

your computer

January/February, 1983 \$2.00* NZ\$3

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The Mercury Printers

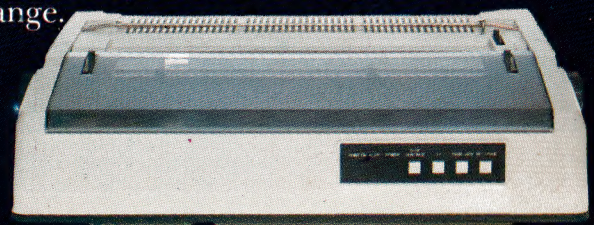
Ampec have the printers for you... The Mercury F10 gives you high quality printing at 40 cps. It gives you easier adaptability and simplifies your software requirements, through its built-in word processing functions. All this in a unit only 6" high, which will fit easily into your current system or onto any office desk.

If you want excellence in printing, but a higher print speed, your answer is the Ampec Mercury SP830. Rated at a maximum speed of 80 cps, this printer features fine line spacing which offers excellence in graphics, including superscripts, subscripts and curves.

These daisy wheel printers are built for maximum quality and long life. Both use

industry-standard cartridge ribbons and type wheels, giving you a wide range of type faces which are interchangeable in seconds.

Printers for tomorrow – ready for your needs today – from the Ampec Mercury range.



AMPEC
The absolute in peripheral thinking.

inside your computer

Vol 2, No 7. January/
February, 1983

special

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IBM Special Survey

Finally! IBM is about to launch its personal computer on the Australian market — release date is mid-February — and expects to put a large dent in the sales of market leaders like Apple. Our Special five-story survey looks at the machine, the support and products already available for it, and its background.

news

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Your Computer News

Our roundup of the latest in software and hardware, new and upcoming releases and happenings in the world of micro-computers.

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How Dare You!

A dBase II fancier replies to our November issue story on how to modify the package to obtain dates in European format.

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LDOS Revealed

What's the best disk operating system for the Tandy Models I and III? A user of LDOS thinks he has the answer, and here he tells us why.

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Unix v CP/M

CP/M columnist Bill Bolton introduces a few 'guest speakers' to talk about the relative merits of these two operating systems.

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MicroNavigation

A small computer can take all (or

most of) the hard work out of navigation for the sailors amongst you: here's part two of a short but interesting series to show you how.

education

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Tandy's Author I

Resident education writer Dr John Barrett steps aside this month to give colleague Jim Rennie the floor. He has the full story on a soon-to-be-released authoring package from Tandy, and says it's excellent.

for beginners

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Your Computer Clinic

Where we set out to solve readers' problems, and try not to create more for them in the process...

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Understanding Assembler

Here's part three of our experiment in writing a monitor for your system — this time accepting command lines, buffering them and interpreting them.

70

BASIC For Birdwatchers

Les Bell's tutorial looks at Micro-soft BASIC's several ways of formatting screen/printer output through the PRINT USING function.

business

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Caxton's Cardbox

Never use a computer when a five-by-seven file card will do, we used to say. Now we're not so sure — this package sets out to replace the manual file-card system, and does it well with several powerful features.

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The Mitliest Might?

Er, well, um...regular readers will recognise this as the phantom review Les Bell's editorial mentioned two issues ago — it mysteriously disappeared from the magazine. Here it is at last, the Hewlett-Packard HP41CV.

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Intelligent Interfacing

An owner report on Micro-80's interface which joins your computer to an Olivetti typewriter for smart daisywheel operation.

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Super Dick's Super 80

Another owner report, this time on Dick Smith's Super 80 kit computer.

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Apple Keyboard Update

Tired of having to go through complicated tricks to get some of the characters missing off the Apple keyboard? Steve Zanker's short machine language routine solves the problem simply and quickly.

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Shape Table Creator

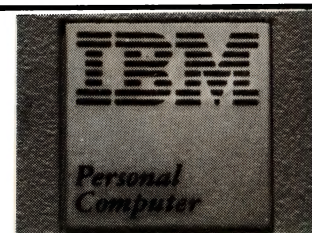
Another task made easy for Apple owners: this time the creation of shape tables, normally so complex most users just give up after reading the manual.

departments

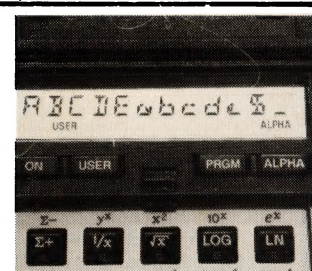
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Text File

Your words, our pages...



Stirring the micro market: IBM finally gets going, preparing for the Australian launch of its personal computer within a few weeks. We present a comprehensive special report on the IBM entry, starting on page 16.



Where does the dividing line between computer and calculator start? It's getting harder to determine, as Les Bell discovers when he looks at the HP41CV on page 40.

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Popular Systems

Individual columns devoted to the popular systems, including new columns devoted to the VIC-20 and the Kaypro II.

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Readers' Services

Want to contribute a story, write a program, ask a question, subscribe, sue us or...? Read this first.

editorial



SALES TAX is already a point of some contention in the microcomputer industry. However, the situation is not helped by the ignorance of some dealers as to how sales tax is calculated.

A retailer should calculate sales tax at 20 percent (or whatever the going rate) on the wholesale price of the goods. If you are offered a software package at \$100 plus \$20 sales tax, either you are being charged too much tax, or the dealer is selling the package for the same price as he paid for it.

It does make one wonder about the ability of some dealers to support what they sell when they can't even perform a simple sales tax calculation.

And speaking of support and service — in recent months we've bought three computers for the office and home. Two of these did not work when delivered!

In one case, we were able to get to the faulty connections which were the source of the problem and fix it ourselves. The other machine had a faulty B: disk drive. On its return from service, we discovered that the 'technician' had simply swapped over the two disk drives. Drive B now worked, but drive A had the problem!

Surely both machines should have been tested before delivery? And couldn't the fault have been fixed, not just moved to another part of the system?

In contrast, when a fault appeared on the third system (a rare occurrence and, in this case, our own fault), the supplier bought us a steak and a beer while the fault was fixed — properly — on the spot. Why can't all suppliers be like that?

Incidentally, you may have noticed our unusual cover date — January/February. It doesn't mean we'll be producing 11 issues a year; in fact, it is designed to bring our cover date into line with our publishing date, which has remained consistent for almost a year.

From now on, watch out for the magazine in the middle of the month before the cover date: that is, the March issue in mid-February, the April issue in mid-March, and so on. That's standard publishing practice, and is designed to allow time for distribution to distant corners of the country, and overseas.

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Two 8" double sided, double density drives giving 2.4 MB on line. The BIOS auto-senses the type and density of disk in use. The controller will support two additional 8" drives AND four 5" drives.

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Provided for future expansion.

CP/M 2.2

Fully implemented BIOS provides features and facilities simply not found in any other system. Written and supported in Australia.

CACHE DISK BUFFER

All disk reads cause the whole track to be buffered in the second memory bank. This dramatically speeds up disk access.

WARMBOOT FROM MEMORY

The CP/M CCP and BDOS are written to the second memory bank during cold boot. This means that the disk in drive A: does not need CP/M on it after initial cold boot and that warm boots are VERY fast.

TYPE AHEAD BUFFER

Keyboard input generates a Z80 mode 2 interrupt to place the character in a 64 byte FIFO (first in, first out) buffer.

BUILT IN "M" DRIVE

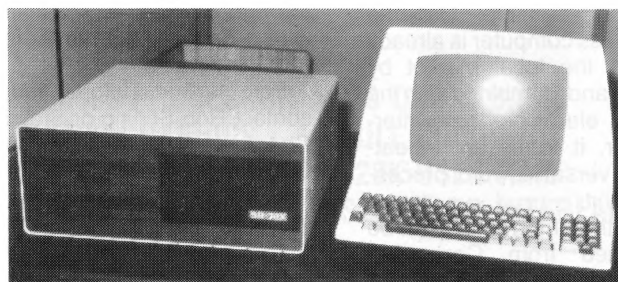
The unused 48K of the second bank implements a VERY FAST pseudo-disk drive for heavily disk bound tasks such as submit files.

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A user selectable option provides our own CCP which is upward compatible from the Digital Research version and increases overall system usability for old and new CP/M'ers by adding several new commands and improving existing ones.

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your computer news



\$3950 Word Processor

ONE OF Sydney's leading microcomputer specialists for businessmen, Computers Galore, has introduced what it claims to be the cheapest word-processing package on the market.

Computers Galore's Neutral Bay showroom is offering a daisywheel letter-quality word processor, including computer and daisy-wheel printer at the all-inclusive price of \$3950. The package comprises an Osborne 64K CP/M computer and an Adler typewriter/printer.

"Without a doubt, this must be the best value available on the Australian market," managing director Steve Colman said.

"The portable Osborne business computer is already taking the local market by storm and, combined with the Adler electronic typewriter-printer, it forms an unbeatable, versatile word processing unit."

Further information can be obtained from Computers Galore, 99 Military Road, Neutral Bay, NSW, 2089, or phone (02) 908 2355. □

Dot Matrix Printers

DATASCAPE, the national distributor for Anadex printers, has released two new dot matrix word-processing printers, the WP3000 and the WP6000.

The WP3000 features 100

cps in letter mode and 180 cps in draft. The unit comes standard with tractor feed, and a cut-sheet feeder is available as an optional extra. Multiple fonts can be selected by hardware or software and intermixed on the same line. A powerful non-volatile download option is available for storing special fonts as required.

The WP6000 is very similar to the WP3000 but designed for those special applications requiring very high throughput. Speed in letter quality mode is up to 180 cps and up to 500 cps in draft mode.

Both printers are designed for users with multi-role applications or when a higher throughput than is possible with a daisy wheel printer is required.

For further information, contact Rob Stirling or Steve Chapman at Datascape, 33 Grosvenor Street, Neutral Bay, NSW, 2089, or phone (02) 909-1233. □

Epson Buffer Card

THE GLW Epson printer buffer is designed to maintain control over your printer while you go on using your computer for more productive activities.

The printer buffer accepts data at up to 3000 characters per second, and feeds it to the printer as fast as it can accept it — without using any

of the computer's memory or time. As soon as the printer buffer has stored your document in its buffer, control of your computer is returned to you.

The \$185 GLW Epson printer buffer's features include 32K of memory, repeat of page or pages on the press of a button, simple installation (the circuit card plugs into the existing auxiliary interface connector inside the Epson MX-80, MX-80 F/T or MX-100 without modification), standard Centronics compatible interface, and compatibility with existing printer-control software, including Grafrax-80.

For further information, contact G L Wragg, 4 Pryton Court, Balwyn, Vic, 3103, or phone (03) 890 6918 between 6pm and 10pm. □

Osborne Option

A NEW screen option for the Osborne I computer, Screen-Pac, gives the Osborne user a choice of three screen widths: the Osborne's normal 52-column screen width, the standard 80-column and — unique to the Osborne — a 100-column screen width which is ideal for spreadsheet programs.

The three screen widths are all software selectable and can be changed dynamically in user-written programs. The option costs \$299 (recommended retail), including installation.

For further information, contact David Glover on (02) 411-7255. □

Interactive Debug

MICROSOFT has added a symbolic interactive debugging facility as one of four major improvements in the latest release (4.6) of Microsoft COBOL.

Other enhancements include an Indexed Sequential Access Method (ISAM) that has been restructured to show greatly improved ex-

ecution time; a Common Runtime Library; and a Link-to-Disk linker loader that enables the user to link very large programs.

COBOL program developers will find a much more efficient environment with the 4.6 release. For the user, the biggest impact will be greatly increased speed, as a result of the new ISAM and the Common Runtime Library.

The new debugger provides natural, English word commands, and uses program data names as references in commands. It revolutionises COBOL program development on micros by breaking the dump-change-run cycle and by presenting data in a highly readable form.

For further information, contact David Glover at Glover and Associates on (02) 411-7255. □

Eight-Colour Copies

A NEW hard-copy device which inexpensively produces quality eight-colour copies of the images produced on a graphics screen has been developed by Seiko.

The copier, which made its debut at the recent Japanese Computer Exhibition, is one of the first to successfully overcome problems encountered by the colour computer graphics user in transferring electronic images to paper.

The machine uses thermal techniques to deliver colour copies of a graphics screen in one minute — and at a minimal cost around 25 cents per copy. This cost includes the wax ink rolls and the rolls of paper.

The unit employs a D-Scan graphics printer system which links directly with graphics displays though the standard RS-170 video or Centronics parallel interfaces.

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



Compact Keyboard

CONFORMING to the new DIN profile-height standards (12.5 mm), the ND059-001 keyboard boosts compact key spacings (18 mm). The off-the-shelf keyboard is targeted for portable terminals and desktop applica-

tions. Measuring 114 mm by 273 mm, the keyboard uses the sealed domeswitch technology.

The patented construction, activated by a 100 gm force, provides hysteresis that eliminates teasing. The unit's breaking feel gives the typist comfortable key feedback, according to the manufacturer, Advanced Input Devices.

The electrical-switch-matrix output of the MK059 is compatible with the RCA CDP 1871 C-MOS keyboard encoder. Switch outputs are terminated at 2.5 mm straight pins located on the back of the printed circuit board.

For further information, contact Philip Jackson, Daneva Australia, 66 Bay Road, Sandringham, Vic, 3191, or phone (03) 598 5622. □

System Work Stations

CREATIVE Engineering's small work station has been developed to make computer installation more efficient and the operator more comfortable.

The Work Station consists of a desk with shelf, filtered power supply and an acoustic cabinet for a printer. The steel framed desk has a timber top which is faced and edged with corinite.

The back plate of the desk is fitted with three power points all of which draw their power through a 10A Siemens line to line, line to ground and RFI suppression filter. The filter system protects the computer from any spikes or noises in the mains supply.

The acoustic cabinet is free-standing so the printer does not take up valuable desk space. It is fitted with a

240V cooling fan and power point inside, and features three-layer insulation and a double-glazed observation window.

