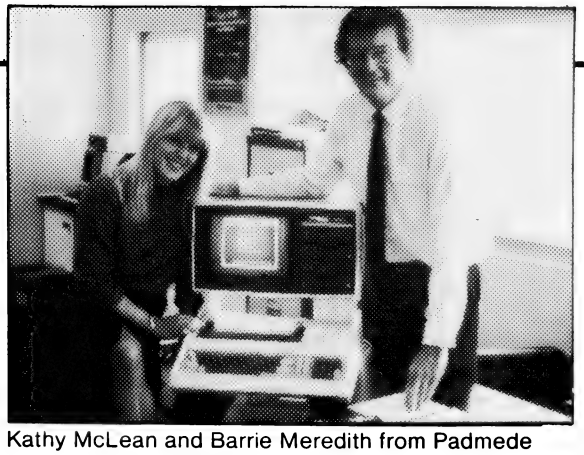
All modules are very easy to implement and operate. Documentation is comprehensive and easy to follow. The Sigma/OKI Microcomputer team is supporting all its Dealers in making Padmede's software available.

Original development took place in England, with Barry Meredith and John Perry of Padmede in Australia making extensive changes to suit local requirements. This included use of the advanced Sigma/OKI facilities such as high resolution colour display and inbuilt 80 cps printer.

Sigma/OKI Personal Computers also have a large library of software from other suppliers. These include Digital Research, Micropro, Sorcim, and Australian applications from Cyres, Boulevard, IMS, John F. Rose and others.



Kathy McLean and Barrie Meredith from Padmede

Packages ready for use under CP/M include Wordstar, Mailmerge, Supercalc, Spellstar, DBase II, FMS-80, Supersort and many many more.

Our dealers will be pleased to give personalized advice. The Sigma/OKI Dealer index can be found earlier in this issue.

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Getting dBest From dBase – Part1

One of the most popular software packages for small business people who want to 'do their own thing' is Ashton-Tate's dBase II. As they soon discover, it ain't all that easy, and there's a shortage of 'how-to' articles on dBase. Les Bell sets out to correct that omission.

ALTHOUGH there is now a wide range of software packages available for business users, ranging from general accounting to courier company management or real estate property management, all these packages suffer from one problem. They are basically supplied on an 'as-is' basis, and they are set up to conform to a fairly general model of how a business operates.

Most small businesses which have been running for a few years generally have developed their own procedures and paperwork, which may be totally different from the proposed computerised system. Alterations to the computer system will generally be impossible on grounds either of cost or a flat refusal on the part of the software supplier to even consider modifications – and for good reason.

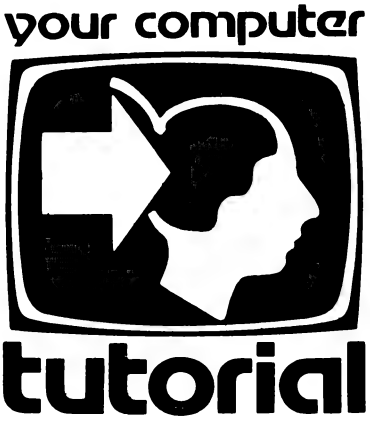
For many businesses with their own unique requirements, there is often no off-the-shelf software package available. Having a package custom written can be horrendously expensive, usually in excess of the cost of the hardware.

In these situations one alternative for the beleaguered businessman is to roll his own software. Now, before you all give up at the thought of – shock, horror! – actually writing your own software, let me make a few points.

I am well aware that the businessman's raison d'etre is to run his business, not write programs. However, he can save himself a lot of money by rolling his own, and quite possibly come up with a better result – one that better fits his own needs – because of his own intimate knowledge of his business and what he wants.

Furthermore, I would suggest that tackling projects of this nature would virtually always result in disaster if conventional third-generation procedural languages like BASIC or COBOL were used. However, as we shall see, the latest generation of languages such as dBase II do a lot of the hack work for the programmer, making it feasible to attempt much more sophisticated file management tasks – the heart of business programming – than would otherwise be wise.

Finally, I know that untutored users can write their own sophisticated business applications because I know several who have done it. Take our own Managing Editor, Matt Whelan, for example. He doesn't claim to be a programmer (even today!) – he was, in fact, a motoring journalist before he decided computers might be more fun – yet he has written a sophisticated debtors/invoicing package in dBase II code. Others have written complete accounting systems to meet their own particular needs. So you see, it can be done.



Plan of Attack

In this series, I shall attempt to achieve two major objectives: first of all, to lay down some rules and methods for the design of database systems, with particular reference to dBase II; and secondly, to extend, correct and 'flesh out' the dBase II documentation, which even Ashton-Tate would agree is not a paragon of edifying prose.

In part, this is a function of the complexity of dBase II itself, and partly a result of the inner inconsistencies of the dBase II design. Unlike some programming languages and software systems, such as the C programming language, which show a singularity and sparseness of design, dBase seems rather to have grown as more and more ingenious features were added. In software engineering parlance, it lacks orthogonality.

dBase II is a product of Ashton-Tate, of California. It is a relational database system and programming language combined with a report generator program which makes it easy to write programs to maintain files, or even to maintain files without programs.

dBase II is an interpreter, like MBASIC, which means that if you type in a command line, the program will try to execute it immediately. This makes it particularly easy to debug programs and try out ideas.

dBase Commands

To start up dBase, your computer should already have booted up CP/M (or CP/M-86 or MS-DOS) – see your manuals for instructions – and should be displaying the drive prompt. Type 'DBASE', and the disk drives should whir and then dBase will print its sign-on message and ask you for the date.

Here lies the first area of difficulty for Australians in using dBase. The US date format expects the month first, then the day and then the year, while here and in Europe, we put day first, then month and year. We have published two different methods for reversing the date format in *Your Computer* (November '82, page 60 and January '83, page 35).

The most recent version (2.4) of dBase allows the user to choose the date format at installation time.

Incidentally, I shall not deal here with the dBase installation procedure, as most of the problems that arise are machine specific and best resolved with your dealer and/or hardware supplier.

Assuming that you have got dBase fired up and running, you should now see the '.' prompt. dBase is command driven; that is, it does not present the user with menus of possible actions but instead relies upon the user to type in 'English-like' sentences specifying what he wants done.

We'll start by creating a database. In our introduction to database systems (see page 20) it is explained that a database file consists of multiple records, and each record contains a number of fields, such as NAME, ADDRESS1, ADDRESS2 and others.

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Back order qty	numeric	6	
Reorder level	numeric	6	

For our first example, we'll create a small inventory database for a mail order company. Later, we'll go on to use this database in filling orders.

Imagine that our hypothetical mail order house sells computer books by mail. Each book is uniquely identified by a stock number, and we also want to keep on file the title, author, publisher, retail price, wholesale price, quantity in stock, back order quantity and re-order level.

Creating the database from the command level is simplicity itself. However, before we start, we'll want to jot down a few things in advance to make things easier. Firstly, we'll need to decide on a name for each field of the database. So that we don't get into confusion with later examples, everybody should use the same names.

Each field will also have a type, just as variables in BASIC can be either numeric or strings. dBase has three types of fields: character (used for alpha strings), numeric (used for values in calculations) and logical (used for true/false indications).

We also need to specify a length for each field – in other words, the maximum number of characters or digits it can hold. For example, a six-character stock number will let us handle up to one million books, far more than dBase's practical limitation of 65,000-odd. It's unlikely that a book title will require more than, say, 50 characters.

In the case of numeric fields, dBase lets us specify both the number of digits in the field and the number of digits after the decimal point, so we'd better jot that information down too.

Here's the basic layout of the file:

To create the database, we type (at the dBase '.' prompt) CREATE. dBase

```
STRUCTURE FOR FILE:  B:BKINV    .DBF
NUMBER OF RECORDS:   00011
DATE OF LAST UPDATE: 06/16/83
PRIMARY USE DATABASE
FLD        NAME       TYPE WIDTH   DEC
001      STOCKNO       C    006
002      TITLE         C    050
003      AUTHOR        C    025
004      PUBLISHER     C    006
005      SELL:PRICE    N    006    002
006      BUY:PRICE     N    006    002
007      STOCK         N    006
008      BACKORDER     N    006
009      REORDER       N    006
** TOTAL **              00118
```

Figure 1: The File Structure

```
RECORD # 00001
STOCKNO    :       :
TITLE      :                                    :
AUTHOR     :                          :
PUBLISHER  :       :
SELL:PRICE:        :
BUY:PRICE  :       :
STOCK      :       :
BACKORDER  :       :
REORDER    :       :
```

Figure 2: Sample Data-Entry Screen

Continued on Page 108

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California Dreaming

By Frank Lee

The annual desire to attend the National Computer Conference ranks roughly with the lemming's urge for self-destruction, writes Frank Lee. Four days of tramping the equivalent of eight football fields crammed with fellow travellers, exhibits and their minders can do fearful things to legs, feet and brains.

DAY ONE at the 1983 National Computer Conference, at Los Angeles in sunny California, began with the usual waiting lines and minor irritations. My lapel-mounted plastic registration card pronounced that I came from the little-known land of AUSTRA. The attached yellow ribbon, bearing the warning *International Visitor*, ensured that the natives addressed me slowly, and in Basic English. The Little Golden Books Austran/American dictionary proved invaluable.

I decided to case the joint with a fast "walk-through", a kind of technical jog. Being familiar with the general distribution of things can save a lot of time in the long run. Having thus resolved, I checked my location at the *You Are Here* sign and began a methodical survey of the first of three main exhibit halls.

Some of the exhibitors' stands were very classy. MicroPro had an all-out promotion of its new galaxy of stars in a booth which offered seating for a theatrical audio/visual presentation, featuring a large video screen.

Seymour Rubenstein was seen luring prospects into a Tardis-sized conference room at regular intervals. WordStar, Rubenstein's first product, is acknowledged as the number one best-selling word-processing package, and most users are familiar with the MailMerge and SpellStar options. Now, the list of products includes StarIndex, DataStar, SuperSort, CalcStar, InfoStar, PlanStar, StarBurst and WordMaster. The emphasis is on integration.

A somewhat more excited crowd stood around an unlikely clad gent dressed as a World War I pilot. The headset and microphone seemed a bit anachronistic, but it soon became clear what he was up to: the microphone terminated in Key Tronic's version of an IBM-

PC keyboard. The keyboard was equipped with a voice-recognition system which had been trained to respond to phrases such as "hard right", "centre yoke", "up", "down", "radar", "full throttle", "flaps" and so on.

Each phrase generated the equivalent keystrokes required by MicroSoft's flight simulator running on the IBM-PC. A large colour screen showed a vicarious pilot's eye view of the instruments and the world outside. As one onlooker beside me offered, "What a blast!"

Steambath Tactics

IBM-PC microcomputers were a dime a dozen. So, too, were the clones. But why some of these clone-builders try is difficult to fathom. If you're going to make a copy (albeit improved) of the PC, then why gratuitously make changes to those aspects which make the PC what it is? Keyboards are a good example. Key Tronics has a superb improved keyboard for the PC, and will gladly sell them on an OEM basis, but only minor changes have been made to the layout, countering criticisms from early PC users.

One of the "real" clones is the portable (well, almost) Compaq. The Compaq comes standard with one 320-kilobyte mini-floppy, 128 kilobytes of RAM and a built-in 23 cm monochrome screen. It is claimed to be card, disk, screen and keyboard compatible with the IBM-PC. All of this weighs in at just under 13 kg and retails for $US2995. The equivalent upgraded IBM-PC would run to around $3740. The Compaq stand was one of those relegated to the "steambath"...

A word of explanation. It seems that something always goes wrong at the National Computer Show. This time, it was the air-conditioning system, set up for exhibitors in the six "inflatable" tents. For some reason (let's blame a computer, huh?), the air-conditioning didn't. The inflatables were almost unbearable as they baked in the hot Californian midday sun.

Nevertheless, in the midst of a sea of red faces and fans, the hardware just chugged along with rarely a casualty. The microcomputers were clearly more hardy than their minders – some of these exhibitors deserve Congressional Medals of Honour for staying at their posts...and some, would you believe, in immaculate three-piece suits.

Amongst the Compaq's fellow sufferers were the good folk at the Australian Trade Commission stand. Bill Caelli was doing his thing nearby for Oz with ERA, and couldn't believe how little attention the United States was giving to data security. The talk by Adleman on encryption systems attracted only 70 attendees.

I was given to understand that your place in the sun (or out of it in this case) at the conference was determined by previous attendance records. It seemed appropriate that IBM, DEC, CDC and their ilk were stationed within the delightful main exhibition area. Their air-conditioned comfort was shared by MicroPro and the other big-league micro software companies.

It was, therefore, quite a surprise to see Scott Oki emerge from the MicroSoft stand in Tent City.

Oki has style. His three-piece suit was neatly buttoned up, but he looked (and felt) as though the show had become a giant sauna. But despite his obvious physical discomfort he couldn't suppress delight with the reaction to his new product – the Multi-Tool Word.

A very neat, but low-key, presentation showed convincingly how this new word-processor for the IBM-PC was superior to WordStar: "What you see is what gets printed."

This includes the various type fonts, without those annoying symbols which WordStar uses to tell you that the next section is in bold type. There's also no need to re-format when changes are made to existing text. Multiple windows are supported, as are multi-column print-outs. It's a very smooth product.

Said Oki, "Seymour (Rubenstein) snuck in here yesterday to see what we'd done. He paled visibly." Not a bad trick in that heat.

Different Control Keys

Is WordStar about to go nova and turn into a black hole? I asked Oki if the key sequences for Multi-Tool Word were very different to the familiar control keys of WordStar (hoping, of course, that he'd say "no").

"Yeah," he replied, "they're different all right – so what? Ours are easier to learn. Don't fret, Frank – you'll pick it up in 20 minutes."

The eight-bit central processing unit within me muttered a curse upon the Philistines who created the 16-bit Goliath. Trouble is, he's got so tall that I'd never reach him with my slingshot.

The present release of Multi-Tool Word runs under MS-DOS on the IBM-PC, but knowing Scott Oki, it won't be long before it's available on a range of other systems. Patience, all you Z80 hackers.

The exhibits opened at 10am and closed at 6pm. I'd promised myself that the evenings would be devoted to pounding my keyboard. Alas, poor resolution. ComputerWorld demolished the first free evening with a most tasteful nosh-up in the grounds of the Disneyland Hotel.

Advertised as a get-together for the persons of the press and other hangers-on, ComputerWorld plied the sizeable gathering with Mexican delights, both food and entertainment. Somehow, most of the Australian contingent managed to become feature writers, technical editors or managing directors of mysterious publications such as *Bit* (presumably a smaller version of *Byte*) and *Their Computer*. Fortunately, it was a bus that delivered said motley crew to its hotel at evening's end.

George Morrow, of Morrow Designs, and Bill Godbout, of CompuPro, were likewise confined to the Punishment of the Tents. Buddies from way back, both put on elegant evening gatherings.

Baroque And Beef

For the Tuesday night, Morrow had hired a cosy but pleasant room at the Hilton on the Park for an excellent soiree featuring a baroque quartet (I'm a flute fancier from way back) and a superb side of beef.

As this evening of culture drew to a close, Morrow unveiled to his appreciative audience his latest baby: a Micro Decision with a five-megabyte hard disk and a 400-kilobyte floppy, plus heaps of software, for under $US3000. That's cheap. It runs with a Z80A at 4 Mhz and has 64 kilobytes of RAM.

We discovered the next day that Apple Computer had hired the whole of Disneyland for the Tuesday evening, and had been handing out invitations to anyone who asked! I consoled myself with the rationalisation that the National Computer Conference was just another Disneyland. Anyhow, Frontierland was closed for reconstruction...

It would have been a social misdemeanour to have snubbed Bill Godbout's invitation for Wednesday evening, so, armed with Rod Whitworth, of Automation Statham, we spent the third evening withdrawing toothpicked goodies from a vertically skewered stack of melons. There, we found a small coterie of *The Goon Show* addicts who couldn't believe our good fortune to have regular weekly broadcasts of the Goons in Oz.

A sure indicator for something worthwhile is a crowd pressing about a stand. Most of this year's National Computer Conference stands had the usual browsers, but a few – just a few – had them stacked in the aisles. One purveyor of communications hardware achieved this by employing a Las Vegas card magician with style. He was good. His interaction with the crowd was brilliant. It's just a shame I can't recall anything about the product.

Further down the hall, another crowd had gathered. Not, this time, for more entertainment but for a new portable microcomputer with the unlikely title of Gavilan.

Following the advent of the Osborne I, portable microcomputers have at-

tracted increasing attention. This article, for example, was pounded out on an 8 kg Otrona Attache in a Los Angeles hotel room, using WordStar.

Now, 8 kg is quite a lot to drag halfway around the world, but it does fit neatly underneath the airline seat, and it is easily switched for different supply voltages. The Gavilan, however, checks in at just on 4 kg – light enough, and small enough, to fit neatly into a briefcase.

October Production

The Gavilan (sotto voce for dramatic effect) is A Nice Machine. Its internal rechargable battery keeps you on the air for around eight hours before hungering for a powerpoint.

The 16-bit Gavilan made its debut at the Comdex show in April. The units being displayed and demonstrated at the National Computer Conference were still classified as prototypes, with full production planned to start in October. The expected retail price is $US3995.

The main unit is 7 cm high by 29 cm wide and 29 cm long, and comprises a full typewriter keyboard with numeric keypad, fold-up eight-line by 66-character flat LCD display (bit-mapped), a novel touch-pad (a "solid-state mouse"), an Intel 8088 central processing unit, CMOS semi-conductor circuitry for minimal battery drain, 300-baud direct-connect modem (a CCITT version is promised), 75 mm Hitachi micro-floppy disk drive (320-kilobyte formatted), composite video output socket for a full 80 by 24 screen, 80 kilobytes of RAM (of which 32 are available to the user) expandable to 336 kilobytes, and an RS 232 interface.

Six keyboard flavours are offered: North American, British, Swedish, German, French and Dutch. The LCD screen is bit-addressable and displays 64 by 400 pixels.

The Gavilan has an AC adaptor/recharger, for either 110 or 220 Volts, supplying 12 Volts DC, so the unit can be recharged or operated from a car's cigarette lighter. Recharging takes one hour if the computer is not switched on, or six hours if it is being used. The fast-charge mode is possible since the central processing unit monitors the cell temperature.

The Gavilan operating system supports five application ROM "capsules" and MS-DOS.

Also demonstrated was an optional printer ($985), adding just over two kilograms and another 12 cm to the overall length of the basic unit. The printer, which is rated at 50 characters per second, contains its own rechargable battery pack which is good for up to 60,000 characters on a single charge. It uses 22 cm wide ordinary paper in single sheets and utilises a dot-matrix non-impact system with a thermal ribbon. The results are somewhat better than can be achieved with the Texas Instruments "silent 700" style of thermal printer.

Plug-In Capsules

Though not exhibited, Gavilan also offers a combined second micro-floppy disk drive and memory expansion module. The disk unit adds a further 320 kilobytes of formatted storage. Also contained in this module is an additional 128 kilobytes of user RAM.

A separate acoustic-coupled modem is also available, and includes yet another self-contained battery pack. Since this attaches directly to the main unit's RS 232 socket, Australian users should have no difficulty with locally available modems (though it would be nice to be able to use the in-built direct coupled modem).

There is room in the main unit for up to four plug-in capsules, each contributing up to 32 kilobytes. These can be used to add a further 128 kilobytes to the system, or a mixture of ROM, PROM, EPROM and RAM. The RAM capsules are non-volatile, each being powered by a small lithium battery which gives one year of storage back-up.

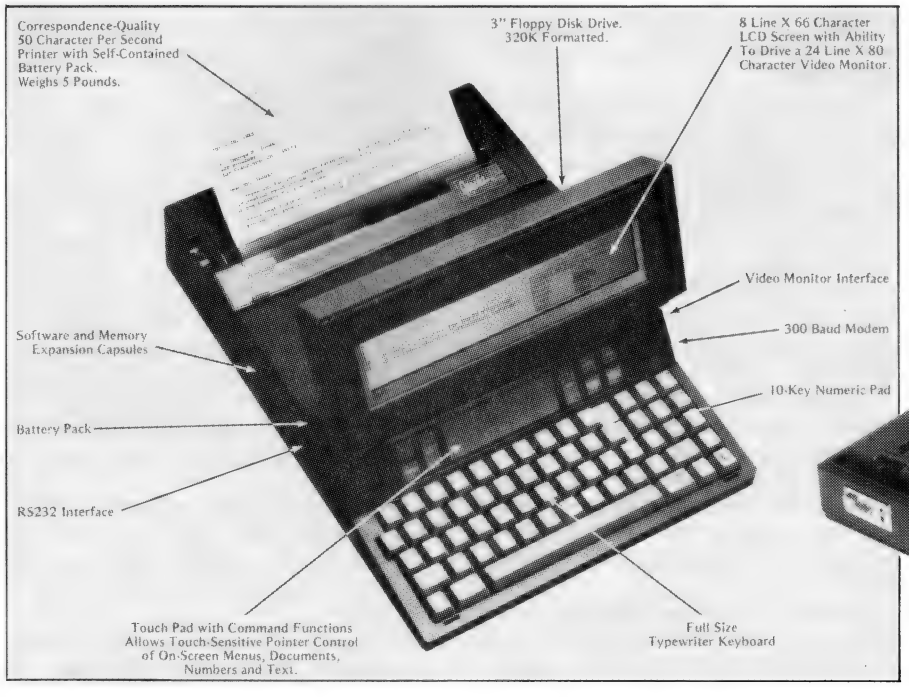
There are five proprietary CapsuleWare systems which are normally supplied on micro-floppies, but which can also be provided as plug-in ROM capsules. These provide for word-processing, spreadsheets, portable secretary system, communications and forms processing.

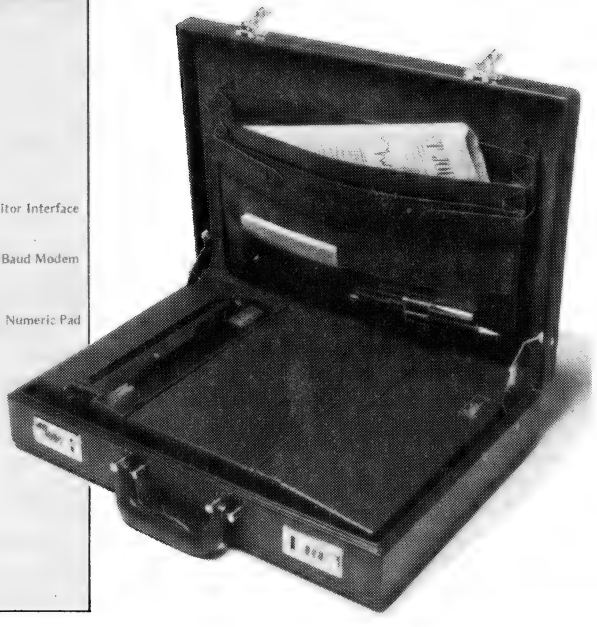
Just above the keyboard, and below the tiltable LCD screen, is the "solid-state" touch panel. This consists of eight labelled touch-sensitive "buttons" and a much-larger unlabelled rectangle which is used for cursor control, much like a mouse.

The "buttons" are labelled Help, Cancel, Extend Select, Menu, Scroll, Scroll Again, Scroll Back and View. The current software package determines the action taken in each case. The touch panel is designed to minimise the use of the keyboard and to generally simplify operations.

Here's how it works:

The user plugs the appropriate CapsuleWare module into the main unit (or else loads an equivalent micro-floppy disk). A press of the View touch-button displays on the screen a "desk-top"





view. This will be familiar to users of the Apple Lisa system.

Files and documents are marked by appropriate icons. Available services are also shown (for example, appointments, electronic mail, database access and so on). To indicate a selection, the user moves the pointer arrow on the screen by sliding a finger along the large touch panel. (I found that a fingernail was more effective than a fingertip for this purpose; perhaps Gavilan should supply a suitable stylus for this purpose to deter users from using pencils or ballpoint pens as a substitute.)

Easy Scrolling

Sliding the finger to the right, left, up or down moves the arrow just where you want it to go. A quick slide and the arrow moves twice as fast. It really is very easy to make that little arrow point just where you want it to go. Once the arrow is positioned, the touch panel is given a light tap to effect the selection.

With the eight-line display, a document file is easily scrolled up, down, left or right with the scrolling touch buttons. A zoom facility allows you to observe a condensed version of a document. The required section can then be selected through the touch pad.

The Help button is context-sensitive. When this button is touched, the user is prompted by an overlaid menu which asks four questions: What just happened? Where am I? What is this I am seeing? What do I do next?

The pointer is used to select the appropriate question, and the touch panel is tapped to make the selection. For example, if you selected "What just happened?" the reply might be, *You are viewing your desktop. You are pointing to a file drawer which is now highlighted. Nothing else has happened.* The Help facility is actually a tree structure, allowing the user to probe more fully to find answers which may not be apparent from the documentation.

According to the Gavilan literature, all of the CapsuleWare application programs are fully integrated. The interface between the user and all programs is the same. As long as all desired application programs are plugged in (four is the maximum), the information from one application can easily be transferred to another.

For example, if the user is preparing a financial report, spreadsheet calculations can be written into the text of the report without having to load another program. If these spreadsheet figures are updated, they are also updated in the report.

The built-in system software occupies the first 48 kilobytes of the 80 kilobytes in the internal processor memory. This includes the operating system kernel, interpreter, "human-interface" and data-structuring routines.

The "human-interface" software is designed to establish an environment in which the user can interact easily with the individual software packages. It also provides a standard interface for inter-application communications.

The Five Systems

There are five proprietary application systems available as plug-in CapsuleWare or in micro-floppy format:

1. CapsuleWord (word-processing system): Provides full word-processing capability, including text editing, formatting and printing. Standard text or letters may be stored, recalled and modified. Features include global word search and replace; move/copy block, word, sentence and paragraph; multiple fonts, page and paragraph formatting. I tried this particular package for a short time. The "solid-state" mouse performed well, but it would take a lot of convincing to persuade this old WordStar hack to forget his control keys. A somewhat longer session on the machine may have changed my reaction.

2. CapsuleCalc (calculation and analysis system): Spreadsheet system for fina ncial and other calculations; ability to include and print results in reports and documents.

3. CapsuleOffice (portable secretary system): Provides "to do" list, time recording, expense reporting, call reports, routes and schedules, appointments, tickler file and activity reports.

4. CapsuleComm (communications and mail system): Provides access to commercial or proprietary data bases. Allows data transfer between similar or dissimilar computers.

5. CapsuleForm (forms processing): Supports design of user-specific forms for data entry and printing. The fields associated with the form may be simple data-entry fields, or arithmetic results of operations between other fields.

As an alternative to the Gavilan operating system, the user may load MS-DOS from a diskette and run common application programs (Multi-Tool Word?) or use BASIC and Pascal. It would also be nice to have CP/M-86 available for those of us who prefer to use a *real* language like PL/I. It is to be hoped that Gavilan will supply application programmers with all of those nice bits of information about screen control

The Gavilan: not so much a microcomputer, more a macrocomputer.

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and device drivers which other manufacturers so often overlook.

Gavilan indicates that it will be supplying cross compilers for BASIC and Pascal, various debugging tools, a capsule builder, access to the "human-interface" drivers and the data-structuring support software. This development software is said to run either on the Gavilan itself or on the IBM-PC with the Gavilan as the target machine.

Programming Levels

Three application programming levels are to be supported:

1. Forms and spreadsheets: Allows the customer to write applications which interact with the user, through forms. Also provides ability to create an application which is a combination of forms and spreadsheet features.

2. Documents and elements: Provides the ability to define new types of documents for viewing, storing, retrieving and modifying by the "human-interface". The standard interface between the applications and the human interface allows the application program to build new types of elements on top of the data structuring software to create these new documents.

3. Conventional applications: Systems services available include a multitasking operating system, file system, data-structuring software, cursor control, item selection, command menu and property forms support.

It should not be beyond the wit of some keen programmer to equip the Gavilan with a Christensen protocol communications utility to enable the transfer of data and software to this somewhat non-standard storage format.

Trite but true: Documentation is the backbone of any computer system, large or small. There have been some pleasant surprises in this area for users of machines like the NEC Advanced Personal Computer, the IBM-PC and the Texas Instruments Professional. Presentation, content, structure and coverage are excellent in these products.

Unfortunately, we were not able to sample the Gavilan documentation since it is still in preparation. Though I have been assured that the help facility will answer most of the user's questions, there is no substitute for quality documentation. (Our regular readers will be aware that documentation was a primary criterion in the selection of the Personal Computer of the Year award.) I would urge the Gavilan company to create a polished product with its documentation. Too often, the urge to break early into a market causes sacrifices in this area. Don't blow it, Gavilan.

So what is Gavilan company? The Gavilan Computer Corporation was founded in February 1982, four of the five founders originally coming from Zilog Incorporated. I talked with Gavilan's president, Manny Fernandez, who was previously president and chief executive officer of Zilog. His infectious enthusiasm for the product and its future reflects his overall attitude to portables generally and to the market potential.

According to Fernandez, the primary target market is the "mobile professional" – those executives and managers who work both in their corporate offices as well as at home, while on the move, and at client's locations.

While I dearly love my Otrona Attache, the thought of actually using a portable while commuting is quite seductive. Like many others, I choose to live in the tranquil retreats of the Blue Mountains, west of Sydney. The penalty is a two-hour train journey, twice daily. Regular commuters play cards, read, stare out the window, or just doze off.

With its internal battery pack and light weight, the Gavilan would convert my closed briefcase into a lap-mounted office with the added benefit of a quiet environment, uninterrupted by telephone calls or unexpected callers.

Ah, sweet bliss!

Company Logo

Fernandez says that the Gavilan will not be sold direct to professional end-users. Rather, the product range will be targeted toward manufacturing OEMs, software OEMs, volume end-users and distributors. The latter are full service international distribution outlets, usually with a large geographic scope who market to both OEMs and end-users.

According to Manny Fernandez, the design of the software preceded the design of the computer itself.

"We were determined from the start that this wasn't going to be just another 'me too' machine," he said. "So we designed a completely integrated mobile system built around the software. In other words, we designed the architecture before we built the house." The name Gavilan is a bit obscure to most of us. Apparently, there's a red-feathered hawk by that name which frequents the mountains near the company's headquarters. The company logo is a rather badly handwritten version of Gavilan. Fernandez believes that, in time, this unfamiliar scrawl will become a meaningful symbol, representing a major step forward in cost-effective information processing.

Next year's all-singing, all-dancing National Computer Conference is to be held in Las Vegas from July 9-12. They say it reaches 60 degrees Celsius at midday in Vegas... I wonder if they'll have another Tent City. □

president

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No Frills But Lotsa Thrills

Owner Tony McSherry celebrates the delights of his Option II microcomputer.

THE OPTION II is the archetypal "blackbox", no-frills personal computer. Measuring 57 by 48 by 18 cm and weighing 22 kg, it certainly stretches the definition of "portable" but, with a bit of grunting and sweating, I do manage to move it around quite a bit.

The Option II, from Melbourne-based Microprocessor Applications (MPA), is based on the Wavemate Bullet single-board computer with 128 kilobytes of RAM, direct memory access (DMA), two serial ports, a Centronics port, built-in Winchester interface and double-density disk-controller. It features two 20 cm double-sided, double-density disk drives with a total storage capacity of 2.4 megabytes.

RAM is arranged in two 64-kilobyte banks with 16 kilobytes of the second bank being used as a buffer for the DMA device. The bottom 48 kilobytes of buffer memory may be swapped with the bottom 48 kilobytes of main memory by writing a 1 to port 1AH. This means that the Option II may be used as a two-user system, running MP/M, or is suitable for the new CP/M Version 3.00.

However, since the top 16 kilobytes of buffer memory is restricted by the DMA device, only MP/M Version 1.1 is available, giving 44 kilobytes of transient program area (TPA) in the main memory and 48 kilobytes in the second bank. The MP/M supplied by the manufacturer can be further customised to provide password-only access to enhance system security.

I haven't mentioned graphics, colour, high-resolution screen or keyboard. This is because it hasn't got them. You may provide your own terminal to plug into the beast, or Microprocessor Applications will provide you with a Wyse 100 terminal, customised to your own requirements.

The Wyse 100 features a separate editing keypad and programmable function keys – it is available with 32 of WordStar's multi-key commands programmed into the function keys – which reveal their contents on the bottom line of the screen. My only objection is a lack of tactile feedback from the keys.

However, I had no need for the Wyse 100 as I had previously purchased a Visual 50 terminal; the Visual 50 is a green-screen terminal with a detached slimline keyboard and tiltable and swivelling screen. Its main feature is the emulation of four different terminals – DEC VT52, ADDS Viewpoint, HAZELTINE 1500 and LSI ADM-3A.

All features of the terminal, such as baud rate, word parameters, emulation and XON/XOFF, are selectable from set-up menus obtained by hitting the SET-UP key, with the numeric keypad then used to select various options. The terminal characteristics can be stored by pressing Shift-S in the set-up code and will not be corrupted by turning off the terminal.

The keyboard doesn't have separate function keys, but rather a lone function key, located to the right of the space bar, which will produce escape sequences when hit in conjunction with certain of the numeric keys.

The one feature that made me buy the terminal was the ability to program the numeric keypad to produce three separate sets of escape sequences. I have been used to various word-processors on my old Exidy Sorcerer, with the numeric keypad serving as a function keypad, and I've been looking for the same effect on a terminal.

Unfortunately, most terminals that use a numeric keypad for escape sequences have a predilection for three-character escape sequences. Two-character ones fit much more neatly into WordStar's keystroke dispatch tables, without the necessity of writing customised input routines. Happily, the Visual 50 has a two-character escape sequence alternate.

One of the problems of having so many terminal characteristics is that you have to be careful with setting. I experienced some difficulty with programs such as dBase II and SuperCalc, when the terminal was running at 9600 baud. My first reaction was to believe I hadn't customised the programs correctly. However, some experimentation revealed that the terminal only misbehaved when the XON/XOFF function was set.

Apparently, the Visual 50 is a little too eager to send an XOFF when its FIFO

(first in, first out) buffer is filling up. The operating system has no trouble with this, but certain programs do. With the XON/XOFF function switched off, the problem disappears and no characters seem to be lost from buffer overflow.

Back to the Option II. After lugging the large black machine home, I plugged in, switched on and placed the CP/M disk into drive A. To my disbelief, the disk was accessed and the CP/M prompt appeared immediately.

Still shaking my head, I went through the usual back-ups and generally played around. When the initial shock of its working wore off, I decided to transfer some of my Sorcerer software, which I had painstakingly transferred to 20 cm single-sided, single-density disks from my 13 cm Micropolis disks.

Placing a disk in drive B, I asked the system to give me a directory of the disk. With depression mixed with a certain smugness, I watched "Cannot determine density" appear on the screen. Since I had already tried out these disks on an identical machine without any troubles, and the same problem appeared when I attempted to format disks in single-density, I realised something was wrong.

After a phone call to Microprocessor Applications, I quickly disconnected everything and shot off to Box Hill with the machine under my arm. Following a quick board replacement, I headed home with my faith in Murphy's Law once again reaffirmed.

This might be an opportune time to discuss the internals of the blackbox. With the black aluminium lid removed, you can see two large disk drives with the smaller computer board sitting on top of one of them. Throw in one fan, a power supply, line filter and some cables and that's it – so much for complex internals.

The Option II is an Education Department-preferred machine and has been sold to a number of schools. The school configuration has just one disk drive and only two serial ports on the back panel. Unfortunately, the software provided with the system reflects this school configuration:

FORMAT: Formats double- or single-density disks. Contains help messages and automatically senses number of sides.

SYSGEN: Writes a CP/M system on to the disk in drive A.

SET-UP: Utility to configure console and printer baud rate, printer type, automatic line-feed, step time and auto-command. Only writes to disk it exists on.

SDCOPY: Copies files between different disks using one drive plus the usual CP/M stuff.

SDIR: Very useful sorted directory program. Shows file size in kilobytes and is my choice for the auto command on each disk.

So far, I have described a reasonable machine with a fast CP/M and adequate disk storage. You might reasonably be asking why the big deal? The answer lies in that extra bank of memory.

After a week of using the Option II heavily for word-processing and programming, I collected my MP/M operating system. Having borrowed another terminal, I plugged it into the other serial port on the back (I usually use this for my modem), placed the MP/M disk in the drive and rebooted. Once again, to my surprise, MP/M loaded and the now-familiar MP/M prompt – user number and disk drive – appeared on both termi-

Specification and Report Card

Unit:	Option II			
Made By:	Microprocessor Applications, 48 Rutland Road,			
	Box Hill, Victoria			
Processor:	Z80			
Clock Speed:	4MHz			
RAM:	128 kilobytes in two banks			
ROM:	Bootstrap loader			
I/O:	Two serial, one Centronics, intelligent			
	Winchester interface			
Operating System:	CP/M, MP/M			
Languages:	Anything that runs under CP/M			
Peripherals:	Two double-sided, double-density drives,			
	1.2 megabyte each			
Expansion:	General-purpose external DMA bus			
Best Points:	MP/M implementation			
Worst Points:	None I can think of			
Ratings:	**excellent**	**very good**	**good**	**poor**
Documentation:			✓	
Ease of use:		✓		
Functionality:	✓			
Support:	✓			
Value-for-money:	✓			

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nals. I now had the two machines for the price of one!

However, you can't really force a single eight-bit Z80 microprocessor to become two machines without some decrease in performance. I have noticed no real degradation in processor speed, but disk accesses are noticeably slowed.

Incidentally, my MP/M is Version 1.1, not the re-released Version 2.x that is now available. Like the CP/M basic input/output system, there is extensive error-trapping, and disk formats are completely compatible with CP/M-written disks.

Using MP/M is usually indistinguishable from using CP/M. There are, however, a few differences. To reset the disk system, you must use the DSKRESET program – Control-C is ignored at CLI level and will cause the message "Abort (Y/N)" to appear if it is struck when running a program. A time-of-day clock is supported, but it needs to be reset each time the system is rebooted.

MP/M also provides facilities for spooling files to the printer, detaching processes, aborting processes and will always search the A disk (user's area 0) for a program if it doesn't find it on the logged disk.

Besides the set of CP/M and MP/M manuals, Microprocessor Applications supplies about 12 pages of documentation on both systems as well as documentation on altering the basic input/output system (BIOS). The documentation isn't for beginners but it is adequate for anyone with some experience with computers.

An Option II with a Wyse terminal, two disk drives, CP/M operating system and WordStar costs $4950 plus tax – not exactly cheap, but with the addition of another terminal and MP/M ($200), it makes a fairly interesting two-user word-processing system. Keep in mind that the Wyse terminal has been fully customised for WordStar. The addition of a 10- or 20-megabyte hard disk to the system would make it the perfect choice for a small business that requires word-processing and database facilities.

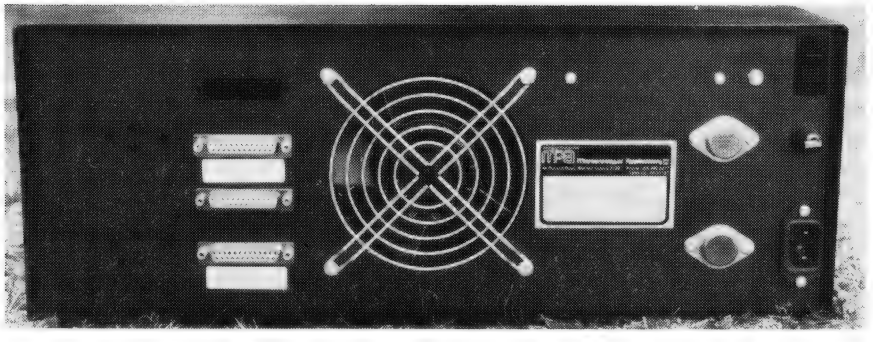
This brings me back to the Exidy Sorcerer and my reasons for purchasing a plain vanilla type of machine to replace it.

The Exidy Sorcerer was, in my opinion, a machine before its time. It featured 48 kilobytes of memory, built-in MicroSoft BASIC in a ROM-PAC, a nice keyboard, full upper- and lower-case, 512 by 248 graphics and RAM set up so that it ran CP/M without any problems.

Due to the efforts of the people who bought one, it now has a large range of software and peripherals. Its memory has been increased to 56 kilobytes of RAM with the use of a RAM-pac, and it is supported a large range of disk drives through its S-100 expansion unit or directly from the 50-pin connector on the back.

Customised word-processors such as Spellbinder were available and it ran the vast range of CP/M software without any problems. Its two limitations were that it did not support standard single-density 20 cm disk drives and its screen format was 64 by 30.

Since I design and write commercial software in my spare time, I wanted an 80-column screen, 20 cm disks and a slightly faster machine – so I ended up with the Option II. □



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MBG 83

Defender for the Faithful

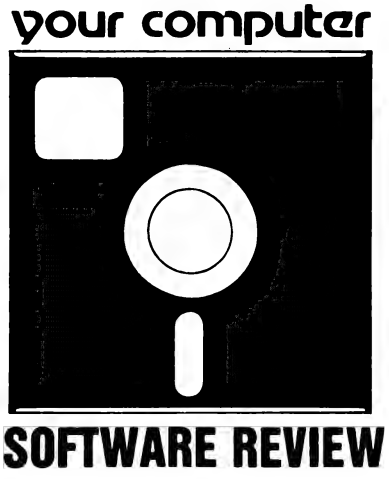
By Clayton Haynes

Based on the arcade game of the same name, Defender has joined the (seemingly) never-ending list of "slaughter the aliens before they slaughter us" computer games.

TWO THINGS prompted me to write this review of Defender, an arcade game from System Software in Perth. First, I discovered that *Your Computer* doesn't have an Exidy Sorcerer, which means the staff can't test software for this baby, which means any reviews must be supplied by inspired users of specific machines.

Second, I realised that the only time the word "Sorcerer" is mentioned in *Your Computer*, it's by someone writing to Text File, asking for programs and more information on the Sorcerer.

The theme of Defender is the usual Space Invaders-type routine. However, in this case, if you don't manage to protect your fellow Earthlings at the top of the screen, they change into annoying mutants ... and if you take too long to destroy all the aliens, along come creatures called Baiters, which are something like nuclear-powered frisbees.