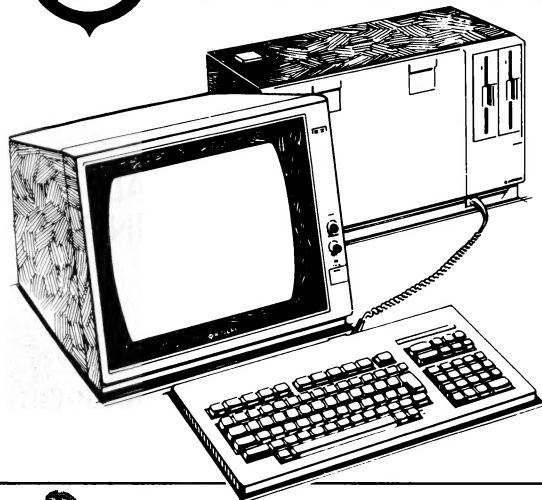
Many extras are available to add to the system desk. These include a variety of shelf configurations, dust proof disk storage systems in the form of free-standing cupboards or mobiles, drawers and slings for disk drives and modems.

The small system work station is available directly from the manufacturer, Creative Engineering, by phoning (02) 888 1278. Delivery is free inside the Sydney metropolitan area.

The price of this unit (desk, power system and acoustic cabinet) is \$579 installed, including sales tax. Both can be purchased separately. The unit carries a six-month guarantee. □



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Dynamic RAM Chip

A DYNAMIC RAM controller chip designed to ease the task of interfacing dynamic RAMs to microprocessors has been released by Texas Instruments.

Featuring synchronous operation and a wide range of functions (address-multiplexing, timing control, and refresh/access arbitration), the new TMS4500A can directly address and drive up to 256K of memory.

The TMS4500A incorporates a 16-bit multiplexer that generates row, column, and refresh addresses for up to 32 dynamic RAMS. It also provides the strobe signals required by the RAMs to decode the addresses.

An on-chip, 8-bit refresh counter generates the 256-row addresses needed to refresh the dynamic RAMs, while a refresh timer gen-

erates the necessary timing signals. The refresh rate is strap-selectable, and a refresh may be initiated either internally or externally. The user also has the choice of operating the TMS4500A in transparent or cycle-steal refresh modes.

The TMS4500A is available immediately for \$20 each in 100-piece quantities.

For further information, contact Texas Instruments Australia, PO Box 106, North Ryde, NSW, 2113, or phone (02) 887 1122. □

Pericomp Piper

PERICOMP, a newly formed computer company based in Brisbane, has announced the launch of the company's first computer, the 'Pied Piper'.

Designed and manufactured by Pericomp in Brisbane, the 'Pied Piper' is an

advanced single-board computer employing the CP/M-80 or MP/M operating systems. It boasts a full 256 kilobytes of RAM, allowing the use of any of the myriad software programs now available.

Four serial line capability provides connection for up to four terminals, or three and a serial printer, operating in multi-user multi-tasking format. A typical four-workstation configuration would cost in the region of \$17,000.

Further information can be obtained from Gary Worth at Pericomp Computers phone (02) 233 3266 in Sydney or (07) 229 9200 in Brisbane. □

Apple Courses

A WIDE range of micro-computing courses, devoted to an in-depth understanding of the Apple computer, will be

offered at the New South Wales Institute of Technology during 1983.

The course, under the auspices of Insearch Ltd, will be taught by staff from the Institute's faculty of mathematical and computing sciences and by visiting experts.

Further information on the courses, contact Insearch Ltd, PO Box 123, Broadway, NSW, 2007, or phone (02) 2 0930, ext 9119. □

IBM Workstations

IBM'S ERGONOMICALLY designed Synergetix furniture, introduced in the United States in early 1981, is now released in Australia.

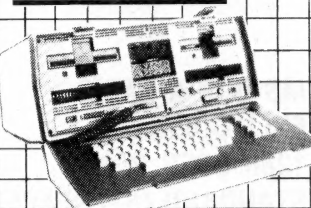
This line of furniture, for word- and data-processing workstations, is operator-adjustable to provide each in-

ALBERT HADID

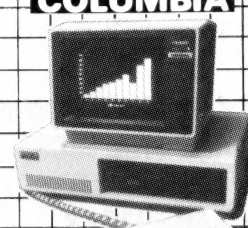
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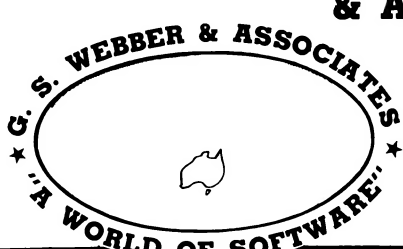
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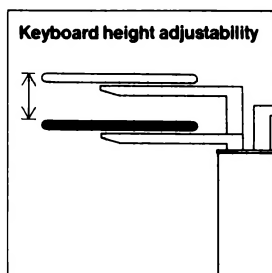
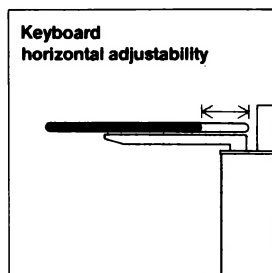
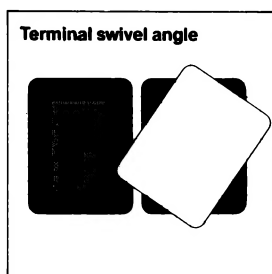
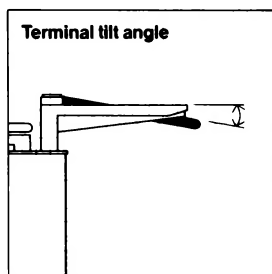
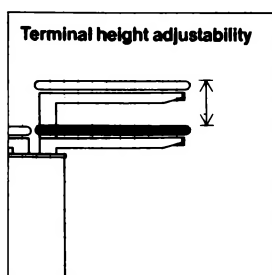
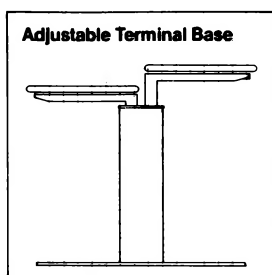


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The focal point of the Synergetix workstation is the adjustable terminal base, which has easily accessible and simple-to-operate controls that allow operators to separately raise or lower the CRT and keyboard, and to adjust the keyboard's depth.

Small, rectangular or triangular height-adjustable extensions can be attached to the Synergetix base to provide additional workspace. The triangular extensions also enable numerous workstation arrangements to minimise the floor space required in this line of workstation furniture.

The price of the various standard modules are: adjustable terminal base, \$775; rectangular or triangular extension, \$174; printer stand, \$299; basic operator's chair, \$323.

For further information, contact IBM Australia at 168 Kent Street, Sydney, NSW, 2000, or phone (02) 234 5639. □

Software Promotion

IMAGINEERING, the Australian VisiCorp distributor, has launched a consumer-oriented software promotion across the VisiCorp family of products.

Each consumer who chooses three separate VisiCorp products gets one of them free. The free program can be worth up to \$475 to the purchaser.

The products available are VisiCalc, VisiTrend/Plot, Visi/File, VisiDex, Visi-Schedule, VisiCalc Advanced Version, Visi Plot, VisiTerm, Desktop/Plan, and VisiCalc Business Forecasting Model.

The offer is available at all local microcomputer dealers stocking the VisiCorp products.

The objective of this consumer promotion is to increase the awareness of the family concept of VisiCorp products. □

PA Australia's Wang

AUSTRALIA'S largest management and technical consultancy, PA Australia, is to be linked with its British parent-company's headquarters by what is said to be one of the world's most sophisticated word-processing and computer systems.

The system, a Wang Virtual Storage (VS) 100 computer sited in London, is part of a project by the international consultants to automate its worldwide network of 78 offices.

The new system will provide distributed word processing for the London base and manage the operation of Wang's electronic mail system, Mailway, between 16 unit-headquarter offices across four continents. PA will also be making extensive use of Wang's Alliance system to develop a worldwide information retrieval network communicating via Mailway.

Shop — By Computer

TELESHOPPING, enabling people to sit at home and order their shopping requirements by computer, will be introduced in Britain this year. Some 2500 people in the West Midlands will participate in the six-month trial, beginning in March.

Their homes will be equipped with a viewdata computer keyboard installed by Viewtel Services, a private company established by the Birmingham Post and Mail newspaper group.

The system, called Club 403, will allow users to order their requirements from local shops and, by linking with the nation-wide Prestel service, give them access to weather forecasts, flight information, holidays, entertainment and traffic reports. The householder will pay for the service.

For further information, write to Club 403, Viewtel Services Ltd, 28 Colmore Circus, Queensway, Birmingham, England B4 6AX. □

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• Library Catalogue	\$150
• Loan System	\$150

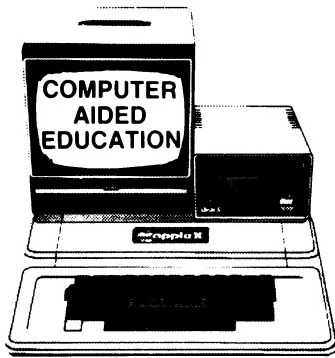
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Spinwriter For IBM

THE FIRST letter-quality printer plug-compatible with the IBM Personal Computer has been announced by NEC Information Systems Australia.

NEC's new Spinwriter Model 3550 can simply be attached to the IBM-PC parallel printer port. It then becomes functional for both data processing and word-processing applications.

Operating at speeds up to 35 characters per second, the new printer offers the same features and varied forms handlers as NEC's other Spinwriter 3500 series printers.

For further information, contact NEC Information Systems Australia at 99 Nicholson Street, St Leonards, NSW, 2065, or phone (02) 438 3544. □

48K of RAM, and a 13cm floppy disk drive. The programs run under DOS 3.3, and are written in Applesoft BASIC.

For further information, contact Philip Rebakis, School of Mathematics and Computing, Western Australian Institute of Technology, Kent Street, Bentley, 6102, or phone (09) 350 7672. □

Mastering VisiCalc

SYBEX HAS released two new books in the United States for VisiCalc users and potential VisiCalc users.

'Mastering VisiCalc' is a thorough guide to VisiCalc, the powerful electronic spreadsheet program. Beginning with what VisiCalc is and what it can do, this \$US11.95 book describes and illustrates each feature of VisiCalc, and clearly explains how to use VisiCalc spreadsheets for planning, forecasting, and budgeting.

'Doing Business With VisiCalc' is a \$US11.95 guide to the popular and powerful 'electronic spreadsheet' for common business calculations. It includes more than forty applications for accounting and management planning — from financial statements to master budgets; from pricing models to investment strategies.

For further information write to Wallace Rutherford, Sybex, 2344 Sixth Street, Berkeley, California 94710. □

Apple Package

THE SCHOOL of Mathematics and Computing at the Western Australian Institute of Technology has developed a Linear Programming (Operations Research) Package for Apple II microcomputers.

The package is capable of solving a wide range of linear programming problems, and provides information on the optimal solution as well as a comprehensive sensitivity analysis.

The package will run on Apple II microcomputers with

Low Cost Terminal

DATASCAPE'S new intelligent terminal, model VT4100, features both conversational and buffer modes with full editing capabilities (line and character insert/delete) and protected/unprotected fields.

The terminal is a high-quality unit, using a 20 MHz, P31 Green Phosphor tube and featuring an ergonomically designed detached keyboard for optimum operator convenience, and three-key rollover.

The VT4100 as standard contains emulations for Hazeltine 1500-1510, Esprit, ADDS Viewpoint and the Lear Seigler ADM-3A. Other emulations will follow.

The outstanding feature, however, is the number of user programmable function keys offered. Up to 42 keys are available for special program functions, making the unit ideal for WordStar applications.

Datascape is releasing the unit at a special introductory price of \$695, plus tax, for one-off units, valid till February.

Further information can be obtained by contacting Rob Stirling or Steve Chapman at Datascape, 33 Grosvenor Street, Neutral Bay, NSW, 2089, or by phoning (02) 909-1233. □

Spinwriter Dealer

DATASCAPE has been appointed a nationwide dealer for the NEC Spinwriter range of letter-quality impact printers.

NEC Spinwriters use a thimble construction print wheel, allowing higher throughput standard 'daisy-wheel' type by having two characters on each petal. They also offer 128 characters per thimble, rather than the 96 standard with daisywheels.

For further information contact Rob Stirling or Steve Chapman at Datascape at 33

Grosvenor St, Neutral Bay, NSW, 2089, or phone (02) 909 1233. □

Cut-Price Tandy

IN A BID to introduce and further extend the use of microcomputers in Australian schools, Tandy Electronics is offering its largest discounts ever on its popular TRS-80 product range.

The offers, valid until February 28, are available to all schools from primary to university levels, and carry no limit per customer.

Saving range from \$400 on the 1983 catalogue price of a 16K Model III "student station" to more than \$10,860 on a complete, ready-to-run "TRS-80 Classroom". □

Silent Scribes

DATASCAPE'S 'Silent Scribe' range of Anadex printers is now augmented by two new models.

The model 1550 is a multimode printer for print speeds up to 120 cps with tractor or friction feed for single sheets, proportional spacing and high resolution graphics.

The DP9625A multipass printer, the big brother of the DP9620A, features the same 200 cps throughput in draft mode at 10 cpi and 100 cps in near-letter-quality plus the added feature of 50 cps in double-pass correspondence quality.

Designed for applications using tractor feed, it offers 12 different character set selections changeable on-line, plus dot addressable graphics with 72 by 144 resolution.

Both serial and parallel interfaces are standard with 6 RS232C protocols including Diablo (ETX/ACK).

For further information, contact Rob Stirling or Steve Chapman at Datascape, 33 Grosvenor Street, Neutral Bay, NSW, 2089, or phone (02) 909-1233. □

STOP

(Read this now!)

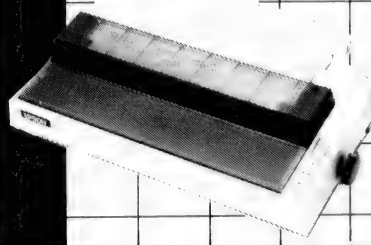
OSBORNE

The Osborne computer offers exceptional value as a complete system, and as Authorised dealers we offer the support to match. The value of the Osborne is clear and simple: 64K RAM, dual floppy disk drives (200K storage), 5" VDU (you can plug-in bigger VDU's), CP/M, WORDSTAR word processing, SUPERCALC, CBASIC, MBASIC, and it is fully portable. \$2595 complete.