There's no winner in this game; the object is simply to rack up a high score. The author has included his score, which is a further incentive – I'm just about halfway there.

Two alternative operation configurations are provided. The first uses the direction arrows to move your ship up, down and in reverse (including thrust). You can fire your laser using either TAB, key 5 or SPACE. Smart bombs, which are good things to clear out all the aliens in the area, and hyperspace use the S and H keys respectively.

The second layout, and the logical one to me, uses the TAB for up, the left SHIFT for down, GRAPHIC for reverse, the + key for thrust, 4 for fire, 5 for smart bombs and, finally, 6 for hyperspace. This may seem a lot, but you quickly get used to using six or seven buttons at once.

The overall presentation of the program, which comes on cassette with a two-page instruction booklet, sets an example for other software houses. What's more, the drawing on the front of the package is an accurate example of what the screen looks like during the game.

The cassette has both 300- and 1200-baud copies for reliability. The program is entirely Z80 code and, at 16 kilobytes, is admirably compact (take note, Apple users: an equivalent of this game for the Apple takes 48 kilobytes). The speed of Defender is phenomenal – nobody would find it too slow.

One interesting point is the use of the top third of the screen for a long range radar. It must be seen to be believed – the whole temporal universe is displayed in miniature, with your section marked off. This makes the game the best graphics handler I've seen.

As a Sorcerer user of three years' standing, I've seen just about every bit of game software available. This one gets my vote as the best-written, most addictive game for the Sorcerer. □

SOFTWARE REPORT CARD

Program:	Defender			
Made By:	System Software			
Hardware Reqd:	Exidy Sorcerer (minimum of 16 kilobyte)			
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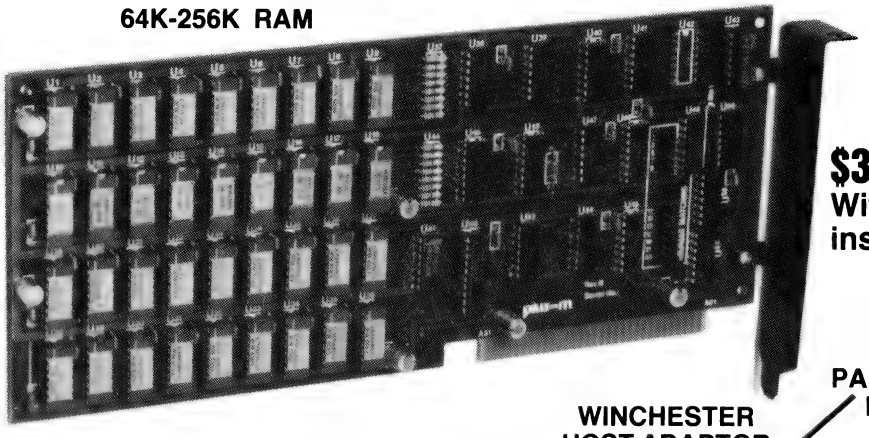

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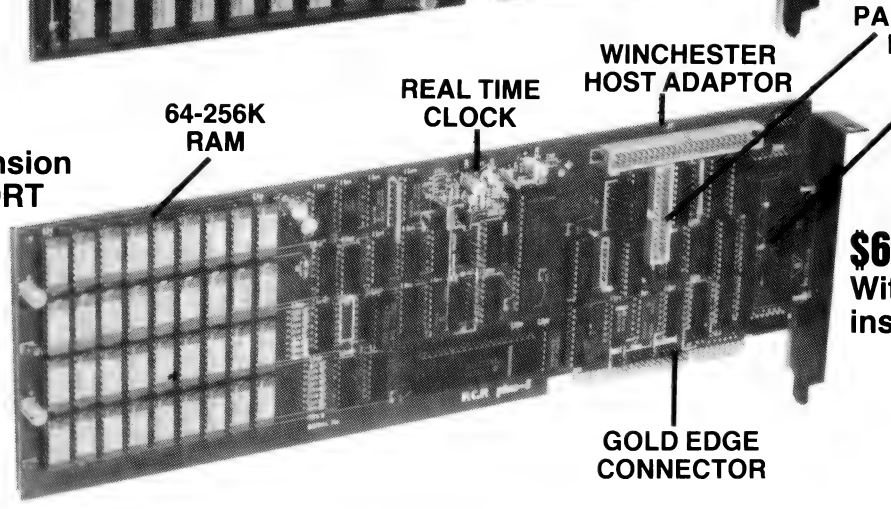

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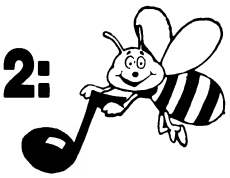

Roll Over Beethoven

By Milan Hudacek

In part one of this series, we constructed a sound-effect-producing Assembly Language sub-routine and came up with some nice noises. This month, we take a more theoretical approach and, finally, finish this series with Beethoven's "Ode to Joy"!

SOME OF YOU may have wondered why the "MicroBee Sound Effects" program worked the way it did. I apologise for publishing the program first and theory later, this being my favourite approach: a little practice in advance should raise some interest.

What made the sound-effects so exciting and how could we produce them just by simple switching on and off the current through the speaker?

Every periodic physical phenomenon, such as sound, can be represented by the sum of the period frequency and its multiples. The period frequency is called the fundamental and the multiples are called harmonics.

The quality of a sound depends on the number of harmonics and their prominence. This is what we did in our sound-effect program: we varied the number of harmonics and their prominence and we did it at random or periodically with different periods, or even with the periods randomly changing. That's why we got such a variety, using only the simple on-off switching principle.

Type in this program:

```
00100 REM *** SQUARE WAVE HARMONIC ANALYSIS ***
00110 DATA 46,0,89,80,62,248,211,2,21,32,253,62,184,211,2,29,32
00120 DATA 253,45,32,237,201
00130 FOR I=0 TO 21
00140 READ D
00150 POKE I,D
00160 NEXT I
00170 CLS:LORES
00180 CURS 1,2
00190 PRINT "SQUARE WAVE HARMONIC ANALYSIS :  DUTY CYCLE"
00200 CURS 3,15
00210 PRINT "1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20";
00220 FOR T=63 TO 123 STEP 3
00230 GOSUB 290
00240 NEXT T
00250 FOR T=123 TO 63 STEP -3
00260 GOSUB 290
00270 NEXT T
00280 GOTO 220
00290 D0=(126-FLT(T))/63
00300 CURS 44,2:PRINT INT(D0*50);"% ":CURS 1,1
00310 PLOTR 0,47 TO T,47:PLOT T+1,47 TO 126,47
00320 PLOT 0,46 TO T,46:PLOTR T+1,46 TO 126,46
00330 A0=1/(1+D0)
00340 FOR N=1 TO 20
00350 A=INT(ABS(SIN(FLT(N)*3.14*A0)/FLT(N)/3.14)*100)
00360 K=N*6-2
00370 I=0
00380 IF A=0 THEN 420
00390 FOR I=1 TO A
00400 SET K,I+6
00410 NEXT I
00420 FOR J=I+7 TO 47
00430 IF POINT(K,J)=0 THEN NEXT: J 460
00440 RESET K,J
00450 NEXT J
00460 NEXT N
00470 POKE 1,1000
00480 I=USR(0,(63+T)*256+126-T)
00490 RETURN
```

After starting it with RUN, you should:

1. See a picture of a square wave with a varying duty cycle (the duty cycle is the ratio of the ON interval to the sum of the ON and OFF intervals – that is, the period).
2. See a graphic representation of the relative prominence of the fundamental and harmonics up to the 20th harmonic.
3. Hear a sound corresponding to the waveform just being shown.

Unfortunately, you can't hear the sound when the graphics start moving – the reason has been already explained in part one of this series. The sound is always produced after the corresponding waveform has been displayed, together with its frequency-domain representation. (That's what the graph of harmonics is called, as opposed to the actual waveform shape, which is often referred to as the time-domain representation.)

Harmonic Analysis

This technique of analysing waveforms, which provides pictures about the harmonics, is called harmonic analysis. It is an indispensable scientific tool.

Watching the harmonics move, and listening to the sound, you'll notice how the shape of the waveform directly influences the quality of the sound you hear.

The total content of harmonics increases with the duty cycle decreasing from 50 per cent, while the fundamental is continuously diminishing. A pure 50 per cent duty-cycle square wave has only odd harmonics – or, rather, their "envelope" in the spectrum often has a periodic character.

Does it matter if we swap the lengths of the ON and OF intervals? No, as far as sound is concerned. The only difference would be in the direct-current component (mean value) of the signal – the absolute values of both the fundamental and the harmonics remain unchanged and, as you can't hear the DC – the resulting effect is the same. (Moreover, there is a coupling capacitor in your MicroBee, protecting your speaker against an excessive DC bias.)

In practice, it means you don't have to worry which of the two intervals is actually "speaker bit on" and which is "speaker bit off" - it simply doesn't matter.

Now, let's go back to our sound-effects. This program is a somewhat modified version of the "Effect 1" from the last month:

```
00100 DATA 46,0,89,80,62,248,211,2,21,32,253,62,184,211,2,29,32
00110 DATA 253,45,32,237,201
00120 FOR I=0 TO 21
00130 READ D
00140 POKE I,D
00150 NEXT I
00160 POKE 1,INT(RND*30)+1
00170 T=INT(RND*100)+1
00180 FOR N=0 TO 2*T STEP INT(RND*20)+1
00190 M=INT(ABS(FLT(N-T)))
00200 I=USR(0,(T+1-M)*256+M+1)
00210 NEXT N
00220 GOTO 160
```

The lines 100-150 'POKE' our machine-language sub-routine into the memory. The tone length is initialised on line 160 as a random number in the range of 1-30. (This isn't a mistake: the expression INT(RND*N) returns a random number in the interval 0,N-1 since RND is always less than 1.)

The variable T, assigned on line 170, is a half of the period of pulse-width modulation of the square-wave signal. This means we're going to periodically change the duty cycle of the waveform.

The step of the pulse-width modulation is a random number 1-20, as seen on line 180.

Not So Confusing

Line 190 looks rather confusing, thanks to MicroWorld BASIC, but isn't difficult to understand: the value of M changes from T to O and back to T again during one modulation period. (The modulation period is given by one complete FOR-NEXT loop between the lines 180-210 in our program.)

Finally, line 200 calls the machine-code sub-routine. Both ON and OFF interval lengths vary from 1 to T+1, but in the opposite phase: their sum remains constant. This means the pitch remains constant during one complete FOR-NEXT loop. Only the quality of the sound changes.

This approach does have shortcomings. The modulation is done by BASIC and, therefore, the change of frequency or duty cycle can't be made smooth – you can actually hear the intervals between steps. This brings about an additional low-frequency modulation of the signal (which might be useful in many cases, because some of the resulting effects are really interesting).

But wouldn't it be nice to have a sub-routine, which could change all the tone parameters smoothly, producing a synthesizer-like gliding sound?

It would, and here is the sub-routine:

```
ADDR   CODE    LINE    LABEL   MNEM    OPERAND

0000           00100           ORG 0
0000 010000    00110           LD BC,0          ;'ON' INCREMENT DUMMY VALUE
0003 110000    00120           LD DE,0          ;SAME FOR 'OFF' INTERVAL
0006 D9        00130 LOOP0:    EXX              ;SWAP REGISTER BANKS
0007 3EF8      00140           LD A,248         ;LOAD 'SPEAKER BIT ON' VALUE
0009 2A2E00    00150           LD HL,(ONINT)    ;LOAD 'ON' INTERVAL LENGTH
000C 09        00160           ADD HL,BC        ;INCREMENT
000D 222E00    00170           LD (ONINT),HL    ;STORE AGAIN
0010 D302      00180           OUT (2),A        ;OUTPUT TO PORT B
0012 2B        00190 LOOP1:    DEC HL           ;DECREMENT 'ON' COUNT
0013 7D        00200           LD A,L           ;GET LSB OF 'ON' COUNT
0014 B4        00210           OR H             ;TEST THE COUNT FOR ZERO
0015 20FB      00220           JR NZ,LOOP1      ;LOOP FOR SPEAKER BIT ON
0017 3E88      00230           LD A,184         ;LOAD 'SPEAKER BIT OFF' VALUE
0019 2A3000    00240           LD HL,(OFFINT)   ;LOAD 'OFF' INTERVAL LENGTH
001C 19        00250           ADD HL,DE        ;INCREMENT
001D 223000    00260           LD (OFFINT),HL   ;STORE AGAIN
0020 D302      00270           OUT (2),A        ;OUTPUT TO PORT B
0022 2B        00280 LOOP2:    DEC HL           ;DECREMENT 'OFF' COUNT
0023 7D        00290           LD A,L           ;GET LSB  OF 'OFF' COUNT
0024 B4        00300           OR H             ;TEST FOR ZERO
0025 20FB      00310           JR NZ,LOOP2      ;LOOP FOR SPEAKER BIT OFF
0027 D9        00320           EXX              ;SWAP REGISTER BANKS
0028 7D        00330           LD A,L           ;GET LSB OF TONE LENGTH COUNT
0029 B4        00340           OR H             ;TEST THE COUNT FOR ZERO
002A 20DA      00350           JR NZ,LOOP0      ;LOOP UNTIL ZERO
002C D9        00360           EXX              ;SWAP REGISTERS BACK
002D C9        00370           RET              ;RETURN TO BASIC
0002           00380 ONINT:    DS 2             ;'ON' INTERVAL INITIAL LENGTH
0002           00390 OFFINT:   DS 2             ;'OFF' INTERVAL INITIAL LENGTH
0000           00400           END
00000 Total errors

LOOP2   0022    OFFINT  0030    LOOP1   0012    ONINT   002E
LOOP0   0006
```

The principle remains the same. Notice, however, this modification:

1. All parameters are now 16-bit values, rather than eight-bit – this extends the tone range.
2. Both the ON and OFF interval values are incremented once during each tone period.

The increment can be zero, in which case this sub-routine resembles the old one. It can, however, be a positive or negative number and we'll see in a while what can be done with it.

Type this program:

```
00100 DATA 1,0,0,17,0,0,217,33,0,0,217,62,248,42,51,0,9,34,51,0
00110 DATA 211,2,43,125,180,32,251,62,184,42,53,0,25,34,53,0
00120 DATA 211,2,43,125,180,32,251,217,43,125,180,32,217,217
00130 DATA 201
00140 FOR I=0 TO 50
00150 READ D
00160 POKE I,D
00170 NEXT I
00180 INPUT "ON INTERVAL : ";N
00190 INPUT "OFF INTERVAL : "¦F
00200 INPUT "ON INCREMENT : ";B
00210 INPUT "OFF INCREMENT : ";D
00220 INPUT "TONE LENGTH : ";L
00230 POKE 51,N:POKE 52,N/256
00240 POKE 53,F:POKE 54,F/256
00250 POKE 8,L:POKE 9,L/256
00260 POKE 1,B:POKE 2,B/256
00270 IF B)=0 THEN 290
00280 POKE 1,INT(FLT(B)+65536):POKE 2,INT((FLT(B)+65536)/256)
00290 POKE 4,D:POKE 5,D/256
00300 IF D)=0 THEN 320
00310 POKE 4,INT(FLT(D)+65536):POKE 5,INT((FLT(D)+65536)/256)
00320 I=USR(0)
00330 GOTO 180
```

Lines 100-170 load our new sub-routine to the memory. Lines 180-220 ask you about the tone parameters; the ON and OFF increments can be negative, positive or zero.

Passing The Parameters

Notice how the parameters are passed to the machine-code sub-routine: each is POKEd as a 16-bit quantity into two successive memory locations, the least significant byte first. The specific addresses for each tone parameter are obvious from the program.

Run the program and, as the program prompts, successively enter:

1000,1,-1,0,999

To have some more fun, try these combinations:

1000,1,-1,1,999

5000,1,-10,10,490

1,1,1,1,1000

1,1,1,0,1000

Try to experiment yourself. If you want to exit from the sub-routine prematurely, perhaps due to improper input tone parameters, you have to do it by pressing the reset button, because our sub-routine ignores the BREAK key. Just press the reset button, hold it down for a while, then release it. Run again.

Notice that:

1. If both increments are equal to zero, the tone pitch and quality remains constant.
2. If both increments are positive, the pitch will decrease.
3. The pitch will increase with both increments negative.
4. If the increments are of opposite polarity, the one with greater magnitude prevails.
5. If the increments are of opposite polarity with the same non-zero magnitude, the resulting sound seems to "rotate", resembling the popular Leslie effect.

Something Strange Happens

Some of the parameters are inter-related. For example, if you enter the ON interval length equal to 100, 'increment'=-1 and 'tone length'=1000, something strange happens as the tone length is actually the number of the tone periods, and the "increment" is added to the interval length each period, it's obvious that we get a negative interval length before the tone ends.

A negative 16-bit integer number N actually equals 65536-N, which means we suddenly get a very large number as the interval length. That's why you hear a very low-frequency clapping in such cases, and you have to use your reset button to bail out.

There is a simple formula to prevent this happening. If any of the increments is negative, it must fulfil this requirement: the absolute value of the increment times the tone length must be less than the initial interval. This is valid for both ON and OFF intervals.

The following program, if typed correctly, should produce something resembling *Ode to Joy*. (Sorry, Ludwig!) The first part is produced using the standard MicroBee BASIC command PLAY. The second one is played by our new subroutine. Hear the difference! □

```
00100 REM *** ODE TO JOY ***
00110 DIM T(65),L(65),X(13)
00120 DATA 1,0,0,17,0,0,217,33,0,0,217,62,248,42,51,0,9,34,51,0
00130 DATA 211,2,43,125,180,32,251,62,184,42,53,0,25,34,53,0
00140 DATA 211,2,43,125,180,32,251,217,43,125,180,32,217,217
00150 DATA 201
00160 FOR I=0 TO 50
00170 READ D
00180 POKE I,D
00190 NEXT I
00200 DATA 20,20,21,23,23,21,20,18,16,16,18,20,20,18,18,0
00210 DATA 20,20,21,23,23,21,20,18,16,16,18,20,18,16,16,0
00220 DATA 18,18,20,16,18,20,21,20,16,18,20,21,20,18,16,18,11,0
00230 DATA 20,20,21,23,23,21,20,21,18,16,16,18,20,18,16,16
00240 FOR I=0 TO 65
00250 READ T(I)
00260 L(I)=3
00270 NEXT I
00280 L(13)=2:L(29)=2:L(37)=2:L(38)=2:L(42)=2:L(43)=2:L(55)=2
00290 L(56)=2:L(64)=2
00300 L(12)=4:L(14)=4:L(28)=4:L(30)=4:L(48)=4:L(54)=4:L(63)=4
00310 L(65)=4
00320 FOR I=0 TO 65
00330 PLAY T(I),L(I)
00340 NEXT I
00350 PLAY 0,6
00360 DATA 196,184,172,163,153,144,136,128,121,114,107,100,95
00370 FOR I=0 TO 12
00380 READ X(I)
00390 NEXT I
00400 FOR I=-1 TO 65
00410 IF I)-1 THEN 460
00420 N=800:F=800
00430 B=-4:D=-4
00440 W=142
00450 GOTO 540
00460 IF T(I)=0 THEN 660
00470 E=X(T(I)-11)
00480 B=4:D=-4
00490 N=2*E:F=N
00500 W=L(I)*4500/(F+N)
00510 IF I(65 THEN 540
00520 B=-1:D=1
00530 W=N-1
00540 POKE 51,N:POKE 52,N/256
00550 POKE 53,F:POKE 54,F/256
00560 POKE 8,W:POKE 9,W/256
00570 POKE 1,B:POKE 2,B/256
00580 IF B)=0 THEN 600
00590 POKE 1,INT(FLT(B)+65536):POKE 2,INT((FLT(B)+65536)/256)
00600 POKE 4,D:POKE 5,D/256
00610 IF D)=0 THEN 630
00620 POKE 4,INT(FLT(D)+65536):POKE 5,INT((FLT(D)+65536)/256)
00630 K=USR(0)
00640 NEXT I
00650 END
00660 PLAY 0,L(I)
00670 NEXT I
```


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16 PAGE POCKET PROGRAMS

Hex to Decimal

By J Ken Clarke

NOT ONLY will this program convert hexadecimal into decimal, it will also let you know if you give it a non-existent code.

```
5 PRINT AT 10,0;"( HEX TO DEC CONVERSIONS )"
10 SCROLL
20 INPUT A$
30 IF A$=" " THEN RUN
40 IF LEN A$=1 THEN GOTO 100
50 LET A=(16*(CODE A$(1)-28)+(CODE A$(2)-28))
60 SCROLL
70 IF  A>255 OR A<0 THEN GOTO 100
80 PRINT A$,A
90 GOTO 100
100 PRINT A$;"DOES NOT EXIST IN HEX."
110 GOTO 10
```

Flash

By Peter McKay

FLASH IS a program that takes a message from the user and prints it in a way that makes it appear to flash. It does this by printing each letter individually as well as its inverse character over the ordinary characters. The flashing message is printed in the centre of the top of the screen. Line 25 finds where the start of the message will be printed.

```
  1 REM "FLASH"
  5 PRINT "HEADING?"
 10 INPUT H$
 15 CLS
 20 LET L=LEN H$
 25 LET M=14-INT (L/2)
 30 DIM A$(L*2)
 40 FOR I=1 TO L
 45 LET A$(I)=H$(I TO I)
 50 LET A$(L+I)=CHR$ (CODE A$(I
) +128)
 60 NEXT I
 70 PRINT AT 0,M;A$(1);
 80 FOR N=2 TO L
 90 PRINT A$(N);
100 NEXT N
110 PRINT AT 0,M;A$(L+1);
120 FOR K=L+2 TO L*2
130 PRINT A$(K);
140 NEXT K
150 GOTO 70
200 SAVE "FLASH"
210 GOTO 1
```

Death Star

By Jon Barnett

DEATH STAR has been developed for the ZX80 and requires two kilobytes. The object of the game is to collect as many points as possible before destroying the Death Star, and at the same time avoiding enemy fighters.

Type E to avoid the fighters or, if they're in front, destroy them by typing F. If the player isn't quick enough, he'll be hit by the fighter.

To dive into the trench, type D. The chance of being hit by guns depends on the importance of the target. If the X-Wing survives the guns, the screen will blank for a random amount of time; upon its re-appearance, the player must fire (NEWLINE). The scoring is worked out from the player's reaction time. The game ends with the destruction of the Death Star or the X-Wing.

```
 10 LET H=0
 20 PRINT "INSTRUCTIONS?"
 30 INPUT A$
 40 IF NOT CODE(A$)=62 THEN GO TO 100
 50 PRINT "YOU HAVE BEEN ISSUED AN X-WING  FIGHTER"
 60 PRINT "YOUR OBJECTIVE:DEATH STAR"
 70 PRINT "ITS ONE WEAKNESS IS AN EXHAUST  PORT THAT WHEN HIT
    WILL LEAD TO  A CRITICAL REACTION OCCURRING"
 80 INPUT A$
 90 CLS
100 LET S=0
110 LET F=0
120 LET T=40
130 LET E=RND(7)
140 PRINT "SCORE","FUEL","TORPS"
150 PRINT S,F,T
160 PRINT
170 IF E=1 THEN PRINT "TIE FIGHTER IN FRONT"
180 IF E=2 THEN PRINT "TIE FIGHTER BEHIND"
190 LET G=RND(6)
200 IF G=1 THEN PRINT "EXHAUST PORT BELOW"
210 LET C=3
220 IF G 2 THEN GO TO 310
230 IF G 3 THEN GO TO 280
240 PRINT "FIGHTER HANGAR BELOW"
250 LET P=75
260 LET C=6
270 GO TO 310
280 PRINT "COMMUNICATIONS TOWER BELOW"
290 LET P=50
300 LET C=9
310 POKE 16414,0
315 POKE 16415,0
320 INPUT A$
330 LET A=PEEK(16414)+PEEK(16415)*256
340 CLS
350 IF A$="D" THEN LET F=F-16
360 IF A$="E" THEN LET F=F-8
370 IF A$="F" THEN LET F=F-6
380 IF F 0 THEN GO TO 680
390 IF E 2 AND A$="D" THEN GO TO 540
400 IF E 2 THEN GO TO 670
410 IF E=2 THEN GO TO 460
420 IF NOT A$="F" THEN GO TO 460
430 IF A 151 THEN LET S=S+75-A/2
440 PRINT "TIE FIGHTER DESTROYED"
450 GO TO 670
460 IF NOT A$="E" THEN GO TO 510
470 IF A 151 THEN GO TO 700
480 IF A 26 AND NOT RND(8)=1 THEN GO TO 500
490 LET F=F-A/2
500 GO TO 670
510 IF A 151 THEN GO TO 700
520 IF A 26 AND NOT RND(4)=1 THEN GO TO 540
530 LET F=F-A/2
540 FOR I=1 TO 20+RND(20)
550 NEXT I
```

```
560 IF RND(C)=1 THEN GO TO 720
570 POKE 16414,0
575 POKE 16415,0
580 INPUT A$
590 LET A=PEEK(16414)+PEEK(16415)*256
600 LET T=T-1
610 IF G=1 AND A 26 THEN GO TO 770
620 IF A 50 THEN GO TO 670
630 LET S=S+P-A
640 IF C=6 THEN PRINT "FIGHTER HANGAR DESTROYED"
650 IF C=9 THEN PRINT "COMMUNICATIONS TOWER DESTROYED"
660 IF T=0 THEN GO TO 740
670 GO TO 130
680 PRINT "YOUR X-WING HAS RUN OUT OF FUEL"
690 GO TO 750
700 PRINT "IMPERIAL FIGHTERS HAVE DESTROYED YOUR X-WING"
710 GO TO 750
720 PRINT "GUN EMPLACEMENTS HAVE CLAIMED    YOUR CRAFT"
730 GO TO 750
740 PRINT "ALL YOUR TORPEDOES HAVE BEEN     EXPENDED"
750 PRINT "YOU HAVE FAILED TO DESTROY THE   DEATH STAR AND THE
    REBELLION     WILL BE CRUSHED"
760 GO TO 800
770 PRINT "YOU HAVE DESTROYED THE DEATH     STAR AND SAVED THE
    REBEL ALLIANCE"
780 PRINT ,"*YOU ARE A HERO*"
790 LET S=S+200
800 IF H S OR H=S THEN GO TO 830
810 LET H=S
820 PRINT "THE NEW HIGH SCORE IS ";H
830 PRINT
840 PRINT "NEW GAME?"
850 INPUT A$
860 IF CODE(A$)=62 THEN GO TO 20
```

Larger Screen

By Jason Teh

AS YOU know, the ZX81 screen size is 22 by 32 lines, plus another two for your command words. Some users know how to POKE on to these extra lines, but wouldn't it be easier to PRINT on them? Yet if you attempt to do so, you will get an error report code of 5/number.

However, if you have the line POKE 16418,0 in your program, you will get no such report and you'll be able to PRINT on them. This makes your screen size 24 by 32 lines and so enhances your display.

However, certain rules must be obeyed. Before input or scroll can be used, you must POKE 16418,2 (the original number) or else the program will crash!

The reason why POKE 16418,0 adds on two lines to the display is because that address in the ROM tells the machine how many lines you cannot PRINT on. Therefore, if you tell it that it is 0, then you can PRINT on the whole screen.

This program is for the ZX81 with 16-kilobytes of RAM but the line POKE 16418,0 also works for a one-kilobyte machine. It is just that the actual example program takes more than one kilobyte of memory...so to run it on the one-kilobyte machines, just shorten the program.

To RUN it on a ZX80 with eight kilobytes of ROM, change lines 40 and 80 to PAUSE 4E4 and delete line 90.

```
 1 REM LARGER SCREEN BY JASON TEH   25/11/82
10 POKE 16418,0
20 PRINT AT 22,2;"THIS ADDS ON 2 LINES TO THE";TAB 1;"
   SCREEN SIZE MAKING IT 24 BY 32"
30 PRINT AT 11,10;"PRESS A KEY"
40 IF INKEY$="" THEN GOTO 40
50 PRINT AT 22,0;" 32 inverse asterisks "
60 PRINT " 32 inverse asterisks "
70 PRINT AT 23,2;"THESE ARE THE EXTRA TWO LINES"
80 IF INKEY$<>"" THEN GOTO 80
90 IF INKEY$="" THEN GOTO 90
100 PRINT AT 7,1;"WARNING. YOU MUST POKE 16418,2"
110 PRINT AT 9,3;"BEFORE YOU INPUT OR SCROLL"
120 PRINT AT 11,5;"OR ELSE IT WILL CRASH"
130 PRINT AT 13,9;"PRESS NEWLINE";AT 14,0;"THE EXTRA LI
    NES HAVE DISAPPEARED"
140 POKE 16418,2
150 INPUT A$
160 FOR N=1 TO 22
170 SCROLL
180 NEXT N
190 PRINT AT 11,9;"BY JASON TEH"
200 STOP
```

Paint Roller

By C. Bennetto and K. Shepherd

THIS PROGRAM was inspired by the need for an art gallery-type program for the one-kilobyte Sinclair ZX81. Keys 5,6,7,8 are used for their corresponding arrows. Other keys can be used for the 16-kilobyte version. There are lots of possibilities, including rub-outs in every direction and jumping columns.

One-kilobyte:

```
100 LET 1=3
110 LET D=3
115 INPUT A$
120 PRINT AT I,D; A$
130 IF INKEY$="5" THEN LET D=D-1
135 IF INKEY$="6" THEN LET I=I+1
140 IF INKEY$="7" THEN LET I=I-1
145 IF INKEY$="8" THEN LET D=D+1
150 PRINT AT I,D;" "
155 GOTO 120
```

16-kilobyte:

```
121 REM Up left diagonally
122 IF INKEY$="Q" THEN LET I=I-1
123 IF INKEY$="Q" THEN LET D=D-1
124 REM Up right diagonally
125 IF INKEY$="P" THEN LET I=I-1
126 IF INKEY$="P" THEN LET D=D+1
127 REM Down left diagonally
128 IF INKEY$="Z" THEN LET I=I+1
129 IF INKEY$="Z" THEN LET D=D-1
131 REM Down right diagonally
132 IF INKEY$="M" THEN LET I=I+1
133 IF INKEY$="M" THEN LET D=D+1
136 REM Change characters (your pencil)
137 IF INKEY$="C" THEN GOTO 115
```

Commodore VIC 20 Machine Language

By P Thacker

IF YOU OWN a VIC-20 without a printer, and you want to get a hard copy of the program in your computer, you must write it by hand.

However, having to type LIST and then stopping the computer and typing LIST again is inconvenient. With this machine-code program installed, to stop the computer, just press the CTRL and SHIFT keys simultaneously. To resume, just press the CTRL and COMMODORE keys together.

The program requires that the VIC-20 has the three kilobytes of memory unavailable to BASIC below the screen. (This occurs when an eight- or 16-kilobyte cartridge is plugged in with either the Super Expander or a three-kilobyte cartridge). This is where the machine-language program resides; in fact, from locations 1024 to 1099.

To use the program type in the BASIC loading program, making sure that each of the 76 DATA statements is correct and then save it on tape or cassette. RUN it and if all goes well, the READY message should appear. Then to activate the program, type SYS 1024 and press RETURN. The READY prompt should appear and that's it.

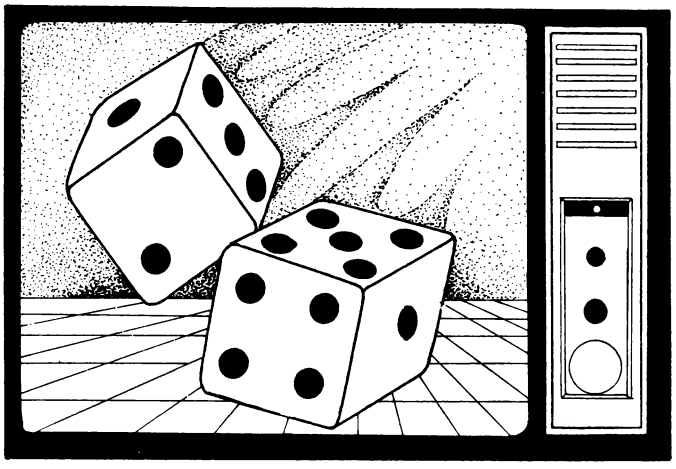
CTRL and SHIFT will also stop the program in the computer when it is running, which could be useful if you are called away during a game. CTRL and COMMODORE keys will resume the program without any ill-effects.

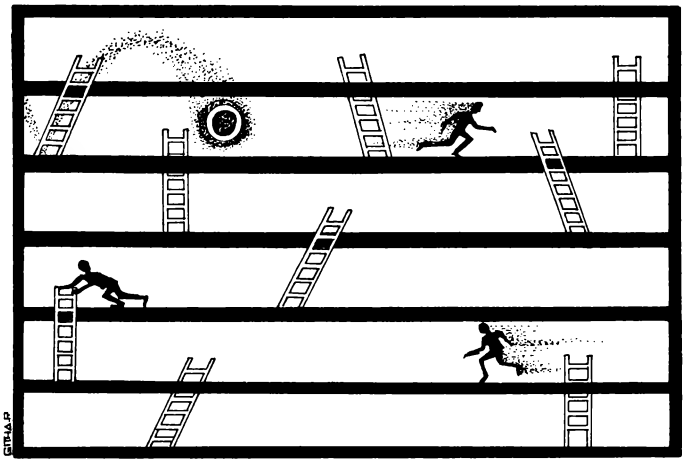
The machine-language routine doesn't interfere with the PROGRAMMER'S AID cartridge, but it does cause the computer to lock-up if you call the VIC-MON cartridge. You can avoid this by disengaging the routine by pressing all three keys at the same time – that is, CTRL, SHIFT and COMMODORE. Once out of the monitor, you can engage it again by SYS 1024.

```
];L\
]LIST

10  FOR I = 1024 TO 1099
20 READN
30  POKE I,N
40  NEXT
50  DATA 120,8,72,173,21,3,201,4
60  DATA 240,17,133,1,173,20,3,133
70  DATA 0,169,4,141,21,3,169,31
80  DATA 141,20,3,104,40,88,96,8
90  DATA 72,32,159,255,173,141,2,201
100  DATA 7,240,19,201,5,208,10,32
110  DATA 159,255,173,141,2,201,6,208
120  DATA 246,104,40,108,0,0,165,0
130  DATA 141,20,3,165,1,141,21,3
140  DATA 169,0,240,237
150  REM
155  REM  SYS1024 = SET UP
160  REM  CTRL & SHIFT = PAUSE
170  REM  CTRL & SHIFT & C'DORE = OFF
180  REM  CTRL & C'DORE = RESUME
```

```
0400 SEI
0401 PHP
0402 PHA
0403 LDA $0315
0406 CMP £$04
0408 BEQ $041B
040A STA $01
040C LDA $0314
040F STA $00
0411 LDA £$04
0413 STA $0315
0416 LDA £$1F
0418 STA $0314
041B PLA
041C PLP
041D CLI
041E RTS
041F PHP
0420 PHA
0421 JSR $FF9F
0424 LDA $028D
0427 CMP £$07
0429 BEQ $043E
042B CMP £$05
042D BNE $0439
042F JSR $FF9F
```





```
0432 LDA $028D
0435 CMP £$06
0437 BNE $042F
0439 PLA
043A PLP
043B JMP ($0000)
043E LDA $00
0440 STA $0314
0443 LDA $01
0445 STA $0315
0448 LDA £$00
044A BEQ $0439
```

NOTE: the £ symbol means #

The code from $041f to $044A is relocatable.

Commodore VIC 20 with Super Expander

By Carlos Nolf

DICE ROLL simulates the rolling of dice and uses the Super Expander's graphics capabilities to plot the dice on the screen.

It gives you a choice of one or two dice and, once the first roll has appeared, you can roll again by pressing the space bar. If any key other than the space bar is pressed, the program will terminate.

This program was written to be used while playing games like Monopoly. It can be easily modified so that instead of pressing the space bar you can press the fire button on a joystick or paddle.

In this way, whenever it is a player's turn to roll the dice, he just presses the button and his roll will appear on the screen, replacing the previous "roll".

Modifications for other machines would involve changing the "circle" and "paint" commands, which put the dots on the dice, into sub-routines which plot out a coloured-in circle or, if possible, puts a character there – for example, O or *

```
1   REM DICE ROLL
2   REM BY C.NOLF
3   REM
5   DIM H(3,3)
10  PRINT CHR$(147)
20  PRINT "HOW MANY DICE (1-2)?";
30  GET N:IF N=0 THEN30
40  IF N<>1 AND N<>2 THEN 10
50  X1=100:Y1=100
60  IF N=2 THEN X2=600:F=1
70  GOSUB 400
150 R1=INT(RND(1)*6+1):G=50
200 IF N=2 THEN R2=INT(RND(1)*6+1)
210 IF R1=1 OR R1=3 OR R1=5 THEN
    H(2,2)=1
220 IF R1=2 OR R1=3 OR R1=6 THEN
    H(1,1)=1:H(3,3)=1
225 IF R1=4 OR R1=5 OR R1=6 THEN
    H(1,1)=1:H(3,1)=1:H(1,3)=1:H(3,3)=1
230 IF R1=6 THEN H(1,2)=1:H(3,2)=1
240 FOR P=1 TO 3:FOR U=1 TO 3
250 IF H(P,U)=1 THEN H=G+P*100:V=100*U+50
    :CIRCLE3,H,V,26,26:PAINT3,H,V
270 NEXT U,P
280 IF F=2 THEN F=1:R1=R2:G=550
    :GOSUB 600:GOTO 210
290 CHAR 16,2, "PRESS SPACE BAR"
295 CHAR 17,2, "FOR ANOTHER ROLL"
300 GET K$:IFK$="" THEN300
310 IF K$<>CHR$(32) THEN: GRAPHIC4 :END
320 GOSUB 600:SCNCLR:GOTO 50
400 GRAPHIC3:COLOR11,3,6,2
410 DRAW2,X1,Y1 TO X1+300,Y1 TO X1+300,
    Y1+300 TO X1,Y1+300 TO X1,Y1
420 IF F=1 THEN X1=X2:F=2:GOTO 410
450 RETURN
600 FOR P=1TO3: FOR U=1TO3:H(P,U)=0:NEXT U,P
610 RETURN
```

Commodore 4016 Bomb Disposal

By Mark Sager

WITH THE Bomb Disposal program, you're in a building with five levels connected by ladders. A bomb, represented by a white circle, is somewhere in the building. The bomb must be located and taken to the top level, where it is thrown off...

However, the bomb has a timer/fuse that could explode, and the building contains booby traps, which add extra time to your ascent. There is also an assassin who occasionally takes pot-shots at you – the only way to avoid him is to jump down a level.

When you reach the top level, turn left and stop two paces from the edge. If the bomb hits a wall after you've thrown it, you lose.