EPSON

Australia's most popular printers, the Epson MX80 and MX 100 type III F/T's offer high quality printing in a variety of sizes and styles, 100 c.p.s. print speed and full graphics capability. Interface options include parallel and RS232 serial, as well as the Apple graphics interface. And C.P.C. now offers a full 12 month warranty on all Epson printers. Come and see them in action at one of our stores.



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The Apple III is the latest addition to the broad and flexible Apple range. With up to 256K memory and a host of other features it is a superb machine for business or pleasure. We have expanded our staff and facilities to offer the highest level of support in Australia, for both business and personal users. So whether you need a network of Apples, or simply some advice on software, contact one of our stores today.

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**CITY PERSONAL
COMPUTERS**



CCS Releases X8 JOL

A NEW version of JOL (Job Organisation Language) has been developed by CCS (Clarke Computer Software) to run on Facom's OSIV/X8 Operating Systems. X8 JOL was developed and tested at Victorian Railways, where it is now implemented on the Facom M160F system.

OSIV/F4 JOL is available for Facom users through FAL, or inquiries can be made by contacting CCS direct, at phone (03) 63 9421 Melbourne. □

Graphics Terminal

A NEW GRAPHICS terminal designed to fill the local-market need for a low-cost, high-capability graphics display unit, has been released by the Nippon Computer Company. □

The terminal provides a resolution in the 1000-pixel class and is claimed to offer the highest cost-performance ratio in this class of graphics display.

It will be marketed in Australia by the TCG Group's computer graphics division. Standard features include 355 mm high-resolution raster scan CRT, 1032 by 790 dots viewable, mixed graphics and text capability through the picture cell methods and user control of the entire display area.

It incorporates an RS-232C and Centronics compatible 8-bit parallel ports standard, 274K memory, dot addressable graphics and powerful file and plotting commands.

For further information, contact Jim Kennett at the TCG Group, phone (02) 699-8300. □

Programmed EPROMs

DON McKENZIE, of Tullamarine (Victoria) has overcome the problem of adding expensive EPROMs to your Tandy/Dick Smith system. He will supply, burn, and post to you anywhere in Australia, a 2716 2K EPROM for \$12.90.

A copy can be made from one 2716 to another, or you can send Don a 'System Format Tape' which can be copied. All tapes and EPROMs are returned.

EPROMs for '80' type computers include circuits and/or wiring instructions, and cover installation at HEX addresses 3000 to 37DF, 3900 to 3BFF, and F800 to FFFF.

Current EPROMs available include a three-line descender character generator for System 80s and TRS80s, TC8 tape operating software at F800 HEX, and lower case for Tandy Line Printer One or Centronics 779. These have to be mounted on a small matrix board and wired to your system. Circuits are designed for experienced hobbyists and technicians.

For further information, contact Don McKenzie at 29 Ellesmere Crescent, Tullamarine, Vic, 3043, or phone (03) 338 6286. □

printer claimed to combine ultra-high print quality and reliability with low operating noise level has been released by CASE Communication Systems.

Called the CASE M45, the new model is claimed to be one of the most versatile top-quality printers for computers and word-processors available today.

The M45, which is priced at \$2595, is capable of printing bi-directionally at 45 characters per second. Automatically controlled hammer intensity ensures the energy utilised on each impact is appropriate to the character size and shape to provide overall print quality consistency. Programmable intensities enable bold, shadow and underscore printing for maximum visual impact.

as well as the standard single plastic printwheel, the M45 features the use of ultra-high quality double-plastic print wheels. A character dependent ribbon advance mechanism assures optimum print consistency and maximum ribbon life.

The 10, 12 and 15 characters per inch spacing is standard on the M45, along with proportional spacing. Vertical spacing is selectable at 6, 8 or 12 lines per inch.

For further information, contact Barry Foster at CASE Communication Systems, phone (02) 438 2400. □

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THE WINNERS

HERE WE GO! It's time for four lucky people to discover just how well they fared in *Your Computer's* two great competitions — the first, for a total of more than \$1100 worth of Arfon expansion gear for the Commodore VIC, and the second for a choice of \$150 worth of TRS-80 software from the Compshop Australia catalogue.

The competitions attracted enormous interest — so much so that our mail room has declared a black-ban on further YC competitions. A total of just under 5000 entries was received; if you've ever opened 5000 letters, you'll know how they feel.

They even got to the stage where they know some of our readers by first name, and recognise their handwriting; people like Steven DeRooy, from Queensland, who submitted a staggering 338 entries in the Arfon competition.

In fact, that particular competition was dominated by multiple entries: almost half of the entrants submitted more than one coupon. A total of 63 people submitted more than 10 entries, and nine of those forwarded 100-plus coupons.

Only a handful of the multiple entrants sent all their coupons in at once, which means we've done Australia Post a big favour. We calculated that one reader alone spent around \$80 in postage! Another sent in 82 entries from New Zealand — we'd prefer not to think about what that cost.

The Winners

The winners, surprisingly, didn't all come from that dedicated group of 100-coupons-plus entrants.

First placegetter in the Arfon competition, William Newton of Sydney, sent in 23 entries. The second placegetter was also runner-up in the most-entries race — Jim Prior, of Inglewood in Western Australia, entered 220 times to also take second place in the 'most determined' stakes.

A mere two entries was enough to bag third place for Canberra's Milton Lofberg.

Multiple entries also figured in the Compshop competition, and 44 entries was enough to tilt the odds the right way for S Rickens, of Brisbane. Only 14 people sent in more than 10 entries each in this competition.

The Prizes

Compshop first, because it's the easiest: Mr Rickens gets to pick his own prize(s), to the value of \$150, from the competition sponsor's catalog of TRS-80 software.

The choices include space games, combat games, adventures, pinball, the popular Penetrator and a lot more. Congratulations, and enjoy!

Our VIC-20 expansion equipment, supplied by local distributors Computer Cellar (Newcastle, NSW), Computer Imports (Adelaide), and Vic Soft (Perth), comes from Arfon Microelectronics, a small company in North Wales which specialises in microcomputer design and software writing.

Central to the philosophy is the VIC-20 Expansion Unit, the first prize on its way to William Newton along with full (3K, 8K and 16K) expansion RAM to bring the value of his prize up to more than \$500.

Second prizewinner Jim Prior also gets the expander board plus 16K of RAM, while third placegetter Milton Lofberg gets the Arfon expander by itself.

The expansion unit is a metal box which is designed to accept the VIC 20 at the front and cradle it. Immediately behind the VIC is a box which contains, at the left, a power supply for both the VIC and its extras, and at the right, an expansion motherboard designed to accept a range of plug-in goodies. In the centre is an area where the video modulator can be inserted.

The VIC is pushed in from the front, and mates with connectors which supply power (so that the VIC's adapter is no longer needed) and also buffers the VIC's expansion bus and supplies it to the motherboard. The case is a squeeze, but it holds the VIC tightly in position.

Plug-ins for the motherboard include a 3K EPROM cartridge, and 8K and 16K RAM cartridges. There is also a range of serial, parallel and analogue I/O cards, which together turn the VIC into a formidable little computer.

The VIC has been quite cunningly designed to take advantage of additional memory. On power-up, it scans through memory, checking each location, and if it detects more than 3K of memory, it moves the screen RAM out of the way of the BASIC so that larger programs can be loaded.

On the other hand, this has the disadvantage that programs, mostly games, which access the screen memory directly, will no longer work.

Arfon has, cleverly, developed a program which returns an expanded VIC into its original non-expanded state, to maintain compatibility with all other software. □

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IBM PC VIC 20
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*Please complete below and return to Imagineering with a cheque for \$4.75 (\$3.75 + \$1.00 postage) and we will send you the Guide.

NAME _____ * Business _____
ADDRESS _____ Home _____
Student _____
None _____

* Machines Owned

The guide will be available in limited quantities from your local microcomputer dealer.

*Please tick

See
MIDDLE PAGES
NOW!

IMPORTANT NOTICE

Factory installed Multi-Density offer for early Osborne 1TM owners.



Now, owners of the earlier 'brown case' Osborne 1 can have the Multi-Density option installed in their machine during February at Osborne's Sydney Service Centre for just \$250.00. The option includes a full check and adjustment of the computer and new double-density versions of WordStar, MailMerge, Supercalc, MBASIC and CBASIC. The installation carries a full 60 day warranty from Osborne Computer Corporation.

The increased disk capacity of 192K lets your Osborne handle more elaborate programs with ease, halves your diskette costs, saves you time and allows you to use disks recorded on other computers.

This offer applies to all owners of 'brown case' Osbornes – regardless of where or when they were purchased, and even if they've had a non-Osborne double density previously fitted. To minimise inconvenience, all installations will be made by appointment and should be completed within 48 hours.

For users who have the Osborne Multi-Density option but have not yet had it fitted, installation and testing – including a full test of the entire computer, will cost just \$50.00. Installation charges do not include costs of shipping computers to Osborne's Service Centre, but do include return shipping costs. To arrange your installation appointment, please fill in the coupon on this ad or call in to your nearest Authorised Osborne Dealer. You will then be contacted by Osborne Computer Corporation with your appointment date and shipping instructions. Alternatively, you can call Osborne's Technical Director, Murray Baker on (02) 438 1800.

The more you use your Osborne, the more you need from it. Expand the power of your Osborne with the Osborne Multi-Density option. As well as doubling the capacity of your diskettes, the unique Multi-Density option lets your Osborne read files created on other computers – including the Xerox 820, DEC VT180, IBM PC (running CP/M 86) and Cromemco 5". No other personal computer can offer this. Of course, the Multi-Density option will allow you to read your own single density Osborne disks.

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IBM Moves In — Better Late Than Never!

It's here at last! This month will see the release of the IBM Personal Computer and, as usual, Les Bell has words to say...

IBM HAS entered the computer business at last with the announcement of the IBM Personal Computer. After many years of selling typewriters, photocopiers and other office paraphernalia, at last it's going to sell something that can make a real difference to office productivity.

The IBM PC has been out for nigh on 18 months in the US. All the indications are that its owners love it and are glad they bought it; so much so that IBM has had



difficulty keeping up with demand.

There are several reasons for this. First, and probably the major contributing factor to the machine's success, there's the IBM name. That counts for a lot with the public, to whom the words IBM and computer are synonymous. I know of one company who replaced an IBM mainframe with a new brand. The new vendor claimed its reliability track record was enviably high mainly because the staff would still say 'Oh no, the IBM's broken down again', even though it had long been replaced by a Brand X machine!

Flowing on from the IBM name advantage is the support software. Software vendors like Visicorp, who only sell hard-



ware dependent products and prefer to be aligned with major companies, have put a major effort into producing versions of their software for the IBM. IBM purposely designed the machine to have the comprehensive keyboard, function keys and colour graphics features necessary to support such software, and this has paid off in the software now available.

Related to the supply of software is the processor in the machine, the Intel 8088. Because this is a superset of the older 8080 processor, it is possible to convert software to run on it with only a minimum

of effort. Of course, it doesn't take advantage of the full power of the processor (nowhere near it) but at least it runs. Like a lame dog.

As we said when we first tested the IBM last year, the BASIC interpreter of the PC is lamentably slow — approximately equivalent to running the 8-bit version on a 3 MHz Z-80.

The reason for this is that Microsoft presumably translated its 8-bit software to 8086 code using a translator program such as Intel's CONV-86 or Digital Research's XLT-86. Such programs cannot

make intelligent assumptions about what the programmer is doing, and will always produce conservative code. In addition, many of the 8080 instructions have no single equivalent on the 8088, but must be emulated with a sequence of instructions.

The same problem applies to all mechanically translated software — it will miss out on the performance improvements possible. For example, one 8080 communications program I wrote has a multi-instruction loop that reduces to just a few bytes on the 8088.

However, we are now starting to see a number of native code compilers appearing for the 8086 which will be used to generate quicker code. Digital Research has released Pascal/MT+86, CB-86 should be out by the time you read this, and PL/-86 is due shortly. Several other companies have produced C compilers, and these are already being put to use by companies whose commercial products are written in C (smart move).

In addition, Microsoft has produced a very comprehensive macro assembler and linker which has features to support large programming efforts. Available as an extra for PC-DOS, it is supplied as standard with MS-DOS, and is almost completely compatible with Intel's 8086 assembler. With the ability to address



structures, bit fields and arrays, quite ambitious projects become feasible.

This brings me to one aspect of the IBM PC which some may view as a virtue and others as a drawback — the availability of so many operating systems. The package which comes with the machine is PC-DOS, alias MS-DOS, but IBM has also lent support to CP/M-86 and the UCSD P-system. The result has been a battle royal between Microsoft and Digital Research, with no end in sight.

Microsoft will not supply its BASIC to run under CP/M-86, and has set out to license MS-DOS to as many manufacturers (particularly Japanese) as possible. Digital Research has countered by announcing the development of its own BASIC, and releasing graphic extensions for CP/M and Concurrent CP/M-86, a multi-tasking single-user operating system which allows the user to run multiple programs and switch between them at will.

Microsoft has always been a more sales-oriented and accommodating company, willing to install special versions of its BASIC with standalone disk drivers for many Japanese companies.

It are also more applications-oriented than DR, releasing such consumer items as Microsoft Adventure. Digital Research, on the other hand, has always been very straight in its belief that it supplied the invariant portion of CP/M and it was up to the hardware company to write the hardware dependent portion (BIOS); many Japanese companies do not seem to have been able to do that, and most still don't do it well. DRI is oriented towards tools for software development professionals, such as its PL/ compiler, and makes few concessions to the neophyte.

The upshot of all this has been a great divide in the IBM PC marketplace. The developers of system software such as the C compilers have generally plumped to support CP/M-86 while the Visicalc users just accept PC-DOS; some are trying to hedge their bets. Meanwhile the UCSD Pascal freaks are doing their own thing. The whole situation is confusing, and is slowing down the introduction of new software.

The Hardware

There is nothing new about the hardware of the IBM PC. In fact, by modern standards, it is quite old-fashioned. The basic circuitry is more or less straight from the Intel manuals on the 8088 and its support chips — there are no surprises there.

One thing that did surprise us, when we looked inside the machine, is the fuse placement. While most machines have a simple screw fuseholder on the back, the IBM's fuse is mounted inside the power supply, and looks like it would take an enormous effort to get at.

In fact, for the average owner, fuse re-

placement will mean a trip to the service centre. We can only hope that the Australian model will have a redesigned power supply in this regard.

The Australian Launch

At the time of writing, the launch of the IBM PC is shrouded in mystery. IBM has placed an embargo on reporting details of the dealers who will be handling the machine and is generally trying to cloak the whole event in secrecy.

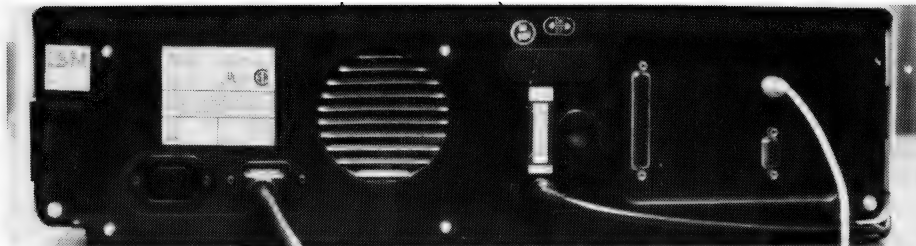
The announcement date hasn't even been revealed!

However, some details have leaked

out, primarily due to some of the dealers being unable to contain themselves. The biggest news is that the PC will be sold in department stores. In Melbourne, Myers city store will sell the machine, while in Sydney, Grace Brothers is setting up a retail computer centre in Parramatta.

This represents quite a step in some direction in computer sales in Australia — hopefully forward.

But whatever else happens, the launch of the IBM PC will mark a milestone in the development to maturity of the Australian microcomputer industry. □



Specifications and Report Card

Unit:	IBM Personal Computer			
Made By:	International Business Machines Corp.			
Processor:	Intel 8088			
Clock Speed:	4.77 MHz			
RAM:	16 Kbytes min, 256 k max, 64 Kbytes typ.			
ROM:	Bootstrap and self-test			
I/O:	Serial comms and parallel printer i/f			
Languages:	BASIC, Pascal, others under CP/M-86			
Keyboard:	QWERTY nice, with cursor/numeric pad			
Display:	40 × 24, 80 × 24 software selectable			
Graphics:	320 × 200, 16 colours			
Peripherals:	160 Kbytes/floppy disk			
Expansion:	Internal RAM, hard disk controllers and others			
Best Points:	IBM, 16-bitter			
Worst Points:	Slow BASIC			
Ratings:	excellent	very good	good	poor
Documentation:	✓			
Ease of Use:		✓		
Functionality	✓			
Support:		✓		
Value-for-money:		✓		
Extras Included:	1 floppy, colour graphics			
Options:	N/A			
Price:	N/A			
Review Unit from:	Customized Technology			

Now You Have Your IBM What Will You Do With It?

The key to the power of any computer is the software that is available for it — a great machine is useless without any programs. Potential IBM buyers are about the most fortunate on our market — because the machine has been around so long overseas, they don't have to wait for the right extras to be developed for it. In fact, there was more available for the IBM (both software and accessories) before its release than can be had for some machines which have been on sale for six months or more...

AS MANY COMPUTER owners will realise, the major investment in their system is eventually in software, not the initial hardware. In the last year, for example, I would easily have spent over \$1500 on new software, all of it intended to make my computer work even harder. Many commercial users would exceed this figure, and even games addicts (piracy notwithstanding) can accumulate a fair investment.

A computer is really just an empty shell — it's the software that gives it life. And so we keep on acquiring software to perform an ever wider range of tasks.

The IBM PC will predominantly appeal to professional and business users, and for this reason much of the software that is appearing for it is business-oriented. We contacted some of the software suppliers known to be gearing up for the introduction of the PC, and had a look at some of their wares.

IBM's Time Manager

Time Manager first appeared for the Apple computer, and was a very popular program. Written in Pascal, it has proved fairly easy to transport across to the IBM using MS-Pascal (oops, I mean IBM Pascal!).

On first powering up, Time Manager prompts for the current date and time, and then displays a calendar for the current month. Time Manager is organised in levels — month, day and entry. Days which have entries will be displayed in reverse video, and the user can 'zoom in'



on a level to examine the entries for that day.

The PgUp and PgDn keys will move the user backwards or forwards a month or day, depending on the current level. By using the cursor control keys, the user can move the screen pointer to the day of interest, and then press the 'Enter' key to move to the day level.

At the day level, the first entries for that day are displayed. Each entry has an associated priority, permanence and category, as well as its text. The priority of an entry controls the way Time Manager will manipulate it. For example, * or 'star' priority is the highest, and Time Manager will carry over these entries from day to day until completion, forming a dynamic

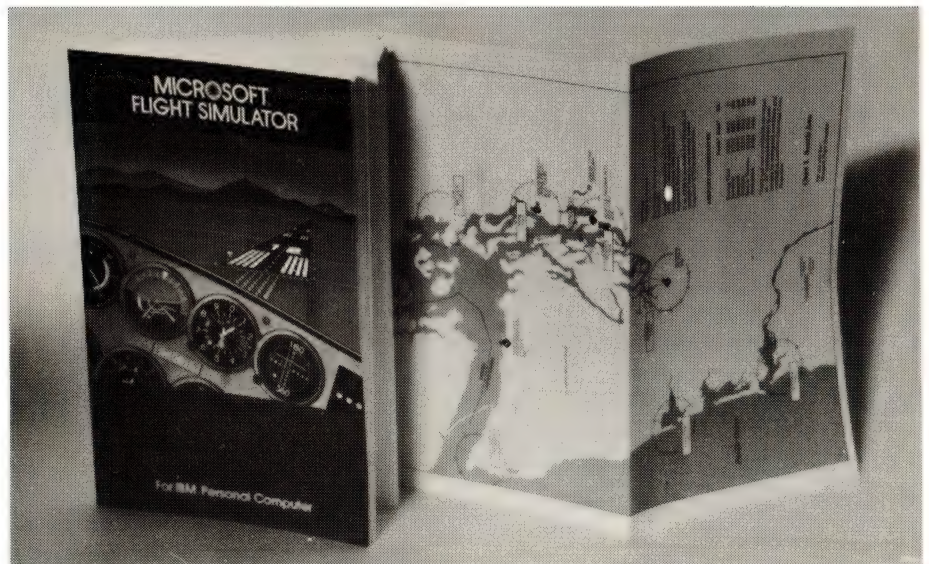
'to-do' list. Appointment priority applies to those entries which will be sorted into chronological order, while 1, 2 or note priorities apply to less important entries.

Entries which will fall on the same date each year (birthdays, anniversaries, and so on) can be tagged as permanent to simplify the transfer of information between data disks at the end of a year or six-month period. Each entry can be classified into one of 26 categories (A — Z), and entries of equivalent priority are sorted by category when displayed.

As well as the chronological displays, Time Manager can be used to display entries by priority, by category, or by keyword. This is useful for finding important tasks which have not yet been completed, appointments with a particular person or related tasks.

As well as its more conventional time manipulation functions, Time Manager can also maintain nine accounts. Entries can contain punctuation symbols followed by numbers, which it will total into the appropriate account. Pressing the F5 key will display a summary of the accounts. Totals can be computed over a particular period and by keyword, category or priority, allowing a capability which only database management systems can rival.

Account categories can be further divided by category and keyword. The whole system is very powerful when used with ingenuity — indeed, one computer store in Sydney is reputed to have used Time Manager to do all its accounts until



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Today's world is a computer world and a tough world. You need to look at the business computer as a necessity and look for value in a business computer. The Osborne 1 has been praised in magazines like *Your Computer*, and *Australian Personal Computer*, just for the hardware you get for the price. It has a powerful 64K RAM memory; full business keyboard with alpha and numeric; two built-in floppy disk drives and a built-in screen - all inside a tough, portable case.

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finally purchasing a full-blown accounting system. On the other hand, many accountants would probably throw up their hands in horror at this unconventional form of book-keeping!

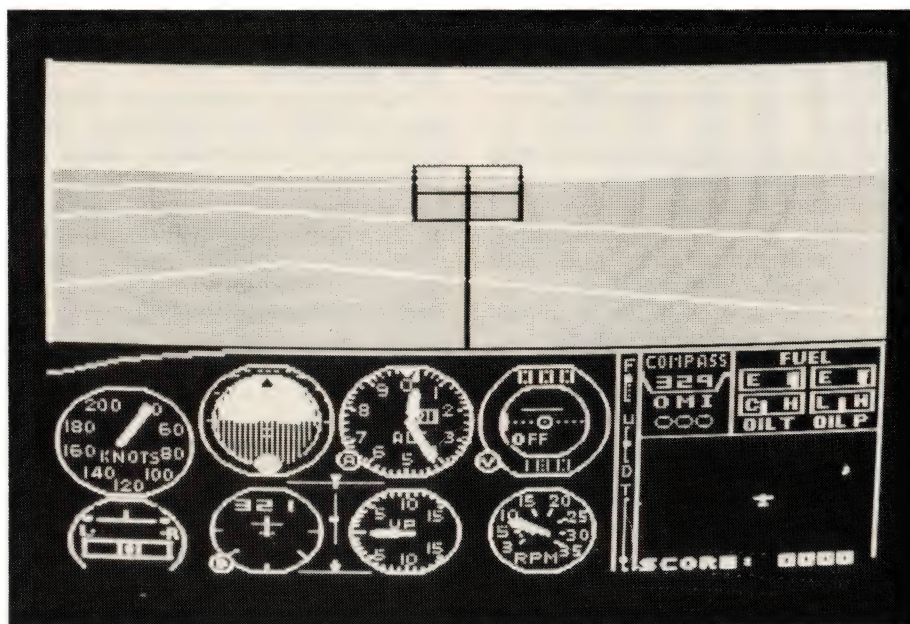
Time Manager also allows the user to create screens of text known as notepads. These can be stored on disk, edited and retrieved as required. Additional commands allow the user to change account descriptions, category names, the date, notepad titles and the data diskette title. Flags control case folding, printer spacing, tone generation and prompt levels.

Time Manager can be used as an 'alarm clock', which will buzz when a pre-set time is reached, and will also calculate the number of days between dates. Its internal calendar can display monthly pages from January 1901 to December of 2155.

The Time Manager diskette is copy protected (tsk, tsk — I thought IBM owners were above such petty thievery) and is designed to work with a specially formatted data diskette. Two master data diskettes are supplied; one for 40-column displays and one for 80-column operation. The basic difference between them is that 40-column screens can only hold half as much text, and so twice as many entries can be made on that diskette.

At the end of a year (or six months) any perpetual information is transferred to a new diskette, and the process continues. It's a shame, though, that the Time Manager documentation contains no information on the file formats and layouts, so that other programs cannot pick up information from this system.

The documentation is produced in the standard IBM style, and is nicely presented, making extensive use of examples (the raw data for which is supplied on the data diskettes). It is very much oriented towards the non-technical user.



The program makes extensive use of the IBM's programmable function keys, and a keyboard overlay would simplify operation greatly — but this idea doesn't seem to have occurred to the program packagers at IBM.

Time Manager is a very useful program indeed. It works well, and does what is claimed, and in fact if there was a CP/M version, I'd probably buy a copy. Maybe I'll have to buy an IBM to run it?

VisiCorp Products

The first of these to grace an IBM owner's software shelves will undoubtedly be VisiCalc, the most talked-about and, probably, the most-purchased personal computer program ever.

What is there left to say about Visicalc? Nothing, really, that you haven't heard or read here before, so let's go on to some of the lesser-known products in the series.

Visitrend/Plot

Visitrend/Plot, for readers who have just returned from three years in the outer reaches of Kazhukstan, is a set of routines for maintenance, analysis and presentation of statistical information. It is designed to operate with Visicalc, and these two programs can exchange files in the DIF (Data Interchange Format) format.

VT/P consists of three subsystems. The main program is used for file management and data editing. Named series of data points can be entered and multiple series stored in a data file on disk. The program generally operates on one series at a time, but maintains multiple series in memory during operation.

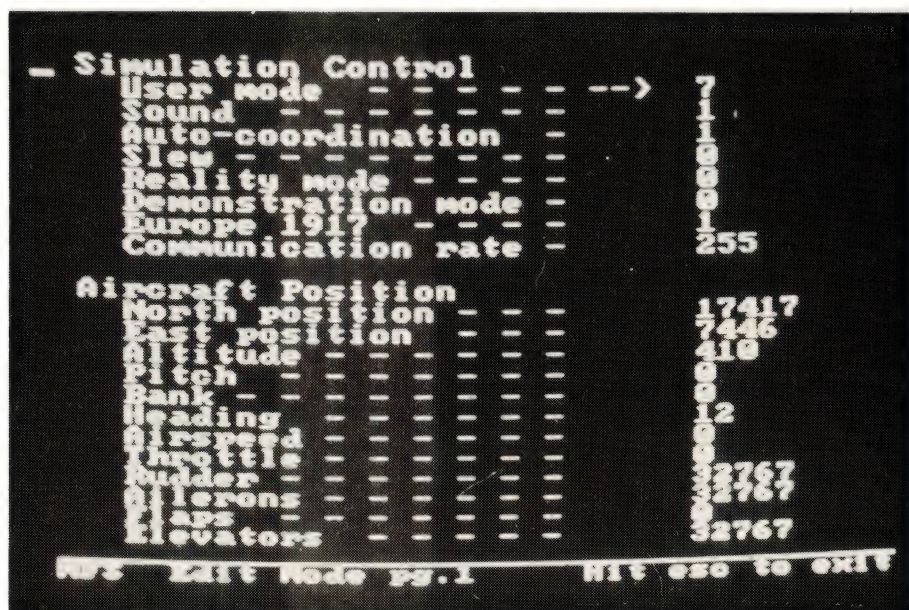
Data can be extracted from Visicalc worksheets using the DIF format with just a few simple commands.

Once loaded into the program's data area and edited, data values can be plotted. Several types of charts are supported, including line bar and area charts, pie charts, x-y plots and high-low-close plots which illustrate data ranges.

Within each chart type, several options are possible. For example, bar charts can be full or half width, positioned to the right or left of the X-coordinate tick points. On line charts, the plotting symbol for points can be changed from a square with a dot to a triangle with a dot, a number sign, asterisk and others.

Visiplot allows good control over scaling factors and display range so that meaningful displays can be produced. Some programs automatically choose their own values for these, so that graphs always fill the screen regardless of the units used. This can make comparison between graphs extremely difficult and nullify the whole point of using a graphical presentation.