Controls:
4 = Move left
6 = Move right
8 = Climbing ladders
2 = Jump down one level
0 = Throw bomb

A couple of tips: To start, you must name the compound of A PARTICULAR chemical formula – its name is Phenolphthalein. And your man changes shape on collection of the bomb.

```
READY.

1 PRINT"□"
2 GOTO9999
5 PRINT"□"
6 P=BA
7 BA=33079
10 REM***COPYRIGHT M.SHGHR 1982***
50 DIMA(12)
60 DATA32936,32941,32946,32951,33096,33102,33108
70 DATA33262,33269,33276,33426,33436
80 FORN=1TO12
85 READA(N)
90 NEXTN
100 PRINT"          BOMB DISPOSAL          ▒"
110 PRINT"                                 ▒"
120 PRINT"                                 ▒"
125 PRINT"  ▒▒▒
```

```
220 PRINT"▒  ▒                                    ▒"
230 PRINT"▒  ▒                                  - ▒"
240 PRINT"▒  ▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
250 PRINT"▒  ▒                -                 ▒"
260 PRINT"▒  ▒                                  ▒"
270 PRINT"▒  ▒                -                 ▒"
280 PRINT"▒♦♦▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
300 M=65
400 D=33558
410 R=INT(RND(1)*2+1)
420 IFR=1THENB=33373
430 IFR=2THENB=33533
440 S=INT(RND(1)*100+200)
450 POKEB,81
590 H=INT(RND(1)*6+1)
592 W%=INT(RND(1)*6+1)
593 IFW%=1THENPOKEBA,32:BA=33079:POKEBA,88
594 IFW%=2THENPOKEBA,32:BA=33239:POKEBA,88
595 IFW%=3THENGOSUB9000
596 IFW%=3THENPOKEBA,32:BA=33399:POKEBA,88
600 FORI=1TO12
610 H=INT(RND(1)*6+1)
620 IFA=1THENPOKEA(I),32
630 IFH>1THENPOKEH(I),102
700 X=PEEK(151)
705 Z=0
710 IFX=42THENZ=-1
720 IFX=41THENZ=1
730 IFX=10ANDD<32920 THEN GOSUB3000
740 IFX=50ANDPEEK(D-40)=45THENGOSUB2000
745 IFX=18ANDPEEK(D+40)=102THENGOSUB4500
750 IFPEEK(D+40)=32THENGOSUB1000
760 IF PEEK(D+2)=102THENZ=0
800 POKED,32:D=D+Z:POKED,M
825 IFPEEK(D+Z)=81THENM=160:POKEB,32
850 L=L+1
860 NEXTI
865 IFL>S THEN 5000:B=D
870 GOTO590
1000 FORQ=1TO4
1010 POKED,32:D=D+40:POKED,M
1015 FORHH=1TO100:NEXTHH
1020 NEXTQ
1030 RETURN
2000 FORQ=1TO4
2010 POKED,45:D=D-40:POKED,M
2015 FORHH=1TO100:NEXTHH
2020 NEXTQ
2030 RETURN
3000 IFM=65THENRETURN
3005 B=D
3010 POKEB,32:B=B-41:POKEB,81
3013 POKED,65
3020 POKEB,32:B=B-41:POKEB,81
3030 POKEB,32:B=B- 1:POKEB,81
3040 POKEB,32:B=B+39:POKEB,81
3050 POKEB,32:B=B+40:POKEB,81
3060 IFPEEK(B+40)=90 THEN6000
3070 IFPEEK(B+40)=102THEN5000
3090 GOTO3050
4500 IFD>33496THENRETURN
4505 POKED,32:D=D+40:POKED,M
4510 POKED,102:D=D+40:POKED,M
4520 POKED,32:D=D+40:POKED,M
4540 POKED,32:D=D+40:POKED,M
4550 X=0:RETURN
5000 E1=D:E2=D:E3=D:E4=D:E5=D:E6=D
5005 FORRH=1TO8
5010 POKEE1,32:E1=E1+40:POKEE1,42
5020 POKEE2,32:E2=E2-40:POKEE2,42
5025 POKED,42
5030 POKEE3,32:E3=E3+39:POKEE3,42
5040 POKEE4,32:E4=E4-39:POKEE4,42
5050 POKEE5,32:E5=E5+41:POKEE5,42
5060 POKEE6,32:E6=E6-41:POKEE6,42
5070 NEXTRH
5080 END
6000 PRINT"▒"
6001 PRINT"YOU DID IT!":END
9000 P=BA
9002 FOR LA=1TO24
9005 X=PEEK(151)
9010 IFX=18THENGOSUB4500
9020 POKEBA,88:POKEP,32:P=P-1:POKEP,M
9030 IFPEEK(P-1)=MTHEN5000
9040 NEXTLA
9050 POKEP,32:RETURN
9999 PRINT"▒"
10000 PRINT"        ▒▒▒    ▒▒   ▒   ▒  ▒▒▒"
10001 PRINT"        ▒  ▒  ▒  ▒  ▒▒ ▒▒  ▒  ▒"
10002 PRINT"        ▒  ▒  ▒  ▒  ▒ ▒ ▒  ▒  ▒"
10003 PRINT"        ▒▒▒   ▒  ▒  ▒  ▒  ▒▒▒"
10004 PRINT"        ▒  ▒  ▒  ▒  ▒  ▒  ▒  ▒"
10005 PRINT"        ▒  ▒  ▒  ▒  ▒  ▒  ▒  ▒"
10006 PRINT"        ▒▒▒    ▒▒   ▒   ▒  ▒▒▒"
10007 PRINT"  "
10008 PRINT"    "
10009 PRINT"          ▒▒▒ ▒▒▒▒ ▒▒▒"
10010 PRINT"          ▒▒ ▒▒ ▒ ▒▒▒▒"
10020 PRINT"
10030 PRINT"
10040 PRINT"       ▒▒▒
10050 PRINT"      ▒C▒ COPYRIGHT  EXAMPROG
10060 PRINT"       ▒▒▒
10070 PRINT"
10080 PRINT"       NAME THIS FOR A GAME
10090 PRINT"           C  H  O
10100 PRINT"             20 16 4
10200 INPUTG$
10300 IFG$="PHENOLPHTHALEIN"THEN5
10400 GOTO10200
```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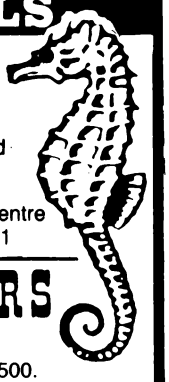

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Indy

By Ben Brown and Shaun Tennant

THE AIM of Indy is to accumulate as many points as possible by completing a full circuit (900 points) in as little time as possible. Penalty points: one every half-second. Crashing into obstacles is indicated.

```
1 REM           INDY DELUXE
2 REM           WRITTEN BY BEN BROWN AND SHAUN TENNANT(SHEEP)
10 CLS
20 PRINT"
                    I N D Y   D E L U X E

KEYS FOR MOVING:  'ESC' OR THE UPWARDS ARROW
                  'CTRL' OR THE DOWNWARDS ARROW
                  ',' "
25 PRINT"PRESS 'S' TO START THE GAME AND TO CONTINUE FROM
INSTRUCTIONS

YOU ARE DEDUCTED 1 POINT FOR EACH CLOCK AND YOU RECEIVE 900
POINTS FOR A FULL CIRCUIT"
30 IF INKEY$="S" THEN 35 ELSE 30
35 CLS
37 POKE 15701,191 :POKE 15721,191 :POKE 16021,191 :POKE 16     042,191
40 FOR A=6 TO 41:H=12
70 SET(H,A):NEXT A
100 FOR B=12 TO 117
140 SET(B,23):NEXT B
170 FOR C=6 TO 41
200 SET(117,C):NEXT C
240 FOR D=0 TO 17
270 SET(63,D):NEXT D
300 FOR E=30 TO 47
340 SET(63,E):NEXT E
370 X=5:Y=24
385 IF INKEY$="S" THEN 420 ELSE 385
420 G=10000
430 SET(X,Y)
440 IF PEEK(14400)=8 THEN RESET(X,Y):Y=Y-3
460 IF Y<1 THEN Y=1
470 IF PEEK(14400)=16 THEN RESET(X,Y):Y=Y+3
480 IF Y>46 THEN Y=46
490 IF PEEK(14368)=16 THEN RESET (X,Y):X=X-3
500 IF X<1 THEN X=1
510 IF PEEK(14368)=64 THEN RESET(X,Y):X=X+3
520 IF X>126 THEN X=126
525 IF Y=25 THEN G=G+450
530 IF POINT(X+1,Y)=-1 THEN 1000
540 IF POINT(X-1,Y)=-1 THEN 1000
550 IF POINT(X,Y+1)=-1 THEN 1000
560 IF POINT(X,Y-1)=-1 THEN 1000
600 G=G-1
700 GOTO 430
1000 PRINT"YOU CRASHED YOUR SCORE IS ";G
1010 INPUT"DO YOU WANT ANOTHER GAME (YES=1) ";DE
1020 IF DE=1        THEN 35 ELSE END
```

Base Converter

By Richard Tooth

BASE CONVERTER is, as its name implies, a program to convert a number from one base to another.

The number to be converted is entered, followed by the base of that number and the new base. Thus, 23 decimal can be converted to binary by typing the numbers 23,10,2. The program will accept the letters A-Z as digits in a number; therefore, FFFF is a legal number.

To exit the program, type !. A$ holds the original number, BASE holds the original base, NBASE holds the new base, C$ holds the resultant numbers and SUM holds the decimal representation.

The program, which works by converting the number to decimal and then to the required base, was written on a TRS80 Model III, but should work on any other machine.

```
10 PRINT "BASE CONVERTOR    By R.Tooth 1982"
20 PRINT "================================":PRINT
30 '
40      'INITIALIZATION AND INPUT
50 CLEAR 200
60 IP$(1)="Number":IP$(2)="Old base":IP$(3)="New base"
70 '
80     ' LOOP TO INPUT NUMBER, IT'S BASE & THE NEW BASE
90 FOR LOOP=1 TO 3
100 NU$(LOOP)=""
110 PRINT IP$(LOOP);"=";
120 Y$="":Y$=INKEY$:IF Y$="" THEN 120
130 IF Y$="!" THEN END
140 IF Y$=CHR$(13) THEN 170  ELSE IF Y$)"/" AND Y$(":" OR Y$)"@"   THEN NU
$(LOOP)=NU$(LOOP)+Y$:PRINTY$;
150 IF Y$=CHR$(8) THEN PRINT Y$;:NU$(LOOP)=LEFT$(NU$(LOOP),LEN(NU$(LOOP))-
1)
160 GOTO 120
170 PRINT "  ";:NEXT LOOP
180 PRINT
190 IF NU$(1)()"" THEN A$=NU$(1)
200 IF VAL(NU$(2)))0 THEN BASE=VAL(NU$(2))
210 IF VAL(NU$(3)))0 THEN NBASE=VAL(NU$(3))
220 '
230     ' CONVERT OLD BASE TO DECIMAL
240 FOR LOOP=LEN(A$) TO 1 STEP -1
250 IN$=MID$(A$,LEN(A$)-LOOP+1,1)
260 IF IN$)="A" AND IN$(="Z" THEN IN=ASC(IN$)-55 ELSE IN=VAL(IN$)
270 SUM=SUM+IN*(BASE[(LOOP-1))
280 NEXT LOOP
290 '
300     ' CONVERT DECIMAL TO NEW BASE
310 I=1
320 NF=INT(SUM/NBASE)
330 B$=STR$(INT(SUM-NF*NBASE+.5))
340 B$=RIGHT$(B$,1)
350 IF INT(SUM-NF*NBASE))9 THEN B$=CHR$(INT(SUM-NF*NBASE)+55)
360 C$=B$+C$
370 IF SUM-NB(0 THEN GOTO 430
380 SUM=INT(SUM/NB)
390 I=I+1
400 GOTO 320
410 '
420     ' OUTPUT NEW NUMBER
430 PRINT A$;"  =";C$
440 PRINT TAB(LEN(A$)-1);BASE;TAB(LEN(A$+C$)+2);NBASE
450 SUM=0:C$="":GOTO 90
```

Othelo

By Tony Hinde

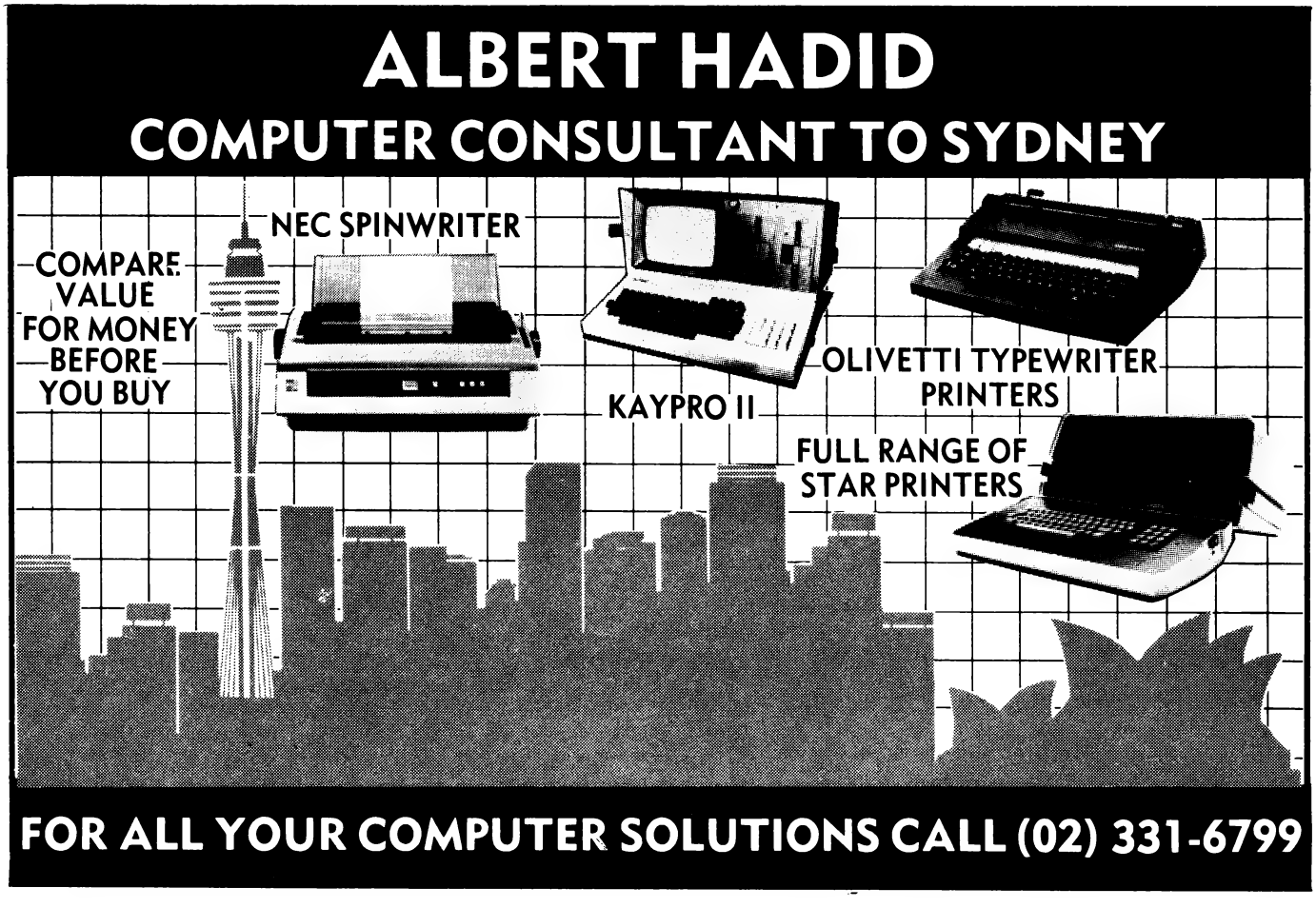
THIS IS the standard two-player Othello game, except it has a 10 by 10 board.

To enter your move using co-ordinates X,Y, where X equals 1 to 10, the enter button need not be pressed, just the number you require.

To input a co-ordinate as 10, you must press SHIFT 1. The program flips all the necessary pieces for you. It uses the standard rules.

```
10 CLS:'                        O T H E L O
15 CLEAR1000
20 Z$=STRING$(31,176)
30 Y$=CHR$(191)+STRING$(2,182)+CHR$(191)+STRING$(2,182)+CHR$(191)+STRING$(2,182)
+CHR$(191)+STRING$(2,182)+CHR$(191)+STRING$(2,182)+CHR$(191)+STRING$(2,182)+CHR$
(191)+STRING$(2,182)+CHR$(191)+STRING$(2,182)+CHR$(191)+STRING$(2,182)+CHR$(191)
35 X$=STRING$(2,182)+CHR$(191)
40 PRINTTAB(26);"OTHELO":PRINTTAB(26);"******":PRINTTAB(15);Z$:FORX=1TO10:PRINTT
AB(15);Y$;X$:NEXT
100 DIMA(10,10)
190 A(5,5)=1:A(6,6)=1:A(5,6)=2:A(6,5)=2
200 PRINT@476,STRING$(3,191)STRING$(2,176);:PRINT@540,STRING$(2,176)STRING$(3,19
1);
210 PRINT@909,"X- 1  2  3  4  5  6  7  8  9  10 -X";
220 P=240:FORC=1TO10
230 PRINT@P,C;:P=P+64
240 NEXT
243 P=1
245 PRINT@176,"Y";:PRINT@880,"Y";
250 PRINT@128,"PLAYER"P;
260 PRINT@192,"********";
270 PRINT@320,"( X , Y ),???";
310 PRINT@122,"YOUR";:PRINT@186,"TURN";:PRINT@250,"PLAYER";:PRINT@315,P;
350 A$=INKEY$:IFA$=""THEN350ELSEN=ASC(A$):IF(N<49ORN>57)ANDN<>33THEN350
352 IFN=33THENA1=10:GOTO360
355 A1=VAL(A$)
360 PRINT@321,A1;
400 A$=INKEY$:IFA$=""THEN400ELSEN=ASC(A$):IF(N<49ORN>57)ANDN<>33THEN400
405 IFN=33THENA2=10:GOTO420
410 A2=VAL(A$)
420 PRINT@325,A2;:GOTO2000
2000 X1=A2:Y1=A1
2010 C1=X1-1:IFC1<1THEN2020ELSEK=K+A(C1,Y1)
2020 C1=X1+1:IFC1>10THEN2030ELSEK=K+A(C1,Y1)
2030 C=Y1-1:IFC<1THEN2040ELSEK=K+A(X1,C)
2040 C=Y1+1:IFC>10THEN2050ELSEK=K+A(X1,C)
2050 C=Y1-1:C1=X1-1:IFC<10RC1<1THEN2060ELSEK=K+A(C1,C)
2060 C=Y1+1:IFC>10ORC1<1THEN2070ELSEK=K+A(C1,C)
```

```
2070 C1=X1+1:IFC1>10ORC>10THEN2080ELSEK=K+A(C1,C)
2080 C=Y1-1:IFC<1ORC1>10THEN2090ELSEK=K+A(C1,C)
2090 IFK=0THEN250
2095 K=0
2300 IFA(X1,Y1)>0THEN250
2310 A(X1,Y1)=P:PRINT@(141+X1%64+Y1%3),STRING$(2,(206-P%15));
2400 IFX1=1THEN2500ELSEFORX=X1-1TO1STEP-1
2410 IFA(X,Y1)=0THEN2500
2413 IFA(X,Y1)=PTHEN2430
2415 IFH=6THENA(X,Y1)=P:PRINT@(141+X%64+Y1%3),STRING$(2,206-P%15);
2420 NEXT
2425  GOTO2500
2430 IFH=6THEN2500
2440 H=6
2450 GOTO2400
2500 H=0
2505 IFX1=10THEN2600ELSEFORX=X1+1TO10
2510 IFA(X,Y1)=0THEN2600
2515 IFA(X,Y1)=PTHEN2550
2520 IFH=6THENA(X,Y1)=P:M=206-P%15:PRINT@(141+X%64+Y1%3),STRING$(2,M);
2530 NEXT
2540 GOTO2600
2550 IFH=6THEN2600
2560 H=6
2570 GOTO2505
2600 H=0
2610 IFY1=10THEN2700ELSEFORY=Y1+1TO10
2620 IFA(X1,Y)=0THEN2700
2630 IFA(X1,Y)=PTHEN2670
2640 IFH=6THENA(X1,Y)=P:M=206-P%15:PRINT@(141+X1%64+Y%3),STRING$(2,M);
2650 NEXT
2660 GOTO2700
2670 IFH=6THEN2700
2680 H=6:GOTO2610
2700  H=0
2705 FORY=Y1-1TO1STEP-1
2710 IFA(X1,Y)=0THEN2800
2720 IFA(X1,Y)=PTHEN2760
2730 IFH=6THENA(X1,Y)=P:M=206-P%15:PRINT@(141+X1%64+Y%3),STRING$(2,M);
2740 NEXT
2750 GOTO2800
2760 IFH=6THEN2800
2770 H=6:GOTO2705
2800 H=0
2805 X=X1:Y=Y1
2810 X=X-1:Y=Y-1:IFX<1ORY<1THEN2900
2820 IFA(X,Y)=0THEN2900
2830 IFA(X,Y)=PTHEN2870
2840 IFH=6THENA(X,Y)=P:M=206-P%15:PRINT@(141+X%64+Y%3),STRING$(2,M);
2850 GOTO2810
2870 IFH=6THEN2900
2880 H=6:GOTO2805
2900 H=0
2910 X=X1:Y=Y1
2920 X=X-1:Y=Y+1:IFX<1ORY>10THEN3000
2930 IFA(X,Y)=0THEN3000
2940 IFA(X,Y)=PTHEN2980
2950 IFH=6THENA(X,Y)=P:M=206-P%15:PRINT@(141+X%64+Y%3),STRING$(2,M);
2960 GOTO2920
2980 IFH=6THEN3000
2990 H=6:GOTO2910
3000 H=0
3010 X=X1:Y=Y1
3020 X=X+1:Y=Y+1:IFX>10ORY>10THEN3100
3030 IFA(X,Y)=0THEN3100
3040 IFA(X,Y)=PTHEN3070
3050 IFH=6THENA(X,Y)=P:M=206-P%15:PRINT@(141+X%64+Y%3),STRING$(2,M);
3060 GOTO3020
3070 IFH=6THEN3100
3080 H=6:GOTO3010
3100 H=0
3110 X=X1:Y=Y1
3120 X=X+1:Y=Y-1:IFX>10ORY<1THEN3200
3130 IFA(X,Y)=0THEN3200
3140 IFA(X,Y)=PTHEN3170
3150 IFH=6THENA(X,Y)=P:M=206-P%15:PRINT@(141+X%64+Y%3),STRING$(2,M);
3160 GOTO3120
3170 IFH=6THEN3200
3180 H=6:GOTO3110
3200 H=0
5000 IFP=1THENP=2ELSEP=1
5010 GOTO250
```

Asteroid Muncher

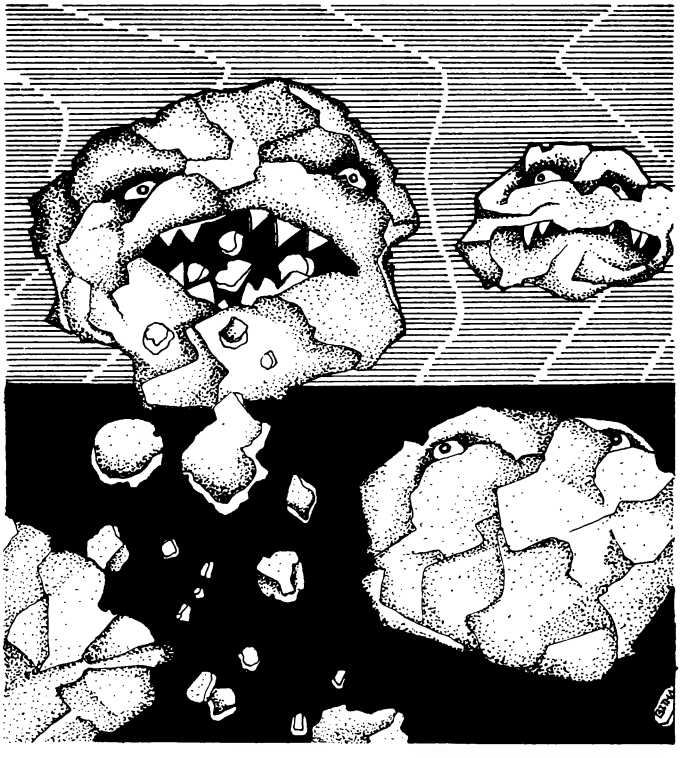
By Ben Brown and Shaun Tennant

THE AIM of Asteroid Muncher is to avoid asteroids by dodging or munching them.

```
3 X=33:CLS
20 PRINT
50 PRINT"
   A S T E R I O D   M U N C H E R

                              BY BEN BROWN AND
                                 SHAUN  TENNANT(SHEEP)
 ',' TO MOVE LEFT
 '.' TO MOVE RIGHT
 'TAB' TO MUNCH"
51 PRINT"
 YOU RECEIVE 1 POINT FOR A CLOCKING AND 20 POINTS FOR
 MUNCHING AN ASTEROID

 PRESS 'S' TO START"
75 IF INKEY$="S" THEN 90 ELSE 75
90 CLS
110 PRINT @960, STRING$(RND    (63),32)
    +CHR$(166);CHR$(153)
111 IF PEEK(14400)=64 THEN 2000
115 IF X=0 THEN 125
120 IF PEEK(14368)=16 THEN X=X-1
125 IF X=63 THEN 140
130 IF PEEK(14368)=64 THEN X=X+1
140 IF PEEK(15360+X)<>32 THEN PRINT "YOU CRASHED
    YOUR SCORE IS ";L:INPUT"DO YOU WANT ANOTHER GAME
    (YES=1) ";DE:IF DE=1 THEN 5000 ELSE END
150 POKE 15360+X,173:POKE 15361+X,158
500 L=L+1
999 GOTO 110
2000 FOR Y=64 TO 960 STEP 64
2005 IF PEEK)15360+X+Y)<>32 THEN JK1=1
2010 IF PEEK(15360+X+Y)=153 OR PEEK (15360+X+Y)=166
     THENL=L+20:POKE 15360+X+Y,32:IF PEEK(15360+X+Y)=153
     THEN POKE 15360+X+Y-1,32 ELSE POKE 15360+X+Y+1,
     32:L=L+20
2012 IF JK1=1 THEN 110
2020  NEXTY:GOTO 110
2310 GOTO 140
5000 CLS:GOTO50
```



APPLE

Snake Maze

By M. J. Smith

SNAKE MAZE is a game in which you, the snake, must get through a small maze, and hit a small yellow dot.

The maze is made up of four sections, or quadrants. There are four different parts of the maze that can go in each quadrant, and the program chooses one at random, and draws it.

The choosing and drawing of the maze is in lines 1000-2460.

```
]LIST

0  REM  >>>    SNAKE MAZE
1  REM  >>>   BY M.J.SMITH
2  REM  >>>
3  REM  >>>CONTROLS:
4  REM  >>> 'A' - UP
5  REM  >>> 'Z' - DOWN
6  REM  >>> ARROWS
7  REM  >>>
8  REM  >>> CTRL-R RESTARTS GAME
9 :
10  REM >>>MAIN LOOP
15  TEXT : HOME : PRINT : PRINT : PRINT : INPUT "SPEED ";PA$:PA =  VAL (PA
    $): IF PA = 0 THEN PA = 20
20  POKE  - 16368,0
30  GOTO 1000
40  COLOR= 1
50 XX = 0:YY = 0
60 X = X + XX:Y = Y + YY
70 XY =  SCRN( X,Y)
80  PLOT X,Y
90  FOR I = 0 TO PA: NEXT
100  IF XY = 2 OR XY = 12 THEN 210
120 A =  PEEK ( - 16384): IF A < 127 THEN 60
130  POKE  - 16368,0
140  IF A = 146 THEN  RUN
150  IF A = 136 THEN XX =  - 1:YY = 0
160  IF A = 149 THEN XX = 1:YY = 0
170  IF A = 193 THEN YY =  - 1:XX = 0
180  IF A = 218 THEN YY = 1:XX = 0
190  POKE  - 16368,0
200  GOTO 60
210  IF XY = 2 THEN 5000
220  IF XY = 12 THEN 6000
999 :
1000  REM >>>DRAW MAZE
1005  GR : COLOR= 2
1010  HLIN 0,38 AT 0: HLIN 0,38 AT 38
1020  VLIN 0,38 AT 0: VLIN 0,38 AT 38
1030  HLIN 0,34 AT 19: VLIN 4,34 AT 19
1040 Q1 =  INT (4 *  RND (1)) + 1: ON Q1 GOSUB 1100,1200,1300,1400
1045 Q2 =  INT (4 *  RND (1)) + 1: ON Q2 GOSUB 1500,1600,1700,1800
1050 Q3 =  INT (4 *  RND (1)) + 1: ON Q3 GOSUB 1900,2000,2100,2200
1055 Q4 =  INT (4 *  RND (1)) + 1: ON Q4 GOSUB 2300,2400,2500,2600
1060  GOTO 40
1100  HLIN 9,14 AT 4: HLIN 14,18 AT 9: HLIN 4,14 AT 14: VLIN 4,14 AT 4: VLIN
    1,14 AT 9
1110 X = 7:Y = 11: RETURN
1200  HLIN 4,9 AT 4: HLIN 9,14 AT 14: VLIN 4,18 AT 4: VLIN 1,14 AT 14: VLIN
    8,10 AT 9: HLIN 8,10 AT 9
1210 X = 2:Y = 16: RETURN
1300  VLIN 1,14 AT 4: VLIN 4,18 AT 9: VLIN 1,14 AT 14
1310 X = 2:Y = 2: RETURN
1400  HLIN 4,14 AT 14: VLIN 4,14 AT 4: VLIN 1,9 AT 9: VLIN 1,14 AT 14
1410 X = 12:Y = 2: RETURN
1500  HLIN 29,34 AT 4: HLIN 20,29 AT 9: HLIN 34,37 AT 9: HLIN 24,34 AT 14:
    VLIN 1,4 AT 24: VLIN 4,9 AT 29: VLIN 9,14 AT 34
1570  RETURN
1600  HLIN 33,35 AT 4: HLIN 29,34 AT 9: HLIN 24,29 AT 14: VLIN 1,14 AT 24:
    VLIN 4,9 AT 29: VLIN 3,5 AT 35: VLIN 9,18 AT 34
1670  RETURN
1700  HLIN 20,34 AT 4: HLIN 24,37 AT 9: HLIN 33,35 AT 14: VLIN 9,14 AT 24:
    VLIN 14,18 AT 29: VLIN 13,15 AT 34
1760  RETURN
1800  HLIN 20,24 AT 4: HLIN 24,29 AT 9: HLIN 28,30 AT 14: VLIN 9,14 AT 24:
    VLIN 1,9 AT 29: VLIN 13,15 AT 29: VLIN 4,18 AT 34
```

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APPLE

```
1870  RETURN
1900  HLIN 29,34 AT 29: HLIN 33,35 AT 24: VLIN 24,37 AT 24: VLIN 20,34 AT
     29: VLIN 23,25 AT 34
1950  RETURN
2000  HLIN 24,37 AT 24: HLIN 33,35 AT 29: HLIN 20,34 AT 34: VLIN 24,29 AT
     24: VLIN 29,34 AT 29: VLIN 28,30 AT 34
2050  RETURN
2100  HLIN 20,24 AT 29: HLIN 24,29 AT 24: HLIN 23,25 AT 35: VLIN 33,35 AT
     24: VLIN 24,37 AT 29: VLIN 20,34 AT 34
2150  RETURN
2200  HLIN 24,37 AT 24: HLIN 20,34 AT 29: VLIN 29,34 AT 24: VLIN 34,37 AT
     29: VLIN 29,34 AT 34
2250  RETURN
2300  HLIN 4,14 AT 24: HLIN 4,18 AT 29: VLIN 24,34 AT 4: VLIN 38,34 AT 9: VLIN
     34,37 AT 14
2350  COLOR= 12: PLOT 6,26: COLOR= 2
2360  RETURN
2400  HLIN 4,18 AT 24: HLIN 1,4 AT 29: HLIN 4,9 AT 34: VLIN 24,34 AT 9: VLIN
     29,37 AT 14
2450  COLOR= 12: PLOT 17,21: COLOR= 2
2460  RETURN
2500  HLIN 4,14 AT 24: HLIN 9,18 AT 34: VLIN 24,37 AT 4: VLIN 29,34 AT 9: VLIN
     24,29 AT 14
2550  COLOR= 12: PLOT 2,36: COLOR= 2
2560  RETURN
2600  HLIN 4,18 AT 24: HLIN 0,14 AT 29: HLIN 4,18 AT 34
2630  COLOR= 12: PLOT 17,21: COLOR= 2
2640  RETURN
4999 :
5000  REM >>>SNAKE HIT WALL
5005  FOR I = 1 TO 50:Z =  PEEK ( - 16336): NEXT
5010 LIVE = LIVE + 1: IF LIVE = 3 THEN  GET A$: GOTO 5100
5020  GOTO 20
5100  TEXT : HOME
5110  PRINT "DO YOU WANT ANOTHER TRY? ";
5120  GET A$
5130  IF A$ <  > "N" THEN  CLEAR : GOTO 10
5140  END
5999 :
6000  REM >>>HIT TARGET
6005  FOR I = 1 TO 10
6010 S =  - 16336
6020 K =  PEEK (S):K =  PEEK (S):K =  PEEK (S):K =  PEEK (S):K =  PEEK (S)
     :K =  PEEK (S):K =  PEEK (S)
6030  NEXT
6035 PA = PA - 5
6040 SC = SC + 1: HOME : PRINT " SCORE : ";SC
6050  GOTO 20
```

Azirka Attack

By M J Smith

YOU ARE the Earth's last chance, fighting off the deadly Azirka fighters. The program gives you the option of altering the number and speed of enemy ships.

Full instructions are included in the program.

```
]LIST
1  REM  AZIRKA ATTACK
2  REM  BY M.J.SMITH
3  REM  10/8/'82
4 :
10  GOSUB 8000
20  GOSUB 10000
30  GOSUB 200
40 SC = 0:Y0 = 80:Y1 = 80:LEVEL = 4
50 HIT = 0:SHOT = 1:YH = 0:MISS = 0
60  HGR
70  HCOLOR= 3: HPLOT 250,Y0 TO 279,Y0 + 3 TO 279,Y0 - 3 TO 250,Y0
90  GOTO 1000
99 :
100  REM  PRINT SCORE<<<
110  VTAB 21: PRINT "NUMBER OF AZIRKAS LEFT - ";: CALL  - 868: PRINT TT -
     AZ
120  VTAB 23: PRINT "           YOUR SCORE - ";: CALL  - 868: PRINT SC
130  RETURN
199 :
200  REM  NEW AZIRKA<<<
210 AZ = AZ + 1: IF AZ > TT THEN 5000
220 BB =  INT ( RND (1) * 7) + 1
230 XX = 10:YY = BB * 20
240  RETURN
299 :
300  REM  SHOOT<<<
310 SX = 0: IF BB = LEVEL THEN SX = XX:HIT$ = "Y"
315  IF HIT$ <  > "Y" THEN MISS = MISS + 1
320  HCOLOR= 6
330  HPLOT 250,Y0 TO SX,Y0
340  POKE 0,90: CALL 768
350  HCOLOR= 4
360  HPLOT 250,Y0 TO SX,Y0
370  IF HIT$ = "Y" THEN HIT$ = "N": GOSUB 400
380 SHOT = SHOT + 1
```

```
390  GOTO 1000
399 :
400  REM  HIT!<<<
410  POKE 0,200: CALL 768: POKE 0,100: CALL 768
420 SC = SC +  INT ((250 - XX) / 30) * 10
430 HIT = HIT + 1
440  HCOLOR= 4: HPLOT XX,YY TO XX - 5,YY + 5 TO XX - 5,YY - 5 TO XX,YY
450  GOSUB 100: GOSUB 200
460  RETURN
499 :
500  REM  YOUR HIT<<<
510 YH = YH + 1
515  IF YH = 5 THEN 5000
520  HCOLOR= 4: HPLOT XX,YY TO XX - 5,YY + 5 TO XX - 5,YY - 5 TO XX,YY
530  POKE 0,255: CALL 768: CALL 768: POKE 0,130: CALL 768: POKE 0,200: CALL
     768: CALL 768
540 SC = SC - 100: GOSUB 100
550  GOSUB 200
560  GOTO 1000
999 :
1000  REM  MAIN LOOP<<<
1010  HCOLOR= 4: HPLOT XX,YY TO XX - 5,YY + 5 TO XX - 5,YY - 5 TO XX,YY
1020 XX = XX + SP
1030  HCOLOR= 3: HPLOT XX,YY TO XX - 5,YY + 5 TO XX - 5,YY - 5 TO XX,YY
1050  IF XX > 250 THEN 500
1060  IF  PEEK ( - 16384) < 127 THEN 1000
1070 KEY =  PEEK ( - 16384): POKE  - 16368,0
1080  IF KEY <  > 193 AND KEY <  > 218 AND KEY <  > 160 THEN 1000
1090 :
1100  IF KEY = 193 THEN LEVEL = LEVEL - 1: IF LEVEL < 1 THEN LEVEL = 1
1110  IF KEY = 218 THEN LEVEL = LEVEL + 1: IF LEVEL > 7 THEN LEVEL = 7
1120  IF KEY = 160 THEN 300
1130 Y1 = LEVEL * 20
1140  HCOLOR= 4: HPLOT 250,Y0 TO 279,Y0 + 3 TO 279,Y0 - 3 TO 250,Y0
1150  HCOLOR= 3: HPLOT 250,Y1 TO 279,Y1 + 3 TO 279,Y1 - 3 TO 250,Y1
1160 Y0 = Y1: GOTO 1000
4999 :
5000  REM  END GAME<<<
5010  HGR : TEXT : HOME : VTAB 6
5020  PRINT "NUMBER OF AZIRKAS  : ";TT
5030  PRINT : PRINT "NUMBER YOU HIT     : ";HIT
5040  PRINT : PRINT "NUMBER OF MISSES   : ";MISS
5050  PRINT : PRINT "NUMBER OF SHOTS    : ";SHOT
5060  PRINT : PRINT : PRINT "YOUR SCORE         : ";SC
5065  POKE  - 16368,0: FOR I = 1 TO 100: NEXT I
5070  PRINT : PRINT "DO YOU WANT TO PLAY AGAIN? ";: GET A$
5080  IF A$ = "Y" THEN  RUN
5090  END
5099 :
8000  REM  SOUND ROUTINE<<<
8010  POKE 768,169: POKE 769,4: POKE 770,133: POKE 771,1: POKE 772,234: POKE
     773,234: POKE 774,234: POKE 775,173: POKE 776,48:
8020  POKE 777,192: POKE 778,136: POKE 779,208: POKE 780,4: POKE 781,198: POKE
     782,1: POKE 783,240: POKE 784,8: POKE 785,202:
8030  POKE 786,208: POKE 787,246: POKE 788,166: POKE 789,0: POKE 790,76: POKE
     791,7: POKE 792,3: POKE 793,96: POKE 794,208:
8040  RETURN
9999 :
10000  REM  INSTRUCTIONS<<<
10010  TEXT : HOME : VTAB 5
10020  PRINT "      A Z I R K A   A T T A C K "
10030  VTAB 10: PRINT  TAB( 14)"BY M.J.SMITH"
10035  VTAB 20
10040  GOSUB 20000
10050  HOME : PRINT : PRINT "RED ALERT!! RED ALERT!!"
10060  PRINT : PRINT "THE AZIRKAN EMPIRE HAS JUST DECLARED WARON EARTH. EV
     EN AT THIS MOMENT THE"
10065  PRINT "EARTH IS UNDER HEAVY ATTACK FROM"
10070  PRINT "AZIRKAN FIGHTERS, AND IT IS YOUR JOB TO STOP THEM."
10080  PRINT : PRINT "YOU ARE CONTROLLING A MOVEABLE LASER     CANNON WITH
     AN UNLIMITED SUPPLY OF      SHOTS."
10090  PRINT "THE AZIRKAN FLEET OF SUICIDE SHIPS WILL ATTACK ONE BY ONE, A
     ND ONCE THE EARTH   HAS BEEN HIT FIVE TIMES, IT WILL        EXPLODE."

10100  PRINT : PRINT : GOSUB 20000
10105  HOME
10110  VTAB 5: PRINT "USE THESE KEYS TO CONTROL THE GUN :"
10120  PRINT : PRINT "A - MOVE UP"
10130  PRINT : PRINT "Z - MOVE DOWN"
10140  PRINT : PRINT "SPACE BAR TO SHOOT"
10150  PRINT : PRINT : PRINT : PRINT "DO YOU WISH TO ALTER THE SIZE AND SP
     EED OF THE AZIRKAN FLEET (Y/N) ? ";: GET A$
10160  IF A$ = "Y" THEN 10500
10165 SP = 15:TT = 50
10170  PRINT : PRINT : PRINT : GOSUB 20000
10180  RETURN
10500  HOME : VTAB 10
10510  PRINT "SIZE OF AZIRKAN FLEET (NORMAL=50) ?";: INPUT TT
10520  PRINT : PRINT : PRINT "SPEED OF AZIRKAN SHIPS (NORMAL=15) ?";: INPUT
     SP
10530  GOTO 10170
20000  PRINT : PRINT "      (HIT SPACE BAR TO CONTINUE)"
20010  IF  PEEK ( - 16384) <  > 160 THEN 20010
20020  POKE  - 16368,0: RETURN
```

MICROBEE

Microbee with Character

By John Tester and Friends

THIS PROGRAM is a development of H. Purvis' program in the December 1982 issue of *Your Computer*, which uses a grid and movable cursor to plot the character.

This expansion of the program allows the PCG to be used as a file so that characters can be recalled and further modified.

The modified characters can be collated in a grid when designing multi-character drawings, and a character space can be reset on or off.

The program generates its own data statements, which can be dumped to either tape or printer. Line 1630 OUT#3 ON selects the 1200-baud tape dump; OUT#5 ON selects the 1200-baud RS232 printer. Line 1740 turns them off after the dump. (These can be changed as required.)

To merge a tape of data with a program, load your program, making sure that there are no line numbers above 20,000. Type

IN#3 ON (CR)

This will disable the keyboard.

Start the tape, and line numbers and data statements, starting at 20,000, will appear on the screen as the data loads.

Line 1730, which is at the end of the data statement, returns control of the MicroBee to the keyboard.