The application of titles to a graph is



also very easy. A titles menu allows the user to specify the particular title to be entered, and in addition movable titles can be entered and positioned anywhere on the graph.

The trend subprogram consists of three major functions: analyze, function and xform. Analyze performs linear multiple regression and trendline forecasting, calculates common statistics of a series such as minimum, maximum, mean, standard deviation and coefficient of correlation, generates tabular output and formats displayed data.

Function performs various common functions on existing series, such as calculating moving averages, percent change or cumulative total series; it can also perform exponential smoothing and generate lead or lag series. Xform lets the user apply his own mathematical and logical operations on a series.

These operations can be combined in various ways, which is the real power of the program. For example, to perform an exponential regression, a data series can be converted using the xform option and then 'regressed'. Working in this way, an analyst is completely free from the messy

details of the number-crunching involved, and can concentrate entirely on the higher level abstractions.

The program is designed to allow the user to move freely among the various sub-modules so that once a series has been transformed or fitted, for example, it can be graphed straight away without a lot of movement through menu structures.

VT/P has the ability to display multiple graphs at once, and to overlay series on each other, making comparisons (for example, budget/actual) extremely simple and graphically clear. The IBM display is well suited to the kind of high resolution graphics performed by the program, and is of a suitable quality for business presentations.

The documentation for Visitrend/Plot is very good. The examples given in the text are supported by data series supplied on the disk, and the manual follows a tutorial style which will suit the novice user quite well.

Visidex

Visidex is a small database system which is intended to store and retrieve information using either a keyword or date

index (for time organisation). Primarily intended for those applications previously handled by file cards, it is in some ways reminiscent of Cardbox, reviewed elsewhere in this issue.

A blank screen can be viewed as a card ready to be filled in, in whatever manner the user chooses. Once text has been entered, the cursor can be moved to a word, and the keyword create command used to place this keyword into an index file. Multiple keywords can refer to a particular screen, and words can be joined to form compound keywords.

A single keyword can point to multiple screens, obviously, and the program can handle cross-referencing and searches for keywords which are not indexed.

The major feature which Visidex has over Cardbox is its calendar. Screens can be keydated as well as 'keyworded', and displayed in chronological order. A keydated screen can optionally be displayed up to 15 days prior to its keydate, acting as a reminder of a forthcoming activity.

Micropro's WordStar

WordStar is WordStar and will forever be; what's different about the IBM PC ver-

Instant Storage!

'I dream of Brownie with the light blue jeans,' sang Spike Jones and his City Slickers. Playing with the IBM, Les Bell expressed a wish for a hard disk, and got it...

MOST USERS WOULD have to agree that the disk capacity of the IBM PC is a bit limiting. If you've just graduated from a cassette-based system, or never used a computer before, the power of a 320 Kbyte floppy disk can be intoxicating, but after a year as a computer freak, our glorious publisher has just had to buy his second 20 Mbyte hard disk — and his story is not so atypical.

So it is that users of 13cm floppy machines in particular are turning to hard disks to ease the problems of their rapidly expanding databases. A comparative newcomer to this market is Genie Computer Corporation of Westlake Village in California, which markets a range of hard disk units for popular computer systems.

We were fortunate enough to obtain a review sample of one of the units from the local distributor, E.D.P. Imports. Genie has a range of disk drives from 5 Mbytes to 20 Mbytes, and a 5 Mbyte fixed plus 5 Mbyte removable drive, which is the model we tried.



sion? The answer is, not a lot. As far as I could tell, it was Version 3.X with the addition of support for colour instead of high/low intensity. There's not a lot else you can do with colour in a word processing program other than make highlighting work better.

As I remember, WordStar Version 3 was written in C, not assembler, and this makes it particularly easy to transport between machines.

Supercalc

Sorcim has for some time provided a CP/M-86 version of its Pascal/M compiler, and followed this with a CP/M-86 version of Supercalc, its spreadsheet calculator program.

It's now available for the IBM PC under PC-DOS, and is as good as ever.

Deadline

Remember Zork? Infocom, the people that wrote that masterly adventure program, have continued the series with Zork II and III, and a completely new form of adventure game called Deadline.

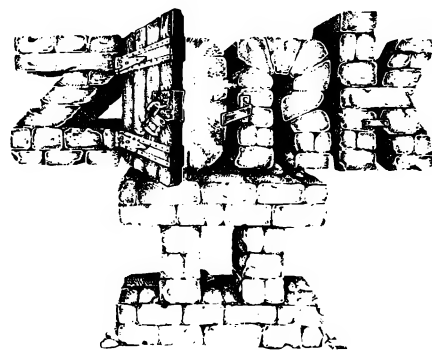
The player is given a dossier of documents and papers relating to the unfortu-

nate demise of Mr Marshall Robner. These include a photograph of the scene of the crime, summary of findings from the coroner's examination, a lab report and other correspondence. There's also transcripts of interviews with various involved parties, and some tablets found near the body.

The player takes the part of a police inspector investigating the crime. At the start of the game, he is standing in front of the door of the Robner residence. His job is to interview the witnesses, examine the evidence, and arrest the murderer — inside 12 hours.

Time elapsed in the game is not the same as real time — in fact, it will typically take 20 hours to solve the case. And of course, it is possible to construct a case against an innocent suspect, in which case the grand jury may not indict the suspect or the trial jury may not convict — and you've blown it.

Infocom has used the impressive natural language ability of the Zorks to good effect in this package. The investigator is required to converse with the witnesses, and one finds that politeness works best!



The Wizard of Frobozz

If you like adventure games, this is one of the best ever!

Chomps

This is a Pacman-style game for the IBM. If you have a colour graphics adapter and display, you'll get the full benefit of the game, but it will work in a monochrome mode on monitors.

Four mazes are stored in data files on the game disk, and the player has to move the chomp around the maze, removing dots as he goes, while avoiding the pursu-

The drive itself is quite small — small enough to replace one of the floppies in the IBM chassis, although our model was mounted in its own cabinet with a power supply, which made it rather larger. The lower half of the drive contains a 5 Mbyte fixed disk, while the upper half is a slot into which a 5 Mbyte cartridge disk can be inserted. The whole assembly looks not unlike a car radio/cassette.

A multi-core cable connects the drive to an interface card which plugs into the IBM PC. The interface itself seems quite simple and probably consists of little more than a parallel port, with the bulk of the control logic on the drive itself. Installation simply involves removing the PC cover (2 screws), unscrewing a blank port cover and plugging in the board and reassembling the system.

The Genie hardware is supplied with matching software for installation and maintenance. After the style of Apple-compatible hard disks, the Genie can be configured as several logical disks (or volumes). These can then be assigned to specific PC-DOS (MS-DOS) drives with the ASSIGN command and from then on behave as though they are ordinary IBM floppies.

Once the INSTALL utility is run, the user can run the Genie utility software which allows formatting, volume allocation and other functions such as a directory of volumes.

On power-up or insertion of a cartridge, the drive takes about a minute to wind up



to operating speed. During this time a front-panel LED flashes to indicate the drive is not ready; thereafter it stabilises to a steady glow, indicating that the drive is ready. Similarly, when removing a cartridge, the user must wait for the drive to slow down before the door will unlock.

The fixed disk can be write-protected by a front-panel switch, so that valuable software is not at the mercy of any rampaging programs (of course, you'd back it all up anyway, wouldn't you?).

We found that bringing the system up wasn't too difficult, although we had only minimal pre-release documentation. Once the system was up and running, it

certainly worked as advertised. The only surprise we had was the relatively slow performance of the system. It actually appeared to run slower than the floppies.

We can only attribute this to the extra operating system overhead involved in breaking the disk into volumes. The difference is quite staggering, as the hard disk should offer a considerable performance gain over the floppies, not a loss.

The message is that this hard disk offers greater on-line storage capacity than floppies, but at a penalty in performance. The Genie supports MS-DOS, CP/M-86 and Pascal, and it would be interesting to see how it performs under those other operating systems. □

ing monsters. There are also four power dots which enable the chomp to pursue the monsters and catch them.

Success at each level moves the game up to a new level of difficulty, and it does get difficult. The author says in the manual that he achieved a score of over 1.3 million on level 11 during a lucky streak, but I never got anywhere near there!

The game uses a disk file to keep track of a 'Hall of Fame' record of the best scores. The action is fast, and the graphics good. The chomp responds quickly to the cursor controls compared with some games which 'miss' controls.

Chomps is available from Customized Technology.

Microsoft's Flight Simulator

Many readers will no doubt remember A2-FS1, the Sublogic flight simulator program for the Apple (and a TRS-80 version). Microsoft has reincarnated it in this new version by Bruce Artwick of Sublogic, with many improvements and upgrades which make it amazingly realistic.

The flight simulator display is broken into two halves. The top half of the screen shows a three-dimensional view out the window of the aircraft. By using the cursor control keys, this view can be of any quadrant, including directly astern (if that's the right word).

The lower half of the display is a standard aircraft instrument cluster, including altimeter, air-speed indicator, artificial horizon, turn indicator, gyro-compass and others. In short, everything is there, including radio and instrument landing gear.

Obviously, the IBM keyboard is no substitute for an aircraft control column, but the various operating functions are quite well distributed over the keyboard. To compensate for the lack of 'feel', the positions of elevators, flaps, and so on are indicated on the instrument panel.

The disk contains airport data for a number of regions of the US, extending into Mexico and Canada. This information includes coastline data, major buildings and other topological anomalies in the area and simulation data for VOR beacons.

The simulation includes cloud cover and night flying, as well as cross winds which the user can set to different speeds at three different altitudes. Turbulence is also simulated. By the way, colour is supported on domestic TV's, but not on RGB monitors — must be a peculiarity of IBM's high-res card.

To all intents and purposes, the simulation is just like flying a real plane. Screen refresh is about four or five times per second, and while the resolution is not fantastic, objects are easily identifiable.

It's not easy; after a day and a half of playing around with it, I still have trouble landing on the runway and more often

come down on the grass of the field — but at least I don't crash as often!

The only shortcoming the 'game' has is in the keyboard simulation of the column — however the simulation is so good that once having tried it, I'm sure many users would willingly pay out \$50 or more for a joystick-style control column add-on.

This package alone will justify the high-res graphics option of the IBM. We got it from Imagineering, and most dealers will have it.

Visifile

Visifile is rather like Visidex; in fact the two programs overlap in capabilities to some extent. However, Visifile is much more oriented to the traditional database applications such as mailing list management.

Like most of the Visicorp software, it is very menu-oriented, and guides the user through a session. It is written in BASIC, and has one awkward complexity in that it is spread over two disks, requiring disk changes, even in a two-drive system.

Visifile manages four types of file: data files, which contain information; index files, which specify the sequence of the data in the data file; report label files, which specify formats for displays and printed reports; and map files, which specify the screen formats for the 'Maintain' function.

Files are composed of records, and each record is composed of fields. Five types of fields are supported: alphanumeric, auto-stamp date, date, dollars-and-cents and numeric. Auto-stamp date fields are automatically filled in by the program with the current date, while date fields automatically format input into date string specifications.

Visifile has a number of rather interesting features — for example a 'sounds-like' search which can be used when you are not sure of spelling or capitalisation. All the usual functions of database management are supported, including report generation and form letters.

Visifile, like the others in the VisiCorp series, is available from Imagineering dealers.

Mailing List

Mailing List, by Alpha Software, will maintain mailing lists of customers, prospects, professional organisations, and so on. It has a capacity of 900 records per disk with DOS 1.0 and 1400 records with DOS 1.1.

It is accompanied by a cassette tape which introduces the program, and a manual with two disks (one for each DOS format). Each record in the mailing list has ten fields: account number, first name, last name, optional field, address lines 1 and 2, city, state, zip code and phone number.

Some of the fields are a bit limiting —

for example, the phone number field is only 12 characters long, whereas a properly written Australian phone number with area code will typically occupy 13 characters. The zip code field, on the other hand is 10 characters — it would be nice to "rob Peter to pay Paul", but unfortunately the program has no provision for this.

Data can obviously be deleted and edited, and the program will also generate a telephone directory listing. All in all, it's quite a handy little program. We got it from Cybernetics Research.

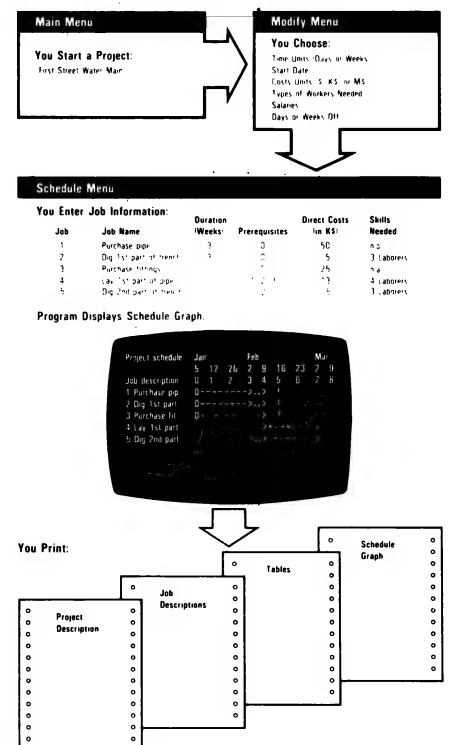
Type Faces

Type Faces is a program which can output any of fifteen different type fonts to a suitably equipped graphics printer. Suitable printers include the IBM PC printer, IDS 460, 560 and Prisms and the Epson MX80/100 (though these and the PC printer must have Grafrax or Grafrax plus).

The program has facilities for centering and underlining text, as well as right justifying, rather after the style of runoff, the print formatting program. The type faces, while nothing like the quality of typesetting, are good enough to lend an original effect to company and club noticeboards and similar applications.

Most of the examples given in the comprehensive manual really demonstrate more of the use of PC-DOS's EDLIN editor; the program itself is very simple to use. And as with other Alpha software, there's an introductory cassette tape.

The program itself is supplied on two disks for the two DOS formats. Cybernetics Research supplied our copy. □



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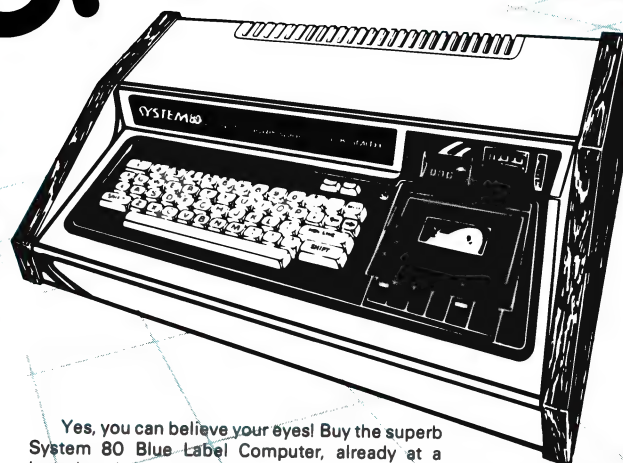


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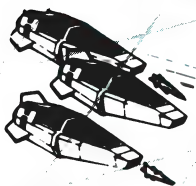
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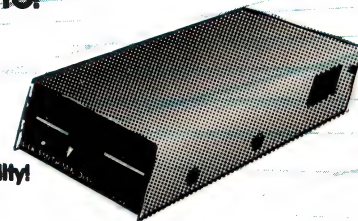
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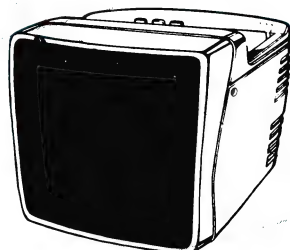
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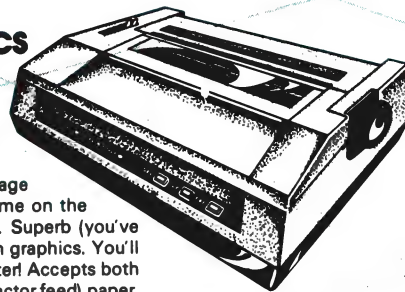
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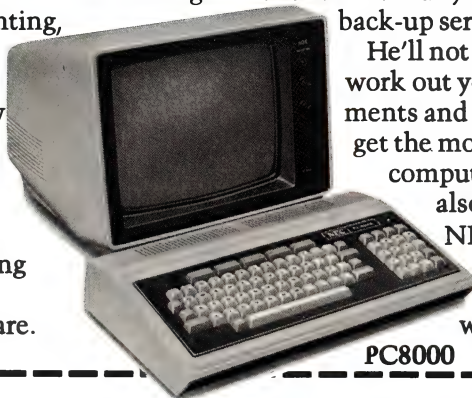
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PC 8000



The Big Sell Of The Little IBM

John Hall and John Skaller, of Sydney's Cybernetics Research, present their views on the IBM Personal Computer after several months' involvement with it on the local market..

MARKETING microcomputers has become more competitive and more complex over the years — so much so that today's customer is, more often than not, totally confused by the dazzling characteristics of the latest machine to hit the market. Why, then, should the IBM personal computer create such excitement on the micro scene? The answer, predictably, isn't simple.

One important feature of the IBM Personal Computer (PC) is its name — IBM. These three letters, for International Business Machines, ensure it will be the largest-selling micro in the world. And because it's going to sell so well, everyone is going to buy it (if that sounds a bit back-the-front, try reading it the other way around.)

The average user wants a machine that works, will be supported, and will retain its resale value. The IBM PC will be the obvious choice, for there is a feeling that IBM can be trusted. In the customer's eyes, IBM has reduced the risk in buying a personal computer. It has also established some much-needed standards within the industry...

The use of MicroSoft BASIC is most welcome. This excellent language well deserves a solid position on the market.

The IBM PC is a solidly constructed system. This is not referring to the heavy-duty construction of the computer itself, but the information technology that surrounds it.

Excellent Support

One of the most attractive features of the IBM PC is its documentation.

With the machine came three manuals — DOS, Guide to Operations, and BASIC

— nicely packaged in conveniently sized binders (almost all software for the IBM PC comes in these or similar binders). There has been comment to the effect that the manuals are typical IBM; this you can take to mean that the information is presented in such a way that even a demented Australian should understand what's going on.

The manuals, which are well set out and easy to read, take you through setting up the machine, running demonstration programs, programming in BASIC, and general housekeeping for backing up files and so on.

What makes the IBM PC really powerful is the amount of software/firmware/hardware support from companies out-

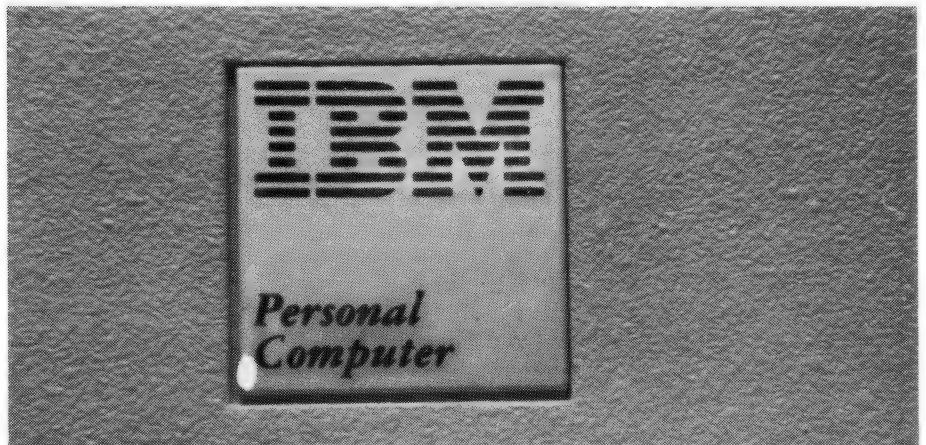
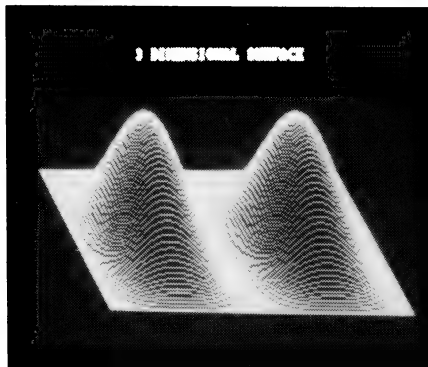
side IBM. At last estimate, 1200 new products for the IBM PC were released in the United States in the last quarter of 1982. These include database systems, memory expansion boards, hard disks, communications, colour monitors and software by the ton.

You want more? In the little over a year that the IBM PC has been available in the United States, there have been three large-circulation magazines released dedicated solely to the IBM. They are 'PC', 'Personal Computer Age' and 'Softtalk (IBM Edition)'. In addition, there are a number of books, both introductory and high level.

Some popular lines available for the IBM PC include the Visicorp lines (VisiCalc, VisiDex and so on), dBase II, WordStar, Micromodeller, the UCSD system, and various high-level languages. Other bits and pieces include light pens, game interfaces, RAM disk emulation and much, much more.

A Salesman's Dream

A powerful 16-bit machine, a beautiful keyboard, loads of support and the IBM name — it looks like a salesman's dream. So why isn't our business, Cybernetics Research, making a million from selling the IBM PC ahead of its official release date?



Well, first of all, we aren't authorised. This doesn't exactly mean that IBM people sanitise the phone after talking to us, but it doesn't make them ecstatic about us, either.

Nevertheless, we believe our reasons for selling the PC before IBM's release were, and are, valid. We wanted to give OEMs and software houses the chance of getting their hands on the machine beforehand (and anyone else, like us, who couldn't wait for IBM.) Cybernetics Research itself is involved in software development — particularly word-processing. We wanted to be ready to bring out at

least one piece of software at the time of the PC launch.

Of course, we also expected to make money — taking a loss is hardly good business. However, as well as making money, we've been spending it, keeping track of magazines, software, hard disks and peripherals. Customers often sense that the 16-bit machines have ushered in a new era for the micro but sometimes they lose sight of the time it takes for the support to grow.

Local software houses are underway with a number of packages, but there are many opportunities and not all of them will

be taken care of for some time. Some accounts packages are available, but vertical market applications requiring Australian software, such as the medical and legal markets, will not all be taken care of for a while yet.

Probably the best way to look at the IBM PC is that it's a machine with great potential. To make it perform in the way best suited to your particular needs, it is a good idea to find out as much as possible about the machine before buying. Then spend the least possible on the configuration that will do the job for you. Should you need to, you can still expand at a later time. □



Market Perceptions, US-Style

By Howard Arrington

THE IBM PERSONAL COMPUTER has, in the United States, spawned a whole industry whose vitality and momentum surpasses the impact felt by other entries into the personal computer market. Hundreds of new and old American companies have rushed to be a part of the tidal wave of products now available for the IBM-PC.

A frequent criticism levelled against new computer entries is that application software isn't yet available; such criticisms toward the IBM-PC have been buried in an avalanche of products. Chances are that you can find, for the IBM-PC, any software package that you loved on another computer.

Two recent American publications listed more than 1000 software products on the market for the IBM. The publications listed more than 250 companies producing software, and more than 450 dealers of IBM equipment and software. This phenomenal growth occurred in less than a year and can be counted on to continue.

In fact, I've seen several new and innovative channels being used here in the United States to move the IBM into the hands of potential customers. For example, distributors are placing software in bookstores, and irrigation companies are selling the IBM with application software to farmers.

American magazine publishers lost no time in making their contribution to the IBM momentum. These magazines are dedicated to the IBM-PC and have experienced rapid growth:

- PC, The Independent Guide to IBM Personal Computers;
- Softalk, for the IBM Personal Computer;
- Personal Computer Age;
- Programmer's Journal, The Resource Newsletter for IBM-PC Programmers;
- Reference, The Business Journal for IBM Personal Computers;
- PC World.

Also, dozens upon dozens of national and local newsletters have sprung up across America. These newsletters carry articles on programming tricks, news, software reviews, and answers to a multitude of subscriber questions.

Last May, the rumour was that IBM would be producing a thousand machines a day by the last quarter of 1982; if the serial numbers on the recent two machines we received in our Boise, Idaho, shop are any indication, some 55,000 machines were placed with customers between the middle of September and the middle of November, since our serial numbers jumped from 160,000 to 214,000. On December 15, a

check with the local Computerland store shows their latest machines have serial numbers in the 231,000 range...

Our shop's first IBM-PC, ordered in October 1981, had a serial number around 107,000; this leads me to speculate that IBM began its sequencing of serial numbers with 100,000. We can then assume that by mid-December 1982, more than 130,000 machines had been delivered, which puts the rate of delivery at around 25,000 machines a month.

The rumour for 1983 is that IBM plans to manufacture a million personal computers, 500,000 of which are targeted to be distributed overseas, primarily in Europe. Perhaps these forecasts fuel the momentum and heighten the tidal wave of products that is overwhelming the competition. Everyone, it seems, wants a piece of the action.

Dozens of companies are attempting to share in IBM's momentum by producing 'look-alike' machines — several advertise that their computer is 100 percent compatible with the IBM-PC — which should provide additional IBM software sales.

Our shop offers several software products. I judge that our clientele mix includes a high percentage of professionals and businessmen. Many customers are looking to buy software to satisfy their

needs because they lack the skills to develop the software themselves.

I frequently get the impression, when handling customer questions, that the IBM-PC is the first computer they have ever owned, and that they are at the beginning of the learning curve trying to understand fundamentals such as how to obtain a directory of the diskette, how to back up a diskette, and how to load a BASIC program. Serving these neophytes has been a challenge since our clientele mix on other machines has had a stronger background.

My brother, John, has had his IBM-PC for nine months and has found it to be more flexible and powerful than the mini-computer he was previously using to analyse the commodities market. John's excitement over his 'dream machine' is hard to contain. Let me describe his application to illustrate.

When his IBM is turned on, a batch file automatically loads his application software and executes it. The software uses a smart modem to auto-dial a host computer 1600 km away and request transmission of the latest commodities prices. These prices are placed on a diskette, and then the IBM signs off of the host computer and hangs up the telephone. Another program then takes over to number crunch the prices and suggest buy and sell decisions. Charts are plotted on the colour graphics display and on paper using a Hewlett-Packard 7470A plotter. While all of this was taking place, John was watching TV since the whole operation does not require his intervention.

John's dream machine is fast. His programs are written in BASIC so they are easy to maintain and modify. The programs are then compiled into machine language to increase their speed from 10 to 30 fold. Finally, he uses our Electronic Disk software product to create the equivalent of a disk drive in the excess computer memory. All file accesses appear to be instantaneous since all of the diskette's information is already resident in memory. This 'dream machine' runs performance circles around a \$200,000 mini-computer he used to use for his commodities programs.

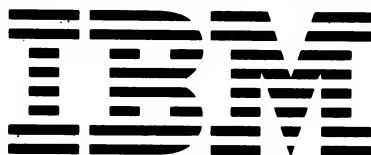
John's computer system includes the following components:

- IBM-PC computer with 320K memory
- Two double-density, double-sided disk drives with 320K storage each
- Serial port, Parallel port
- Hayes Smart modem
- Clock/calendar card
- Hewlett Packard 7470A plotter
- RGB colour monitor
- Epson MX80 printer

He shopped around and bought every item new at below list price. This impressive system was purchased for under \$US6000. □

Teaching The IBM To Think...

IBM Special Survey



Part 5: the Programmer's Viewpoint

I'VE BEEN using the IBM PC for the past month or so in developing some utility programs in 8088 assembly language, using the IBM Macro Assembler under IBM's PC-DOS (Microsoft). I thought a few comments about my transition from CP/M and the 8080/Z80 to this new environment may be of use to others who may be considering making such a change.

Adapting to the different DOS has been reasonably easy. Most of the function calls (0-36) behave in a manner similar to the CP/M equivalents, with only minor changes required.

The documentation provided with the DOS is fairly comprehensive, most of the system information needed by the assembly-language programmer being contained in appendices. It is necessary to have a copy of the IBM Technical Reference Manual, if only for the 80-page BIOS listing contained in it (and fully documented!). In addition to the function calls, one may access the BIOS keyboard, video, serial and parallel port routines using software interrupts.

A line editor, EDLIN, is provided with the DOS. I have been using this to develop my source files. Although, it suffers from the usual limitations of a line editor, I have found it reasonable to use. Individual lines may be screen-edited using the line editor built in the DOS. This allows the usual insertion, deletion, truncation and over-typing and using cursor controls on the numeric key-pad. When my budget allows it, I'll probably go to a full screen editor to gain the additional facilities that it would offer.