A simple program to display the characters of the data statement is:

00100 INPUT "No of chars" A
00110 INPUT "First Char" B1$
00120 P =63488 + ASC(B1$)* 16
00130 FOR I = P TO P + (A* 16)-1
00140 READ D
00150 POKE I,D
00160 NEXT I
00170 PCG
00180 T = ASC(B1$)
00190 FOR M = T TO T + A-1
00200 PRINT CHR$(M);
00210 NEXT M
00220 NORMAL : END

```
00100 POKE 220,16:CLS:Q1$="0"
00110 DATA 255,128,128,128,128,128,128,128
00120 DATA 128,128,128,128,128,128,128,255
00130 DATA 255,1,1,1,1,1,1,1
00140 DATA 1,1,1,1,1,1,1,255
00150 DATA 255,255,255,255,255,255,255,255
00160 DATA 255,255,255,255,255,255,255,255
00170 DATA 255,129,129,129,129,129,129,255
00180 DATA 255,129,129,129,129,129,129,255
00190 DATA 254,254,254,254,254,254,254,0
00200 DATA 0,254,254,254,254,254,254,254
00210 DATA 127,127,127,127,127,127,127,0
00220 DATA 0,127,127,127,127,127,127,127
00230 P = 63488 + 65 * 16
00240 FOR A = P TO P + 16*6-1
00250 READ X : POKE A,X :NEXT A
00260 DIM D(8,16),B(16),E(8),PO(99)
00270 DATA 128,64,32,16,8,4,2,1
00280 FOR A=1 TO 8 :READ E(A):NEXT A
00290 CURS 15,2 :PRINT "P = Print Data"
00300 CURS 15,3 :PRINT "I = Insert Data      Char (   )"
00310 CURS 13,4 :PRINT "256 = Abort Insert"
00320 CURS 15,5 :PRINT "R = Reset Data       Cont (   )"
00330 CURS 15,6 :PRINT "Q = Quit Program"
00340 CURS 15,7 :PRINT "L = Up Cursor"
00350 CURS 15,8 :PRINT "  = Down Curser"
00360 CURS 15,9 :PRINT "< = Left Curser  1"
00370 CURS 15,10 :PRINT "> = Right Curser 2"
00380 CURS 15,11 :PRINT "Z = Toggle Point 3"
00390 CURS 15,12 :PRINT "S = Change Char  4"
00400 CURS 15,13 :PRINT "C = Colate Char   12345678901234"
00410 CURS 32,14  : PRINT"1"
00420 CURS 32,15  : PRINT"2"
00430 CURS 32,16  : PRINT"3"
00440 CURS 32,16  : PRINT"4";
00450 GOSUB 1060
00460 CURS 42,2: PRINT Q1$
```

```
00470 CURS 42,4 : PCG : PRINT Q1$: NORMAL
00480 A1$=KEY$:IF A1$ = "" THEN GOTO 480
00490 P =63488 + ASC(Q1$)*16
00500 IF A1$ = "."THEN GOSUB [ 1, 8] 630
00510 IF A1$ = ","THEN GOSUB [-1, 1] 630
00520 IF A1$ = "L" OR A1$ = "l" THEN GOSUB [-1, 1] 700
00530 IF A1$ = " "THEN GOSUB [1, 16] 700
00540 IF A1$ = "Z" OR A1$ = "z" THEN GOSUB 770
00550 IF A1$ = "P" OR A1$ = "p" THEN GOSUB 1460
00560 IF A1$ = "R" OR A1$ = "r" THEN GOSUB 1160
00570 IF A1$ = "I" OR A1$ = "i" THEN GOSUB 890
00580 IF A1$ = "Q" OR A1$ = "q" THEN POKE220,111:CLS:STOP
00590 IF A1$ = "S" OR A1$ = "s" THEN GOSUB 1010
00600 IF A1$ = "C" OR A1$ = "c" THEN GOSUB 1310
00610 GOTO 460
00620 VAR (K, L)
00630 VAR (K,L) :IF C = L THEN RETURN
00640 IF D(C,R)=1 THEN LET A2$ ="CC" ELSE LET A2$ = "AB"
00650 GOSUB 870
00660 C=C+K
00670 IF D(C,R)=1 THEN LET A2$ ="EF" ELSE LET A2$ = "DD"
00680 GOSUB 870
00690 RETURN
00700 VAR (K,L):IF R=L THEN RETURN
00710 IF D(C,R)=1 THEN LET A2$ ="CC" ELSE LET A2$ = "AB"
00720 GOSUB 870
00730 R = R + K
00740 IF D(C,R)=1 THEN LET A2$ ="EF" ELSE LET A2$ = "DD"
00750 GOSUB 870
00760 RETURN
00770 IF D(C,R)=0 THEN LET A2$="EF":LET D(C,R)=1 ELSE LET A2$="DD":LET D(C,R)=0
00780 GOSUB 870
00790 IF D(C,R)=1 THEN LET B(R)=B(R) + E(C) ELSE LET B(R)=B(R)-E(C)
00800 POKE P+R-1, B(R)
00810 CURS 42,4 :PCG:PRINT Q1$; :NORMAL
00820 RETURN
00830 FOR V = 1 TO 16
00840 CURS 1,V : PRINT "                ";
00850 CURS 1,V : PRINT [I3 V];[I4B(V)];:NEXT V
00860 RETURN
00870 CURS 46+C*2,R :PCG: PRINT A2$;:NORMAL
00880 RETURN
00890 FOR V=1 TO 16
00900 CURS 1,V: PRINT"           ";:POKE 220,111
00910 CURS 1,V: INPUT "Data ?";Z;:POKE 220,16
00920 IF Z>255 THEN GOSUB 870 : RETURN
00930 B(V) = Z :POKE P+V-1, Z
00940 FOR W =1 TO 8: D(W,V)=0
00950 IF Z >= E(W) THEN LET D(W,V) =1:Z = Z-E(W)
00960 IF D(W,V) = 1 THEN LET A2$ = "CC" ELSE LET A2$ = "AB"
00970 C = W: R = V: GOSUB 870: NEXT W
00980 NEXT V :C = 1 : R = 1
00990 IF D(C,R) = 1 THEN LET A2$ = "EF" ELSE LET A2$ = "DD"
01000 GOSUB 870: RETURN
01010 CURS 35,2: PRINT "Char (   )":CURS 15,14: PRINT"SELECT CHAR"
01020 Q1$=KEY$:IF Q1$="" THEN 1020
01030 IF ASC(Q1$) >70 OR ASC(Q1$) <65 THEN 1060
01040 CURS 15,14 :PRINT "RESERVED CHR"
01050 CURS 15,15 :PRINT "TRY AGAIN":GOTO 1020
01060 GOSUB 1430 :P =63488 + ASC(Q1$)*16
01070 FOR V=1 TO 16 :CURS 1,V: PRINT"            ";
01080 Z=PEEK (P+V-1) : B(V)=Z :POKE P+V-1,Z
01090 FOR W =1 TO 8 :D(W,V)=0
01100 IF Z >= E(W) THEN LET D(W,V) =1:Z = Z-E(W)
01110 IF D(W,V) = 1 THEN LET A2$ = "CC" ELSE LET A2$ = "AB"
01120 C = W: R = V: GOSUB 870
01130 NEXT W :NEXT V :C = 1 :R = 1
01140 IF D(C,R) = 1 THEN LET A2$ = "EF" ELSE LET A2$ = "DD"
01150 GOSUB 870 : RETURN
01160 CURS15,14:PRINT"RESET  ON=A"
01170 CURS15,15:PRINT"      OFF=S"
01180 G1$=KEY$ :IF G1$=""THEN 1180
01190 IF G1$="A"OR G1$="a" THEN LET A2$="CC":F=255:GOTO1210
01200 A2$="AB" :F=0
01210 GOSUB 1430 :FOR R=1 TO 16
01220 IF F=0 THEN LET B(R) =0 ELSE LET B(R)=255
01230 FOR C=1 TO 8
01240 IF F=0 THEN LET D(C,R)=0 ELSE LET D(C,R)=1
01250 GOSUB 870 :NEXT C :NEXT R
01260 P=63488 + ASC(Q1$)*16
01270 FOR A=1 TO 16 :POKE P+A-1,F :NEXT A
01280 R = 1 : C = 1
01290 IF F=0 THEN LET A2$="DD" ELSE LET A2$="EF"
01300 GOSUB 870 : RETURN
01310 CURS 15,14 :PRINT"INPUT VERTICAL"
01320 CURS 15,15 :PRINT "No. "
01330 I1$=KEY$:IF I1$="" THEN 1330
01340 I=INT(VAL(I1$))
01350 IF I>4 OR I=0 THEN 1330
01360 CURS 15,14 : PRINT"INPUT HORISONTAL"
01370 CURS 15,15 : PRINT"No.(Two No's) "
01380 FOR J =1 TO 100 : NEXT J
01390 GOSUB 1780
01400 IF H>14 OR H=0 THEN 1370
01410 CURS (H+32),(I+7):PRINT Q1$
01420 CURS (H+32),(I+12):PCG:PRINT Q1$;:NORMAL
01430 CURS 15,14:PRINT"                "
01440 CURS 15,15:PRINT"                "
01450 RETURN
01460 CURS 15,14 :PRINT"TO SCREEN = S"
01470 CURS 15,15 :PRINT"TO TAPE   = A"
01480 I1$=KEY$:IF I1$="" THEN 1480
01490 IF I1$ = "S" OR I1$ = "s" THEN GOSUB 1430:GOTO 830
01500 CURS 15,14 :PRINT"INPUT No PCG"
01510 CURS 15,15 :PRINT"CHARS (Two No's)"
01520 GOSUB 1780
01530 GOSUB 1430
01540 IF H=0 THEN 1510
01550 CURS 15,14 :PRINT"INPUT PCG CHARS"
01560 Q=20010 :FOR T=1 TO H
01570 FOR J = 1 TO 100 : NEXT J
01580 P1$=KEY$:IF P1$="" THEN 1580
01590 PO$(T)=P1$ :PRINT TAB (12);PO$(T);",";:NEXT T
01600 POKE 220,111:CLS : PRINT: PRINT "    SET TAPE TO RECORD"
01610 PRINT"   HIT ANY KEY TO DUMP"
01620 H1$=KEY$:IF H1$ ="" THEN 1620
01630 OUT#3 ON:OUT#5 ON
01640 PRINT" 20000 REM Char's are ";
01650 FOR T=1 TO H
01660 IF T=H THEN PRINT PO$(T):GOTO 1680
01670 PRINT PO$(T);",";
01680 NEXT T :FOR M=1 TO H :PRINT Q;" DATA";:FOR S=0 TO 15
01690 U=63488+ASC(PO$(M))*16+S
01700 IF S=15 THEN PRINT PEEK(U): GOTO 1720
01710 PRINT PEEK(U);",";
01720 NEXT S :Q=Q+10 :NEXT M
01730 PRINT CHR (26) : REM TO WARM START ON RELOAD
01740 OUT#3 OFF:OUT#5 OFF
01750 PRINT "Dump Finished - Press any key to return."
01760 H1$=KEY$:IF H1$="" THEN 1760
01770 POKE 220,16:CLS:GOTO 290
01780 H2$=""
01790 H1$=KEY$:IF H1$="" THEN 1790
01800 H2$=H2$ + H1$
01810 IF LEN(H2$)<2 THEN CURS19,15:PRINT"    ";H2$;"     ":GOTO 1790
01820 H=INT(VAL(H2$)) :RETURN
```

Babysitting Club

By Chris Hinge

THIS PROGRAM can be easily modified for a mailing list or for phone numbers and directory-type record/file/listing.

It is stored in a dimensional array of 14 rows by five columns. You can change the size of the array to add more to the list (that is, the rows), and/or add or reduce the information per row (that is, the columns).

The program was designed for a MicroBee with a C-Itoh 8510A printer with a parallel interface using the MicroBee's parallel port.

Modifications for serial printers: delete lines 360, 390 to 410, 430 and 570, and change the PRINTTAB statements in lines 420 to 560 to LPRINTTAB.

Some details of the program

Lines 180 to 240 set up the array.

Lines 250 to 290 print the club member's name and you input his current points; storing is in the fifth column in the array.

Line 310 to 340: you input the name of the secretary, month and message if any.

Line 360: Output to VDU and parallel port.

Line 370: Number of copies to be printed.

Line 390: Selects printer and print style.

Line 400: Form-feed command.

Line 410: Elongate "print on" command.

Line 430: Elongate "print off" command.

Lines 470 to 550 format and print the contents of the array, and look for null char for the end of the array.

Line 560 prints a message at the end of the list.

Line 570 deselects the printer.

Line 580 switches off the parallel port.

```
>LIST

00100 REM **** B & C SOFTWARE **** COPYRIGHT 1-2-83 **** CHRIS HINGEE
00110 REM  BABY SITTING CLUB MONTHLY POINTS REPORT
00120 REM  PROGRAMMED FOR C-ITOH 8510A PRINTER
00130 REM  SET UP FOR MAX. 14 MEMBERS
00140 REM  TO ADD NEW MEMBERS FILL IN DATA LINES THAT HAVE NULL CHARS.
00150 REM  TO REMOVE MEMBERS DELETE DATA LINE AND ADD NEW DATA LINE AT END WITH 5 LOTS OF NULL CHARS.
00160 REM  TO EXPAND BEYOND 14 MEMBERS CHANGE LINES 190 - 200 - 250
00170 CLEAR
00180 STRS(2000)
00190 DIMN1(14,5)
00200 FORI=1TO14
00210 FORJ=1TO5
00220 READ N1$(I,J)
00230 NEXTJ
00240 NEXTI
00250 FORX=1TO13
00260 IFN1$(X,1)=""THEN300
00270 PRINTN1$(X,1);:INPUT" -- TYPE IN THIS MONTH'S POINTS. ";P1$
00280 N1$(X,5)=P1$
00290 NEXTX
00300 PRINT:PRINT
00310 INPUT"TYPE THE NAME OF THE SECRETARY OF THE MONTH. ";M1$
00320 INPUT"TYPE THE NAME OF THE MONTH. ";O1$
00330 M2$=""
00340 PRINT"TYPE IN MESSAGE OF THE MONTH."
00350 INPUT"IF NONE PRESS RETURN.";M2$
00360 OUT#0ON:OUT#1ON
00370 FORI=1TO X
00380 CLS
00390 PRINTCHR$(17);CHR$(27);CHR$(78)
```

```
00400 PRINTCHR$(12)
00410 PRINTCHR$(14)
00420 PRINTTAB(8);"*** BABY SITTING CLUB ***":PRINT:PRINT
00430 PRINTCHR$(15)
00440 PRINTTAB(31);"**** ";O1$;" ****":PRINT
00450 PRINTTAB(24);"**** SECRETARY OF THE MONTH ****"
00460 PRINTTAB(28);"**** ";M1$;" ****":PRINT:PRINT:PRINT
00470 F=1:G=X/2+1
00480 PRINTTAB(10);N1$(F,1);:PRINTTAB(50);N1$(G,1)
00490 PRINTTAB(10);N1$(F,2);:PRINTTAB(50);N1$(G,2)
00500 PRINTTAB(10);N1$(F,3);:PRINTTAB(50);N1$(G,3)
00510 PRINTTAB(10);N1$(F,4);:PRINT" *** POINTS = ";N1$(F,5);:PRINTTAB(50);N1$(G,4);
00520 IFN1$(G,5)=""THEN560ELSEPRINT" *** POINTS = ";N1$(G,5)
00530 PRINT:PRINT
00540 F=F+1:G=G+1
00550 IFG(X+1THEN480
00560 PRINT:PRINT:PRINT:PRINTTAB(5);M2$:NEXT1
```

```
00570 PRINTCHR$(19)
00580 OUT#1OFF:END
10000 DATA"CHRISTIAN NAME & SURNAME","NO & STREET NAME","SUBURB","PHONE NO.","POINTS"
10010 REM FOLLOW EXAMPLE
10020 DATA"CAROL & JOHN CITIZEN","1 QUITE STREET,","SOMEWHERE HILLS.","777-7777","0"
10030 DATA"","","","","",""
10040 DATA"","","","","",""
10050 DATA"","","","","",""
10060 DATA"","","","","",""
10070 DATA"","","","","",""
10080 DATA"","","","","",""
10090 DATA"","","","","",""
10100 DATA"","","","","",""
10110 DATA"","","","","",""
10120 DATA"","","","","",""
10130 DATA"","","","","",""
10140 DATA"","","","","",""
```

BASIC

Allplot BAS

By Dr David Hollway

THIS IS a variant of the Plotter.BAS, published in the April 1982 issue of *Your Computer*.

Much of the description given then (pages 76-79) also applies to Allplot.BAS and need not be repeated. The difference is that this variant is used alone, not as a sub-routine or chained, and takes the numerical data needed for plotting graphs, or drawing diagrams, only from files.

In addition, it allows keyboard instructions to be stored, so that additional copies of graphs may be obtained at any time without re-entering scale information and labels.

The method of using Allplot.BAS is to first prepare a sequential file of the X and Y values to be plotted. These may be either results recorded during a computation or instrument readings entered from the keyboard. (The non-document option of WordStar is convenient for preparing data files as it allows errors to be corrected easily.) The data files consist of a sequence of numerical values of X and Y separated by carriage returns. A different file name is used for each variable to be plotted.

Next, load Allplot.BAS as a BASIC program, run and choose one of the options displayed. The program then will ask for a file name and will record in it all keystrokes from that point on. These may include options, scale data, plotter instructions and labels. The recording of the sequence of instructions may be terminated by choosing option 13. In some cases, it is preferable to use one instruction file for the scale, grid lines, X and Y labels, and title and another file (if necessary) for the plotting instructions.

The next step usually is to set the X and Y scales using options one or two, as described in the earlier article, and then plot a graph from a file of results by choosing option four.

At this point, the program will ask whether to draw a line through the X and Y values, or simply mark the points. If both a line and marks are needed, option four should be called twice, using the same data file.

On the first call, 0 is chosen (at line 9206 in the listing) and a number between one and six chosen on the second call. These numbers identify the geometrical shape of the point, as described in the Watanabe DigiPlot manual.

If, instead of producing a new graph, the operator wishes to obtain a copy of one previously drawn, option 14 should be chosen.

After receiving the file name containing the instructions, a new copy will be drawn and the program will return to display the options.

```
8000 REM**   ALLPLOT.BAS A PROGRAM FOR PLOTTING FROM FILES OF
8001 REM**   X&Y VALUES AND STORING ORDER SEQUENCES.  DISK: 25.
8002  DTR=57.296
8010 EDG%=1:LPRINT CHR$(27);"Q":PRINT "====FOR OPTION <N>, TYPE: N CR"
8011 PRINT "DRAW X & Y AXES: 2-SIDES.....<1>, 4-SIDES..<2>"
8012 PRINT "REPEAT X & Y AXES.............<3>"
8014 PRINT "PLOT FROM A FILE..............<4>"
8016 PRINT
8018 PRINT "MOVE PEN OR WRITE ON PLOT.....<5>"
8020 PRINT "DRAW LINES PARALLEL WITH THE..... X<6> OR Y<7> AXIS"
8022 PRINT "DRAW 'GRAPH PAPER' GRID.......<8>"
8024 PRINT "EDGE LIMIT OFF.(DEFAULT-ON-).....<9>"
8026 PRINT "SOLID(DEF)/BROKEN LINE TOGGLE...<10>" : DD%(0)=0 : DD%(1)=0
8027 PRINT
8030 PRINT "STORE ORDERS IN A FILE.....<12>"
8032 PRINT "CLOSE THE ORDER FILE.......<13>"
8034 PRINT "WORK THROUGH AN ORDER FILE....<14>"
8045 PRINT "STOP.........................<19>"
8046 GOSUB 8700 : OPT=NUM
8050 ON OPT GOTO 8065,8065,8143,9200,8550,8620,8620,8143,8060,8053
8051 OPTL=OPT-10 : ON OPTL GOTO 8010,8800,9000,8900,8010,8010,8010,8010,8058
8053 BRO%=1-BRO% : LPRINT "L";BRO%
8054 IF BRO%>0 THEN PRINT "PITCH =":GOSUB 8700:SG%=NUM :LPRINT "B";SG%
8056 GOTO 8010
8058 LPRINT CHR$(27);"P" : STOP
8060 PRINT "REMOVE<0>, RESTORE<1> EDGE LIMIT";
8062 GOSUB 8700 : EDG%=CINT(NUM) : GOTO 8010
8065 BOX=OPT : GOSUB 8070 : GOTO 8145 : REM****INPUT DATA****
8070 FOR XY%=0 TO 1 : IF XY%=0 THEN PRINT "X-SCALE" ELSE PRINT "Y-SCALE"
8075 PRINT "LINEAR<1> OR LOG.<2>";
8077 GOSUB 8700 : LIG(XY%)=CINT(NUM)
8080 IF LIG(XY%)=1 THEN PRINT "UNITS PER MM";
8082 IF LIG(XY%)=1 THEN GOSUB 8700 : UPMM(XY%)=NUM : GOTO 8090
8085 LTN=LOG(10):PRINT "MM PER DECADE";: REM LATER = 1/UPMM(XY%)
8087 GOSUB 8700 : UPMM(XY%)=NUM
8090 PRINT "BEGIN SCALE AT ? UNITS"; :GOSUB 8700 : BS(XY%)=NUM
8095 PRINT "END SCALE AT ? UNITS";   :GOSUB 8700 : ES(XY%)=NUM
8100 IF LIG(XY%)=2 THEN GOTO 8115
8105 PRINT "MARK EVERY ? UNITS"; :GOSUB 8700 : MEV(XY%)=NUM
8110 PRINT "NUMBER EVERY ? UNITS";
8112 GOSUB 8700 : NEV(XY%)=NUM : GOTO 8120
8115 IF SGN(BS(XY%))<>SGN(ES(XY%)) THEN PRINT "ILLEGAL LOG. SCALE"
8120 NEXT XY%:PRINT "IS DATA OK?, <Y> <N>";
8122 GOSUB 8750 :IF Z$="NO" THEN GOTO 8070
8125 FOR XY%=0 TO 1:IF LIG(XY%)=2 THEN UPMM(XY%)=1/UPMM(XY%):GOTO 8135
8130 SCL(XY%)=(ES(XY%)-BS(XY%))/UPMM(XY%) : GOTO 8140
8135 LTM(XY%)=LTN*UPMM(XY%) : SCL(XY%)=LOG(ES(XY%)/BS(XY%))/LTM(XY%)
8140 SCL(XY%)=SCL(XY%)+.00001 : NEXT XY% : RETURN
8143 IF BOX=0 THEN BOX=2
8145 IF LIG(0)*LIG(1)=0 THEN GOSUB 8070 : REM==AXES & LINES==
8150 OAX=BOX : IF OPT><8 THEN GOTO 8160
8155 PRINT "COARSE <19> OR FINE <5> GRID";
8157 GOSUB 8700 : CFG=NUM : OAX=1:BOX=1
8160 FOR XY%=0 TO 1 : FST=0 : MM(0)=0 : MM(1)=0 : OAX=BOX : GOTO 8170
8165 FST=0 : OAX=1 : MM(XY%)=0 : MM(1-XY%)=SCL(1-XY%)
8170 NR%=0: IF LIG(XY%)=2 THEN GOTO 8215
8175 FOR VV=BS(XY%) TO ES(XY%) STEP MEV(XY%)*.999999 : REM==LINEAR AXIS==
8180 MM(XY%)=(VV-BS(XY%))/UPMM(XY%)
8185 DD%(1-XY%)=7 : II=VV/NEV(XY%)
8190 IF ABS(10*II-CINT(10*II))<.0001 THEN DD%(1-XY%)=12
8195 IF ABS(2*II-CINT(2*II))<.0001 THEN DD%(1-XY%)=25
8200 IF ABS(II-CINT(II))<.0001 THEN DD%(1-XY%)=40
8205 IF OPT=8 THEN GOTO 8320
8210 GOSUB 8410 : NEXT VV : ON OAX GOTO 8335,8165
8215 BSS=ABS(BS(XY%)) : STT=10↑(INT(LOG(BSS)/LTN)) : STT=STT*SGN(BS(XY%))
8220 NR%=0 : RESTORE 8225
8225 DATA 5,20,10,10,20,5,50,2,100,1
8230 MM(XY%)=0 : DD%(1-XY%)=50 : FST=0 : GOSUB 8410
```

BASIC

```
8235 RESTORE 8225 : VV%=100 : REM NEW DECADE.
8240 READ DVV%,NN%
8245 IF DVV%=100 THEN GOTO 8255
8250 IF LOG(1+DVV%/VV%)/LTM(XY%)<2 THEN GOTO 8240
8255 FOR N%=1 TO NN% : VV%=VV%+DVV%
8260 MM(XY%)=(LOG(VV%*STT/BS(XY%))/LTN-2+NR%)/UPMM(XY%)
8265 IF MM(XY%)<0 THEN GOTO 8310
8270 IF MM(XY%)>SCL(XY%) THEN ON OAX GOTO 8335,8165
8275 DD%(1-XY%)=5 : IF VV%/10=INT(VV%/10) THEN DD%(1-XY%)=9
8280 IF VV%/50=INT(VV%/50)     THEN DD%(1-XY%)=16
8285 IF VV%/100=INT(VV%/100)   THEN DD%(1-XY%)=25
8290 IF VV%/500=INT(VV%/500)   THEN DD%(1-XY%)=40
8295 IF VV%/1000=INT(VV%/1000) THEN DD%(1-XY%)=50
8300 IF OPT=8 THEN GOTO 8320
8305 GOSUB 8410
8310  NEXT N% : IF VV%<1000 THEN GOTO 8245 : REM NEW LOOP
8315 NR%=NR%+1 : RESTORE 8225 : VV%=100 : GOTO 8235 : REM NEW DECADE
8320 OAX=1 : IF DD%(1-XY%)<CFG THEN GOTO 8330
8325  GOSUB 8410 : DD%(1-XY%)=0 : MM(1-XY%)=SCL(1-XY%) : GOSUB 8410 : FST=0
8330 MM(1-XY%)=0 : ON LIG(XY%) GOTO 8210,8305
8335 NEXT XY% : REM===NUMBER THE SCALES===
8340 LPRINT "S"; 2 : FOR XY%=0 TO 1
8345 LPRINT "Q";XY%  : IF XY%=0 THEN DV=8 ELSE DV=6
8350 MM(1-XY%)=-8+XY%*2 : IF LIG(XY%)=2 THEN GOTO 8380
8355 FOR VV=BS(XY%) TO ES(XY%) STEP MEV(XY%)*.999999
8360 II=VV/MEV(XY%) : IF ABS(II-CINT(II))>.0001 THEN GOTO 8375
8365 MM(XY%)=(VV-BS(XY%))/UPMM(XY%)-4 : FST=0 : GOSUB 8410
8370 LPRINT "P";CINT(VV/MEV(XY%))*MEV(XY%)
8375 NEXT VV : GOTO 8405
8380 SCD=-20 : FOR VV=LOG(STT/BS(XY%))/LTN TO SCL(XY%)*UPMM(XY%)
8385 MM(XY%)=VV/UPMM(XY%)-6 : MM(1-XY%)=-8 : IF MM(XY%)-SCD<12 THEN GOTO 8400
8390 IF MM(XY%)<-6.00001 THEN GOTO 8400
8395 FST=0 : GOSUB 8410 : LPRINT "P";BS(XY%)*10↑VV : SCD=MM(XY%)
8400 NEXT VV
8405 NEXT XY% : LPRINT "Q";0 : LPRINT "H" : GOTO 8010
8410 IF FST=0 THEN X$="M" ELSE X$="D" : REM===MOVE PEN OR DRAW===
8412 IF JM%>0 THEN X$="M"
8415 XU%=MM(0)*10+300 : YU%=MM(1)*10+300
8420 LPRINT X$;XU%;",";YU% : IF DD%(0)+DD%(1)=0 THEN GOTO 8435
8425 LPRINT "D";XU%+DD%(0);",";YU%+DD%(1)
8430 LPRINT "D";XU%-DD%(0);",";YU%-DD%(1) : LPRINT X$;XU%;",";YU%
8435 IF JM%>0 THEN LPRINT "N";JM%
8437 DD%(0)=0 : DD%(1)=0 : FST=1 : RETURN
8550 HI%=0:PRINT " TYPE WORDS TO BE PRINTED, OR:-";REM=<5>WRITE WORDS ON PLOT=
8555 PRINT "MOVE PEN=<.M>,  DRAW=<.D>,  CHANGE LETTER SIZE=<.S> OR ANGLE=<.A>"
8560 PRINT "HEAVY PRINT=<.H>,  LIGHT PRINT=<.L>(DEFAULT),   EXIT=<.X>"
8562 GOSUB 8750 : FST=0 : S$=Z$ : PRINT S$;
8565 IF S$=".L" THEN GOTO 8550 ELSE IF S$=".H" THEN HI%=1:GOTO 8555
8570 IF S$=".S" THEN GOTO 8595 ELSE IF S$=".D" THEN FST=1
8575 IF S$=".M" THEN GOTO 8605 ELSE IF S$=".X" THEN GOTO 8615
8577 IF S$=".A" THEN GOTO 8600 ELSE IF S$=".D" THEN GOTO 8605
8580 FOR II=27 TO 27+HI%*270 STEP 90:MM(0)=MM(2)+HI%*.25*COS(II/DTR)
8585 MM(1)=MM(3)+HI%*.25*SIN(II/DTR):FST=0:GOSUB 8410
8590 LPRINT "P";S$:NEXT II:GOTO 8555
8595 PRINT "LETTER SIZE <1> TO <15>";
8597 GOSUB 8700 : XU%=NUM :SU%=XU% : LPRINT "S";XU% : GOTO 8555
8600 PRINT "TOWARDS: +X<0>,+Y<1>,-X<2>,-Y<3>";
8602 GOSUB 8700 : XU%=NUM : LPRINT "Q";XU% : GOTO 8555
8605 PRINT "X IN MM=";: GOSUB 8700 : MM(0)=NUM : PRINT "Y IN MM=";
8607 GOSUB 8700 : MM(1)=NUM : MM(2)=MM(0):MM(3)=MM(1)
8610 GOSUB 8410 : GOTO 8555
8615 LPRINT "Q";0 : LPRINT "H" : LPRINT "S";3 : GOTO 8010
8620 IF LIG(0)*LIG(1)=0 THEN GOSUB 8070 : REM ===OPTIONS<6>&<7>===
8625 XY%=7-OPT : PRINT "TO RETURN TO OPTIONS, TYPE: .X CR"
8630 IF XY%=0 THEN PRINT "X UNITS=";: GOSUB 8750 :S$=Z$
8632 IF XY%=1 THEN PRINT "Y UNITS=";: GOSUB 8750 :S$=Z$
8635 VV=VAL(S$) : IF VV><0 THEN GOTO 8645
8640 IF S$=".X" THEN LPRINT "H" : GOTO 8010
8645 MM(0)=0 : MM(1)=0 : IF LIG(XY%)=2 THEN GOTO 8655
8650 MM(XY%)=(VV-BS(XY%))/UPMM(XY%) : GOTO 8665
8655 IF SGN(VV)><SGN(BS(XY%)) THEN PRINT "OFFSCALE" : GOTO 8010
8660 MM(XY%)=LOG(VV/BS(XY%))/LTM(XY%)
8665 FST=0 : GOSUB 8410 : MM(1-XY%)=SCL(1-XY%) : GOSUB 8410
8670 FST=0 : MM(1-XY%)=0 : GOSUB 8410 : GOTO 8630
8700 REM STORE/RETRIEVE NUMBER*******************
8710 IF STORE=-1 THEN INPUT#ORD%,NUM : RETURN
8720 INPUT NUM
8730 IF STORE=1 THEN PRINT#ORD%,NUM
8740 RETURN
8750 REM STORE/RETRIEVE STRING*******************
8760 IF STORE=-1 THEN INPUT#ORD%, Z$ : RETURN
8770 INPUT Z$
8780 IF STORE =1 THEN PRINT#ORD%,Z$
8790 RETURN
8800 REM OPEN AN ORDER FILE TO STORE ORDERS********
8810 IF STORE><0 THEN GOTO 8910
8825 INPUT "TO FILENAME ";ORD$ : ORD%=1
8840 OPEN "O",#ORD%,ORD$ :PRINT "FILE ";ORD$;"  NO.";ORD%;" READY FOR INPUT"
8845 LPRINT CHR$(27);"POPENED FILE ";ORD$;"  NO.";ORD%
8850 LPRINT CHR$(27);"Q": STORE=1 : GOTO 8010
8900 REM OPEN AN ORDER FILE TO BE READ **********
8910 IF STORE ><0 THEN PRINT "CLOSE FILE ";ORD$;" NO.";ORD%;"FIRST" : GOTO 8010
8920 INPUT "PLOT FROM FILE ";ORD$ : ORD%=1
8940 OPEN "I",#ORD%,ORD$ : PRINT "FILE ";ORD$;" NO.";ORD%;" WILL BE READ."
8945 LPRINT CHR$(27);"POPENED  ";ORD$;"  NO.";ORD%;"FOR READING"
8950 LPRINT CHR$(27);"Q" : STORE =-1 : GOTO 8010
9000 REM CLOSE THE ORDER FILE*********
9020 CLOSE#ORD% : PRINT "CLOSED FILE ";ORD$;"  NO.";ORD%
9030 LPRINT CHR$(27);"PCLOSED FILE ";ORD$;"  NO.";ORD%
9040 LPRINT CHR$(27);"Q" : STORE=0 : GOTO 8010
9200 REM PLOT OR DRAW FROM A FILE **********
9205 IF LIG(0)*LIG(1)=0 THEN PRINT "SET SCALES FIRST":GOTO 8010
9206 PRINT "DRAW LINE <0> OR MARKS <1> TO <6>"
9207 GOSUB 8700 : JM%=NUM
9210 PRINT "GET RESULTS FROM FILENAME":GOSUB 8750:FIN$=Z$
9220 FIN%=2
9230 OPEN "I",#FIN%, FIN$
9240 LPRINT CHR$(27);"POPENED FILE ";FIN$;"  NO.";FIN%
9245 LPRINT CHR$(27);"Q": FST=0
9250 IF EOF(FIN%) THEN GOTO 9410
9260 INPUT#FIN%, PNT(0),PNT(1)
9270 PRINT "X=";PNT(0);"   Y=";PNT(1)
9300 II=0:FOR XY%=0 TO 1 : IF LIG(XY%)=2 THEN GOTO 9320
9310 MM(XY%)=(PNT(XY%)-BS(XY%))/UPMM(XY%) : GOTO 9340
9320 IF SGN(PNT(XY%))><SGN(BS(XY%))THEN GOTO 9380
9330 MM(XY%)=LOG(PNT(XY%)/BS(XY%))/LTM(XY%)
9340 IF EDG%=0 THEN GOTO 9370
9350 IF MM(XY%)<=.00001 THEN MM(XY%)=0 : FST=0 : II=1
9360 IF MM(XY%)>SCL(XY%) THEN MM(XY%)=SCL(XY%) : FST=0 : II=1
9370 NEXT XY% : IF II=0 THEN GOSUB 8410 : GOTO 9390
9380  PRINT "OFFSCALE POINT OMITTED"
9390 II=0
9400 GOTO 9250
9410 CLOSE #FIN%
9420 LPRINT CHR$(27);"PCLOSED ";FIN$;"  NO.";FIN%
9430 LPRINT CHR$(27);"Q": FST=0 :JM%=0: LPRINT "N";0
9440 LPRINT "H" : LPRINT "L";0:MK=0: GOTO 8010 RUN
```

SORCERER

CBasic for Removal

By Mark James

HERE IS a small CBASIC program for removing unwanted line numbers for CBASIC source programs. This program is modified from a CP/MUG volume.

Two changes may be required for other computer systems: changing the value following the buff statements (lines 49 and 50).

```
 1:     CONSOLE
 2:     REM
 3:     REM           *** FILE CONVERTION PROGRAM ***
 4:     REM
 5: %PAGE60
 6: %INCLUDE COMMENT
 7=     REM
 8=     REM * * * * * * * * * * * * * * * * * * * * * * * * *
 9=     REM *                                               *
10=     REM *   AUTHOR              MARK JAMES              *
11=     REM *                                               *
12=     REM *   INSTALLATION        HOME                    *
13=     REM *                                               *
14=     REM *   DATE WRITTEN        16/11/82                *
15=     REM *                                               *
16=     REM *   SECURITY            NONE REALLY             *
17=     REM *                                               *
18=     REM *   LANGUAGE            CBASIC VER 2.07         *
19=     REM *                                               *
20=     REM *   SOURCE COMPUTER     SORCERER                *
21=     REM *                                               *
22=     REM *   OBJECT COMPUTER     SORCERER                *
23=     REM *                                               *
24=     REM *   MEMORY SIZE         44,000 CHARACTERS       *
25=     REM *                                               *
26=     REM *   COLLATING SEQUENCE  A.S.C.I.I.              *
27=     REM *                                               *
28=     REM * * * * * * * * * * * * * * * * * * * * * * * * *
29=     REM
30:     PRINT CHR$(12):PRINT
31:     PRINT TAB(20);"CONVERT   VER 1.20"
32: 11 PRINT:PRINT
33:     INPUT "Enter file name to convert :";F$
34:     PRINT:PRINT
35:     INPUT "Do you want to view the Input  file (Y or N) ?";IV$
36:     PRINT
37:     INPUT "Do you want to view the Output file (Y or N) ?";OV$
38:     PRINT
39:     IN.FILE$=F$+".LST":OUT.FILE$=F$+".BAS":IMP.FILE$=F$+".$$$"
40:     BAK.FILE$=F$+".BAK"
```

SORCERER

```
   41:     REM
   42:     REM      CHECK FILE
   43:     REM
   44:     S1%=SIZE(IN.FILE$):S2%=SIZE(BAK.FILE$)
   45:     IF S1%<1 THEN PRINT IN.FILE$;" DOES NOT EXIST":GOTO 50
   46:     IF LEFT$(F$,1)="*" THEN PRINT "CANNOT READ ";IN.FILE$:GOTO 50
   47:     IF MID$(F$,3,1)="*" THEN PRINT "CANNOT READ ";IN.FILE$:GOTO 50
   48:     IF S2%>0 THEN OPEN BAK.FILE$ AS 1:DELETE 1
   49:     OPEN     IN.FILE$ AS 1 BUFF 50 RECS 128
   50:     CREATE TMP.FILE$ AS 2 BUFF 50 RECS 128
   51: 27  READ # 1;LINE L$
   52:     IF IV$="Y" THEN PRINT L$
   53:     FOR S%=1 TO 80
   54:         IF MID$(L$,S%,1)="=" THEN 27
   55:         IF MID$(L$,S%,1)="R" THEN 43
   56:         IF MID$(L$,S%,1)="*" THEN 35
   57:         IF MID$(L$,S%,1)<>":" THEN NEXT S%
   58:     L$=RIGHT$(L$,LEN(L$)-(S%+1))
   59:     GOTO 39
   60:     REM
   61:     REM      ADJUST THE LINE AND WRITE IT OUT
   62:     REM
   63: 35  S%=S%+2
   64:     FOR S%=S% TO 80
   65:         IF MID$(L$,S%,1)<>" " THEN NEXT S%
   66:     L$="    "+RIGHT$(L$,LEN(L$)-S%):REM    ADD 3 SPACES
   67: 39  IF OV$="Y" THEN PRINT L$
   68:     PRINT USING "&";#2;L$
   69:     GOTO 27
   70: 43  CLOSE 1
   71:     CLOSE 2
   72:     REN1%=RENAME(BAK.FILE$,OUT.FILE$)
   73:     REN2%=RENAME(OUT.FILE$,TMP.FILE$)
   74:     PRINT
   75:     INPUT "Do you want to convert any more files (Y or N) ?";A$
   76:     IF UCASE$(A$)="Y" THEN 11
   77: 50  PRINT
   78:     END
NO ERRORS DETECTED
CONSTANT AREA:       8
CODE SIZE:         733
DATA STMT AREA:      0
VARIABLE AREA:     112
```

SHARP (AND TANDY) PCs

Fuel Consumption

By R J Maclean

THIS PROGRAM calculates the fuel consumption and cost of fuel for a car. The user must input four different types of information. These are: speedo start (commencing mileage), speedo end, cost per litre for fuel purchased, and total cost of fuel purchased. (By the way, when mileage is mentioned, the measurement is understood to be in kilometres.)

Speedo Start: This is only entered once, at the creation of a new file. The pocket computer will prompt for the creation of a new file (line 450) if tape input is not used and a file is already retained in the constant memory. Line 80 checks to see if there is already a file in memory. The record will only be accurate if this mileage is recorded at the time the fuel tank is filled *completely*. Further instructions are given in the operating instructions Subroutine (line 700).

Speed End: This figure is asked for at the end of every data-inputting session if the user wants to display the processed data. Once again, an accuracy warning has been included to remind the operator of the correct procedure (line 210).

Cost per Litre for Fuel Purchased: This figure must be entered as a decimal – for example, 42.5 cents per litre would be entered as 0.425. If an input is larger than 0.999, the program will branch to the error sub-routine (line 400), as petrol should not cost (not yet, anyway!) more than 99.9 cents per litre.

Total cost of Fuel Purchased: This figure is entered in normal format – for example, $14.25 would be entered as 14.25. It must be noted that this need not be a full tank of petrol, as a full tank is only needed if the processed data is to be displayed.

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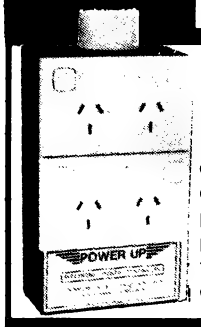

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SHARP (AND TANDY) PCs

```
        FUEL CONSUMPTION
     written by R.J.MACLEAN.
  for SHARP PC-1211 and TANDY PC-1
        Pocket Computers.
        created Feb 1983.

10:"A":USING :C=0
20:BEEP 3:PAUSE " ** FUEL CONSUMPTION ** "
30:Q$="":INPUT "INSTRUCTIONS (Y/N)? ";Q$
40:IF Q$="Y"GOSUB 700
50:Q$="":INPUT "RECALL RECORDS (Y/N)?";Q$
60:IF Q$="Y"GOSUB 500
70:IF Q$="Y"GOSUB 800:GOTO 120
80:IF B>0GOSUB 450
90:IF Q$="Y"GOSUB 800:GOTO 120
100:CLEAR :I=1
110:INPUT "SPEEDO START ?";B
120:BEEP 1:J=-1:K=-1:PAUSE "ENTRY # ";I
130:INPUT "COST/L. =? ";J
140:IF J=0GOSUB 850:GOTO 210
150:IF (J<0)+(J>.999)GOSUB 400:J=-1:GOTO 130
160:INPUT "TOTAL COST =0?";K
170:IF K=0GOSUB 850:GOTO 210
180:IF K<0GOSUB 400:K=-1:GOTO 160
190:E=E+K/J:H=H+K:I=I+1
200:GOTO 120
210:BEEP 2:PRINT "ENTRIES COMPLETED."
220:PRINT "DATA IS READY TO DISPLAY"
230:PRINT "IT IS ONLY ACCURATE IF"
240:PRINT "LAST FUEL STOP FILLED"
250:PRINT "THE TANK AND SPEEDO"
260:PRINT "READING WAS TAKEN AT"
270:PRINT "TIME OF FILL."
280:Q$="":INPUT "DISPLAY DATA (Y/N) ?";Q$
290:IF Q$="N"GOTO 340
300:BEEP 1:INPUT "SPEEDO END ?";C
310:IF (C=B)+(C<B)GOSUB 400:GOTO 300
320:D=C-B:F=D/E:G=F*4.54609/1.609344
330:GOSUB 900
340:BEEP 5:PRINT " ^^^^^^ GOODBYE ^^^^^^"
350:END
400:BEEP 6:PAUSE " WARNING!! INPUT ERROR!!"
410:PAUSE "<<<< RE-ENTER DATA >>>>"
420:RETURN
450:Q$="":INPUT "ADD TO RECORDS (Y/N)?";Q$
460:RETURN
500:BEEP 2:PRINT " **** PREPARE TAPE **** "
510:INPUT #"FUELREC"
520:RETURN
600:BEEP 2:PRINT " **** PREPARE TAPE **** "
610:PRINT #"FUELREC"
620:RETURN
700:BEEP 2:PRINT "TO START RECORD:- FIRST"
710:PRINT "NOTE MILEAGE AT FIRST"
720:PRINT "FUEL FILL. FILL TANK,"
730:PRINT "DO NOT RECORD ANYTHING"
740:PRINT "ELSE UNTIL SECOND FILL."
750:PRINT "ENTER COST/L.(EG:0.429)"
760:PRINT "THEN ENTER TOTAL COST"
770:PRINT "ENTER (0) TO END INPUTS."
780:RETURN
800:I=I+1:RETURN
850:I=I-1:RETURN
900:BEEP 3:PAUSE "INFORMATION FOLLOWS....."
910:USING "#####.##"
920:PRINT "LITRES =",E
930:PRINT "COST =0",H
940:PRINT "KM/L. =",F
950:PRINT "M.P.G. =",G
960:USING
970:PRINT "DISTANCE =",D
980:PRINT "ENTRIES =",I
985:Q$="":INPUT "SAVE RECORDS (Y/N) ?";Q$
990:IF Q$="Y"GOSUB 600
995:RETURN
```

HITACHI

The Growing Screen

By Jack Diklan

BY USING my The Growing Screen program, you can turn your Hitachi Peach into a 50-line machine.