All in all, the DOS 1.10 which I purchased with my system rates very

By Bob Stafford

highly with me and at the giveaway price that IBM offer it (\$US40), it is hard to fault it. To the non-programmer, it offers very fast disk operations and a user-friendly set of commands. My only complaint would be the lack of an assemble command in the DEBUG program provided.

It is difficult at first to get used to the large address space of the 8088 processor. The use of segment registers to deal with 64K chunks of memory requires some digesting.

As many of the 8088 instructions can handle memory variables as well as registers, you need to rethink your approach to the structure of the assembly-language program as compared to the 8080/Z-80. If you directly convert the mnemonics of the 8080 program to 8088 mnemonics, the result will not be very efficient in the use of memory and in speed of execution. It is better to take the logic and then change the structure to fit the 8088 architecture.

In general, if you have some programming experience with the 8080/Z-80 assembly language, the transition to 8086/8088 assembly language is not a great shock. For smaller programs (less than 64K) which do not use heaps of data space, you can keep to a single segment model and work in a familiar CP/M type environment.

If you have used any Microsoft disk BASIC under CP/M, you should feel at home with the IBM PC BASIC(s). With the colour/graphics card, the machine has three different BASICs available. Cassette BASIC is built into the ROM of the machine. BASIC adds disk commands to this and BASICA adds some advanced graphic features, event trapping for communications, light pen use and so on and two sub-languages (DRAW for making graphic shapes, PLAY for music generation).

Just to test some of these features, I wrote a small program which drew a filled-in circle and displayed the time of day there. It also played a version of "Waltzing Matilda" in the background. To my surprise, all of this required only 15 lines of code! Admittedly, the program was a bit rough at the edges, but it does show some of the power of BASICA and only took a very short time to write with the BASIC manual in one hand. □

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Up-date dBase? How Dare You!

Monty Jaboor, of Melbourne's Cycorn Computer Systems, says our article on updating Ashton-Tate's dBase II — a modification to accept date input in European format — only showed the hard way to do it. Here's his alternative, along with his comment on ours...

YOU DIDN'T perchance hear a scream of horror emanating from Melbourne around the start of November did you? There I was quietly perusing the November issue of *Your Computer* and what do I see but John Hastwell-Batten's article on updating dBase II and it just slipped out (the scream, that is).

In a way it gladdens my old heart to see that there are still people dedicated to achieving a simple end by the most complicated means available. Reminds me of standing up in a hammock (or a canoe if you prefer aquatic sports).

Seriously though folks, I must come to the rescue of dBase because it is quite easy to get a European format date onto the system date area without having to resort to modifying the package. As I recall, the SET DATE TO statement was mentioned in the READ.ME file in revision 2.02 of dBase and is of course in the 2.3B manual.

I have enclosed a .CMD file which works under revision 2.3B and (I think) under 2.02 as well. This would usually be called START.CMD and would be activated by the instruction DBASE START.

The date picture 99/99/99 ensures that only 0-9 or spaces may be entered for day month or year. The slashes are constants and need not be entered. Days or months less than 10 may be entered with leading

zeros or with leading or trailing spaces. Days are checked between 1 and the maximum number for the input month. Months must be between 1 and 12 and years must be between 1 and 99. Leap years are processed correctly.

When the date has been checked and pronounced fit for European consumption it is stored in the system data DATE() from whence it may be extracted at any time

during the course of the dBase session.

We have set up a number of systems using dBase and have found this a satisfactory means of setting the system date. This command file would usually be the front end of a master menu which would be the starting point for all processing.

My compliments to J H-B on his assembler expertise. I'll stick to the easy way! ☐

```
SET TALK OFF
STORE T TO NO:DATE
STORE '312831303130313130313031' TO DAYS
STORE '** MONTH NOT 1-12 OR YEAR NOT 1-99' TO ERROR1
STORE '** DAY IS NOT CORRECT FOR THIS MONTH' TO ERROR2
STORE '** PLEASE REENTER DATE - PRESS ANY KEY TO CONTINUE' TO REENTER
DO WHILE NO:DATE
  ERASE
  STORE ' ' TO TODAY
  @ 11,10 SAY "PLEASE ENTER TODAY'S DATE (FORMAT DD/MM/YY) " ;
  GET TODAY PICTURE '99/99/99'

  READ
  STORE VAL(STR(TODAY,1,2)) TO D
  STORE VAL(STR(TODAY,4,2)) TO M
  STORE VAL(STR(TODAY,7,2)) TO Y
  * FOLLOWING IF-ENDIF TESTS FOR MONTH IN RANGE 1-12, YEAR IN RANGE 1-99
  IF M < 1 .OR. M > 12 .OR. Y < 1 .OR. Y > 99
    @ 13,10 SAY ERROR1
    @ 14,10 SAY REENTER
    WAIT TO REPLY
    LOOP
  ENDIF
  * FOLLOWING IF-ENDIF TESTS FOR DAY IN RANGE 1 TO MAXIMUM-ALLOWABLE-FOR-MONTH
  * MAXIMUM DAYS ARE CHECKED AGAINST THE STRING STORED IN CONSTANT 'DAYS'
  * INNER IF-ENDIF CHECKS FOR SPECIAL CONDITION OF 29th FEB IN A LEAP YEAR
  IF D < 1 .OR. D > VAL(STR(DAYS,M*2-1,2))
    IF M = 2 .AND. INT(Y/4)*4 = Y .AND. D = 29
      STORE F TO NO:DATE
      LOOP
    ENDIF
  ENDIF
  @ 13,10 SAY ERROR2
  @ 14,10 SAY REENTER
  WAIT TO REPLY
  LOOP
ENDIF
* IF WE HAVE COME THIS FAR THE DATE IS OK. SET NO:DATE TO FALSE & EXIT DO LOOP
STORE F TO NO:DATE
ENDDO
* STORE INPUT DATE AS THE SYSTEM DATE
STORE STR(D,2)+'/'+STR(M,2)+'/'+STR(Y,2) TO TODAY
SET DATE TO &TODAY
* RELEASE MEMORY VARIABLES & RESET 'TALK'
RELEASE ALL
SET TALK ON
```



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Caxton's CARDBOX

We've already looked at database manager programs of the more conventional, numeric-oriented kind. In this article, Les Bell examines a text-oriented, user-friendly package.

ON SEVERAL OCCASIONS recently, I've had phone calls from people looking for a database manager to store information such as article abstracts and perform keyword searches. Some had been thinking in terms of dBase II or FMS-80, while others had seen those packages and rejected them as unsuitable.

Most database managers are intended to maintain databases of financial or other numeric data, and are really meant as tools for the creation of a new breed of accounting systems. They are not very good at maintaining textual databases, or at doing fast searches of files when the search criterion is not a key field for an index.

On a simpler level, people have been creating files using a word processor, and then using the processor's 'find' command to locate keywords. In fact, I used to maintain my index to Dr Dobb's that way! More recently, specialised programs have appeared, such as the CP/M User's Group FIND.COM, which can rapidly search through a text file and report all lines containing a specified string.

This leaves a gap in the market for a more generalised database which people can use to maintain indexes and lists of information in a manner analogous to the manual card file (remember them?).

Which brings us to Cardbox. This package allows the user to create and store electronic 'file cards' and then select from them for display or printing in a rather sophisticated manner.

CardBox requires a minimum 48 Kbyte CP/M 2.2 or MP/M system, 100 Kbytes of disk storage, and a 24 by 80 screen. There aren't all that many computers around these days that won't fit the bill: for example, an Apple with Softcard and 80-column card will do just fine.

Installing Cardbox is quite simple: just copy the files onto a CP/M disk, and then, if you have one of the terminals Cardbox already knows about, run the TERMDEF program to install the terminal cursor addressing codes.

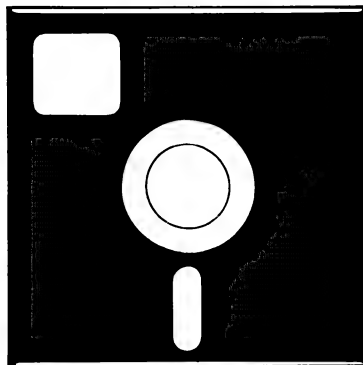
If yours is a more unusual terminal (and most will be) you will have to run the TERMDEF program and supply the addressing codes from your terminal man-

ual. Most computer owners have done this so often for various software packages that they probably don't even need to refer to the manual!

For some reason, when I installed Cardbox on my system, it asked me the baud rate of the terminal. I can't really see what it proposed to do with the information, particularly in the absence of other information such as the address of the baud rate generator chip. Oh well, presumably it knows what it's doing...

Typing CARDBOX will start the program, which consists of a .COM file and a .OVR (overlay) file. The first menu will appear: the primary functions allow access to a database, format editing or creation, or access to operating system utilities which erase or rename a file.

your computer



SOFTWARE REVIEW

Within the database primary function are four secondary functions: Use (for the normal cardbox actions), Analyse (provides statistics on a file), Create (creates a new database) and Repair (which attempts to 'fix up' damaged indexes and generally repair corrupted files).

On selecting the 'Format definition' option as primary function, the secondary functions menu changes to offer two options. Associated with every database (.FIL) file is a format file (.FMT) of the same root name; this specifies the database's 'native' format, but other formats can be created and used for special purposes.

The format file contains three kinds of information: a screen image, which tells Cardbox how the information is to be displayed on the screen; field definitions, which tell the program where the information will be displayed and how it will be

indexed; and print formats, which obviously show how the data will be printed.

At the bottom of the main menu are two more option fields for the name of the file in use and the 'Change Disks' option, which allows operation on a single-drive system with small disk capacity.

The file option is set to the name of the file you wish to use, and you're in business. Cardbox comes with an example database on the disk, so I followed the tutorial manual provided. By changing the filename to BOOKS.FIL and then pressing ESCape, the command options at the bottom of the screen change to 'E to change options, G to perform function, or Q to leave Cardbox'.

Pressing G for 'Go' displays the first card in the file. At the top of the screen is the function being performed, together with the file name, then the level number (more on that later) and the record number and file size.

Next comes the card itself, drawn with hyphens and vertical bar characters, or if your machine is one of the few for which a preconfigured .DEF file is supplied, you may even have graphics capabilities (see below under Complaints).

In this preconfigured example, the file contains an index of books, listing author, illustrator, language and other information. The screen display is laid out exactly like a file card, providing a comforting degree of familiarity for the novice user.

At the bottom of the screen is a list of available commands, which I'll briefly describe:

MAsk: allows SElection or EXclusion of non-indexed words, by searching through the entire text of the database. While this is much slower than searching on an index, it allows searches for which the database was not originally designed.

SElect: allows the database index to be scanned for a particular key word, phrase or sequence of letters. All fields may be scanned, or the scan may be restricted to a certain field. The result of the SElect is a new subset of the database, which can now be operated on in exactly the same way as before.

INclude: allows the addition of records that are outside the current selection.

EXclude: discards records in the current selection that match the specification.

HIstory: provides a list of the selections that have been made to get to the current state.

BAck: undoes the last selection, 'backing up' to the previous selection.

CLear: clears all the selections made,

returning the complete database as the 'current selection'.

Listindex: lists all the indexed words that match the selection argument, as a quick check on the effectiveness of a particular select.

ADd: creates a new record in the current database and displays a card to be filled in. Full editing facilities are provided.

Duplicate: copies the current record onto the end of the database, with an opportunity for editing; saves entry time and errors.

EDit: allows the record on the screen to be modified and stored back into the database, using the same editing controls as the ADd command.

DElete: deletes the record on the screen.

REad: allows records to be appended to the database from another file.

WRite: writes the SElected portion of the database to another file. Three file modes are available: Internal is Cardbox's internal file structure; EXT, NO FLAG is a BASIC sequential file which can be read by BASIC programs or text editors; and EXT, FLAG is similar, with indexed words marked.

Format: allows the format to be changed to that specified by another .FMT file. This will allow the card appearance to be changed.

PRint: the SElected records can be printed, either to the printer or to a disk file. Form lines will be printed using a user-specified character, and paper feed can be paged (optionally with pauses) or continuous.

SAve: ADded or EDited records are only saved in core memory; the SAVE command makes sure that memory and disk are 'in phase', by writing altered records to disk.

QUit: returns the user to the main menu.

These are all the commands an operator needs to make effective use of an initialised database. The command structure is reminiscent of some mainframe keyword search systems, particularly in the hierarchical selection scheme.

For example, in searching a books database, one might first of all select all books indexed on 'science', then exclude those indexed on 'fiction'. The next step might be to include 'technology' and finally to select on the word 'micro+', which would collect all those books on microbiology, microsurgery and microprocessors.

Sophisticated Indexing

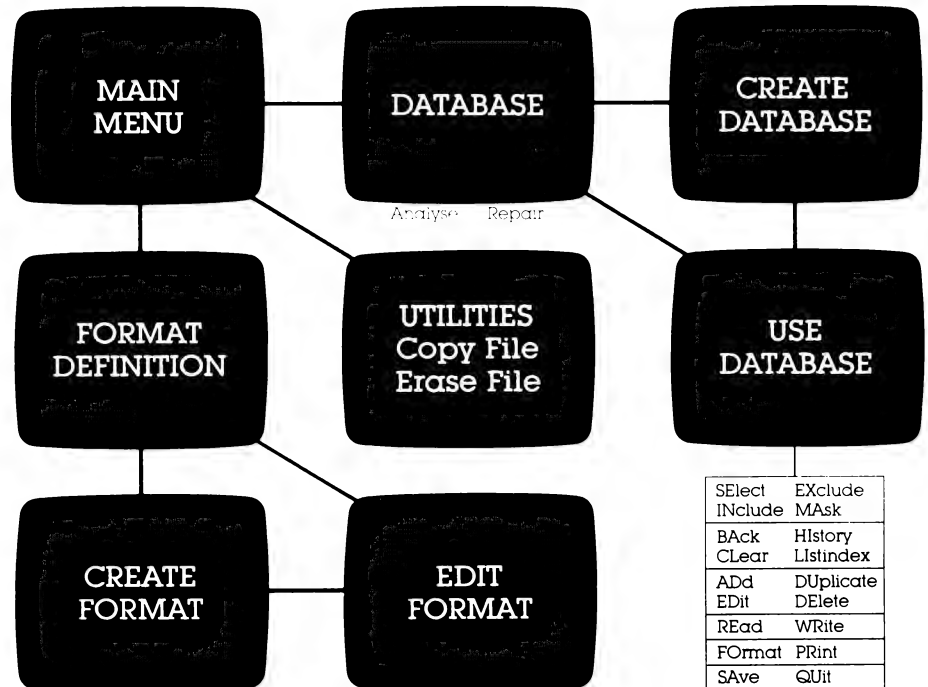
Cardbox is quite sophisticated in the way it indexes. Fields can be set up as non-indexed with no operator override, non-indexed with operator override on selected words, indexed with operator

override, or indexed on every word with no operator discretion.