The Hitachi Peach's video controller is made to display screens one and two simultaneously, and BASIC is tricked into believing the two screens are one.

The program can only function when at least two screens exist. When changing from 80 columns to 40 columns, the screen functions normally, but the reverse is not true. Therefore, the program must be initiated again.

```
10 SCREEN 0,,1
20 FOR I=4 TO 9
30    READ J : POKE &HFFC6,I :
      POKE &HFFC7,J
40 NEXT I
50 POKE &HA5, &H14 : POKE &H23A,
   50 : POKE &H23C, 49
60 DATA 63,6,50,55,&H83,6
```

Write the machine-language program, using the large sub-program base of the resident ROM. To learn how to use these routines properly, it's necessary to become familiar with the particular sub-program.

This can be done by disassembling the routine, paying particular attention to memory locations used.

To get you started, here is an example:

STX $58 X & D Contains the SIN parameter **STD $55**
JSR $CED6 Address of Sine
LDD $56 Get result
LDX $58 Result in $56 – $59, stored as floating point

VERB	LOCATION	TOKEN
END	A57B	80
FOR	B610	81
NEXT	B6E1	82
DATA	A647	83
DIM	AA55	84
READ	D091	85
LET	A710	86
GO	A5D1	87
RUN	A5BD	88
IF	A67B	89
RESTORE	A567	8A
RETURN	A614	8B
REM	A64A	8C
'	A64A	8D
STOP	A584	8E
ELSE	A64A	8F
TRON	B45E	90
TROFF	B45F	91
SWAP	BB4A	92
DEFSTR	B3B1	93
DEFINT	B3B4	94
DEFSNG	B3B7	95
DEFDBL	B3BA	96
ON	E1B4	97
WAIT	AFF3	98
RENUM	BD6C	99
EDIT	F01F	9A
ERROR	BB02	9B
RESUME	BB0D	9C
AUTO	B42C	9D
DELETE	B3FA	9E
TERM	EC49	9F
WIDTH	E012	A0
UNLIST	E06D	A1
MON	DCE6	A2
LOCATE	E04F	A3
CLS	F160	A4
CONSOLE	DFCF	A5
PSET	DF95	A6
-		CF
/		D1
AND		D3
XOR		D5
IMP		D7
YEN (DIV)		D9
=		DB
DSKI$N1		DD
KILL		DF
SGN	C45C	80
INT	C50F	81
ABS	C473	82
FRE	ACC8	83
POS	E082	84
SQR	CB67	85
LOG	C15D	86
EXP	CBD4	87
COS	CED0	88
SIN	CED6	89
TAN	CF22	8A
ATN	CF66	8B
PEEK	AFDF	8C
LEN	AEE4	8D
STR$	ACF2	8E
VAL	AF8F	8F
ASC	AF01	90
CHR$	AEED	91
CINT	CCF7	92
CSNG	CD71	93
CDBL	CD5E	94
LINE	D67F	B6
DEF	BB84	B7
POKE	AFE9	B8
PRINT	B043	B9
CONT	A4AD	BA
LIST	E4BE	BB
CLEAR	DE7C	BC
RANDOMIZE	CC63	BD
WHILE	017C	BE
WEND	017F	BF
NEW	A4F0	C0
TAB(		C1
TO		C2
SUB		C3
FN		C4
SPC(		C5
USING		C6
USR		C7
ERL		C8
ERR		C9
OFF		CA
THEN		CB
NOT		CC
STEP		CD
+		CE
*		D0
^		D2
OR		D4
EQV		D6
MOD		D8
>		DA
<		DC
DSK0$		DE
FIX	C4FF	95
SPACE$	B1C3	96
HEX$	B25F	97
OCT$	B260	98
LOF	E89E	99
EOF	E89B	9A
PEN	E09F	9B
LEFT$	AF0C	9C
RIGHT$	AF2C	9D
MID$	AF36	9E
INSTR	B11E	9F
SCREEN	D840	A0
VARPTR	BD0D	A1
STRING$	B1A4	A2
RND	CC7C	A3
INKEY$	F868	A4
INPUT	E8DD	A5
CSRLIN	E07C	A6
POINT	D577	A7
TIME	D8F7	A8
DATE	D970	A9

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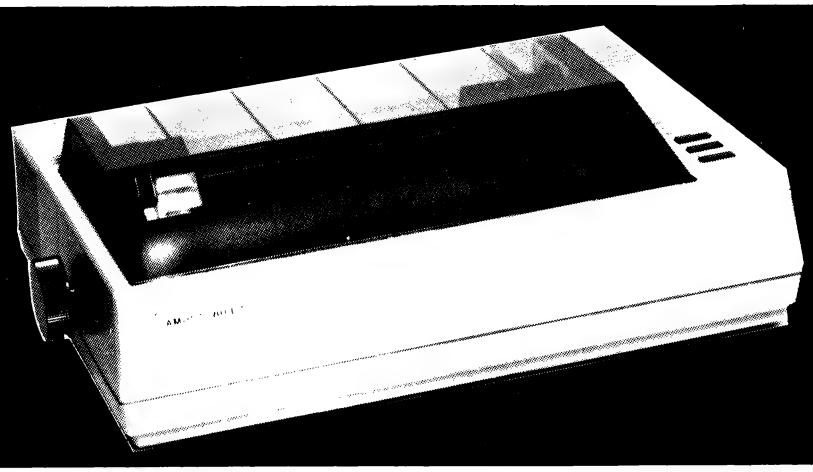

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The Transatlantic Transformation

John Crabb reports on two products aimed at serious Sinclair users, the Bug Byte ZXAS assembler from Britain and the Omni Template program-generator from the United States.

THE CONTRAST traditionally found between software packages from Britain and those from the United States continues to exist when you compare the British-made Bug Byte ZXAS with the American-made Omni Template.

For instance, the British package's documentation, though adequate, is minimal. The American company is more generously inclined, and lavishes attention on its package "support". However, the pricing advantage remains in England's favour.

An assembler for ZX81 machine code, the Bug Byte ZXAS is described as giving the user the full powers of the Z80A chip, without laboriously having to POKE in codes. You do need a minimum of 16 kilobytes of RAM, since the machine-coded program (with some supplementary BASIC) occupies five kilobytes. It is placed out of harm's way at the top of memory.

I found that loading was easy, first time, and the product fully lives up to the maker's claims.

The instruction leaflet is minute, and even then half the space is taken up with a list of mnemonics. The remain der gives you a barely sufficient description of the uses of ZXAS. However, this is definitely a "hands-on" product which you learn to use by experience. There are seven error messages (though I found one so-called error message, "no mistakes", to be something of a misnomer; the other six are useful).

There are a few user-friendly touches - for example, the comma, used by convention to separate some mnemonic letters, is replaced by a fullstop for ease of entry (it saves you having to operate the shift key). You can have up to 256 labels, which can be used for jump, call or temporary data stores, and entry is by decimal or HEX. (If the latter, the value is preceded by a $ sign.)

If you're a serious ZX81 user, the ZXAS is definitely for you. It's cheap, good, effective and fast. Bug Byte suggests you get its Disassembler/Debugger as a companion to the ZXAS; it's probably a good idea.

The Omni Template, on the other hand, is a program for generating other programs. You need 16 kilobytes of memory because this large package is written totally in BASIC.

It provides a framework so that you can structure your programs in an easily readable, consistent manner. In addition, there are several related programs, such as Fitpoints, for statistical work and forecasting (co-efficients of regression and standard estimates of error), and Calculator, which turns your ZX81 into a personal calculator.

The Template program itself contains many utility modules (sub-routines), including sort, titling, menu-selection layout and decimal-number formatting. The documentation is detailed: almost 30 A4-size pages, covering descriptions, numerical examples and full listings.

Another nice touch, in the package support service, is the guarantee that if your tape becomes unusable, you can send it back with a $3 handling fee and have it replaced. (Incidentally, all cassettes carry an Omni serial number.)

All in all, it's a good item for serious ZX80 and ZX81 users. While loading was nowhere near as easy as with the Bug Byte, Omni at least supplies Template purchasers with a leaflet giving loading tips... □

SOFTWARE REPORT CARDS

Program:	Template			
Made by:	Omni			
Useful for:	Any statistical programming application			
Hardware Reqd:	Sinclair ZX80 or ZX81 with 16 kilobytes			
Ratings:	**excellent**	**very good**	**good**	**poor**
Documentation:		✓		
Ease of use:	✓			
Speed:			✓	
Functionality:	✓			
Support:		✓		
Value-for-money:		✓		
Extras included:	Three programs apart from Template			
Price:	US$14.50			

Program:	ZXAS			
Made by:	Bug Byte			
Useful for:	Machine-code programming			
Hardware Reqd:	Sinclair ZX81 with minimum of 16 kilobytes			
Ratings:	**excellent**	**very good**	**good**	**poor**
Documentation:				✓
Ease of use:	✓			
Speed:		✓		
Functionality:	✓			
Support:				✓
Value-for-money:	✓			
Price:	5 pounds Sterling			

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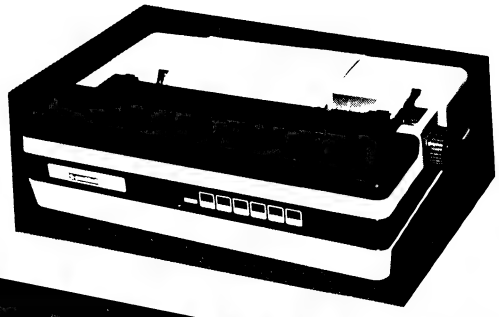

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SETTING THE STANDARD

Getting Friendly, Part 2:

The Mystery Of The Linked List

By Jeff Richards

Having covered how to make data-entry procedures as friendly as possible in part one of this three-part series, Jeff Richards moves on to linked lists.

THE FACILITY of random-access disk storage provided by MicroSoft BASIC-80 (MBASIC) operating under CP/M Revision 2, provides the programmer with the tools needed to construct efficient and powerful databases.

In order to extract maximum performance from them, the programmer should consider some of the more powerful data-accessing techniques. A linked list is a handy data-access technique that is easy to implement, works in conjunction with other data-access techniques, and can be useful in a wide variety of applications.

When starting to work with random-access disk storage, the programmer quickly becomes aware of the most significant aspect of this process – the need to keep track of the record number at which different items are stored. Many techniques are available for this, ranging from sorted indexes through hashed-key indexes to binary trees. Within all these processes, linked lists have a role to play – and, in some cases, can be used to extend the power of whatever data-retrieval technique is used.

What is a linked list? Anyone who has dissected the internal storage form of an interpreted BASIC program has probably met a linked list. In this application, each line of the BASIC program can be considered a record. Within this record are contained a number of data items – line number, variable names, keyword codes and so on. One of these data items is a pointer to the memory location at which the next sequential program line is stored. This pointer is one element in a linked list, and the set of pointers constitute the list itself.

The use of a linked list here provides a number of advantages. First, it provides a means of quickly jumping from one program to the next – for instance, when searching for a line number to resolve a GOTO or GOSUB.

Second, each pointer in the list provides an implicit description of the length of the line, because the lines have been arranged so that the pointer from one line will point to the byte immediately at its end.

Third, it speeds up the process of moving blocks of lines when the program is being edited – a part of that memory can be moved up or down, and all pointers concerned can be updated by adding or subtracting the amount of movement (the "offset").

Three Important Elements

This example also demonstrates the three important elements of a linked list. The first is that there must be – externally to the list itself – a reference to the start of the list; in this example, it is the bottom of program memory. Secondly, each element in the list (except the last) will point to one other element, and each element (except the first) will be pointed to by one other element. Finally, there must be some indication that there are no more items in the list – a pointer of zero is used for this task.

Though the internal-storage format of an interpreted BASIC program provides a familiar example of a linked list, it is not the type of list that is most likely to be useful in data-storage and retrieval operations.

There are two important characteristics of a linked list that have considerable usefulness in data storage. A convenient way of grouping items of one class, and indication of an ordered sequence within an otherwise unordered (or differently ordered) set of records.

Consider the use of a linked list to identify a subset of a file of data items. Perhaps the simplest distinction between records in a file is the distinction between records that do or do not contain valid information. Why would we want to know anything about records that do not contain valid information? In a file where records can be deleted as well as added, unused records will be created in the middle of the file.

Unless we keep track of this free space, it can't be re-used when more items are added. Though records can be flagged as "free", finding such empty records would involve a slow and tedious search. If we maintain a linked list of "free" records, then we can quickly examine the list to find the first available free record number for a new data record.

Maintaining this "free list" is extremely simple. First, we need a pointer to the first free record. This pointer must be maintained in a status record, which is often the first record of a file (though there could be a separate status file). When the file is initially created, each record in the file is inserted with a pointer to the next free. This will be the next sequential record. The last record will have a pointer to the next free of 0 (or –1, or 999999, depending on preference) to indicate that this record is the last. When a data record is added to the file, it is added at the position pointed to by the first free pointer in the status record. But before it is written away at that record number, the record is read to ob-

tain the next free record. This next free record replaces the first free one in the status record. When a data item is deleted, the reverse applies.

When the last record in the file is used, the addition procedure automatically inserts the end-of-list indicator into the first free pointer in the status record, so the add procedure can immediately detect that there is no more room in the file.

Similarly, the delete procedure would write the end-of-list indicator back into the first record that became available after the file had been filled, so that such a record automatically becomes the end of the free list.

The only drawback to this system is that the file must be created as a linked free list before it can be used, so the maximum size of the file should be known in advance. However, it is reasonably easy to detect the "file full" state and attach extra records to the end of the file, updating a status value for the new size.

Building A Linked List

Listing One is a small program that builds a file consisting entirely of one linked list of free records. The first free record, the number of records currently in the file and the maximum size of the file are written to the status record.

Listing Two is a similar program that adds dummy data records to the file created in Listing One. The data will be added at the next free record – the operator doesn't have control over the storage location. (If we wanted to subsequently retrieve a particular record, we would have to take note of where the program has decided to store it.) The test for a full file is included, so that the file can grow beyond the size of the initial linked free list. The code to handle this is in lines 150 to 180.

Listing Three will delete data records at nominated positions. It displays the updated status when complete. Note that there is no test to ensure that the record being added back into the free list really is a data record. Adding free records into the free list is a very effective way to corrupt it. We have assumed that the index kept by the operator is accurate.

The code in lines 100 to 120 is only needed to enable the details of the record being deleted to be displayed. If we are going to bother displaying the details, good practice would dictate that we check with the operator that the correct record has been selected. (This checking has been left out for simplicity.)

Such an implementation of a linked list is very simple and effective, but this application did not require that the items in the list be in any particular order. This form of list is like a push-down stack – the last item pushed on to the stack is the first one popped off – and is suitable for many data applications where we are only interested in members of sets. This use of a linked list enables us to quickly access all members of a given set, regardless of their physical storage location and without having to read any unnecessary records.

Consider, for instance, a motor dealer's inventory control system. One aspect of the system might permit the dealer to enquire into his stock in two categories: model and colour. Within each of these categories there can be four characteristics. Each category will be data items for the data record, and each data record will be in two linked lists. Each category will support four such lists.

The resulting structure is set out in Tables One and Two.

Find Me A Sedan

The first line of Table Two can be interpreted as "The linked list for MODEL-MANUAL SEDAN will have a status record pointer-to-first of 23. The data item at record 23 will have a pointer to next-this-MODEL of 24. The data record at 24 will have a pointer to next-this-MODEL of 0." (There are a total of eight lists through this data base, and any one record will be a member of two such lists; the status record must maintain a pointer-to-first for all eight lists).

Obviously, the important aspect of this list is to be able to quickly retrieve all records of a particular type, and the sequence is unimportant. By simply finding the appropriate pointer-to-first, the system can work down the list to find all the cars in the category.

Two characteristics could be selected by working down one list and rejecting records that don't fit the second category. For instance, "Find all the yellow 4-speed coupes" would produce 30, 52 and 55 for 4-SPEED COUPE and would then ignore 30 and 52 as not fitting the second criterion.

More advanced database diagnosis is possible if the lists are carefully selected. "Red sedans" could be selected by starting with RED (23, 24 and 90) and ignoring 90 as it is not MANUAL SEDAN nor is it AUTO SEDAN. Beyond this, it starts getting a little too difficult for linked lists to handle easily.

But linked lists can also be used to indicate sequence. Such a sequential linked list may incorporate all items in a file, or it may include only a subset, but the procedure involved in maintaining sequence is the same.

A linked list with sequence is a little harder to maintain. One reason for this is that we have to find the position within the existing sequenced linked list at which the new item is to be inserted; another reason is that the event of the insertion being at the beginning of the list is not automatic.

Consider an example from the same motor dealer. Sales information is maintained on a monthly basis, in a simple sequential file. However, the dealer would like to have prompt access to sales information in order of vehicle stock number, so he can check on rate of stock turnover.

Therefore, when a new sales transaction is added on to the end of the file, we will search down the existing items, examining vehicle stock numbers, until we find one greater than the stock number of the latest sale. The linked list will be broken at this point, and the new item added.

Table Three demonstrates the case where stock number 785 has been added to the file. Its position in the linked list is between stock numbers 773 and 791; this means that record number 1 (773), which now points to record number 4 (791), will be re-pointed to the new record, 5 (785), and 5 (785) will be pointed to 4 (791). So the list sequence is now 3,1,5,4,2.

Start At The Beginning

This scheme takes care of adding to the end of the list, as long as the end is detected, but provision must be made for updating the pointer-to-first if the new item has to be added to the beginning of the list.

Sequential linked lists that refer to a subset of the records in a file are handled in precisely the same way. Deleting items from a sequential linked list follows similar procedures, but special provision has to be made if the item happens to be the first one in the list.

Linked lists also come in a number of slightly different forms. A circular linked list is one in which the record at the "end" of the list points to the record at the beginning. This type of list is used where we can find one record through

some sort of index and we want to ask "Now find all the other records in the same category". The program will work down the list, going straight through the "end" until it comes back to its starting point. Such a circular list must use some device other than a pointer of zero to indicate the "end" for the purposes of adding to the list.

Another common trick is to maintain in the status record a pointer-to-last as well as a pointer-to-first. This is used where the required retrieval sequence of a linked list is the order in which the items were deposited. By maintaining a pointer-to-last, the add routine can go straight to the end of the list rather than searching through it. The retrieval routine, on the other hand, will use the pointer-to-first to extract the items sequentially.

Sometimes, linked lists will be made bi-directional – that is, pointers are maintained within each data record that point to the previous as well as to the next sequential.

It is also possible to use linked lists within the file to "attach" subsets of records to a master record. An example would be a file of inventory items in which some items are sub-assemblies of other items.

In this case, the pointer-to-first is actually a data item in the master part record, and the linked list will include all sub-assemblies for that master part. The pointer-to-next for the last item in the list might be a pointer back to the master part, so that by finding any sub-assembly we can trace its master part.

Complex – And Powerful

The use of linked lists can become extremely complex – and, correspondingly, powerful. Take, for example, a database used for cataloging a magazine collection :

A simple non-sequential linked list might be used for the free space. A linked list of the whole file might indicate sequence of addition to the collection, while a sequential linked list within each publication would indicate publication date. Multiple non-sequential linked lists might be used to group magazines under categories of subject and publisher. If details of individual articles are maintained as separate records in the same file, linked lists might be used to tie those articles to the file record containing the magazine details. Finally, multiple circular linked lists might be used to group articles on the same subject together. (And over all this there might be some sort of index scheme which permits details of any particular magazine to be retrieved at will.)

In company with such esoteric database concepts as multi-redundancy hashing algorithms and packed-node

TABLE 1 - Data Matrix

RECORD NO.	MANUAL SEDAN	AUTO SEDAN	4-SPEED COUPE	5-SPEED COUPE	RED	WHITE	BLUE	YELLOW
23	X				X			
24	X					X		
26		X			X			
30			X				X	
52			X			X		
53				X				X
55			X					X
90				X	X			

TABLE 2. List Structure

CATEGORY	CHARACTERISTIC	FIRST	NEXT	NEXT	NEXT	NEXT	NEXT
MODEL	MANUAL SEDAN	23	24				
	AUTO SEDAN	26					
	4-SPEED COUPE	30	52	55			
	5-SPEED COUPE	53	90				
COLOUR	RED	23	26	90			
	WHITE	24	52				
	BLUE	30					
	YELLOW	53	55				

TABLE 3 - Adding to a Sequential List

BEFORE			AFTER		
POINTER TO FIRST = 3			POINTER TO FIRST = 3		
RECORD NO	STOCK NO	POINTER TO NEXT	RECORD NO	STOCK NO	POINTER TO NEXT
1	773	4	1	773	5
2	800	0	2	800	0
3	770	1	3	770	1
4	791	2	4	791	2
			5	785	4

LISTING 1. Create a file of linked free list

```
 10 DEFINT A-Z
 20 PRINT "Create Master File"
 30 INPUT "Number of Records for Master File = ",I
 40 IF I<=1 GOTO 30
 50 OPEN "R",#1,"MAST",80
 60 FIELD #1,2 AS NXT$,2 AS MAX$,2 AS CNT$
 70 FOR R=2 TO I
 80  LSET NXT$=MKI$(R+1)
 90  PUT #1,R
100 NEXT R
110 LSET NXT$=MKI$(0)
120 PUT #1,I+1
130 LSET NXT$=MKI$(2)
140 LSET MAX$=MKI$(I)
150 LSET CNT$=MKI$(0)
160 PUT #1,1
170 CLOSE
180 STOP
```

self-balancing B-trees, simple linked lists may not appear to be of much significance. However, for all their simplicity they're a powerful tool in the organisation of data within a file, and a simple linked list implementation can frequently make a significant contribution both to speed of data retrieval and storage efficiency. □

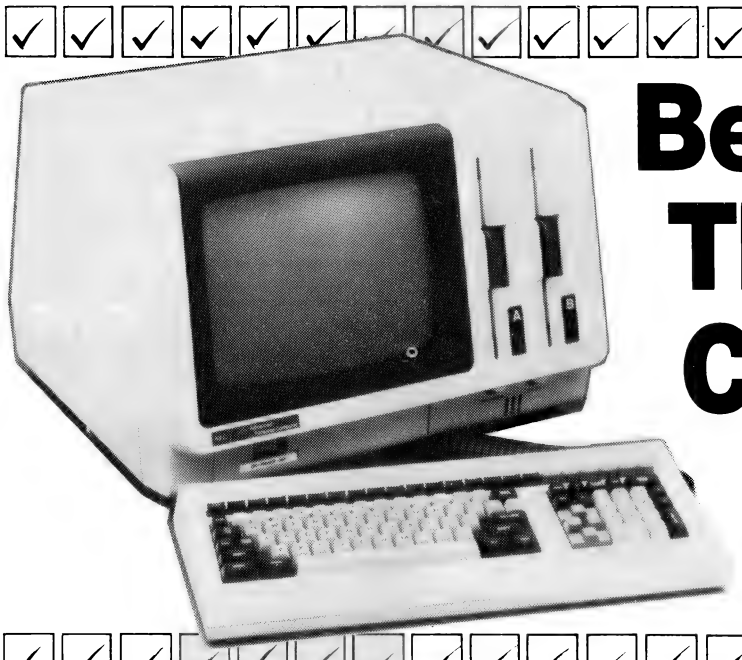
LISTING 2. Add a record, using next free.

```
10  DEFINT A-Z
20  PRINT "Character for File = ";
30  C$=INPUT$(1)
40  PRINT C$
50  OPEN "R",#1,"MAST",80
60  FIELD #1,2 AS NXT$,2 AS MAX$,2 AS CNT$
70  FIELD #1,80 AS REC$
80  REM GET DUMMY DATA IN R$
90  R$=STRING$(80,C$)
100 GET #1,1
110 NXT=CVI(NXT$)
120 MAX=CVI(MAX$)
130 COUNT=CVI(CNT$)+1
140 IF NXT<>0 GOTO 190
150 MAX=MAX+1
160 NXT=MAX+1
170 FIRST=0
180 GOTO 210
190 GET #1,NXT
200 FIRST=CVI(NXT$)
210 LSET REC$=R$
220 PUT #1,NXT
230 GET #1,1
240 LSET NXT$=MKI$(FIRST)
250 LSET CNT$=MKI$(COUNT)
260 LSET MAX$=MKI$(MAX)
270 PUT #1,1
280 PRINT "Record has been stored at ";NXT
290 PRINT "File Count = ";COUNT
```

LISTING 3. Delete a record and update free list.

```
 10 DEFINT A-Z
 20 OPEN "R",#1,"MAST",80
 30 FIELD #1,2 AS NXT$,2 AS MAX$,2 AS CNT$
 40 FIELD #1,80 AS REC$
 50 GET#1,1
 60 MAX=CVI(MAX$)
 70 INPUT "Record Numebr to Delete = ",R
 80 IF R>MAX THEN PRINT "ERROR":GOTO 70
 90 IF R<2 THEN PRINT "Can't delete the
             status record !!":GOTO 70
100 GET #1,R
110 R$=REC$
120 GET#1,1
130 COUNT=CVI(CNT$)-1
140 PUT #1,R
150 LSET NXT$=MKI$(R)
160 LSET CNT$=MKI$(COUNT)
170 PUT #1,1
180 PRINT "Record was :"
190 PRINT R$
200 PRINT "Record Number";R;" is now
             back in the Free List"
210 PRINT "File Count = ";COUNT
220 CLOSE
230 STOP
```

See **Dick Smith** *insert this issue!*



Benchmarking The Personal Computer Of The Year

By P S Maher

James Joyce would have shuddered. Shakespeare would have been thrilled to bits. More and more writers, reports P S Maher, are making use of the sophisticated technology that hard-nosed men of industry have been forced to install in order to stay competitive.

THE POWERFUL creative possibilities of word-processors are only now coming within the economic reach of writers. However, many word-processing programs offered to creative writers aren't really adequate because of their inability to cope with chapter-length documents. Likewise, some microcomputers obviously aren't suited to the specialised task.

About 18 months ago, I fell foul of some slick advertising which had given an air of respectability to a virtually unknown microcomputer by using such hypes as "World's Best", "Most Powerful" and "Unequalled Quality".

However, the Japanese newcomer that I'd purchased didn't seem to be the same one which the advertisements hailed. At least, mine didn't seem to be the "World's Best" anything, except, perhaps, the world's best headache.

Eventually, I returned the monstrosity and its appalling documentation to the dealer, and solemnly swore never to buy another Japanese computer. If someone had then told me that I'd purchase a Japanese computer nearly a year later, I would have told them to take a long walk off a short pier.

Nevetheless, after months of studying the word-processor market, I eventually chose the NEC Advanced Personal Computer, from the land of Oriental computer magic, and the Metasoft Corporation's The Benchmark Version 3.0, a very sophisticated word-processing package from the land of Stars and Stripes. It has proved to be a combination that could quite easily kick the dedicated word-processors out of bed.

Though called the "Advanced Personal Computer", NEC obviously intends the APC to primarily be a business machine. The superb software available – for example, Benchmark, dBase II, Microplan, RM Cobol and IMS-Ascent – certainly suggests such an approach.

The APC operator's guide gives clear instructions for setting up the computer and other peripherals, as well as use and care of disks. Clear instructions are also given for using a dot-matrix or daisywheel printer, including ribbon replacement, and self-testing.

Within the packaging is a protective cover rather like a large plastic shower-cap. By sitting the keyboard on top of the monitor and slipping on the plastic hood, the whole computer is nicely protected from dust.

The connections for the keyboard, printer and RS-232 device, such as a modem, are well protected behind a removable panel; the cables pass through a hollow slot to emerge, out of sight, from the base of the computer/monitor.

Superb Resolution

My APC is the monochrome, 128-kilobyte version, with two double-sided, double-density disk drives, though single-sided single-density disks can also be used. The green phosphor display is a high-resolution one with a non-glare screen; the legibility of the text displayed on the monitor is quite outstanding, with beautifully formed letters and superb resolution – one of the best available on any microcomputer.

The keyboard has sculptured keys and an excellent touch, and the long, coiled cable between the monitor and keyboard allows me to recline in my chair, with the keyboard on my lap. One of the APC's features is a "type-ahead buffer", which allows you to keep typing while the computer does something else – when it's finished, it looks to see what you've typed.

Just above the main keys sits a row of 22 function keys and one key marked FNC, which is really a shift key that allows a further 22 functions to be accessed. Sixteen of the function keys are user-programmable (that makes 32 programmable functions with the FNC key), while the remaining six functions keys have a fixed function.

Above the function keys is a removable, labelled strip naming the functions of each function key. With NEC-supported software, like The Benchmark, the keys have been pre-programmed and the strip has been printed for you. The beauty of this is that the APC can be a dedicated word-processor or a dedicated graphics terminal or a dedicated data terminal or a dedicated anything! The drudgery of learning which key controls what is removed when the functions are laid out before you, ready-labelled.

The manual for The Benchmark (a Metasoft Corporation program) and the two manuals for CP/M-86 (from Digital

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Research) are supplied in sturdy, three-ring binders, covered in beige synthetic suede to complement the colour and texture of the APC. All three manuals carry the APC logo and NEC Information Systems Incorporated's name, as well as a licence number for each program. The Benchmark manual, though not up to the standard of, say, IBM's documentation, is well written and should be comprehensible to virtually anyone. Though not quite as friendly as it could be, it is well structured, which probably makes up for the "user's guide" feel.

The introduction suggests that you "try everything as you read about it", and that you become familiar with the basics before moving on to more advanced features. The "basics" are sufficient to allow you to format and print the documents you have written and edited. However, if you do have an urgent need to accomplish an advanced task, it is easy to read ahead – only in a few places does a chapter require knowledge from previous chapters.

Serious Omission

Each chapter introduces itself by giving an overview of the concepts it covers, and how each function will benefit the user in his word-processing. Step-by-step instructions are given for each operation, and many sample screens are provided so that you can check your progress.

An almost-complete appendix gives instructions for setting-up The Benchmark. It includes a summary of commands and the functions of all keys, identifying their specific use in every situation.

A serious omission from the manual, however, is a section on problems that may be faced, such as what to do when you've completely filled a disk and are in the middle of editing. Another omission is some sort of guide to normal operating parameters – for instance, the approximate time that a given operation should take with a document of a certain size. A test document, and a standard routine to check that the program and machine are getting along, would make me feel much better about trusting my hours of work to The Benchmark.

To use The Benchmark, you must have a copy of the CP/M-86 operating system, though you needn't understand any of it. The manual will take you by the hand – just follow the steps and type in everything that's green. The whole process takes about 15 minutes and only has to be done once.

This involves formatting blank disks; copying certain files from the CP/M-86 disk to The Benchmark disk; creating "storage units" on your data disks; providing information about your system's

configuration (for instance, which printer you have); and making back-up copies of The Benchmark program disk.

In configuring your system, you are also given certain options, such as having the computer request the correct time and date each time it is started, or a "beep" emitted when a key is pressed (tactile feedback). An important feature is the ability to change the APC's video configuration – that is, you can change the colours which the screen produces if you don't find the present set-up comfortable.

You can also modify the way the text is presented – it can be reversed, highlighted, blinked, underlined, overlined, have a vertical slash through it, or be normal. Changes can be made to all text, not just the text you type in – for example, warnings are very noticeable if they are yellow and blinking. On a monochrome screen, you can change the settings to alter the intensity and characteristics of the screen presentation.

Another option is to have the CP/M-86 status line constantly displayed at the top of the page. This tells you the day, date and time, and whether the CAPS LOCK, ALT or GRPH keys are engaged.

Storage Units

The Benchmark itself is menu-driven, which means that all the options open to you at that point are displayed on the screen, which in turn means the option you want to select is just a keystroke away. There is no need to remember any commands.

The program automatically loads and starts when you insert it in the drive. The first menu gives you the option of starting the word-processor or going to other The Benchmark-compatible programs, such as Metasoft's Mail-List Manager and Communicating Word-Processor, which will communicate with other computers using The Benchmark. You may also exit to CP/M-86 or make changes to the setting-up information you provided about your system's configuration (in case you change your printer).

When The Benchmark is chosen, the main menu appears and gives you these options: Documents may be created, revised, merged, copied, deleted or viewed; you may also set the time and date; configure the display; or select additional procedures, which include reading and writing CP/M-86 files, and exiting the word-processor to return to the very first menu.

Every program has an Achilles' heel and this is The Benchmark's: Documents are stored in "storage units" (SUNs) which can be regarded as "drawers" full of documents and are, really, CP/M-86 data files. The Benchmark allows you to create up to seven SUNs - in essence, a filing cabinet of seven drawers.

The manual warns that SUN 1, created on The Benchmark disk itself and functioning like a catalogue drawer of file information at the top of the filing cabinet, must not be changed or have documents stored on it – it is the master SUN, containing such information as the internal calendar, file-names for the other SUNs and the phrase library.

Therefore, the effective number of SUNs, or file drawers, is six. You can put more than one SUN file on a disk, but the manual doesn't recommend it.

Unfortunately, SUN 1 is the "default" value for every disk operation, which means that unless you specify otherwise, the document you create will be stored in the catalogue drawer at the top of the filing cabinet – exactly where you're warned not to store things! The maximum capacity of a SUN is only 512 kilobytes, so the APC's 989-kilobyte drives aren't being fully utilised (unless the remaining space is used for a mailing list).

This seems to suggest that if you had a hard disk-drive system, no matter what the capacity, you couldn't store more than 6 by 512 kilobytes – about three megabytes – of data for The Benchmark. However, using floppies won't limit you, since you can call as many disks as you like "SUN 2", because the program only sees one SUN 2 at a time in drive B.

Control And Action Modes

One final point about disks: an indicator, telling you how full (in per cent) a disk is, appears on all directories. This refers to the whole disk and not the storage unit (the manual makes no mention of this). The result is that when the indicator nears 50 per cent, it's time to either delete earlier revisions or create another SUN. If you don't, your editing session can be nastily terminated with little warning and you could lose hours of work.

Though this sounds horrific, it is easily avoided by keeping a close eye on the indicator and saving only the last one or two revisions. There should be few problems for short documents but very long documents need careful nursing. The latest release of The Benchmark, Version 3.0L, is supposed to fix this problem.

Creating, revising and viewing are accomplished through the actions of various "modes". There are two types of modes: a control mode and various action modes.

Control mode is the base from which everything works; it allows you to freely examine the document or to begin any other operation or command by pressing the right key.

Action modes are operations like inserting or deleting, searching or replacing. You enter an action mode when you start using a function and you leave it when you execute or escape that function. Leaving the action mode takes you back automatically to the control mode...from there you can enter another action mode.

A help screen can be called up whenever you are in the control mode. It lists the various functions available to you and their related keys; this could prove to be useful if you lost the labelling strip above the keyboard.

Very nearly everything can be done using the 44 function keys. As a bonus, most functions can be accessed from the main keyboard as well. A mnemonic system is used to define functions from the keyboard back-up system. For instance, press I to insert or D to delete. This is one of the strong factors that brings The Benchmark so close to the dedicated word-processors – it certainly beats the multiple keystrokes required by other word-processing packages, such as WordStar.

Perhaps the most important keys on the keyboard are the execute keys, which make any actions final, and the escape key, which allows you to escape from something you didn't want to do or intend.

Alternate Commands

It takes a deliberate movement to execute something simply because the keys are in the function row and this reduces the chance of errors. However, having to hit "execute" rather than "return" takes some getting used to. However, if you remember that the return key on a word-processor does much the same as it does on a typewriter, then it becomes second nature.

A further use of the escape key is the provision of an alternate set of commands. Pressing the escape key in the control mode puts you in alternate control mode, which allows you to do things you would normally do in insert mode.

The cursor can be moved up and down from line to line and left and right from character to character using the cursor keys, which are sensibly placed together in a cross shape.

The cursor will move from word to word forwards using the tabulator key or backwards using shift-tabulator combination. Pressing T and B takes the cursor to the top and bottom of each screen.

Screens of text can be changed by pressing one function key for either the next or prior screen, and the cursor may leap larger distances using the jump command, which travels to any page in the document you desire. You must also jump pages if you try to scroll farther

back than memory will permit.

Though the cursor covers small and large distances, there is no provision for medium distances – for example, moving from sentence to sentence or paragraph to paragraph at a time. However, this is a small inconvenience due to the speed at which the cursor moves.

Whenever a screen changes, the last three lines of the last screen are reshown at the top of the new screen and the cursor also blinks at the first new line so you don't lose your place.

A handy feature is horizontal scrolling, where pages of up to 156 characters wide can be displayed by shifting the entire screen left and right. Again, a few words from the last screen are given to you to keep your place.

Defining text is an integral part of many functions: whenever text must be deleted, moved, copied, exchanged, put into headings or footings, or stored in the phrase library, it is defined by a single keystroke and then highlighted so that it stands out from the rest of the text.

Character Defining

Text is defined a character at a time using the forward cursor arrow, but this is obviously too slow for large blocks of text, so new types of cursor movement are made possible. Hitting the return key will define whole lines at a time, while hitting any character will define up to and including the next occurrence of that character. For instance, if I had begun defining at the beginning of this paragraph and pressed "n", I would have defined up to the "n" in "defi*n*ed".

Whole sentences can be defined in this way by pressing the fullstop key, and single words can be defined by pressing the spacebar.

There are four modes used constantly in The Benchmark: Insert, Delete, Exchange and Overtype.

Insert opens as much space as you need to insert extra text, closing the gap after you have hit the execute key.

Delete removes the text you define.

Exchange is engaged by typing X; it swaps the text you define for the text you insert – it's really an automatic way of going to Insert after Deleting.

Overtype (hit O) will let you freely move the cursor anywhere you like and change anything just by typing over it...very useful, indeed. While overtyping, the INS and DEL keys function to insert single spaces or delete single characters.

The display's first five lines give you the time and date, the current mode that you are in (for example, Inserting), the cursor's position in the document (that is, number of characters from the left, the number of lines from the top of the current page and the page number), which print style you have selected, the new title and revision letter, the printer's status (on/off), and the current tabulator setting.

Warnings and other instructions appear at the bottom of the page. Warnings are always accompanied by an audible "bleep".

Formatting a document is achieved with the page layout and print-style selection panels as well as the tabulator line. All three are engaged by hitting function keys and all have standard default settings provided to save time changing them each time you use the program.

Layout Changes

The page-layout capability allows you to select left and right margins, character and line pitch, first and last print lines to leave space for headings and footings, the size of the "Word-Wrap Hot Zone" (where The Benchmark looks for the right place to make a carriage return), proportional spacing (if your printer supports it), the type of sheet-feeder you use (if any), and whether you want your document printed normally (ragged-right), right-justified or centred (each line balanced between the left and right margins).

Changes in the layout are shown on the screen: each time you return to the control mode, the text is displayed as it will be printed, even if right-justification or very wide margins have been chosen.

The print-style selection panel allows you to choose normal, underlined, bold, overstrike and shadow styles, or combinations of these. Overstriking is used to place accents on top of printed characters for other languages.

You may change the colour of the text if you are using a red/black ribbon. Superscripts and subscripts are also catered for.

Tabulator stops are used in the same way as a typewriter, but with many more enhancements. You can have normal tabs, indent tabs which cause the cursor to return to the same indent level rather than the beginning of the line, numeric tabs which align the decimal points or the last digits of integers, centre tabs, right-justify tabs,

Dot and underline leaders will fill the space from where you tabbed to the D or U stop with either a row of dots or a row of dashes.

Time And Date

Using simple codes, The Benchmark can be instructed to automatically print the time and date, at the time of printing. The time can be printed in a 12- or 24-hour mode, while dates can be any of seven standard formats – for example, 1/7/83 or July 1, 1983.

Continued on Page 102

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Analysing Statistics With BASIC, Part 2:

Distribution of F Ratios

By John L Plummer

THE PROGRAM "F Distribution" calculates the probability of two random samples from a normally distributed population giving an F ratio equal to or greater than a given value. It may be used as a subroutine in analysis of variance programs. The input is an F value and its associated degrees of freedom.

A normal deviate (Z) corresponding to the F ratio is calculated by the approximation of Peizer and Pratt (Journal of the American Statistical Association, 63, p1417, 1968).

The program chooses a formula for Z (lines 140,60,180,260), according to the values of the degrees of freedom. If both the numerator (DFI) and denominator (DF2) degrees of freedom are greater than 1, the area beyond Z is equal to the desired P value. If either DF1 or DF2 or both are equal to 1, the area beyond Z is equal to half of the desired P value.

A further approximation (lines 280-300) calculates the area beyond Z, and this is converted to a P value, with appropriate adjustment if Z is negative or either DF = 1.

Example: An F ratio of 2.8825 has two degrees of freedom in the numerator and 13 in the denominator. What is the probability of a value as large as this? Answer: p = 0.0896.

Data Transformation

Certain assumptions underlie the analysis of variance. Two of these assumptions are that the samples were taken from populations having equal variances, and that the populations are normally distributed. Serious departure from either of these assumptions may invalidate the conclusions of the analysis, especially if sample sizes are unequal. It is sometimes known from experience or theory that a particular transformation (such as square root, logarithm, or reciprocal) of the data will result in closer adherence to these assumptions.

However, when this is unknown, a suitable transformation may be found empirically. An appropriate transformation usually exists if the variances of the samples are related to their means – most often, samples having higher means will have greater variances. The program 'Data Transformation' finds such a transformation.

The data must contain no negative numbers or zeros. If these are present, a constant should be added to all data items to make them positive.

The program asks for the number of groups, the maximum group size (NMAX), and the individual items. If the number of items in a group is less than NMAX, enter PI after the last item. After the data is entered, it will be displayed on the screen for checking; incorrect entries may be corrected at this point.

The program calculates FMAX (a measure of heterogeneity of variance) and a pooled estimate of skewness (one type of non-normality) after a number of different transformation of the form X = A (I,J) ↑ P where A(I,J) are the data items.

For the purposes of the program, logarithms correspond to the case P = 0. P often does not take exactly the value 0 when it is expected to, so the logarithm transformation is used when P falls within a narrow range around zero. The optimal transformation will be one which minimises FMAX (minimum value = 1) and reduces skewness to near zero. Fortunately, a single transformation usually satisfies both criteria reasonably well.

The values of P examined are selected by line 310. Usually, the optimal value of P will lie between –1 and 1, but in some cases values outside this range will be required. It is not necessary to determine the value of P very precisely. For example if P = 0.3 was found to be optimal, it would be reasonable to round this off to 0.5 (square root transformation) if this was convenient or theoretically attractive.

Analysis of Variance

Having chosen a value of P, all data items must be raised to this power (or converted to logarithms, if P = 0) prior to analysis of variance. If a constant was added to the data to eliminate negative numbers or zeros, this must also be added prior to transformation.

Where the chosen P value is negative, it is desirable to multiply the transformed data by –1 to restore the original order. In some cases, the transformed data will consist of very small numbers. If this occurs, they should all be multiplied by a constant to bring them up to a reasonable size. For example, if all data ended up in the range 0.000001 to 0.000009, they should all be multiplied by 1,000,000. This will not affect the results (F values) of the analysis of variance, but will help avoid rounding errors during calculation.

Histogram

This program plots a histogram of residuals about group means for a number of samples. It may also be used to plot a histogram of a single sample of data. Its function complements that of "Data Transformation". While "Data Transformation" calculates and corrects for skewness and inequality of variances, it is of no help in assessing certain other data characteristics, such as multimodality and the presence of outliers, which are certainly of interest to the analyst. A histogram of residuals enables a quick check for the presence of these features.

The program asks the operator to enter 1 if a plot of residuals about group means is required. This is the appropriate method where the data consist of a number of samples which could have come from populations having different means. If there is only a single sample, any number other than 1 should be entered. Entry of 1 when data consists of a single group will still give the correct histogram, but additional information which is likely to be of interest, such as the number of items falling in a particular range, will be more difficult to obtain. In addition, more data can be handled by the single group option.

A factor F is chosen (lines 720-740) such that when all the frequencies are multiplied by F, the tallest bar of the histogram will occupy most of the screen height. The F value calculation is appropriate for the ZX81, which has a screen height of 44 pixels. The calculations of F and WIDTH (number of pixels in bar width, line 780) should be modified if running the program on other micros.

Occasionally, due to rounding errors, the largest item(s) will be missed when the last category (F(C)) is being filled. In that case, the sum of the contents of array F will be less than N (the total number of items). Line 760 corrects F(C) if this has occurred. If, after the histogram has been plotted, it is desired to change the number of categories, enter GOTO 560. □

PROGRAM 1

F Distribution

```
 10  REM "F DISTRIBUTION"
 20  REM NORMAL APPROXIMATION TO FΔΔΔΔ PEIZER AND PRATT
 30  PRINT "F = ?"
 40  INPUT F
 50  PRINT "DF NUMERATOR = ?"
 60  INPUT DF1
 70  PRINT "DF DENOMINATOR = ?"
 80  INPUT DF2
 90  PRINT "F("; DF1; ","; DF2; ") = "; F
100  IF DF1 = DF2 AND F = 1 THEN GOTO 390
110  IF DF1 < > 1 AND DF2 < > 1 THEN GOTO 200
120  IF DF1 = DF2 THEN GOTO 180
130  IF DF2 > 1 THEN GOTO 160
140  LET Z = - (DF1 - 2/3 + 1/(10 * DF1)) * SQR (1/(DF1 - 5/6) * LN (1 +
     1/F/DF1))
150  GOTO 270
160  LET Z = (DF2 - 2/3 + 1/(10 * DF2)) * SQR (1/(DF2 - 5/6) * LN (1 +
     F/DF2))
170  GOTO 270
180  LET Z = 1/3 * SQR (6 * LN (1 + F))
190  GOTO 270
200  LET S = (DF2 - 1)/2
210  LET T = (DF1 - 1)/2
220  LET N = (DF1 + DF2)/2 - 1
230  LET P = DF2/(DF1 * F + DF2)
240  LET Q = 1 - P
250  LET D = S + 1/6 - P * (N + 1/3) + .02 * (Q/(S + .5) - P/(T + .5) + (Q -
     .5)/(N + 1))
260  LET Z = D/ABS (S - N * P) * SQR (2/(1 + 1/(6 * N)) * (S * LN (S/(N * P))
     + T * LN (T/(N * Q))))
270  REM CALCULATE TAIL END AREA
280  LET R = EXP (- Z * Z/2)/2.5066282746
290  LET Y = 1/(1 + .33267 * ABS Z)
300  LET U = R * (.4361836 * Y - .1201676 * Y * Y + .937298 * Y * Y * Y)
310  LET U = INT (10000 * U + .5)/10000
320  IF DF1 = 1 OR DF2 = 1 THEN GOTO 360
330  IF SGN Z = -1 THEN GOTO 410
340  PRINT "PROBABILITY = " ; U

350  STOP
360  IF SGN Z = -1 THEN GOTO 430
370  PRINT "PROBABILITY = " ; 2 * U
380  STOP
390  PRINT "PROBABILITY = .5"
400  STOP
410  PRINT "PROBABILITY = " ; 1 - U
420  STOP
430  PRINT "PROBABILITY = " ; 1 - 2 * U
440  STOP
```

PROGRAM 2

Data Transformation

```
  5  REM "DATA TRANSFORMATION"
 10  PRINT "HOW MANY GROUPS?"
 20  INPUT M
 30  PRINT "MAX GROUP SIZE? (NMAX)"
 40  INPUT N
 50  PRINT "IF GROUP SIZE < NMAX, THEN ENTER PI AFTER LAST ITEM"
 60  DIM A(M,N)
 70  DIM B(M)
 80  FOR I = 1 TO M
 90  PRINT "GROUPΔ"; I
100  FOR J = 1 TO N
110  PRINT "ITEMΔ"; J
120  INPUT A(I,J)
130  IF A(I,J) = PI THEN GOTO 160
140  IF A(I,J) = 0 OR SGN A(I,J) = -1 THEN GOTO 820
150  NEXT J
160  NEXT I
170  CLS
180  FOR I = 1 TO M
190  PRINT "GROUPΔ"; I
200  FOR J = 1 TO N
210  IF A(I,J) = PI THEN GOTO 240
220  PRINT A(I,J); "Δ";
230  NEXT J
240  PRINT
250  PRINT
260  NEXT I
270  PRINT "IF OK ENTER 1; IF NOT, CORRECT ΔΔΔΔ A (GROUP, ITEM) AND GOTO 180"
280  INPUT W
290  IF W < > 1 THEN GOTO 10
300  CLS
305  REM P = EXPONENT
310  FOR P = 1 TO -1 STEP -.5
320  FOR I = 1 TO M
330  LET Y = 0
340  LET X = 0
350  FOR J = 1 TO N
360  IF A (I,J) = PI THEN GOTO 430

370  IF .01 > P AND P > -.01 THEN GOTO 400
380  LET X = X + SGN P * A (I,J) ** P
390  GOTO 410
400  LET X = X + LN A (I,J)
410  LET Y = Y + 1
420  NEXT J
425  REM STORE MEANS IN B (M)
430  LET B (I) = X/Y
440  NEXT I
450  LET CUB = 0
460  LET CUMSS = 0
470  LET COUNT = 0
480  FOR I = 1 TO M
490  LET SQ = 0
500  LET Y = 0
510  FOR J = 1 TO N
520  IF A (I,J) = PI THEN GOTO 630
530  IF .01 > P AND P > -.01 THEN GOTO 560
540  LET X = SGN P * A (I,J) ** P - B (I)
550  GOTO 570
560  LET X = LN A (I,J) - B(I)
570  LET SQ = SQ + X * X
580  LET CUMSS = CUMSS + X * X
590  LET Y = Y + 1
600  LET COUNT = COUNT + 1
610  LET CUB = CUB + SGN X * ABS X ** 3
620  NEXT J
625  REM STORE VARIANCES IN B (M)
630  LET B (I) = SQ/(Y-1)
640  NEXT I
650  LET POPVAR = CUMSS/COUNT
660  LET SKEW = CUB/COUNT/POPVAR ** (3/2)
670  IF .01 > P AND P > -.01 THEN GOTO 700
680  PRINT "EXPONENT = "; P
690  GOTO 710
700  PRINT "EXPONENT = 0"
710  PRINT "SKEWNESS ="; SKEW
720  LET BIGVAR = B (1)
730  LET LITVAR = B (1)
740  FOR I = 1 TO M
```

```
750  IF B (I) > BIGVAR THEN LET BIGVAR = B (I)
760  IF B (I) < LITVAR THEN LET LITVAR = B (I)
770  NEXT I
780  PRINT "FMAX = "; BIGVAR/LITVAR
790  PRINT
800  NEXT P
810  STOP
820  PRINT "ZEROES AND NEGATIVE DATA NOT ΔΔΔΔ PERMITTED"
830  STOP
```

Histogram

```
 10  REM "HISTOGRAM"
 20  PRINT "ENTER 1 IF PLOT OF RESIDUALS ΔΔΔΔ ABOUT GROUP MEANS REQUIRED"
 30  INPUT W
 40  IF W < > 1 THEN GOTO 370
 50  PRINT "HOW MANY GROUPS?"
 60  INPUT G
 70  PRINT "MAX GROUP SIZE? (NMAX)"
 80  INPUT S
 90  DIM A (G,S)
100  DIM M (G)
110  LET N = 0
120  PRINT "IF GROUP SIZE < NMAX, ENTER PI AFTER LAST ITEM"
125  REM INPUT GROUPED DATA
130  FOR I = 1 TO G
140  PRINT "GROUPΔ" ; I
150  LET SUM = 0
160  LET Z = 0
170  FOR J = 1 TO S
180  PRINT "ITEM Δ" ; J
190  INPUT A (I,J)
200  IF A (I,J) = PI THEN GOTO 250
210  LET SUM = SUM + A (I,J)
220  LET Z = Z + 1
230  LET N = N + 1
240  NEXT J
245  REM CALCULATE GROUP MEANS
250  LET M (I) = SUM/Z
260  NEXT I
270  DIM Z (N)
275  REM STORE RESIDUALS IN Z (N)
280  LET N = 0
290  FOR I = 1 TO G
300  FOR J = 1 TO S
310  IF A (I,J) = PI THEN GOTO 350
320  LET N = N + 1
330  LET Z (N) = A (I,J) - M (I)
340  NEXT J
350  NEXT I

360  GOTO 440
370  PRINT "HOW MANY ITEMS?"
380  INPUT N
390  DIM Z (N)
395  REM INPUT SINGLE GROUP DATA
400  FOR I = 1 TO N
410  PRINT "ITEMΔ" ; I
420  INPUT Z (I)
430  NEXT I
435  REM SORT Z (N)
440  LET T = N - 1
450  FAST
460  FOR I = 1 TO T
470  LET K = I + 1
480  FOR J = N TO K STEP - 1
490  IF Z (J) > Z (I) THEN GOTO 530
500  LET Y = Z (J)
510  LET Z (J) = Z (I)
520  LET Z (I) = Y
530  NEXT J
540  NEXT I
550  SLOW
560  PRINT "HOW MANY CATEGORIES?"
570  INPUT C
580  LET A = 1
590  LET V = 0
600  LET R = (Z (N) - Z (1))/C
610  LET M = R + Z (1)
620  DIM F (C)
630  CLS
635  REM CALCULATE FREQUENCIES IN C CATEGORIES, WIDTH R
640  FOR J = 1 TO C
650  FOR I = A TO N
660  IF Z (I) > M THEN GOTO 690
670  LET F (J) = F (J) + 1
680  NEXT I
690  LET A = A + F (J)
700  LET M = M + R
710  LET V = V + F (J)
715  REM CALCULATE HEIGHT EXPANSION FACTOR, F

720  IF F (J) = 0 THEN GOTO 750
730  IF J = 1 THEN LET F = 44/F (J)
740  IF 44/F (J) < F THEN LET F = 44/F (J)
750  NEXT J
755  REM CORRECT ANY OMISSIONS DUE TO ROUNDING ERRORS
760  IF V < N THEN LET F (C) = F (C) + N - V
770  REM CALCULATE WIDTH OF BARS
780  LET WIDTH = INT (64/C)
790  LET D = 0
800  LET E = WIDTH - 1
810  REM PLOT THE HISTOGRAM
820  FOR I = 1 TO C
830  FOR J = D TO E
840  FOR K = 0 TO F * F (I) - 1
850  PLOT J,K
860  NEXT K
870  NEXT J
880  LET D = D + WIDTH
890  LET E = E + WIDTH
900  NEXT I
910  STOP
```


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The Elusive Turing – The Machine You Use When You Don't Use A Machine

Jack Dikian takes look at the 46-year-old Turing machine and provides a program, written in BASIC.

AT SOME TIME or another, we've all realised the meaning of the expression, "What the computer can do, can be precisely described by a human being." This is easily understood, especially when we consider a program as being nothing more than a set of pre-determined rules.

These rules will effectively determine, in advance, the operation of the machine in a particular run. We could, however, also state that any procedure, if it can be precisely defined, can also be written and run as a computer program.

This last statement is often used in conjunction with the work of Alan M Turing. In his 1937 paper, Turing invented a theoretical class of machines, called Turing machines.

These formal machines allowed Turing to analyse the idea of computability. That is, they provide a simple formalism for describing a procedure, while at the same time be powerful enough to execute all "effective" procedures.

The Machine

A Turing machine is made up of three main components. These include:

- An infinitely long tape, divided into character-length squares and acting as an external storage medium;
- A tape read/write device, the tape head; and
- A simple internal memory device, the state table.

The behaviour of the machine at any one instant is directly dependent on an appropriate quintuple selected from a finite set of quintuples.

The Turing program is, in fact, a series of these quintuples. A quintuple has this form:

$$= [Q(t)\ R(t)\ W(t)\ Q(t+1)\ M]$$

Q(t) is the state the machine is in, at time (t), Q is usually labelled with an integer. R(t) and W(t) are symbols the tape head can read and write at time (t). That is, at time (t), the head will need to see the symbol R, and substitute it with the symbol W.

Q(t+1) is the state the machine will be in after executing the current quintuple. That is, at time (t+1), the machine will be in state Q(t+1). M determines the relative movement of the tape head, in the transition from state Q(t) to state Q(t+1).

For example, M can have values in the set [L,N,R]. M equals L results in the tape head moving one square left, ready for the next cycle. N implies a null movement, while R moves the head one square to the right.

Let's demonstrate this with a few simple examples. Example One will move the tape head right along the tape, read the symbol A, and substitute it with the symbol B. This process will continue until the symbol # is encountered.

Figure One shows the machine's actions for the example.

```
Q(t)    R(t)    W(t)    Q(t+1)    M
----    ----    ----    ------    -
1       A       B       1         R
1       #       #       H         N
```

EXAMPLE 1

```
--------------------------
tape   |A |A |A |# |.....
--------------------------
       ^
state 1
--------------------------
|B |A |A |# |.....
--------------------------
       ^
state 1
--------------------------
|B |B |A |# |.....
--------------------------
       ^
state 1
--------------------------
|B |B |B |# |.....
--------------------------
       ^
state 1
--------------------------
|B |B |B |# |.....
--------------------------
       ^
state H (The Halt State)
```

FIGURE 1

The BASIC Program

The BASIC program is a simple Tur-

ing machine interpreter. It was written for the Hitachi Peach microcomputer, but it can be modified quite easily to run on most machines. Those Peach BASIC features that may cause some worry to users of other machines are documented in the listing. There is a limit on the length of the tape used; I have set it to 300 characters, but this can be changed if required.

The interpreter is menu-driven – that is, you're required to input commands found in a list of command options. For example, you might type in P to load a Turing program from the keyboard. Once the program is loaded, you can return back to the menu, to start a new command.

An interaction may involve this sequence of command calls: (run basic program), command P to load program, command L to list program, command T to load tape, command R to run Turing program, and command Q to quit.

Command P allows the user to input a Turing program. The program can have up to 10 different states, and be no more than 20 lines in length. The states are labelled with single-digit numbers, ranging from 0 to 9. The state "h" is also valid, representing the "halt" state. When in the "p" mode, the keyboard is strobed, and information typed on the screen is self-formatted. Editing is not possible. Therefore, if an error in typing does occur, you would need to quit the current mode by typing a fullstop and starting the option again.

Command T allows the user to input (initialise) a tape. The keyboard is strobed and editing is not possible. The typed characters are appended to the tape and also displayed on the screen. The tape can hold up to 300 characters, but this can be changed. The fullstop is again used to terminate the inputting sequence. It is possible to re-load the tape by typing T at any stage in the interaction.

Command L will list the current Turing program – hit any key to continue.

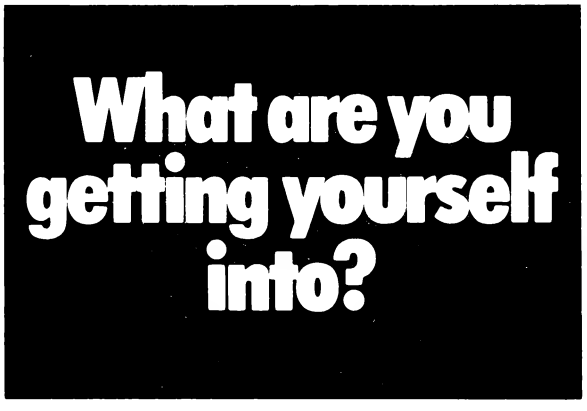
Command R will run the current Turing program, using the current tape. This option will simulate the operation of the Turing machine. The current segment of the tape is displayed, with a pointer moving along it. The moving pointer represents the tape head. The current line in the program is also displayed. The run is terminated upon encountering an error, or halting normally. The error messages are supposed to be self-explanatory.

Command S will allow the user to single-step through the run. Hitting any key will result in executing the next line of the program.

Command H gives a short summary of the command options.

Command Q will quit the interaction. □

```
10   REM          ******************************************
20   REM          *                                        *
30   REM          *       "TURING MACHINE SIMULATOR"       *
40   REM          *                                        *
50   REM          *        Author:  JACK DIKIAN            *
60   REM          *                                        *
70   REM          *        Last modified: OCT 12,1982      *
80   REM          *                                        *
90   REM          *        Machine: Hitachi Peach          *
100  REM          *                                        *
110  REM          *             copyright (C)              *
120  REM          *                                        *
130  REM          ******************************************
140 WIDTH 80: SCREEN 0 :COLOR5
150 PP=0: TT=0 : PRINT: PRINT"Turing Machine Ver 1.0"
160 DIM P1$(20,5),T1$(300)
170 REM ((( array to hold Turing program, and tape )))
180 LOCATE 8,8
190 PRINT "Please enter option"  : PRINT
200 REM read command from keyboard
210 PRINT "Enter tape                    t"
220 PRINT "Enter program script          p"
230 PRINT "Run program fast              r"
240 PRINT "Run program single step       s"
250 PRINT "List program                  l"
260 PRINT "Help                          h"
270 PRINT "Quit                          q"
280 LOCATE 4,4
290 A$= INKEY$ : IF A$ < " " THEN 290
300 REM ((( if Null character then keep polling keys )))
310 IF A$="p"  THEN IF PP=0 THEN GOSUB 750 :GOTO 180 ELSE CLS: GOTO 430
320 REM ((( pp=0 when command p called for first time, other wise set to 1 )))
330 IF A$="r" THEN S=1: GOSUB 1000 :GOTO 180
340 IF A$="s" THEN S=0: GOSUB 1000: GOTO 180
350 IF A$ ="l" THEN GOSUB 1570 : GOTO 180
360 IF A$="q" THEN CLS : END
370 IF A$="t" THEN IF TT=0 THEN GOSUB 510 : GOTO 180 ELSE CLS:GOTO 470
380 REM ((( tt=0 when command t called for first time, other wise set to 1 )))
390 IF A$="h" THEN GOSUB 1680: GOTO 180
400 LOCATE 4,4
410 PRINT "Unknown command ";A$
420 GOTO 290
430 PRINT "A program is already defined, Do you want to define it again"
440 ZZ$ =INKEY$ : IF ZZ$ < " " THEN 440
450 IF ZZ$="y" THEN PP=0 : GOSUB 750 ELSE GOTO 180
460 GOTO 180
470 PRINT "A tape is already defined, Do you want to re-write it"
480 ZZ$=INKEY$ : IF ZZ$ < " " THEN 480
490 IF ZZ$="y" THEN TT=0 : GOSUB 510 ELSE GOTO 180
500 GOTO 180
510 REM read tape from keyboard, the keys are polled
520 CLS: LOCATE 4,4 : PRINT"Initilizing tape"
530 L= 0 : C=0
540 C=0
550 FOR T=1 TO 250: T1$(T)=" ": NEXT : CLS
560 LINE (1,100)-(625,100),PSET,6
570 LINE (1,115)-(625,115),PSET,6
580 LOCATE 0,13
590 C=C+1: L=L+1
600 IF C =79THEN C=1 : FOR Y=1 TO 50 :LOCATE Y,13:PRINT" ":NEXT:LOCATE 4,16
610 W$ =INKEY$ : IF W$="." THEN GOTO 700
620 IF W$ < " " THEN 600
630 REM ((( if Null character then keep getting characters )))
640 LOCATE C,13
650 PRINT W$;
660 IF L<300THEN T1$(L)=W$ ELSE PRINT "No more room" : END
670 LOCATE4,16
680 PRINT L
690 GOTO 590
700 PRINT"Tape now loaded and ready"
710 FOR T=1 TO 1200 : NEXT
720 CLS
730 TT=1
740 RETURN
750 REM ENTER TURING MACHINE PROGRAM self fixing format
760 CLS
770 REM ((( initilize program store, and reset counters )))
780 FOR TY=  0 TO 9
790  FOR TX = 1 TO 5
800   P1$(TY,TX)=" "
810  NEXT: NEXT
820 LOCATE 0,1
830 PRINT"States          Read          Write          Next-State          Move"
840 REM ((( line counter, character counter )))
850 LL=3 : LC =0
860 P$=INKEY$
870 IF P$="." THEN 950
880 REM ((( . terminates inputing sequence  )))
890 IF P$< " " THEN 860
900 LC = LC +1 : IF LC >5 THEN LC = 1: LL =LL +1
910 LOCATE(LC-1) * 16,LL
920 PRINT P$
930 P1$(LL,LC)=P$
940 GOTO 860
950 PRINT "Program loaded and ready"
960 FOR T=1 TO 1200 : NEXT
970 CLS
980 PP=1
990 RETURN
1000 REM run turing program  fast if s=1, single step if s=0
1010 CLS: LL=1
1020 LOCATE 2,5
1030 LINE(1,20)-(620,20),PSET,6
1040 LINE(1,35)-(620,35),PSET,6
1050 LOCATE 1,3
1060 FOR T=1 TO 78
1070 PRINT T1$(T);
1080 M=1
```

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```
1090 NEXT
1100 LOCATE 2,1 : PRINT "Runing...."
1110 LOCATE 40,1: PRINT"Current tape segment: "
1120 LOCATE 2,12: PRINT"Current quintuple in program"
1130 LOCATE 1,5 :PRINT"^";
1140 ST=1: PO =1
1150 R$=T1$(PO)
1160 FOR I= 3 TO 20 : IF R$=F1$(I,2)AND VAL(F1$(I,1)) =ST  THEN LOCATE 2,10: PRI
NT F1$(I,1),F1$(I,2),F1$(I,3),F1$(I,4),F1$(I,5): GOTO 1200
1170 NEXT
1180 IF F=1 THEN PRINT"Program ended" :F=0: GOTO 180
1190 PRINT"Error: in tape" : GOTO 180
1200 T1$(PO) = F1$(I,5)
1210 LOCATE J,5: PRINT" ";
1220 REM ((( blank out last tape marker )))
1230 REM ((( adjust tape head for next state according to MOVE character )))
1240 IF F1$(I,5)="r" THEN M= PO +1 : GOTO 1270
1250 IF F1$(I,5)="l" THEN M=PO -LL : LL=1:  GOTO 1270
1260 IF F1$(I,5)="n" THEN M=PO ELSE PRINT "Error: bad move" : GOTO 180
1270 A= VAL(F1$(I,4)): ST = A : IF A=0 THEN F=1: GOTO 1310
1280 FOR N=3 TO 20 : IF VAL(F1$(N,1))=A THEN GOTO 1310
1290 NEXT
1300 PRINT"Error: no such state" : GOTO 180
1310 IF M  = 1 AND M  =79 THEN 1350
1320 IF M  =79 AND M <=158 THEN 1380
1330 IF M  = 158 AND M = 237 THEN 1440
1340 PRINT "Error: run out of tape": GOTO 180
1350 LOCATE 1,3: FOR T=1 TO 78
1360 PRINT T1$(T); :NEXT : J=M: LOCATE 63,1: PRINT"1..78"
1370 GOTO 1480
1380 LOCATE 1,3
1390 IF AA=0 THEN FOR T= 79 TO 157 : PRINT " "; NEXT
1400 REM ((( aa=0 once, clear screen for tape once )))
1410 LOCATE 1,3: FOR T=79 TO 157 : PRINT T1$(T); : NEXT:LOCATE 63,1:PRINT "79..1
57"
1420 IF M = 79 THEN  J = M -78:  AA =1 ELSE J=M : AA=1
1430 GOTO 1480
1440 LOCATE 1,3 : IF BB=0 THEN FOR T= 15710 237:PRINT " "; : NEXT
1450 LOCATE 1,3: FOR T=158 TO 240: PRINT T1$(T); : NEXT:LOCATE 63,1:PRINT"158..2
40"
1460 IF M 237 THEN  J=M-157
1470 BB=1
1480 LOCATE J,5: PRINT" ";
1490 PO =M
1500 IF M  L THEN 1330
1510 PRINT"End of run"
1520 RETURN
1530 IF S=1 THEN 1150
1540 V$=INKEY$
1550 IF V$ " " THEN 1540
1560 GOTO 1150
1570 REM listing the turing machine program
1580 CLS
1590 PRINT"states       read       write       next-state         move"
1600 FOR B=1 TO 20
1610 PRINT F1$(B,1),F1$(B,2),F1$(B,3),F1$(B,4),F1$(B,5)
1620 NEXT
1630 LOCATE 2,22
1640 PRINT "Type any key to continue"
1650 P$=INKEY$
1660 IF P$  " " THEN 1650
1670 CLS : RETURN
1680 REM give help
1690 CLS
1700 PRINT"(1)  It is best to load in a program first by typing a (p)"
1710 PRINT"      the program should not have more than 10 lines of code"
1720 PRINT"      and some error reports exist. A period (.) will terminate"
1730 PRINT"      the program loading sequence."
1740 PRINT
1750 PRINT"(2.  Next load the tape, by typing a (t) at the menue. "
1760 PRINT"     The tape can hold about 240 characters. A period(.)"
1770 PRINT"     will terminate the inputing sequence. No editing is"
1780 PRINT"     possible. "
1790 PRINT
1800 PRINT"(3)  The command (r) will run the script at fast speed,"
1810 PRINT"     while the command (s) will allow you to single-step"
1820 PRINT"     through the program. The program will stop on "
1830 PRINT"     encountering an error or halting with an answer."
1840 PRINT
1850 PRINT".4)  The command (l) will list the program. (q) will "
1860 PRINT"     quit the interaction."
1870 PRINT: PRINT"Type any key to continue"
1880 W$=INKEY$
1890 IF W$ " " THEN 1880
1900 CLS:RETURN
```


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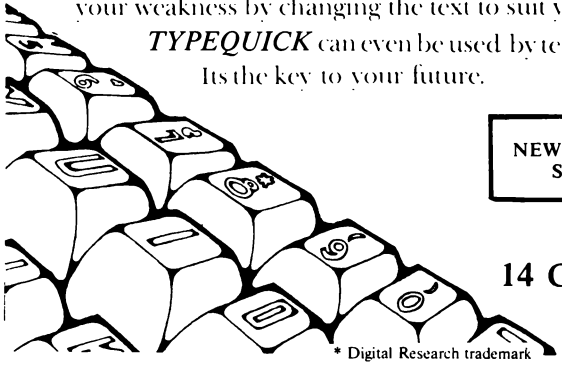

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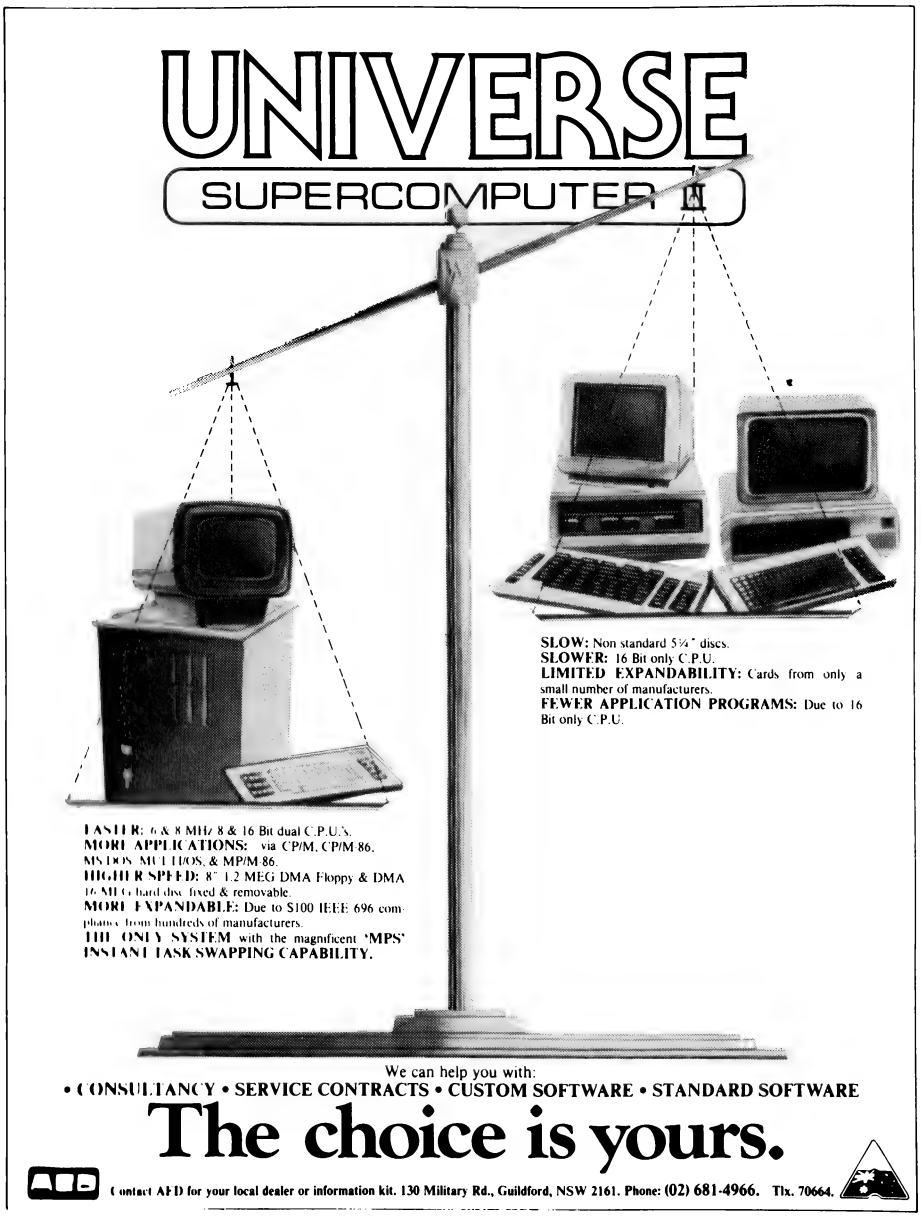
In analysing a typical small business it becomes apparent that the majority of businessmen are required to perform many tasks within a variety of disciplines during a typical business day.

They are required to swap randomly from function to function at the drop of a hat. At one moment they may be production controllers, the next moment sales persons, the next promotions managers, then the storeman, and the accountant, etc, etc. By the very nature of office life they seldom get to finish one task before they are interrupted by some other more urgent demand for their time. Thus they have to drop tools to deal with the situation before then can return to the original task.

To date, microcomputer systems have been unable to rapidly jump from function to function directly, and in a way that allows direct return to the previous task. AED have solved this problem is a revolutionary new operating system concept referred to as MPS or Multiple Program Selection. At the press of two special keys the current task and its screen are put into suspended animation and saved. The user then via a menu, selects one of nine other tasks which at an earlier time were suspended. This new task complete with its screen image is placed into the computer memory and released from suspension. The whole operation takes only six seconds which is about twenty times faster than conventional microcomputers. When the new task is completed the operator may return instantly to the original or yet another task.

Swapping programs on conventional microcomputers is slow, requires a large number of keystrokes, and normally there is little or no menu prompting. MPS, however, is extremely fast, requires only three keystrokes, and is completely Menu assisted. Other companies have attempted to provide a similar solution to this problem, eg, Apple's LISA, however, their approach has been to create a suite of application programs that are fully integrated. This approach yields an improvement over more conventional systems though still suffers the problem of slow swap time and only the programs offered by that particular manufacturer are available for the system.

Because the AED MPS system is implemented in the operating system, it offers the fundamental advantages, of speed and ready availability of suitable application programs. Any of the standard CP/M programs from a vast range of vendors, can be used with the MPS system. MPS is currently only available on the AID UNIVERSE Supercomputer IH which is an extremely expandable, High speed, IEED 696 S100, Dual CPU, 8 and 16 bit microcomputer system.



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your computer text file

Pocket Problems

IN RE-READING my "Chopper Pilot" program (September 1982 edition), I have noticed a typographical error in line 14. It should read:

14 For J = 7432 to 7463 :
READ Q : Poke J, Q : NEXT

This is the line that defines the ship at the bottom.

Also, please note that the helicopter doesn't appear until you move the joystick.

In my "Combat" program (June 1982 edition), line 780 was missing. It reads:

780 If Peek (N) ›98 then
Poke C, Q : Goto 450

Line 900 needs another " in the beginning, and line 1120 should read:

1120 Print "To fire you press the "F" key or the "(up-arrow)" key.

Line 1030 should have a diamond between the (Blue) and (Black).

I hope these corrections clear up any problems.

RIC KUBE
Waikerie, SA

LDOS Shortfall

THE REVIEW of the LDOS operating system by Richard Newcombe (a fellow member of Adelaide Micro Users' Group) made interesting reading. In the space available, Richard did justice to this excellent DOS.

However, I must report one negative aspect of the operating system which, to the best of my knowledge, has not been revealed in any advertising, review or comment: LDOS does not, with respect to the Model I, support direct-booting for double-density operation.

It requires to be booted with a single-density system disk and installation of a double-density driver. (This can be achieved quickly).

There is a utility, SOLE, which apparently converts a double-density system disk so that direct boot is possible – at $US20 from Missosys. The author of SOLE is Roy Soltoff, who is also listed as being the system analyst for the LDOS project.

RAY GREET
Lockley's, SA

MicroBee Matters

THE LATEST version of the MicroBee is a real bargain. However, what about those of us stuck with the first model – that is, the kit version? We demonstrated faith in Applied Technology by purchasing the first-release MicroBee II kits with old-style cases (that can't be upgraded to the newer case), 5.0 BASIC (with no self-diagnostic capability) and BASIC manuals that have since been completely re-written.

We initial owners got the MicroBee off the ground and, to some extent, financed the various revisions of hardware, software and documentation that have emerged since that first release. Now we are virtually stuck with an inferior version of the MicroBee.

Perhaps some sort of exchange/upgrading arrangement could be worked out to enable us to enjoy the full benefits of the latest version of the MicroBee. If this could be achieved, it would generate a lot of goodwill and demonstrate Applied Technology's ongoing support of MicroBee owners.

PETER McDONOUGH
Noble Park, Vic

In Defense Of Applied Tech

YOUR CORRESPONDENT Peter Elford (July 1982 edition) raises some interesting and valid points, regarding the orderly marketing of hobby microcomputers, and also makes some criticisms of Applied Technology's MicroBee – criticisms that I happen to think are unfounded.

I believe Applied Technology has done a remarkable job. In 1981, it was a single-outlet company with about eight employees, about to launch the MicroBee. As far as I can tell, its previous "best-seller" had sold about 1000 units in perhaps three or four years.

Applied Technology's idea of a best-seller was probably in the vicinity of 100 MicroBees sold per year. In the year after the launch, however, it sold 7000, and had to expand to probably 35 people. Anyone who is in a rapidly expanding business will be glad to tell you just how difficult it is to cope with such rapid expansion.

Applied Technology was a hobbyist company, and relied upon a lot of feedback from well-informed experimenters. Suddenly, it had to change to a support company, with a possible 6000 newcomers to computers asking questions. The launch of the MicroBee, in a kit form, was characteristic of earlier hobby and electronic enthusiast aimed companies.

Frankly, I was most impressed with Applied Technology's activities in the early days of the MicroBee launch. It didn't advertise until it had the prototypes ready; it delivered its first kits within a month of the promised date; after the first few deliveries, the kits went together generally without problems (the first few boards had plating problems); and – most impressive of all – it declined to accept orders when it could not fill them.

Incidentally, I have no connection with Applied Technology, beyond that of a customer.

Australians have a tradition of knocking their own products. I took a MicroBee with me while travelling in the United States, and for five months it lived in an airline bag, being used as a portable word-processor. That little Australian company has impressed a hell of a lot of people overseas...

ERIC B LINDSAY
Faulconbridge, NSW

Costly PCOTY

THE NEC APC personal computer is no doubt a great piece of hardware. However, I find myself puzzled by its selection, by *Your Computer*, as the Personal Computer of the Year.

It is simply too expensive.

How many of your readership would be able to pay the "under $5000" mentioned in the advertisement on page 68 of your May edition?

The award criteria inevitably placed the more expensive computers at a great advantage.

Surely, the PCOTY needs to be affordable as well as innovative? It must be affordable to as many persons as possible.

PHIL NANLOHY
Dulwich Hill, NSW

Had the award been given the year Sinclair's ZX80 was launched, it probably would have won. Innovation and technical excellence are not necessarily related to price; performance may be an area where the more expensive models have an advantage, however that is offset by the value-for-money category, which favours the cheaper machines.

If we were nominating a *home computer of the year*, we'd agree it must be affordable to as many persons as possible. The title Personal Computer Of The Year spans a much broader range.

What's Cooking?

I LIKE YOUR magazine and Les Bell's editorials, but I do have some recipes stored on disk (April issue). This enables a quick printout for visitors who say, "I must get that recipe from you." It saves my wife a lot of writing!

PHIL DONALDSON
Gunnedah, NSW

Tasty Bytes

I HESITATE to break a record of eight years, but I would like to report that there is at least one person out here who uses a personal computer for storing recipes.

I have stored all mine, most of them culled not from beautifully illustrated books, but from various scrappy pieces of paper ex-relatives and friends. The initial input was slow, but now that they're in (referenced by name, main ingredient, cooking time, ability to prepare ahead and ease of preparation) meal-planning is simpler and quicker.

I doubt that anyone would buy a computer solely for this reason. However, there are a lot of non-professional people, particularly women, whose first contact with the computer might be something as "homely" as recipe files.

The beauty of personal computers is in introducing a large number of non-technical people to the previous "mysteries" of computing, giving new opportunities for self-improvement and creativity. If respectability and sophistication in the industry means limiting usage to commercial and professional applications, who wants to be respectable and sophisticated?

A STERLING
Tempe, NSW

Can you whip up a 15-minute Humble Pie?

THE DATABASE HOTLINE!

THE dBASE II EXPERTS

★ THE HOTTEST line in database management — Ashton-Tate's dBase II. The most popular DBMS on the world micro scene, it's one of the all-time record sellers. And for good reason.
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★ A HANDFUL of straightforward English commands — like CREATE, EDIT, APPEND, or INSERT — is all you need to know to start using dBase II right now.
★ A POWERFUL English-like command language gives you almost unlimited control of your computer and its files. Full scale accounting systems have been written — by businessmen — using this language and dBase II's database management alone.
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Get it all done by Friday!

★ Friday is easy enough to use at home, powerful enough for the office.
★ Set up an "electronic file" without even peeking at the manual.
★ Find any filed information in seconds, even if there are thousands of entries in the file.
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★ Change the structure of a file with a few keystrokes, without losing any data.
★ Display or print quick reports from all or part of a file.
★ Prepare custom reports laid out just the way you want them, quickly and easily.
★ Set up your system to perform automatic calculations when data is being entered or when reports are being printed.
★ Protect your files with passwords.
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★ Make handy mailing labels any way you want them.

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Annual Index II

FEATURES

(Format: Story title, author, issue)

...And Something For CoCo Lovers, Richard Newcombe, May 1983
16-Bits – Not Quite A Revolution, Les Bell, October 1982
A Beginner's Guide To Tandy Games, Edward McArdle, September 1982
A Peek And A Poke, C D H Cooper, June 1983
A Surfeit Of Systems, Les Bell, April 1983
A.C.S. – A Classy School, Greg Hawkins, August 1982
Are You Being Served?, Lindsay Shapero, June 1983
At Home With Negus, The Atari, Chris McEwan, July 1982
Barson Breaks Out, Lindsay Shapero, April 1983
C No Evil, Jack Dikian, March 1983
California Dreaming, Frank Lee, July 1983
Christensen Protocol – The Manual, Bill Bolton, June 1983
Commodore Comment – And Conversion, Peter Sandys, July 1982
Communication, The Next Big Breakthrough, Les Bell, September 1982
Data 82, Les Bell, September 1982
Data 83 – Showcase Of The Stars, Lindsay Shapero, May 1983
Forget The Crosswords, Buy A Computer, Cosmos Miro, May 1983
Getting The Best From dBase II, Les Bell, July 1983
Good Vibrations, Timothy Nicholls, June 1983
Here Comes SuperBee, Lindsay Shapero, March 1983
How To Justify Computing, Garnett Znidaric, July 1982
I Bought A Bee, Colin Johns, August 1982
In-House Communications, Les Bell, October 1982
Is This On Your Lisp?, Jack Dikian, December 1982
Lisa With An S, Frank Linton-Simpkins, March 1983
Look At The World Through Crystal Balls, Les Bell, June 1983
Market Perceptions, US-Style, Howard Arrington, Jan/Feb 1983
Melbourne Goes To The Show, Les Bell, December 1982
MicroBee Music – The Tone Generator, Milan Hudacek, June 1983
MicroNavigation, Trevor Jones, December 1982
Moose And His Motorcycle Mailing Lists, A C Skarratt, April 1983
More ZX Mods, Robert Chalmers, September 1982
Ouch! They Should Have Warned Me..., Phil Scott, June 1983
Paddle Your Own Computer, Leigh/Barbara Hemmings, June 1983
Play Games By Modem!, Nick Gammon, September 1982
Reflections On The MicroBee, Eric Lindsay, August 1982
Some Of My Best Friends Use W-Processors, Eric Lindsay, April 1983
Tandy's Educational Authoring, Jim Rennie, Jan/Feb 1983
Teaching The IBM To Think, Bob Stafford, Jan/Feb 1983
The Big Day, Les Bell, June 1983
The Big Sell Of The Little IBM, John Hall/John Skaller, Jan/Feb 1983
The Byter Bit, M U Grubb, April 1983
The Christensen Revolution, Bill Bolton, May 1983
The Class Of 82, Natalie Filatoff, April 1983
The First Personal Computer Supershow!, Les Bell, April 1983
The Modem Is The Message, Peter Jetson, May 1983
The Talking Computer, Jack Cross, December 1982
The Winner, By A NEC..., Les Bell, May 1983
The World, According To Clive Sinclair, Martin Hayman, December 1982
Thus Spake Rudolph Langer, Lindsay Shapero, June 1983
Unix Against CP/M, Bill Bolton, Jan/Feb 1983
Unix Against CP/M, Bill Bolton, Jan/Feb 1983
What IS a Database?, Les Bell, July 1983
When Micros Rule The World, Bill Bolton, June 1983
Yesterday I Couldn't Spell Computer...., Lindsay Shapero, May 1983

SPECIALS

(Format: Story title, author, issue)

16-Bits – Not Quite A Revolution, Les Bell, October 1982
IBM Moves In – Special Survey, Les Bell and Others, Jan/Feb 1983
Look At The World Through Crystal Balls, Les Bell, June 1983
The Class Of 82, Natalie Filatoff, April 1983
The Winner, By A NEC..., Les Bell, May 1983
What IS a Database?, Les Bell, July 1983
When Micros Rule The World, Bill Bolton, June 1983

REVIEWS

• Computers:

(Format: Machine, model, processor, operating system, story title, author, issue)

Apple, III, 6502, SOS, The Juicier Apple, Les Bell, July 1982
Apple, Lisa, 68000, Another Star Is Born, Les Bell, March 1983
Apple, IIe, 6502, Apple IIe – First Impressions, Ken Ozanne, May 1983
Applied Technology, Microbee, Z80, MicroWorld BASIC, The Bee, Or Not The Bee, Les Bell, July 1982
Applied Technology, Colour Bee, Z80, Here Comes SuperBee, Lindsay Shapero, March 1983
Archive/Wavemate, SR70X, Z80, CP/M, Single-Board Satisfaction!, Bill Bolton, December 1982
Atari, 400, 6502, BASIC, At Home With Negus, The Atari, Chris McEwan, July 1982
BBC, B, Personal Computer Of The Year, Les Bell, May 1983
BBC, The ABC Of The BBC, David Badger, June 1983
Columbia, MPC, 8088, The Columbia Challenge, Les Bell, March 1983
Columbia, MPC, 8088, Personal Computer Of The Year, Les Bell, May 1983
Commodore, VIC-20, 6502, BASIC, The Bee, Or Not The Bee, Les Bell, July 1982
Commodore, 4016, 6502, BASIC, Commodore Comment – And Conversion, Peter Sandys, July 1982
Commodore, 64, 6502, Personal Computer Of The Year, Les Bell, May 1983
Cromemco, C-10, Z80, CDOS, Small Is Beautiful, Les Bell, April 1983
DEC Rainbow, 100, Z80/8088, Personal Computer Of The Year, Les Bell, May 1983
Dick Smith, Super 80, Z80, ROM Monitor/BASIC, The Bee, Or Not The Bee, Les Bell, July 1982
Dick Smith., Super 80, Z80, Super Dick's Super 80, Robert Tanton, Jan/Feb 1983
Eagle, II, Z80, The Eagle Has Landed, Les Bell, June 1983
Godbout, CPU 8085/8, 8085/8088, CP/M CP/M-86 MP/M816, Eight AND Sixteen, Les Bell, October 1982
Hewlett-Packard, HP75C, Hewlett-Packard 75C – The Missing Link?, Les Bell, December 1982
Hewlett-Packard, HP-41C, HP, The Mitiest Might?, Les Bell, Jan/Feb 1983
IBM, PC, 8088, PC-DOS, My First Computer Is An IBM, Lloyd R Borrett, December 1982
IBM, PC, 8088, PC-DOS, IBM Moves In – Better Late Than Never!, Les Bell, Jan/Feb 1983
IBM, PC, 8088, Any Colour, So Long As It's Grey, Les Bell, April 1983
IBM, PC, 8088, Personal Computer Of The Year, Les Bell, May 1983
IBM, PC, 8088, The IBM-PC – Getting To Know You..., Lloyd R Borrett, June 1983
IMS, 5000SX, Z80, CP/M or TurboDOS, The Turbocharged IMS, Les Bell, July 1982
Kaypro, II, Z80, CP/M, Take Up Thy Computer And Walk, Les Bell, September 1982
Kaypro, II, Z80, CP/M, A Play With The Kaypro II, Les Bell, December 1982
Morrow Designs, MicroDecsn, Z80, CP/M, Decisions, Decisions, Les Bell, November 1982
NEC, APC, 8086, CP/M-86, NEC's Headache Relief, Matt Whelan, October 1982
NEC, APC, 8086, CP/M-86, The Winner, By A NEC..., Les Bell, May 1983
Oki, if-800, Z80, CP/M, OKI's OK Oriental, Les Bell, August 1982
Option II, Z80, CP/M, MP/M, No Frills, Lotsa Thrills, Tony McSherry, July 1983
Osborne, O-1, Z80, Ouch! They Should Have Warned Me..., Phil Scott, June 1983
Otrona, Attache, Z80, CP/M, Take Up Thy Computer And Walk, Les Bell, September 1982
Otrona, Attache, Z80, CP/M, The Ultimate Portable?, Les Bell, November 1982
Otrona, Attache, Z80, Personal Computer Of The Year, Les Bell, May 1983
Panasonic, JB3000, 8088, The Dis-Integrated Computer, Gary ....., April 1983
Sharp, MZ-80B, Z80, Sharp Thinking, L Wetherall/A Baartz, April 1983
Sinclair, Spectrum, Z80, BASIC, Spectrum Analysis, Graham Webber, August 1982
Sirius, 1, 8088, A Star Of The First Magnitude, Leigh/Barbara Hemmings, April 1983
Sirius, 1, 8088, Personal Computer Of The Year, Les Bell, May 1983
Synertek, SYM-1, 6502, All Aboard The SYM-1 Express, Roy Hill, June 1983
Toshiba, T100, Z80, Personal Computer Of The Year, Les Bell, May 1983
Vector, System3005, Z80, CP/M, Old-Time Quality – Vector's 3005, Les Bell, July 1982

• Peripherals:

(Format: Machine, model, story title, author, issue)

Anadex, DP-9501A, Anadexia Nervosa?, Les Bell, August 1982
Arfon, Expander, More Muscle For VIC, Les Bell, September 1982
C. Itoh, 1550, Here's A Big Itoh, Les Bell, August 1982
Case, CX-80, A Case For Colour, Les Bell, August 1982
Centronics, 739/2L, Low-Cost Leter Quality – Centronics 739, Matt Whelan, July 1982
Dick Smith, Dataphone, A Quick Look At The Dick Smith Modem, Bill Bolton, August 1982

Dick Smith, Dataphone, Dataphone – The Review, Bill Bolton, September 1982
Digicard-80, The Ultimate 80-Column Apple?, Peter Sandys, July 1982
Digitek Printmastr, Centronics, Digitek's Apple Printmaster, Jim Rennie, May 1983
Epson, MX-80, Epson's World Beater, July 1982
Fujitsu, SP830, Flying Fujitsu, Les Bell, October 1982
Genie Hard Disk, 5 + 5, Instant Storage!, Les Bell, Jan/Feb 1983
Godbout, MPX-1, Complex Multiplex, Les Bell, October 1982
Micro80, Interface, Intelligent Interfacing, Stephen D Page, Jan/Feb 1983
NEC Spinwriter, 7710/3510, Come In, Spinwriter, Matt Whelan, September 1982
Star, DP-8480, We're Gonna Make You A Star, Les Bell, August 1982
Vision-80, Apple Word Processing Made Easy, Peter Sandys, October 1982

• Software:

(Format: Program name, machine suitable for, story title, author, issue)

Apple Games – Various, Apple II, Applegaming Action, Peter Sandys, August 1982
Author 1, TRS-80, Tandy's Educational Authoring, Jim Rennie, Jan/Feb 1983
BASIC/Z, CP/M, Zuper BASIC!, Les Bell, May 1983
Bag Of Tricks – Disk, Apple II, Need A Bag Of Tricks?, Caroline Christie, August 1982
Bookkeeper, Apple II, Your Apple Computer, Peter Sandys, Jan/Feb 1983
Business, & Disassembler pckgs, ZX80/81, Sinclair Goodies, John Crabb, March 1983
CFS – Cash Flow System, CP/M machines, Tracking The Cash, Les Bell, December 1982
CP/M Operating System, Unix Against CP/M, Bill Bolton, Jan/Feb 1983
Cardbox, Apple II/III, CP/M, Caxton's Cardbox, Les Bell, Jan/Feb 1983
Cash Flow, TRS-80, Where Did All The Money Go?, Stanley Felinski, October 1982
Chomps, IBM, What Will You Do With Your IBM, Les Bell, Jan/Feb 1983
Concurrent CP/M-86, IBM PC, CP/M, Four Times Over, Peter R Harris, December 1982
DEAD – Disk Editor, CP/M, Your CP/M Computer, Bill Bolton, May 1983
Deadline, IBM, What Will You Do With Your IBM, Les Bell, Jan/Feb 1983
Defender, Sorcerer, Defender For The Faithful, Clayton Haynes, July 1983
Digital Research PL/I-80, CP/M, You Speak PL/I, Don't You..., Les Bell, December 1982
Dneiper River Line, Apple, Atari, TRS-80, PET, You're Apple's Been Drafted, Wayne J Crosshall, December 1982
FLEX, 6800/6809-based machines, The FLEXible Operating System, Alan Fowler, July 1982
Falcons, Apple II, Your Apple Computer, Loch Bloomfield, March 1983
Flight Simulator, IBM, What Will You Do With Your IBM, Les Bell, Jan/Feb 1983
G-Pascal, Apple II, Gee, Pascal's Not Bad..., Les Bell, August 1982
Germany 1985, Apple II, The Wargame To End All Wargames, Gregor Whiley/Pete Sandys, June 1983
Gorgon, Apple II, Your Apple Computer, Loch Bloomfield, March 1983
Graphit, Atari 400, How Graphit Fixed Negus, Chris McEwan, June 1983
LDOS Operating System, TRS-80, Tandy's LDOS Revealed, Richard Newcombe, Jan/Feb 1983
Mailing List, IBM, What Will You Do With Your IBM, Les Bell, Jan/Feb 1983
Micropro InfoStar, CP/M, The Database World's Newest Star, Les Bell, July 1983
Multiplan, Apple II IBM CP/M MSDOS, Multiplan The New Generation, Peter Sandys, October 1982
Multiple Program Select, AED Supercomputer, Instant Program Switch, Les Bell, April 1983
OS-9 Operating System, Hitachi Peach/other 6809, OS 9 Power For Your Peach, Les Bell, July 1982
Penetrator, TRS-80 System 80, Penetrating TRS-80 Action, Rod Stevenson, October 1982
Perfect Writer/Speller/Calc, Kaypro II, other CP/M, The Perfect Package, Les Bell, April 1983
S-BASIC, Kaypro II, Other CP/M, S-BASIC: The Best Of Both Worlds..., Jeff Richards, June 1983
Sandy's Word Processor, Apple II, Sandys Revisits Sandy's, Peter Sandys, November 1982
Sanyo System Solution, Sanyo MBC-1000, Sanyo's Software Solution, Les Bell, November 1982
Sapphire MARS, CP/M, CP/M-86, Modellers From MARS, Les Bell, April 1983
Space Math, VIC-20, Space Math – Spaced Out, Albin Wallace, April 1983
Star Battle, ZX81, Star Battler, Mark Waddell, September 1982
Starfighter, System 80, The All-Action Starfighter, J Barker, July 1982
Supervyz, Any CP/M machine, Supervyz Your Office, Les Bell, October 1982
Taxman, Apple II, Your Apple Computer, Loch Bloomfield, March 1983
Template/ZXAS, ZX81, Transatlantic Transformation, John Crabb, July 1983
The Benchmark, NEC APC, Benchmarking The PCOTY..., P S Maher, July 1983
The Graphics Magician, Apple II, The Magician Draws The Line, Glen Thornley, May 1983
The Home Accountant, Apple II, THE Home Accountant, Peter Sandys, November 1982
Time Manager, IBM, What Will You Do With Your IBM, Les Bell, Jan/Feb 1983
Type Faces, IBM, What Will You Do With Your IBM, Les Bell, Jan/Feb 1983
Unix Operating System, Unix Against CP/M, Bill Bolton, Jan/Feb 1983
Various Games, TRS-80, Apple II, The Further Adventures – And Other Games, Edward McArdle, June 1983
Versaform, Apple II, VERSAtile Forms, Peter Sandys, November 1982
VisiCalc, VisiTrend etc., IBM, What Will You Do With Your IBM, Les Bell, Jan/Feb 1983
Vu-Calc, ZX81, SinclairCalc!, John Crabb, April 1983
WP6502, Superboard II, Word Processing – For $50...!, Garnett Znidaric, October 1982
WordBee, MicroBee, Making MicroBee Text, Eric Lindsay, May 1983
WordStar, IBM, What Will You Do With Your IBM, Les Bell, Jan/Feb 1983
Zardax, Apple II, Apple Word Processing Made Easy, Peter Sandys, October 1982
muMath/muSimp-80, CP/M Machines, TRS-80, muSimple muMaths, Ron Haines, March 1983

• Books:

(Format: Book name and author, story title, author, issue)

30 Computer Programs For The Homeowner: D Chance, Book Reviews, Les Bell, April 1983
55 Advanced Computer Programs in BASIC:, Book Reviews, Derek Morris, December 1982
A Programmer's Notebook: David Cortesi, Your CP/M Computer, Bill Bolton, July 1983
Apple BASIC Data File Programming: Finkel & Brown, Book Reviews, David Sharpe, December 1982
Apple Machine Language: Don and Kurt Inman, Book Reviews, M R Dunmill, December 1982
Apple Pascal Games: D Hergert/J Kalash, Book Reviews, Les Bell, April 1983
Bag Of Tricks, Need A Bag Of Tricks?, Caroline Christie, August 1982
Beyond Games: Ken Skier, Book Reviews, Eric Lindsay, April 1983
Computer Reference Guide's Software Handbook,, Book Reviews, Les Bell, April 1983
Computerworld's Greenbook Of Software/Services,, Book Reviews, Les Bell, April 1983
Inside CP/M: David Cortesi, Your CP/M Computer, Bill Bolton, July 1983
Learning To Program In C: Thomas Plum, Heard On The Bus, Leon Yendor, June 1983
Microprocessor Software DATA Book, Book Reviews, Les Bell, April 1983
TRS-80 Graphics For The Model 1 & 3: Kater/Thomas, Book Reviews, Rod Stevenson, December 1982
TRS80 Extended Colour BASIC Manual, Manual Labour, Eric Ulevik, May 1983
The C Primer: Les Hancock/Morris Kreiger, Your CP/M Computer, Bill Bolton, July 1983
The C Puzzle Book: Alan R Feuer, Your CP/M Computer, Bill Bolton, December 1982

• Owner Reports:

(Format: Machine (or program), model, processor, operating system, story title, author, issue)

Business, & Disassembler pckgs, ZX80/81, Sinclair Goodies, John Crabb, March 1983
Concurrent CP/M-86, IBM PC, CP/M, Four Times Over, Peter R Harris, December 1982
Defender, Sorcerer, Defender For The Faithful, Clayton Haynes, July 1983
Dneiper River Line, Apple, Atari, TRS-80, PET, You're Apple's Been Drafted, Wayne J Crosshall, December 1982
Falcons, Apple II, Your Apple Computer, Loch Bloomfield, March 1983
Gorgon, Apple II, Your Apple Computer, Loch Bloomfield, March 1983
LDOS Operating System, TRS-80, Tandy's LDOS Revealed, Richard Newcombe, Jan/Feb 1983
Space Math, VIC-20, Space Math – Spaced Out, Albin Wallace, April 1983
Star Battle, ZX81, Star Battler, Mark Waddell, September 1982
Starfighter, System 80, The All-Action Starfighter, J Barker, July 1982
Tandy TRS-80 – Various Games, TRS-80, A Beginner's Guide To Tandy Games, Edward McArdle, September 1982
Taxman, Apple II, Your Apple Computer, Loch Bloomfield, March 1983
Template/ZXAS, ZX81, Transatlantic Transformation, John Crabb, July 1983
The Benchmark, NEC APC, Benchmarking The PCOTY..., P S Maher, July 1983
The Graphics Magician, Apple II, The Magician Draws The Line, Glen Thornley, May 1983
Various Games, TRS-80, Apple II, The Further Adventures – And Other Games, Edward McArdle, June 1983
Vu-Calc, ZX81, SinclairCalc!, John Crabb, April 1983
WP6502, Superboard II, Word Processing – For $50...!, Garnett Znidaric, October 1982
WordBee, MicroBee, Making MicroBee Text, Eric Lindsay, May 1983
Apple, IIe, 6502, Apple IIe – First Impressions, Ken Ozanne, May 1983
Applied Technology, MicroBee, Z80, Here's A BetterBee, Colin Johns, March 1983

BBC, The ABC Of The BBC, David Badger, June 1983
Dick Smith., Super 80, Z80, Super Dick's Super 80, Robert Tanton, Jan/Feb 1983
Epson, MX-80, Epson's World Beater, July 1982
IBM, PC, 8088, PC-DOS, My First Computer Is An IBM, Lloyd R Borrett, December 1982
IBM, PC, 8088, The IBM-PC – Getting To Know You..., Lloyd R Borrett, June 1983
Option II, Z80, CP/M, MP/M, No Frills, Lotsa Thrills, Tony McSherry, July 1983
Osborne, O-1, Z80, Ouch! They Should Have Warned Me..., Phil Scott, June 1983
Panasonic, JB3000, 8088, The Dis-Integrated Computer, Gary ....., April 1983
Sharp, MZ-80B, Z80, Sharp Thinking, L Wetherall/A Baartz, April 1983
Sharp, PC1500, A Peek And A Poke, C D H Cooper, June 1983
Sirius, 1, 8088, A Star Of The First Magnitude, Leigh/Barbara Hemmings, April 1983
Synertek, SYM-1, 6502, All Aboard The SYM-1 Express, Roy Hill, June 1983

• New Models:

(Format: Machine, model, processor, operating sytem, story title, author, issue)

Apple, Lisa, 68000, Another Star Is Born, Les Bell, March 1983
Applied Technology, Colour Bee, Z80, Here Comes SuperBee, Lindsay Shapero, March 1983

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Commodore, 64, 6502, Commodore 64 Preview, Andrew Farrell, December 1982
Cromemco, C-10, Z80, CDOS, Small Is Beautiful, Les Bell, April 1983
Dick Smith, Dataphone, A Quick Look At The Dick Smith Modem, Bill Bolton, August 1982
Gavilan, 8088, California Dreaming, Frank Lee, July 1983
Hewlett-Packard, HP75C, Hewlett-Packard 75C – The Missing Link?, Les Bell, December 1982
IBM, PC, 8088, PC-DOS, IBM Moves In – Better Late Than Never!, Les Bell, Jan/Feb 1983
IBM, PC-XT, 8088, A PC With Mag Wheels And Hatchback..., Les Bell, April 1983
Kaypro, II, Z80, CP/M, Take Up Thy Computer And Walk, Les Bell, September 1982
Morrow Designs, MicroDecsn, Z80, CP/M, Decisions, Decisions, Les Bell, November 1982
Otrona, Attache, Z80, CP/M, Take Up Thy Computer And Walk, Les Bell, September 1982
Otrona, Attache, Z80, CP/M, The Ultimate Portable?, Les Bell, November 1982
Panasonic, JB3000, 8088, MSDOS or CP/M-86, Son Of IBM Rides Again, Les Bell, July 1982
Sinclair, Spectrum, Z80, BASIC, Spectrum Analysis, Graham Webber, August 1982

BUSINESS

(Format: Story title, author, issue)

16-Bits – Not Quite A Revolution, Les Bell, October 1982
A Play With The Kaypro II, Les Bell, December 1982
A.C.S. – A Classy School, Greg Hawkins, August 1982
Another Star Is Born, Les Bell, March 1983
Apple Word Processing Made Easy, Peter Sandys, October 1982
BASIC Statistical Analysis, John L Plummer, May 1983
Benchmarking The PCOTY..., P S Maher, July 1983
CP/M, Four Times Over, Peter R Harris, December 1982
Case History, Michael Marshall, July 1982
Case History, Les Bell, September 1982
Caxton's Cardbox, Les Bell, Jan/Feb 1983
Come In, Spinwriter, Matt Whelan, September 1982
Commodore Comment – And Conversion, Peter Sandys, July 1982
Communication, The Next Big Breakthrough, Les Bell, September 1982
Data 82, Les Bell, September 1982
Decisions, Decisions, Les Bell, November 1982
Getting The Best From dBase II, Les Bell, July 1983
IBM Moves In – Better Late Than Never!, Les Bell, Jan/Feb 1983
In-House Communications, Les Bell, October 1982
Instant Storage!, Les Bell, Jan/Feb 1983
Lisa With An S, Frank Linton-Simpkins, March 1983
Market Perceptions, US-Style, Howard Arrington, Jan/Feb 1983
Melbourne Goes To The Show, Les Bell, December 1982
Modellers From MARS, Les Bell, April 1983
Multiplan – The New Generation, Peter Sandys, October 1982
My First Computer Is An IBM, Lloyd R Borrett, December 1982
NEC's Headache Relief, Matt Whelan, October 1982
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Old-Time Quality – Vector's 3005, Les Bell, July 1982
Ouch! They Should Have Warned Me..., Phil Scott, June 1983
Paddle Your Own Computer, Leigh/Barbara Hemmings, June 1983
Pocket Programs Bonus Liftout, John H Crabb, December 1982
Pocket Programs Bonus Liftout, John Beutel, December 1982
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Sanyo's Software Solution, Les Bell, November 1982
Single-Board Satisfaction!, Bill Bolton, December 1982
Some Of My Best Friends Use W-Processors, Eric Lindsay, April 1983
Son Of IBM Rides Again, Les Bell, July 1982
Statistical Analysis II – F Ratios, John L Plummer, July 1983
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THE Home Accountant, Peter Sandys, November 1982
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Taking Care Of Floppies, Chris Seers, December 1982
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The Byter Bit, M U Grubb, April 1983
The Database World's Newest Star, Les Bell, July 1983
The Juicier Apple, Les Bell, July 1982
The Perfect Package, Les Bell, April 1983
The Turbocharged IMS, Les Bell, July 1982
The Ultimate Portable?, Les Bell, November 1982
The Winner, By A NEC..., Les Bell, May 1983
Tracking The Cash, Les Bell, December 1982
Up-Date dBase? How Dare You!, Monty Jaboor, Jan/Feb 1983
Up-Dating dBase II, John Hastwell-Batten, November 1982
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BEGINNERS

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Basic For Birdwatchers – Part X, Les Bell, August 1982
Basic For Birdwatchers – Part XI, Les Bell, October 1982
Basic For Birdwatchers – Part XII, Les Bell, November 1982
Basic For Birdwatchers – Part XIII, Les Bell, December 1982
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Basic For Birdwatchers – Part XVI, Les Bell, April 1983
Christensen Protocol – The Manual, Bill Bolton, June 1983
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Logic For Literati – Part II, Les Bell, December 1982
Logic For Literati – Part III, Les Bell, April 1983
MicroBee BASIC, Eric Lindsay, October 1982
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The Modem Is The Message, Peter Jetson, May 1983
Understanding Assembler – Part VI, Les Bell, July 1982
Understanding Assembler – Part VII, Les Bell, September 1982
Understanding Assembler – Part VIII, Les Bell, November 1982
Understanding Assembler – Part IX, Les Bell, December 1982
Understanding Assembler – Part X, Les Bell, Jan/Feb 1983
Understanding Assembler – Part XI, Les Bell, March 1983
What IS a Database?, Les Bell, July 1983
Yesterday I Couldn't Spell Computer...., Lindsay Shapero, May 1983

TUTORIALS

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EDUCATION

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MailMerged Micro Tests, David Bailey, March 1983
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POCKET PROGRAMS

(**Format:** Program name, machine written for, language, story title, author, issue)

• Apple:

Apple Calendar, Apple II, BASIC, Pocket Programs, Geoff W Black, August 1982
Apple Space War, Apple II, BASIC, Pocket Programs, M J Smith, November 1982
Azirka Attack, Apple II, BASIC, Pocket Programs Bonus Liftout, M J Smith, July 1983
Classroom Computers, Apple II, BASIC, Pocket Programs, Brian Fowler, August 1982
DOS 3.3 Disk Peeker, Apple II, BASIC, Apple Disk Peeker, Steven Zanker, November 1982
Epson Connections, Apple II, Pascal, Pocket Programs Bonus Liftout, John Marquet, May 1983
Geometric Graphics, Apple II, BASIC/ML, Pocket Programs, Ian Chia, November 1982
Hackatext, Apple II, BASIC, Pocket Programs Bonus Liftout, Derek Au, May 1983
Hex/Decimal Conversion, Apple II, BASIC, Pocket Programs, R.E.B., August 1982
Keyboard Update, Apple II, Machine/L, Apple Keyboard Update, Steven Zanker, Jan/Feb 1983
Machine Code For BASIC, Apple II, BASIC, Pocket Programs Bonus Liftout, Derek Au, May 1983
Manhole Mania, Apple II, BASIC, Pocket Programs Bonus Liftout, Mike E Bantick, December 1982
Mass Drawer, Apple II, BASIC, Pocket Programs Bonus Liftout, Dino Ganci, December 1982
Merry Christmas, Apple II, BASIC, Pocket Programs Bonus Liftout, Derek Au, May 1983
Removing REMarks, Apple II, BASIC, Pocket Programs, Clyde McLennan, September 1982
Screen Width Formatter, Apple II, BASIC/ML, Pocket Programs, Chris Cotterill, November 1982
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Siren, Apple II, BASIC, Pocket Programs Bonus Liftout, Robert Chalmers, May 1983
Snake Maze, Apple II, BASIC, Pocket Programs Bonus Liftout, M J Smith, July 1983
Student Assignment System, Apple II, BASIC/WP, MailMerged Micro Tests, David Bailey, March 1983
Tape Backup Utility, Apple II, BASIC, Tape Archiving For Apple Disks, Steven Zanker, September 1982
The Wriggling Snake, Apple II, BASIC, Pocket Programs, M J Smith, July 1982
Tower Of Hanoi, Apple II, BASIC, Pocket Programs Bonus Liftout, M J Smith, May 1983
Two-Computer Tic-Tac-Toe, Apple II, BASIC, Play Games By Modem!, Nick Gammon, September 1982
Ullo Again..., Apple II, BASIC, Pocket Programs Bonus Liftout, Steven Zanker, May 1983
Ullo Revisited, Apple II, BASIC, Pocket Programs Bonus Liftout, Derek Au, May 1983
Adventure-Style Game, Apple II/Other Pascals, G-Pascal, Your Own Pascal Adventure, Nick Gammon, August 1982
Pascal Disk Reader, Apple with Lang. System, UCSD, Pocket Programs, Hank Cooper, July 1982

• Commodore:

Bomb Disposal, Commodore 4016, BASIC, Pocket Programs Bonus Liftout, Mark Sager, July 1983
Maxe-Maze, Commodore PET, BASIC, Pocket Programs, Adam Smith, November 1982
Chopper Pilot, VIC-20, BASIC, Pocket Programs, Ric Kube, September 1982
Dice Roll, VIC-20, BASIC, Pocket Programs Bonus Liftout, Carlos Nolf, July 1983
Machine Language, VIC-20, BASIC/ML, Pocket Programs Bonus Liftout, P Thacker, July 1983
Marq St. Hilaire Sights, VIC-20, BASIC, MicroNavigation, Trevor Jones, December 1982
Plotting Two Intercepts, VIC-20, BASIC, How To Plot Two Sights In Aust. Waters, Trevor Jones, Jan/Feb 1983
Ship Maths, VIC-20, BASIC, Pocket Programs Bonus Liftout, Ric Kube, May 1983
Unexpanded VIC Simulator, VIC-20, BASIC/ML, Your VIC Computer, Andrew Farrell, March 1983

• MicroBee

BEE Countdown, MicroBee, BASIC, Pocket Programs Bonus Liftout, Eric Eulenstein, December 1982

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Babysitting Club, MicroBee, BASIC, Pocket Programs Bonus Liftout, Chris Hinge, July 1983
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MicroBee With Character, MicroBee, BASIC, Pocket Programs Bonus Liftout, John Tester, July 1983
Music Generator, MicroBee, BASIC, Make That Bee Buzz!, Ash Nallawalla, May 1983
Ode To Joy/Harmonic Analysis, MicroBee, BASIC, Microbee Music II: Roll Over Beethoven, Milan Hudacek, July 1983
Shooting Gallery, MicroBee, BASIC, Pocket Programs, John H Cameron, September 1982
Sound Effects, MicroBee, MicroBee Music – The Tone Generator, Milan Hudacek, June 1983
Difficulty, Microbee, BASIC, Pocket Programs Bonus Liftout, M Alexander, May 1983
Direction And Distance, Microbee, BASIC, Pocket Programs Bonus Liftout, Peter Nesbitt, May 1983
Mileage Master, Microbee, BASIC, Pocket Programs Bonus Liftout, Peter Ford, May 1983
Pontoon, Microbee, BASIC, Pocket Programs Bonus Liftout, Jim Hendrickson, May 1983

• Peach:

Alarm Clock, Peach, BASIC, Pocket Programs Bonus Liftout, Philip Cookson, May 1983
Fuel Consumption, Peach, BASIC, Pocket Programs Bonus Liftout, Mrs Joan Mann, December 1982
Memlook1, Peach, BASIC, Your Peach Computer, Dom Swinkels, November 1982
Sounds, Peach, BASIC, Your Peach Computer, Dom Swinkels, March 1983
The Growing Screen, Peach, BASIC, Pocket Programs Bonus Liftout, Jack Dikian, July 1983
Turing Machine Simulator, Peach, BASIC, The Elusive Turing Machine, Jack Dikian, July 1983

• Pocket Computers:

Alien Attack, Sharp/Tandy Pocket Comps., BASIC, Pocket Programs Bonus Liftout, Scott Story, May 1983
Fuel Consumption, Sharp/Tandy Pocket Comps., BASIC, Pocket Programs Bonus Liftout, R J McLean, July 1983
Mark Prediction, Sharp/Tandy Pocket Comps., BASIC, Pocket Programs Bonus Liftout, Claude Colle, May 1983
Pocket Word Processor, Sharp/Tandy Pocket Comps., BASIC, Pocket Programs, S Corrigan, November 1982
Spaceship Lander, Sharp/Tandy Pocket Comps., BASIC, Pocket Programs Bonus Liftout, Claude Colle, May 1983

• Sinclair:

Battleships, Sinclair ZX80, BASIC, Your ZX80 Computer, John Batty, August 1982
Real Time Clock, Sinclair ZX80, BASIC/ML, More ZX Mods, Robert Chalmers, September 1982
Catch, Sinclair ZX81, BASIC, Pocket Programs, Paul A Barry, August 1982
DATA Functions For Sinclair, Sinclair ZX81, BASIC, Your ZX81 Computer, David Brudenall, July 1982
Genetic Drift, Sinclair ZX81, BASIC, Pocket Programs, Jon Mears, August 1982
Pontoon, Sinclair ZX81, BASIC, Pocket Programs, Chris Makowski, August 1982
The Sinclair Clock, Sinclair ZX81, BASIC, Pocket Programs, K W Hince, August 1982
Cannibals And Missionaries, ZX80, BASIC, Pocket Programs, Duncan Morrison, September 1982
Kill The Duck, ZX80, BASIC, Pocket Programs, Jeffrey Chi Poon, September 1982
Lunar Lander, ZX80, BASIC, Pocket Programs, Duncan Morrison, September 1982
Australia, ZX80/81, BASIC, Pocket Programs Bonus Liftout, K E Johnstone, May 1983
Break Even Point, ZX80/81, BASIC, Pocket Programs Bonus Liftout, John H Crabb, December 1982
Catcher, ZX80/81, BASIC, Pocket Programs Bonus Liftout, N Weaver, May 1983
Chaser, ZX80/81, BASIC, Pocket Programs Bonus Liftout, N Weaver, May 1983
Death Star, ZX80/81, BASIC, Pocket Programs Bonus Liftout, Jon Barnett, July 1983
Display Inversion, ZX80/81, BASIC/ML, Pocket Programs, Benjamin Smith, November 1982
Draw And Store, ZX80/81, BASIC, Pocket Programs Bonus Liftout, John Norris, December 1982
Economic Order Quantity, ZX80/81, BASIC, Pocket Programs Bonus Liftout, John H Crabb, December 1982
Flash, ZX80/81, BASIC, Pocket Programs Bonus Liftout, Peter McKay, July 1983
Hex To Decimal, ZX80/81, BASIC, Pocket Programs Bonus Liftout, J Ken Clarke, July 1983
Larger Screen, ZX80/81, BASIC, Pocket Programs Bonus Liftout, Jason Teh, July 1983

Paint Roller, ZX80/81, BASIC, Pocket Programs Bonus Liftout, C Bennetto/K Shepherd, July 1983
Resistors, ZX80/81, BASIC, Pocket Programs Bonus Liftout, Alan Hill, May 1983
Symmetry, ZX80/81, BASIC, Pocket Programs Bonus Liftout, Stewart Collins, May 1983
Typing Tutor, ZX80/81, BASIC, Pocket Programs Bonus Liftout, Peter McKay, May 1983
ZX Biorhythms, ZX80/81, BASIC, Pocket Programs Bonus Liftout, P J Thornley, December 1982
Analysis Of Variance, ZX81, BASIC, BASIC Statistical Analysis, John L Plummer, May 1983
F Distribution/Data Transform., ZX81, BASIC, Statistical Analysis II – F Ratios, John L Plummer, July 1983
Star War, ZX81, BASIC, Your ZX81 Computer, David Brudenall, September 1982
TV Cricket, ZX81, BASIC, Pocket Programs, Jeffrey Chi Poon, September 1982

• TRS-80, System 80:

Overlay, System 80, BASIC, Pocket Programs, L Wiggins, August 1982
Death Trap, System 80 TRS-80, BASIC, Pocket Programs, Tony Hinde, September 1982
Space Target, System 80 TRS-80, BASIC, Pocket Programs Bonus Liftout, Peter Endean, May 1983
The Pokies, System 80 TRS-80, BASIC, Pocket Programs, Tony Hinde, September 1982
System 80 Suicide, System 80/TRS-80, BASIC, Pocket Programs, Tony Hinde, July 1982
Tandy Calendar, TRS-80, BASIC, Pocket Programs, T J Carlsen, August 1982
Video Driver, TRS-80 Model I, Assembler, Pocket Programs Bonus Liftout, David Morrison, May 1983
Cheque Records, TRS-80 Model III/Printer, BASIC, Pocket Programs Bonus Liftout, R C Heslewood, May 1983
Artist, TRS-80 System 80, BASIC, Pocket Programs Bonus Liftout, Tony Hinde, May 1983
Asteroid Muncher, TRS-80 System 80, BASIC, Pocket Programs Bonus Liftout, B Brown/S Tennant, July 1983
Base Converter, TRS-80 System 80, BASIC, Pocket Programs Bonus Liftout, Richard Tooth, July 1983
Indy, TRS-80 System 80, BASIC, Pocket Programs Bonus Liftout, B Brown/S Tennant, July 1983
Mastermind, TRS-80 System 80, BASIC, Pocket Programs Bonus Liftout, Tony Hinde, May 1983
Noughts And Crosses, TRS-80 System 80, BASIC, Pocket Programs Bonus Liftout, Frank Mack, December 1982
One-Armed Bandit, TRS-80 System 80, BASIC, Pocket Programs Bonus Liftout, Kim Henkel, May 1983
Othello, TRS-80 System 80, BASIC, Pocket Programs Bonus Liftout, Tony Hinde, July 1983
System 80 Business, TRS-80 System 80, BASIC, Pocket Programs Bonus Liftout, John Beutel, December 1982
TRS-80 Tennis, TRS-80 System 80, Pocket Programs Bonus Liftout, P Wade, December 1982

• Others:

Disk File Fix, APF IM-1, Pocket Programs Bonus Liftout, J L Elkhorne, May 1983
MBASIC Pretty-Print, Any with MBASIC, BASIC, Pocket Programs, Jeff Richards, July 1982
Fogindex, CP/M, PL/I-ASM, You Speak PL/I, Don't You..., Les Bell, December 1982
MBASIC Tokens, CP/M, BASIC, Pocket Programs Bonus Liftout, Jeff Richards, May 1983
dBase Date Routine, CP/M, Assembler, Up-Dating dBase II, John Hastwell-Batten, November 1982
dBase II Date Routine, CP/M, dBase, Up-Date dBase? How Dare You!, Monty Jaboor, Jan/Feb 1983
Memory Sizing, CP/M-86 machines, Assembler, Your CP/M Computer, Bill Bolton, April 1983
Text Manipulator, Compucolour II, BASIC, Almost A Word Processor, D Mason, September 1982
Keyboard setup, Kaypro II, Assembler, Your Kaypro Computer, Jeff Richards, June 1983
Modified CP/M, Osborne O-1, Pocket Programs Bonus Liftout, Nigel Harwood, May 1983
CP/M 2.2 Bitmap, Osborne, Other CP/M, Assembler, Your Osborne Computer, Greg Stringer, June 1983
File Conversion Program, Sorcerer, other CP/M, CBASIC, Pocket Programs Bonus Liftout, Mark James, July 1983
Super-80 Clock, Super-80, BASIC, Pocket Programs, D G Dutton, September 1982
Allplot.Bas, Various, BASIC, Pocket Programs Bonus Liftout, Dr David Hollway, July 1983
Alphanum'c Matching Algorithm, Various, BASIC, Pocket Programs Bonus Liftout, Phil Carter, December 1982
Animals, most machines, MBASIC, Basic For Birdwatchers – Part XI, Les Bell, October 1982

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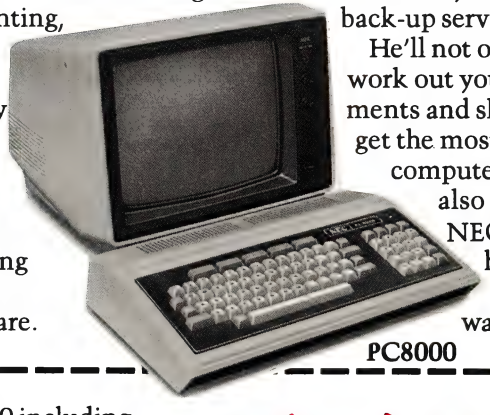

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Challenge	(B)
Padmade	(B)
I.M.S.	(C)

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PASCAL MT+/86	(B)
CIS/COBOL 86	(C)
DRI C 86	(C)
PL/I-86	(C)
SSS FORTRAN 86	(C)
RASM 86	(B)
CONTROL-C BASIC	(C)
SUPER SOFT C 86	(C)
PASCAL/M 86	(C)
JANUS/ADA 86	(B)
Computer Innovations C 86	(B)

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I.E. Asynch-86	(A)
I.E. Bisync–80/3780	(A)
I.E. Bisync–80/3270	(A)
MODEM 86	(B)

Word Processing

Benchmark Word Processor	(A)
Benchmark Telecommunicator	(A)
Benchmark Mail List Manager	(A)
Star Edit-86	(C)
Wordstar-86	(B)
Mailmerge-86	(B)
Spellstar-86	(B)

Data Management

dBASE II	(A)
Infostar 86	(C)
Dataflex 86	(C)

Productivity Tools

Access Manager 86	(C)
Display Manager 86	(C)
Diagnostics/2 86	(B)
Disk Edit 86	(C)
Disk Doctor 86	(C)
RASM 86	(B)
SID 86	(B)
VEDIT 86	(B)
Word Master–86	(B)

Financial Modelling

Micromodeller	(C)
Microplan Spreadsheet	(A)
Microplan Business Planner	(A)
Microplan Consolidator	(A)
Scratchpad 86	(B)
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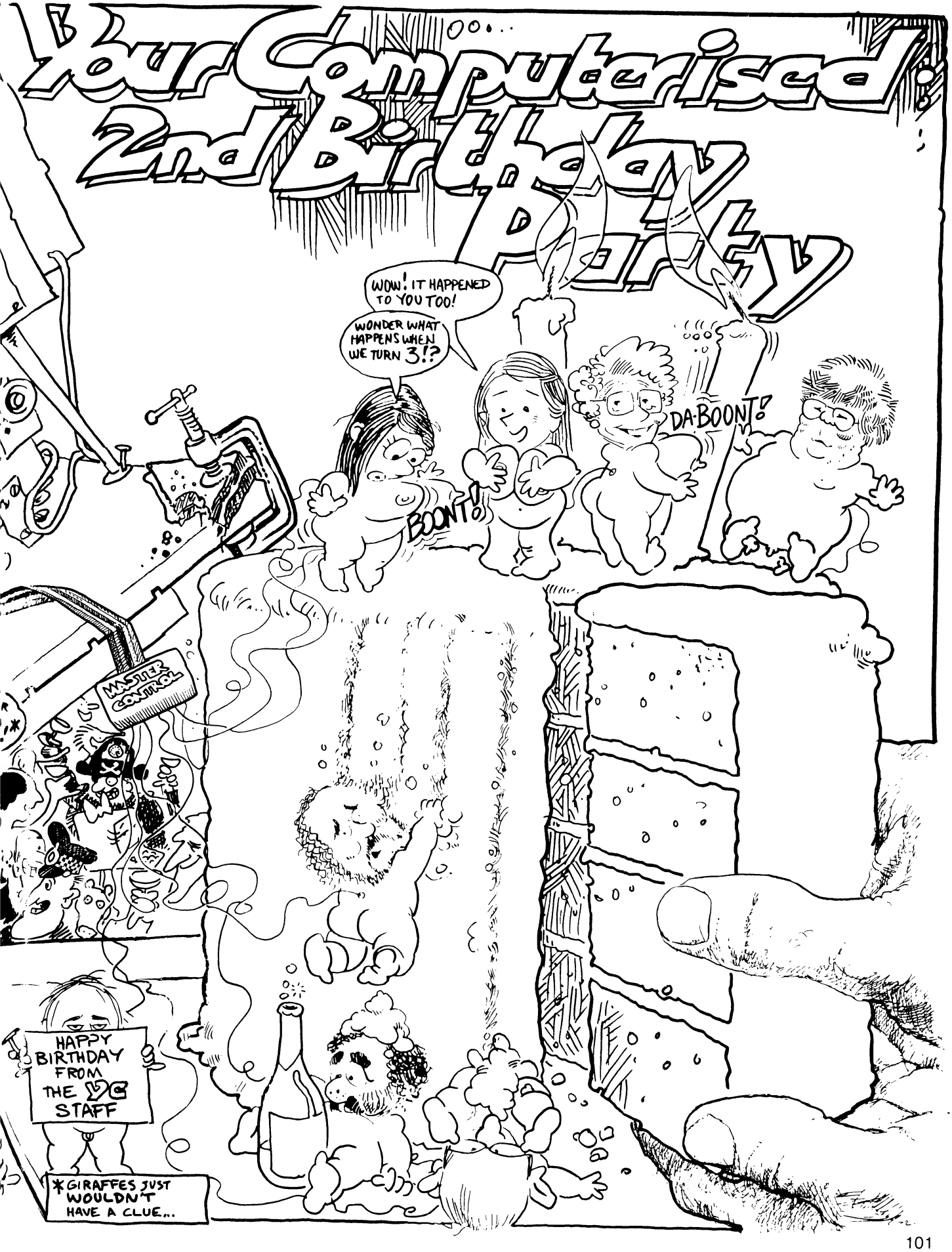
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*GIRAFFES JUST WOULDN'T HAVE A CLUE...

From Page 78

The Benchmark allows you to print a document in two ways: you can select the print option from the main menu or you can print "interactively" from the create, revise or view modes. Both methods allow you to interrupt the printer, using the break/stop key.

The easiest way to print a completed document is to select the print option from the main menu; not only does it allow you to print multiple copies of a document (up to 99 at a time), but other documents may be selected for printing as well (for the same number of copies).

Interactive printing is the best way to generate rough drafts of sections of a document that you are creating, revising or viewing. The beauty of interactive printing is that it is possible to copy a document while it is being worked on, rather than waiting for it to be completed. After setting the print status to "Print On" (or "Print Cont" if you have continuous paperfeed), the cursor is moved through the document. Each time the screen changes, the text is sent to the printer. When a page-break is reached, the computer halts to allow you to insert another page unless you chose "Print Cont".

Documents may be extensively reorganised with very little effort by moving and copying blocks of text, appending (joining) one document to another, and searching and replacing specific sections of text.

The size of blocks of text that can be moved or copied is determined by the amount of memory you have – the more RAM, the greater the block size. Very large blocks often have to be split up and moved in sections.

Search And Replace

Search and replace are almost identical, except replace substitutes the old text (that is, the text you have been searching for) with new text. You can search for any word, phrase, number, symbol, combination of these or hard carriage-return or page-break. You can search for only upper-case, only lower-case, or both.

An added feature is that you don't have to know exactly what you're looking for. By using special "tokens" - wildcard characters – for letters or numbers, you can still search for words, numbers or codes when you are certain of only a few characters in each.

When replacing, you can check exactly what is being replaced by having The Benchmark pause and seek your approval before going to the next replace, or you can order a global replace, which replaces everything you have defined without intervention.

For me, The Benchmark's most impressive feature is its phrase library. This allows you to define any phrase up to 2000 characters long, or any type of formatting device, and recall it by pressing two keys. Each phrase is attached to the alpha key you specify; both upper and lower case can be used to give up to 52 individual phrases.

A phrase is produced by defining the text (or format symbol) after pressing the "define phrase" key. You are then asked to press the key with which you wish to recall it. If the key is already "occupied", you can re-define that key (thus erasing the previous occupant) or try another key.

Phrases are recalled by pressing the "phrase recall" key, followed by the key to which your chosen phrase is attached. This feature is invaluable if you have many standard phrases or are forced to type in codes or other awkward material frequently – for instance, I found typing "CP/M-86" awkward and promptly made it a phrase.

Merged Documents

The only drawback is that there is no way of knowing which phrase is attached to a key without trying it first – you cannot view a directory of phrases and keys on screen. The best way to keep track of phrases is to create a document, with each A-Z key listed with its particular phrase, so that changes are easily made; a hard copy can be kept near the computer.

The Benchmark will allow you to merge variable information into standard pattern documents, so you can personalise standard letters and notices. This saves you having to re-write the same letters over and over, as well as dispensing with the impersonal feel of "To Whom It May Concern" letters.

Pattern documents are prepared in the same way as any other document, except that variable information is enclosed within square brackets. During a merge, The Benchmark stops at each variable and asks you to replace it using the keyboard (except while using the Mailing list, in which case everything is automatic).

An unfortunate thing is that the program does not "remember" variable names so that they only have to be filled in once – each recurrence of a variable must be filled in manually.

Documents – especially legal documents, such as contracts – can be assembled quickly using the index feature because they consist almost entirely of standard "boilerplate" text. Many blocks of "boilerplate" text are maintained in a master document, in which each block is given a name, or ID (up to 10 characters long). This master document must then be indexed.

The indexed document is attached to the document you are working on, allowing you to insert blocks as you need them just by giving the block's ID. You may recall blocks individually or in groups.

Editing columns of text or numbers is made simple using the column mode, which enables you to easily insert, erase or move individual entries, entire columns or space.

The Benchmark's calculator mode complements the column mode. It will add, subtract, multiply and divide, and both intermediate results (for example, the running total) and final results are available.

The Last Word

Business graphics are supported by The Benchmark, allowing you to draw boxes, graphs and charts – anything that can be constructed from vertical and horizontal lines. Text can be mixed in any way with the graphics, for labelling and so on. Though there are faults in The Benchmark, it is obvious that future enhancements are coming: there are still three vacancies in the function-key allotment stakes. Also, throughout the program, there are interesting additional choices that aren't yet supported, such as "Select Language".

The APC should have no trouble supporting different fonts, as the characters on the screen are made up from an eight by 16 matrix, which accounts for their extraordinarily high legibility. There is already a character set of about 256 in the APC, but CP/M-86 allows you to make up another 256 characters of your own design. Unfortunately, your own carefully designed character set is not supported by The Benchmark software. Hopefully, future versions will not have the awkward disk-handling characteristics of Version 3.0H, and the appendix may be expanded.

However, if these things really bother you and you have your heart set on an APC, don't despair – there are other CP/M-86 word-processors that you could use. For example, there is an American program called The Final Word which holds enormous promise, and WordStar is already available here.

Overall, and despite the few faults, The Benchmark offers very sophisticated word-processor facilities, especially on the NEC APC. Its use of function keys and menus makes using the program simple for even first-time operators.

Its advanced features for merging, rapidly assembling of standard documents, column and calculator functions, business graphics, and its ability to integrate with both a mailing list and communications make it most suited to a business environment, though it is equally at home as a personal word-processing system. □

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your CP/M computer

By Bill Bolton

THIS MONTH I have two books by David Cortesi to review. Readers of Dr. Dobbs Journal should immediately recognise the Cortesi name from the columns and feature articles he regularly writes for that magazine. Just to confuse the issue the two books come from separate publishers.

The first book is titled *Inside CP/M* and is published by Holt, Reinhart and Winston. This book is a tutorial on CP/M and a reference guide. The book is written in an easy style and was free of obvious errors. It is by far the best book on using CP/M that has appeared to date. Nearly all areas of using CP/M are well covered in a non-trivial way, yet even several raw beginners I have shown the book to have found the material understandable.

The reference section, which takes up about half the book, covers not only CP/M itself but most of the supplied CP/M utilities, plus CP/M-86, MP/M and CP/NET. Each command is given its own page, while all the BDOS and BIOS functions are similarly treated. I cannot recommend this book too highly. It's available from the Technical Bookshop in Sydney (and probably from others too). Buy it!

The second book is titled *A Programmer's Notebook (CP/M-80 Utilities)* and is published by Reston. I haven't seen this book locally (I bought mine directly off Reston at a show) but I guess Prentice-Hall would be the people to bother about availability.

This book is a must for anyone who wants to learn how to program at assembler level under CP/M. Cortesi has gone through a number of practical examples of writing CP/M utilities in assembler. Starting out with a simple DUMP utility which is slowly refined by adding extra functionality and working up to quite complex programs, the reader is shown the elements of good assembler programming style and how to use the CP/M BDOS system interface.

Program structure is developed on paper using a pseudo high level language (like C or PASCAL) and then once the nature and structure of the task in hand is clear, it is turned into assembler source code. In the later parts of the book Cortesi develops a number of very useful standard code segments and a utility which allows them to be "included" (like the C language "include") into assembler source files.

Not only does the book cover the technicalities of programming CP/M utilities in assembler, there is also a lot of useful and relevant advice about general attitudes in programming (like assuming you have found the "best" solution) which is applicable to programming in any language.

When I bought the book in the US, I was able to buy a 20cm floppy disk with all the source code listed in the book, for an extra $15. I don't know if this will be available locally but it is an excellent idea as there is a lot of very good and useful code presented and it would take quite a while to key it all in.

Once again, this book carries my highest possible recommendation. Buy it!

Another C Tale

The C Primer, by Les Hancock and Morris Krieger, published by McGraw-Hill is an excellent introduction to the C programming language that Leon Yendor, I and many others think so highly of.

The authors have both formerly worked at Bell LAbs and are well qualified to write about C. The book is aimed at beginners and assumes only a minimal familiarity with programming languages. The book is not intended to exist in isolation. It is intended as an introductory work to *The C Programming Language* with the stated aim of "making it more accessible". Also, rather than duplicate exercises, the reader is referred to Alan Feuer's *C Puzzle Book* (previously reviewed in this column) for self testing material.

This book is typical of the literature on C: it is written in a simple, beautiful style which is a pleasure to read. The book does not attempt to introduce all the concepts of the C language but covers the major elements that are essential to building any deeper understanding of the language.

There are plenty of example programs (including deliberate examples of what not to do) using a C compiler from a UNIX system. However, micro users are not ignored and there is one example in BDS C to illustrate the effect that different operating system environments can have on the portability of C programs.

I have no hesitation in recommending this book to anyone interested in the C programming language. It is now readily available from McGraw-Hill outlets. McGraw-Hill kindly supplied the review copy.

McGraw-Hill has set up a division in Australia to handle its range of microcomputer titles so availability of the many excellent books in this range should be much-improved.

It has some interesting new material available (which it has promised copies of for review, but hasn't supplied yet...hint, hint!) including a books on Z-80 assembler subroutines, CP/M-86 and other neat stuff.

More IBM Operating Systems?

I hear consistent rumours from reputable sources that IBM has plans to market at least one (maybe more) new operating system(s) for the IBM PC. I also hear it will start to push one of these new operating systems for the business market rather than PC-DOS.

Various contenders are mooted for the new operating systems. The major ones seem to be "Pick" from CDI and a UNIX style system compatible with CPIX on the IBM Series 1. This would seem to leave Microsoft's XENIX out in the cold as far as IBM is concerned. Apparently IBM is feeling the need for a multitasking OS with flexible data structures. I'd like to stress that this is all still at the rumour stage but they are strong rumours from multiple sources.

Just how many operating systems can IBM hope to support on its PC without creating confusion in its user base? Only time will tell, but if it introduces something that is only supportable on their PC rather than one which has portability to other systems it may find that it cannot call the tune in the micro market in the same way it has done in the large system market.

PCDOS To MSDOS Compatibility

There is already starting to be some backlash in the US from end users about the undocumented differences between PCDOS and MSDOS which both IBM and Microsoft seem very reluctant to detail. It seems that programs written in MSDOS environments have good portability to other MSDOS systems and to PCDOS (which is only what one would expect) but programs written under PCDOS often have poor portability to MSDOS environments (which is not at all what one would expect) without further (unspecified) work being done on them.

Do any readers have further experiences with porting programs from PCDOS to MSDOS environments or vice-versa? My experience so far has been in porting MSDOS programs to PCDOS; I haven't had the need or inclination to try it the other way around yet.

MSDOS Version 2

I have now had a chance to have a first look at MSDOS 2. The first notice-

able change is that there is more disk activity than previously.

Under version 1.25 the File Allocation Tables (FATs) were kept in memory at all times (which appears to be one of the causes of the sometimes fatal activity after changing disks). Version 2 appears to only keep FATs in memory under certain circumstances. They appear to occupy a common memory buffer which may be used for other disk buffering operations. This should short circuit some of the problems I have previously encountered with MSDOS killing disks but does mean that more disk accesses are necessary as MSDOS still wants to work on the FATs in memory and then write them out to disk.

MSDOS 2 has many more intrinsic commands than the previous version. I still haven't figured out what they are all for so I will leave a detailed discussion of them for another time. One nice feature is the ability to customise the command prompt (similar to some UNIX implementations). However, there doesn't seem to be any way to make the change permanent – it has to be done each time the system is booted or a batch startup file created to do it.

The most noticeable change is a heirarchical directory structure similar to UNIX. Some expansion of the directory structure under MSDOS was essential to handle the large numbers of files likely to accumulate on hard disk systems. While I am quite comfortable with heirarchical directories from my previous exposure to UNIX systems, I am not sure that inexperienced users will find the concept easy to grasp. The documentation that I have is in draft form so I am not sure if it reflects what will be released but it certainly needs some improvement if Microsoft intends to sell the concepts of heirarchical directories to users who are unfamiliar with them.

Overall MSDOS version 2 seems to have a number of worthwhile improvements over the earlier releases. However, I am disappointed that Microsoft still has no graphics interface standard or moved further towards multitasking. I will have more to say about it next time after I've logged up a few more hours on it.

DRI Languages For PCDOS

Further to my report in the last issue it seems that the whole range of Digital Research languages and some of the productivity tools will be available under PCDOS.

This includes CBASIC-86, CB-86, PASCAL/MT+ 86, PL/I-86, C 8086, Microfocus COBOL, Display Manager and Access Manager.

More Personal BASIC

Personal BASIC is indeed very largely source code compatible with Microsoft BASIC. I fired up several Microsoft BASIC programs under Personal BASIC and had little problem running them.

I had to make sure the source files were stored in ASCII form rather than compressed binary form before they would load correctly. Once loaded I discovered that Personal BASIC does a syntax check of all the source code before executing it. This turned up a few differences in syntax, such as only being able to use the SYSTEM command as a direct statement. Personal BASIC also does a syntax check during program entry when creating new programs. The error messages it produces are generally more helpful than Microsoft's equivalents.

The single step trace function should also be useful to anyone who does a lot of programing with a BASIC interpreter. From what I hear, there will not be an eight-bit version of Personal BASIC.

There are some minor syntactical differences which are related to direct commands. For instance, rather than using LOAD "filename" under Personal BASIC the command is OLD filename (without the quotes). As this is still a prerelease version I have not attempted to get much more than the flavour of the implementation but so far it seems promising.

The Version 1 release should be out by August. Version 2 will fully support integrated graphics statements through the Digital Research GSX graphics interface under CP/M-86.

Graphics For CBASIC

Other news on the DRI graphics front is that the CBASIC Compilers (CB-80 and CB-86) will be enhanced to support graphics. Not only will standard line drawing and fill commands be available, but full scaling, windowing and clipping facilities will be there too.

The enhanced CBASIC compilers use the GSX interface directly (without the need for further support programs) to display graphics and have the ability to select any graphics workstation available to the GSX for input or output. A useful example program is provided with the enhanced versions to show how the many graphics commands should be used.

I haven't any release details for the new versions yet but feel that they are not too far off.

CP/M-86 Versions

The current release of CP/M-86 is version 1.1 which has been available for now for over 9 months and is available with most 8086/88 systems. At least two suppliers (IBM and Sirius) are still supplying version 1.0 of CP/M-86 which has numerous known shortcomings and bugs and will not support many current versions of CP/M-86 programs due to those shortcomings (for instance VEDIT crashes horribly under CP/M-86 version 1.0 but runs fine under version 1.1).

Digital Research has released its own implementation of CP/M-86 version 1.1 for the IBM PC; however, I don't know if anyone has a later version available for the Sirius 1.

UCSD P-System

I have little regard for UCSD P-System as an operating environment. It is slow and unwieldy in overall operation and has portability as its only virtue. I have studiously avoided it until recently when some new graphics software turned up which only runs under P-System.

My last use of P-System was at Version 2 level. It is now up to version 4 but I'm sorry to say that nothing much has changed as far as the performance or utility of the operating system (or runtime package, as Softech seems to like to term it) goes.

Now that it is available in ready-to-run versions for the popular 8086/88 personal computers, the portability aspects of P-System are now starting to attract quite a few software vendors, so like it or not we may be seeing a lot more P-System product coming our way. Softech has quite a thick listing of available applications programs.

One of the worst aspects of P-System is the documentation. It recently took me 20 minutes just to find out how to copy all the files from one disk volume to another (the equivalent of a PIP *.* under CP/M). It is not that the documentation is incomplete, quite the opposite. It goes into so much detail that it's difficult to sort out the bits that are really important. I still haven't figured out how to copy the contents of one volume to another when the media capacity is different except by doing it one file at a time!

Continued on Page 108

your TRS80 computer

By Rod Stevenson

THERE IS OFTEN a sense of bewilderment among newcomers to the hobby computing scene when they encounter what seems to be merely pretentious jargon. I, being biased of course, and understanding (mostly) what's meant by the language in question, do not agree.

I do recognise there is a need to somehow come to grips with the terminology of any pursuit, and it seems to me one ought to expect there to be more "jargon" concerned with a technical area such as computing, be it hobby or "serious". So I can recommend the February issue of 80micro (an American magazine sold by most newsagents) which has an article starting on page 330 "to facilitate conceptually complex communication between familiars".

Now I realize this issue is no longer available from the newsagents, but I've yet to find anyone who does not keep every past issue of 80micro they have. So if you're a beginner, just ask around your friends at your local computer group. The reason I'm so late in recommending this somewhat old issue is that I appreciated it only after it was brought to my attention by one of the newer members of our local group.

Printer Graphics

The Dick Smith GP80 printer and the Tandy LP7 are both sold with the claim to have fully addressable graphics. And they do too, but the manual is not at all clear on the way to access them. Realizing this, Dick has produced a really helpful "Technical Bulletin No 41" detailing just how to get the desired result, with a sample program and the results it gives reproduced.

As this is certainly not the place to repeat it, I pass on merely that the method of printing is by a vertical column of dots, then advancing the print-head to the next column to print the same again, or another set. And it IS fully addressable in that each of the seven pins on the print-head can be specified.

True, the method DOES take some effort in programming, but the results are potentially there for the willing.

Still with these two printers, in the February 1983 edition of 80micro there was a short article on how to get a screen-dump complete with graphics.

Printer Incompatibilities

With the increasing number of "sophisticated" printers now coming onto the market (the Epson was the first), there exists more potential for incompatibilities with pre-written programs which use the printer even for straight printing, and even more so with the "fancies" of some programs.

One such widely-known area is the confusion with a line-feed and carriage-return. Some require one or the other, and some require both, and some are switchable. If switchable it's a simple matter to try both ways and find out which the program is expecting. If not switchable, it's still possible to get into the program and change things.

Another similar trouble is that some programs use a CHR$(138) for a line-feed, which was recognised by the early Tandy printers, even though Tandy itself advised against it. Changing this to a CHR$(10) or CHR$(13) may not do it on all printers; for instance the ITOH 1510 requires LPRINT"" to give a single linefeed with carriage return, otherwise it will give a double linefeed with each carriage return when there is not a line printed. All to do with its line buffer, which needs to be told to print something, even if that something is nothing!

In a BASIC program it's obvious what to do, but in a machine language one it's a little harder. Disassembling and looking for 37E8H (the printer address) with the character to be printed in the A register will usually provide the clue necessary, unless it's using the ROM printer driver, in which case look for 058DH (Model 1) or 05C5H (Model 3) which will expect the character to be printed to be in the C register.

Another worry is that many printers won't backspace, performing many amazing feats if sent the control code (8) to do so. Usually this is for underlining or to slash the zero. On current-model printers both of these functions are yet another switchable option, so if you find your printer going crazy during some printing just examine whether it's at the same point each time, and if it's prior to either of these instances.

My Ramblings

Our Esteemed Editor has asked that I try to contain myself to a single page of this worthy Journal, which I'm now doing.

Those that wish I hadn't can get more from me and others along the same lines by sending a ssae to 36 Sturt Street, Adelaide, 5000, for a free copy (one issue per person) of the Adelaide User-Group's (of which I'm secretary) newsletter.

Bigger Memories

With additional memory becoming cheaper, and particularly in keyboard memory units for the Model 1 and System 80 becoming commonplace, there is more need for an understanding of how to address memory above 32767 in decimal without the facility of the Disk Basic &H, since these days to have more than 16K does not necessarily imply one will also have disk.

The whole secret is an understanding of the way the memory is addressed (and admittedly the manual is very good at confusing the reader on this particular point). Up to the end of 16K all is as one would expect; that is, it starts at zero and progresses to 32767. But the next memory address is –32768 (minus 32768), until the last address in 48K is –1 (since –0 would be silly!).

So the way to arrive at the correct decimal number is to use the expression: IF AD›32767 then AD = AD-65536.

The actual reason is tied up with signed numbers using 16 bit addresses, and if you want to know more there are very readable and comprehensive treatments of the subject in the elementary Assembly books by Barden, Howe, or Osborne.

Mechanics Of Cassette-Use

It seems quite a few have found greater happiness in following my earlier advice on the modifications to their procedures in using the cassette recorder. So perhaps a few words on what I'd call the "mechanics".

1) leave gaps between recordings; start at even 10s – this will allow for tape stretch and make programs easier to find.

2) don't leave the recorder on play after the program has loaded; this will flatten the pinch roller as well as the tape.

3) rewind the tape after use to avoid kinks made by the guide posts; these kinks will be on the leader if you rewind.

4) don't record on the leader, ever if the tape is supposedly "leaderless"; same reason as above.

5) organise your tapes into categories, such as games, utilities, system, basic, business, word-processing, or whatever.

6) reset the counter at the start of the tape.

7) keep an index card in the cassette case; a simple cataloguing system such as this is more likely to be kept updated.

8) keep backups, and on separate tapes!

9) when re-using a tape, erase a passage before and after to make it easy to find where each program starts; better still, use a bulk eraser. □

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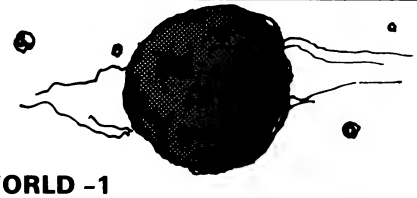

DEATHWORLD -1
THE BLOODSTAR CONSPIRACY

President Catto has been assassinated! Blown to pieces in his own maximum security apartment. The ruthless forces of the Fearros Empire had penetrated deeper into the Dogod Federation security system than had ever previously been feared. Now the mad child-woman Empress, Fess, was preparing for war. Only the experience and skill of President Catto could halt bloody interstellar conflict, but he was dead . .

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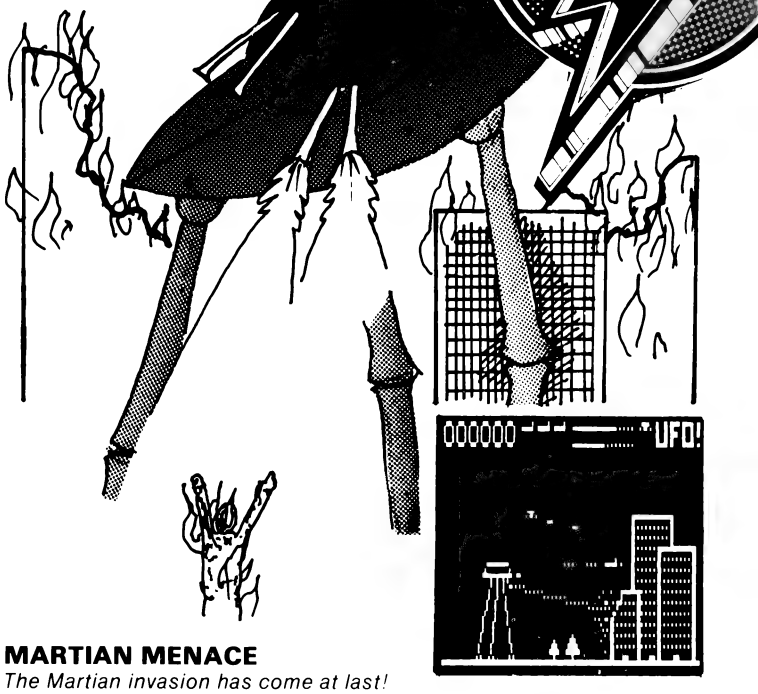

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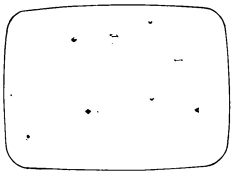

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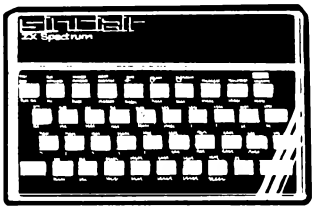

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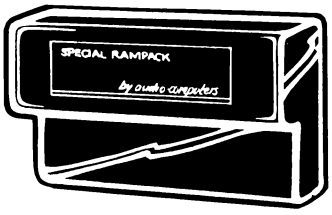

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VEN 880

From Page 105

your CP/M computer

PAMS News

A third RCPM system is on line in Sydney. Barrie Hall and David Simpson have the "Sydney Public Access" RCPM on line at (02) 808-3536. The system uses the same data format as the other on line systems and by the time you read this should be running 24 hours a day.

The SPA RCPM has the latest 30 volumes from the SIG/M user group (up to volume 93) available for downloading on request. The SPA system is using a Modem Technology UDM-1200 modem and Barrie is thinking about supporting CCITT V23 standard 1200/75 bps in the future as well as CCITT V21 300bps service he now offers.

Barrie has written his own communications supervisor so the login routine is a little different from the other systems currently on line.

That makes 3 full public access RCPM systems with file transfer capability in the Sydney area, as well as the restricted access MiCC BBS system. It really about time Melbourne had at least one RCPM system don't you think.

The first Victorian system will be the Gippsland RCPM which should on line by the time you read this. Bob Sherlock tells me that Telecom is due to install the line on June 30th and that the system should be available for users immediately after that. Bob has completed all his testing and knows the system works and is waiting on that dedicated line. Look on the "Software Tools" RCPM in Sydney or the MICOM CBBS in Melbourne for first details of the Gippsland RCPM number.

On the "Software Tools" RCPM another 4 volumes have been added to the MISC collection bringing it up to 23 volumes. The new material is stuff I collected on trips to the US which hadn't been catalogued before. Also on line is version 3.12 of YAM. This represents a major update with some bug fixes and many enhancements over earlier versions.

Header files for implementations to run on the Apple 2 (with CCS7710 card), Osborne 1, OKI, Sanyo M-1000, Sorcerer, Godbout, Kaypro and some others are now on line.

As I write this in mid-June there hasn't been much interest shown in that series articles I suggested last month on starting up an RCPM system, except verbally. What I need to make me go ahead is written responses I can wave in front of others to get their support in terms of contributing material towards the series. Do you want it or not? If so, write that letter to me care of *Your Computer*, now! □

From Page 32

will then prompt for the name of the file to be created, and we reply with BKINV. The program then prompts us to input information about each field on a line: name, type, width and decimal places, each separated by commas. So that you can input the information the same way as I have, the file structure I set up is shown in Figure 1.

After you have input all the field information, typing RETURN at the beginning of a blank line will cause dBase to exit this routine. It then makes the reasonable assumption that having just created a database file you want to put something into it, and asks you if you want to append to it. APPEND is the dBase term for adding records to a database.

If you answer yes to this question, dBase will then present a simple form for you to fill in (Fig 2). Hitting RETURN with the first field empty will exit from the append mode. Figure 3 shows some sample data for a database, constructed by scanning across my bookshelf (incidentally the prices are just a figment of my imagination and bear no relation to reality).

You might like to try entering this data into the database. You'll notice that as you enter some data into a field and then hit RETURN, the cursor automatically moves to the beginning of the next field. When you get to the end of a record, a blank form is re-displayed, ready for the next entry.

If you should make a mistake when entering a field, don't worry about it; just use the delete key to back up to the error and type the correction. However, more sophisticated editing is possible, and if you're familiar with WordStar, you'll soon realise that the two work in virtually the same way.

For example, control-S and –D move the cursor left and right, respectively. Control-E and –X move you to the previous and next field, and control-Y deletes the contents of the current field. Control-G and DEL work in just the same way as WordStar – if you're not familiar with WordStar, check your dBase manual and experiment – and if you make a complete and utter mess of a record and want to abandon it, just type control-Q (for quit).

Enter the data given in figure 3 (or something close to it, at least) as we'll continue to use this database throughout this series.

Once you've finished entering this data, just hit return at the start of a blank record and dBase will return to the command mode. Now, whenever you want to examine or work with this particular database you'll have to tell dBase to 'use' the new database.

This is done by simply entering the

command USE BKINV. dBase will check that the database exists, and then read in the record definition data at the beginning of the file. If you now type LIST, dBase should list out the database. Depending on the design of your computer terminal, the fields may either be cut off at the right of the screen (as the record is 118 characters long) or may be wrapped around.

In any case, the record numbers will be listed down the left of the screen, followed by the data from the database in the correct order. Now try typing GO TOP, followed by BROWSE. The screen should just about be filled with data, with field names at the top of the screen and data below.

Type control-B a couple of times, and the screen should scroll sideways to reveal the stock and pricing fields. Try moving the cursor around using the control-S, –D, –E and –X commands. Finally, type control-Q to abandon this operation, and QUIT to get out of dBase.

Next month, we'll look at the database structure in depth, see how it can be modified, and go on to APPEND, LIST, DISPLAY, BROWSE and other commands in depth. ||

```
Stock Number:      1
Title:  Your IBM PC: Use Applications and BASIC
Author: David E. Cortesi
Publisher: HRW              Sell Price:  19.95        Buy Price:  13.50
Stock on hand:     47       Back Ordered:      0      Reorder Level:     25
-------------------------------------------------------------------------
Stock Number:      2
Title:  Mastering CP/M
Author: Alan R. Miller
Publisher: SYB              Sell Price:  25.45        Buy Price:  17.50
Stock on hand:     23       Back Ordered:     25      Reorder Level:     25
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Stock Number:      3
Title:  Inside CP/M, A Guide for Users and Programmers
Author: David E. Cortesi
Publisher: HRW              Sell Price:  35.50        Buy Price:  24.50
Stock on hand:     33       Back Ordered:      0      Reorder Level:     25
-------------------------------------------------------------------------
Stock Number:      4
Title:  8080/8085 Software Design Book 2
Author: Titus, Larsen & Titus
Publisher: SAMS             Sell Price:  17.95        Buy Price:  11.35
Stock on hand:      8       Back Ordered:      0      Reorder Level:      5
-------------------------------------------------------------------------
Stock Number:      5
Title:  8080/Z80 Assembly Language
Author: Alan R. Miller
Publisher: JWS              Sell Price:  15.95        Buy Price:  10.50
Stock on hand:     12       Back Ordered:      0      Reorder Level:      4
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Stock Number:      6
Title:  Programming the IBM Personal Computer: BASIC
Author: Neill Graham
Publisher: HRW              Sell Price:  16.95        Buy Price:  11.20
Stock on hand:     27       Back Ordered:      0      Reorder Level:     15
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Stock Number:      7
Title:  BASIC Computer Programs for Business
Author: Charles D. Sternberg
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Title:  Economics
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Publisher: MGH              Sell Price:  35.00        Buy Price:  24.00
Stock on hand:     20       Back Ordered:      0      Reorder Level:     15
-------------------------------------------------------------------------
Stock Number:      9
Title:  The Greatest Thinkers
Author: Edward de Bono
Publisher: W&N              Sell Price:  29.95        Buy Price:  18.50
Stock on hand:      7       Back Ordered:      0      Reorder Level:      3
-------------------------------------------------------------------------
Stock Number:     10
Title:  Doing Business with Pascal
Author: Bergert & Hergert
Publisher: SYB              Sell Price:  25.95        Buy Price:  16.85
Stock on hand:     15       Back Ordered:      0      Reorder Level:      5
-------------------------------------------------------------------------
Stock Number:     11
Title:  Management of the Sales Force
Author: Stanton & Buskirk
Publisher: IRW              Sell Price:  23.95        Buy Price:  15.24
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Figure 4: Sample Inventory Data

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your ZX81 computer

By David Brudenall

SORRY ABOUT the lapse in these columns, but in my usual procrastinating manner I just never seemed to get around to them!

Well, finally the Spectrum has arrived in Australia, although Dick Smith managed to pip Barson Computers at the post with his VZ-200. Still, I don't think that the ZX Spectrum at $329 is bad value.

I have a Spectrum (I admit I didn't pay $329 for it – I received it from England in March), and I find it a very nice little machine ("Traitor!" I hear you cry, "This is supposed to be a ZX81 column!"). Okay, so this was a ZX81 column. As there are quite a few Spectrums in Australia (including those like mine which jumped the gun over the 'official' Barson Computer ones), I feel that a bit of local ZX Spectrum support is quite in order.

In any case, I will continue to support the ZX81 in this column, so if you have a ZX81 there is no need for you to give up in disgust just yet! Besides, many Spectrums are being purchased by ZX81 owners upgrading to Sinclair's far superior computer (I know, I'm biased.)

Anyway, back to the Spectrum. Mine has a UHF modulator, and on a colour TV, with careful fine tuning, a near-perfect display can be obtained, almost rivalling that of some dedicated colour monitors.

Although the Spectrum is a colour machine, I mainly use mine on a black and white portable (a fairly new model incorporating a UHF tuner), because I am far too poor to afford a colour TV for use with the Spectrum. The various 'shades of grey' are pretty boring, but at least it's an improvement over just black 'n' white.

The keyboard, although only made of a single sheet of pressed rubber, is a considerable improvement over the elastomeric keyboard of the ZX81 (claimed by some to be the worst computer keyboard ever created, which, no matter how 'ZX81 dedicated' you are, is still hard to dispute). The keys feel somewhat spongy, but the Spectrum has audible feedback, which makes up for the unpleasant (at first) feel.

The audible feedback just mentioned is a quiet 'click' at switch on, but a more audible sound can be created by using a simple POKE. Other POKEs can be used to vary the rate of the auto-repeat, the delay before a key repeats, and so on. Such little features make the Spectrum very pleasant to use.

The increased number of functions per key makes operating the keyboard more complicated than on the ZX81, but as with the ZX81, one gets used to it in time. At least every function and command that the Spectrum uses is right under your nose, and you don't have to go scrounging around in a manual to find if the function you want exists!

The high resolution graphics are quite nice, and fairly easy to use. My only complaint is that the DRAW function does not operate using the start and end coordinates of the line, rather, it operates using the last point plotted as the start of the line, and x points away and y digits up from that position as the end of the line.

LOADing and SAVEing at 1500 baud is quite an improvement over the ZX81's 300 baud, and I have found LOADing programs recorded on other cassette recorders to be much more reliable than the ZX81 was in this regard.

Minor faults aside, I think the Spectrum is good value for money. To expand on this brief resume of the Spectrum, I suggest you read Graham Webber's article published in *YC* last year.

Onto the ZX81 now, I received the following letter from a Sinclair dealer (who shall remain anonymous) several months ago, which reflects the lack of interest Australian distributors, and even Sinclair Research itself, have in selling the ZX81 in Australia.

In the last couple of months I have been trying to obtain ZX81s from Sinclair Australia, to be told it is no longer importing them. The attitude appeared to be that Sinclair England wasn't interested in Australia's relatively small sales, and was giving the majority of its ZX81s to the United States with no priority for Australia.

Apparently Barson's does think that even though the ZX81 is not worth handling the Spectrum is. So it advised me to wait till March(?) when it arrives. In the meantime (5 months) what happens to the consumers? They look elsewhere, and when the Spectrum does arrive it will be up market, (in price and specifications) from the ZX81.

The lower end of the market will be filled, if not by Sinclair, then by the Asians or the Japanese, because of the demand created by computer courses in our schools and the need for hardware for students to get their hands on at a price they can afford.

Students in our area in year 10 are given one period a week on computers and in one high school they have only three computers. They are allowed time during breaks, but three computers do not go far between 600 students.

Although the above letter is rather dated now, the principles mentioned are still as applicable. His predictions have come true, with cheap computers like the VZ-200 arriving before the Spectrum. Barson computers cannot be wholly blamed, although it is probably (and justifiably, I suppose) more excited about its upmarket computers such as the Sirius 1 and the BBC computers.

Just before I end this column I would like to mention (yet again) the Australian ZX Users Association. If you write to AZUA, 19 Godfrey St, Campbell, 2601 and send a 40 cent stamp you will be sent a free introductory copy of AZUA's newsletters – well worth forty cents in anyone's money! □

Free readers' classifieds

For Sale: ZX81, 16K, software tapes, magazines, books. VGC, cheap prices. For information – Mark Ekkel, 33 Roxby St, Manifold Heights, Geelong, 3218.

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Sydney Forth Group: The next meeting will be held on Friday 15th April at 7.00pm in room LG16, Morven Brown Building (opposite library), University of NSW. For further information contact Peter Tregeagle, 10 Binda Rd, Yowie Bay 2228. Ph (02)524 7490.

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Continued on Page 112

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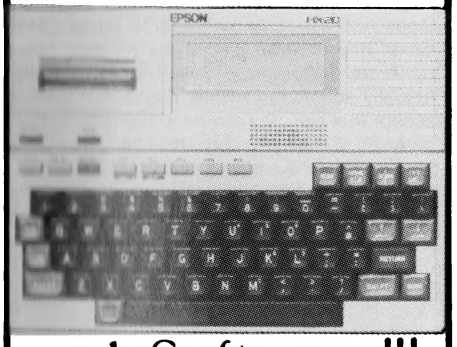

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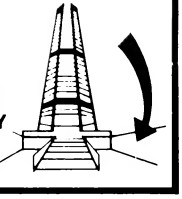

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Style: All items should be typed (or printed) and double-spaced on plain white paper. We will only accept original copies – no photostats. Include your name, address, telephone number and the date on the first page of your manuscript (all manuscript pages should have your surname and page number in the top right-hand corner). Be clear and concise, and keep jargon and adjectives to a minimum.

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advertisers index

ACT Computer Division	87
Archive Computers Brisbane	89
Ampec	28
ANZ Books	79
Aust Computer Products	33
Automated Office	40
Bayne & Trembath	103
CAE	60
Classifieds	112
Commodore	34, 35
Computer Spot	14
Computer Technics	65
Computers 2000	78
COMX	25
Cosmic Software	107
CW Electronics	45
Data Parts	112
Data Sat	9
Dick Smith Electronics	17, 73
Dicker Data	91
Direct Computer Retail	44
Electronic Agencies	8
Entrex	50
Genesis	75
Hadid, Albert	58
Ilehead	94
Imagineering	50, 115
Kinetic Systems	18
Lothlorien Software	113
Magmedia	76
Market Directory	113
Mi Computer Club	83
Micro Education	30, 67
Micro House	24, 46, 60
Microvisions	32
Nashua	5
NECISA	19, 98
NSW Commercial Equipment	56
Ozi Soft	OBC, 26, 109
Personal Computer	47
President	11, 41, 69, 111
Rocksoft	113
Seahorse Computers	56
Sigma Data	27, 29
Software Source	96, 97
Technical Bookshop	22
Type Quick	86
Vendale	108
Vision-80	60

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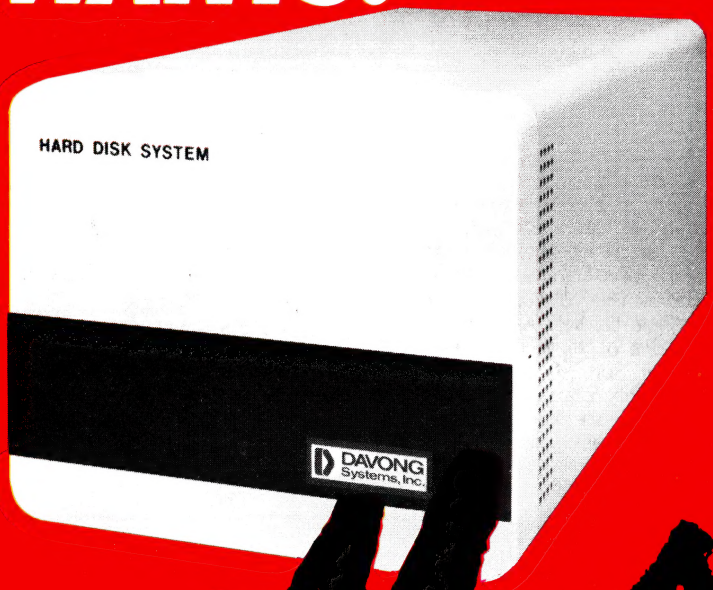

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