Indexing is toggled during data entry with the TAB or £I keys, providing the operator has override capability. If indexing is initially off, the operator can index a word by pressing the tab key while the cursor is on or just beyond the word. Inde-

xed words are highlighted, if your terminal has that capability (but see Complaints below).

Indexing is performed by turning words into upper case, extracting certain punctuation, and indexes on the first 32 characters, which is certainly adequate for any English language purpose except,



© Caxton 1982

Software Report Card

Program:	Cardbox
Made By:	Business Simulations Ltd
Useful for:	Indexing, cataloguing, card file replacement
Hardware Req'd:	48K CP/M system with 100 K minimum disk space, 80 × 24 terminal with cursor addressing

Ratings:	excellent	very good	good	poor
Documentation		✓		
Ease of Use	✓			
Speed		✓		
Functionality	✓			
Support			✓	
Value-for-money		✓		
Extras included:	N/A			
Options:	N/A			
Price:	\$298			
Review copy from:	Imagineering			

perhaps, organic chemistry (tried reading the back of a shampoo bottle recently?).

Hyphenated words are treated specially: Cardbox indexes every part of the word, then removes the hyphens and indexes the whole, truncating it if necessary. For example, 'Hard-to-index' is indexed as 'HARD', 'TO', 'INDEX' and 'HARDTOINDEX'.

Pattern specification during SElection, INclusion, and so on is similarly sophisticated, allowing wildcard matching of characters and string expansion. Where a pattern matches too many records, EXclusion can usually be used to get rid of the unwanted ones.

Other Facilities

Cardbox also has facilities (obviously) to allow card files to be created. This is done using a free-form screen editor to draw the card on the screen and create the fields. On most terminals, both WordStar-style cursor commands and the conventional arrow keys can be used to move the cursor.

Draw mode allows cursor movements to leave lines behind them, and blank lines and columns can be inserted at any time.

Fields are identified internally by a letter of the alphabet, but a two-letter mnemonic name is also used, which will be more meaningful to the user. Also associated with each field are a caption (or prompt), index mode (as described above), and the start and end positions of the field.

The print definition section of the format file is also created at this stage. This includes the page size, margins, number of records per page and miscellaneous other information.

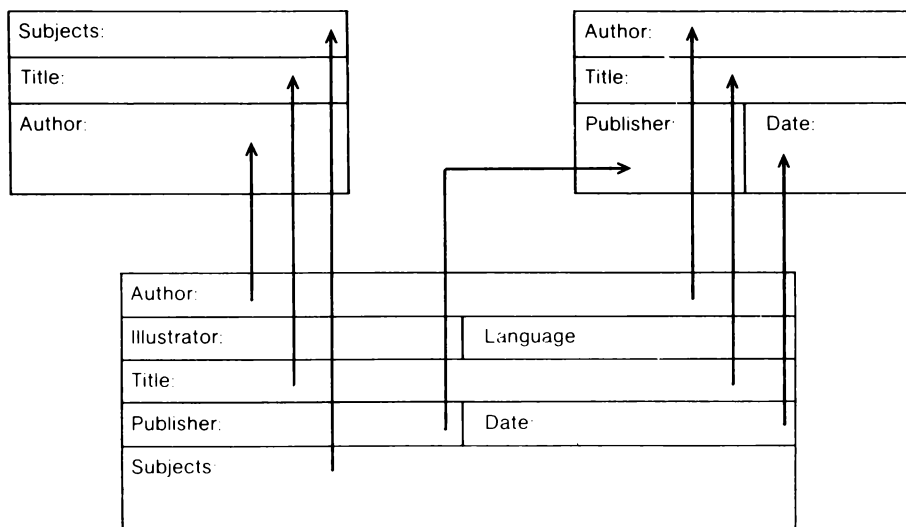
Since Cardbox operates primarily in core memory for speed, while the actual file is on disk, it can sometimes happen, due to power failure or other disaster, that the two versions of the file get 'out of phase', or worse that the index or data files get corrupted.

Do not panic. All is not lost!

Cardbox includes a file repair utility which can examine a file and suggest what is wrong, then set about repairing it. The file actually contains the data file itself (obviously) plus the index, as well as a status record which stores the selections previously made, number of records selected and other information, and a set of flags used internally.

The flags seem to be used for file locking under MP/M, and the fact that the user's status is stored as part of the file indicates that only one user can access a file at a time, even for read only. While this is a significant limitation, it is a sensible way to cope with the vagaries of MP/M (particularly Version 1.1) and still produce a useable program under CP/M.

Databases can also be recovered by



dumping in a compressed (non-indexed) form, and then re-reading and indexing. While this is a slow process, it's almost always better than re-entering a database.

A database can be analysed to produce statistics on file size, space utilisation and file size. In addition, the index can be listed with optional cross-reference, and data records can be listed or statistics on field sizes given.

A useful facility is the screen dump command — pressing Ctrl-P at any time will dump the screen to the printer.

The Complaints

Although Cardbox boasts of using the half-intensity, flashing, underline and graphics features on terminals that have them, the TERMGEn facility does not prompt the user for the appropriate codes and write them into the .DEF file.

Since I have a Televideo terminal, I created a special .DEF file, but the information I supplied would only enable TERMGEn to create a file to all intents and purposes identical to the ADM3A.DEF file already on the disk.

The other major beef is that whenever you return to the main menu, Cardbox appears to have forgotten the name of the file you were working on. Quite often, you will want to continue working on the same file, and having to reenter the name again is a prime example of the kind of mindless tedium that computers are supposed to eliminate!

Cardbox is completely devoid of arithmetic capabilities. It might be a fruitful line for future development to add the ability to (for starters) sum a given field in all the SElected records. This would give a very useful reporting facility straight away, although it must be admitted that it diverges

rapidly from the philosophy which makes Cardbox the unique program that it is.

Documentation

The Cardbox documentation is very good. Two manuals are supplied, each just over 20cm square to fit inside the disk box package. The 28-page tutorial manual builds on the example file supplied to demonstrate the basic techniques of Cardbox while leaving the less useful material for later.

The Reference Manual, at 76 pages, is still not large, but contains a lot of useful material. None of the commands is difficult to use, or conceptually complex, so that not a lot of documentation is required. As well as descriptions of the commands, quite a lot of information is given on the internal file structures used by Cardbox, to give the user a better chance of recovery in case of disaster.

Other information includes interchanging data with MBASIC, operating system commands and a complete description of all error messages. Also included is a reference card which frankly wasn't very useful.

Cardbox seems to be quite quick in operation. While this information is not given in the manual, it seems likely that the index is organised as a B-Tree, as there are no long pauses during data entry to organise the index.

Operation is simple and intuitively obvious, with extremely flexible options for data retrieval. The example of library indexing is one for which Cardbox is ideal, and I suspect that it will find application in many offices for indexing reports and abstracts.

Regular readers will know that one of Bell's Laws of Computing is 'Never use a computer when a three-by-five file card will do', but obviously this will need to be revised in the light of Cardbox. □

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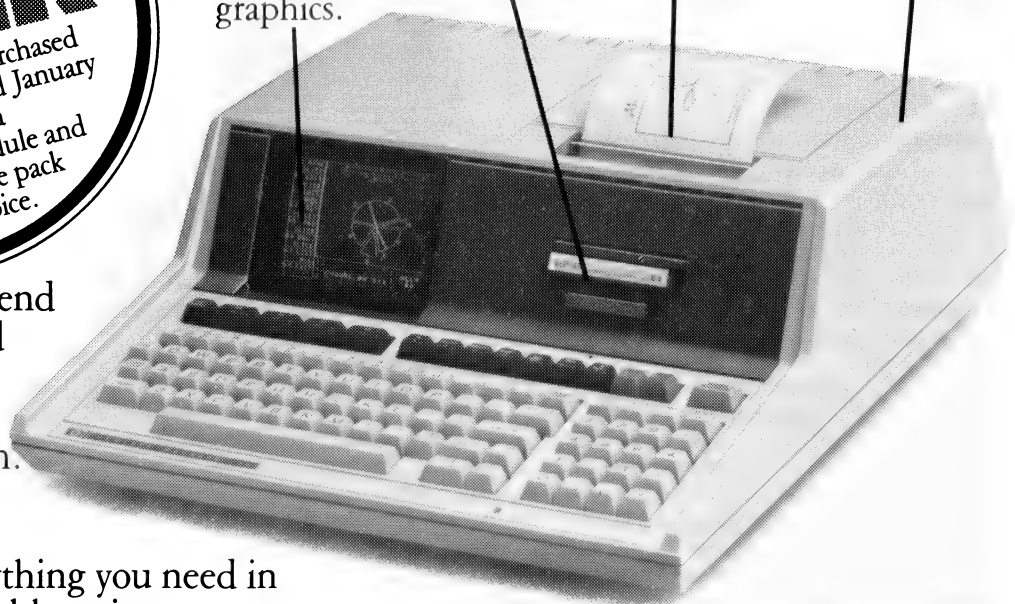
Sydney: 887 1611; Melbourne 890 6351; Adelaide: 272 5911; Perth: 383 2188; Brisbane: 369 8022; Canberra: 80 4244.

2. 210 kb data storage with Random Access Tape.

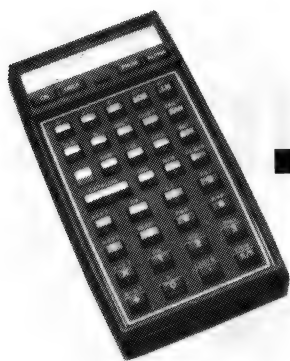
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The Mitiest Might?

The dividing line between micro- and mini-computer has been blurred for quite some time now, and the distinction between super-minis and mainframes is even more difficult to define. But what of the line between calculators and computers, writes Les Bell, as he reviews the Hewlett-Packard HP-41CV — the mite that might be a micro...

FOR SOME YEARS now, I have been having love affairs with Hewlett Packard calculators. It started back in 1974 or so with an HP-45 (9 memories — Wow!), and progressed with an HP-65, HP-67 and now to the latest in the line, the HP-41C and HP-41CV.

The 41 bears little resemblance to its 1972 progenitor. It's about the same size as the early HP-35 — smaller, in fact — but packs a heck of a lot more in. Although the keyboard follows the same basic layout, and it uses the same Reverse Polish Notation to key in calculations, there's not much else in common, apart from the expected Hewlett-Packard quality of design and construction.

The HP-41C and HP-41CV are basically identical; the only difference is in the amount of memory built in. The 41C has 63 registers of memory built in, while the 41CV has 319 — but the 41C can be expanded to a full 319 registers by plugging in memory modules.

At the top of the case is a 12 character alphanumeric liquid crystal display. Based on a segment, rather than dot matrix, design, the display is rather limited in the characters it can show compared to more recent devices such as the HP-75C.

Nonetheless, it can cope with all the letters of the alphabet in upper case, lower case a, b, c, d and e, mathematical symbols and punctuation.

The keyboard is laid out like a conventional calculator and the tops of the keys are marked with digits and functions like any scientific calculator, with a single shift key allowing access to shifted functions.

However, on the sloping faces of the keys are the letters of the alphabet, and when the machine is put into ALPHA

your computer



mode, these can be used to key in the names of functions for execution, or labels or text.

For example, to calculate five factorial (5!) one would key in:

5 XEQ ALPHA FACT ALPHA

and the display would return the result.

The basic 41 has over 130 functions, 68 of which are accessible through the function keys on the keyboard. The remainder can be accessed by spelling them out as in the example above. Most of them are functions used in programming, so this does not really slow the user down.

Programmable Function Keys

However, should you need an obscure function often in manual calculations (for example, standard deviation), then it can be assigned to a key and executed immediately in USER mode.

As well as USER mode, the display has annunciators for program mode, ALPHA mode, low battery indication, degrees/radians/gradians trigonometric operation and the status of the first 5 of the calculator's 55 flags.

Programming the 41 is simplicity itself. Just press the PRGM button, and the calculator will start storing your keystrokes for later repetition. With the addition of powerful looping commands, conditional statements, six levels of sub-

01	LBL "ARR"	Alphanumeric global label
02	"START TIME?"	This string in the ALPHA register
03	PROMPT	is displayed by this instruction
04	"DISTANCE"	
05	PROMPT	
06	"AVG SPEED?"	
07	PROMPT	
08	/	Divide distance by speed giving time
09	HMS	Convert to hours, minutes, seconds
10	HMS+	Add to start time in HMS format
11	"E.T.A. IS "	Place string into ALPHA
12	ATIME	Recall X as time into ALPHA
13	AVIEW	Display ALPHA register
14	PSE	Pause a second
15	"AGAIN "	Place string into ALPHA
16	XEQ "Y/N"	Go subroutine to ask Y or N
17	FS? 01	If flag 1 is set, then
18	GTO "ARR"	go round again
19	RTN	Otherwise, return (i.e stop) here
20	LBL "Y/N"	Beginning of subroutine
21	ENTER^	Push X register up stack, out
22	ENTER^	of harm's way
23	"Y/N?"	Append "Y/N?" into ALPHA
24	AON	Switch ALPHA mode on
25	PROMPT	Stop displaying ALPHA prompt line
26	AOFF	Switch ALPHA off
27	ASTO Y	Store answer into stack register Y
28	"N"	
29	ASTO X	Store "N" into stack register X
30	SF 01	Set flag 1
31	X=Y?	If X=Y (i.e. answer is N) then
32	CF 01	clear the flag
33	RDN	Bring back the previous X value
34	RDN	
35	END	Return to calling program

routines and powerful display control commands, extremely sophisticated programming is possible.

For example, here's a short sample program that illustrates some of the key points. It calculates the estimated time of arrival, given the start time (in hours, minutes and seconds), distance (in km or miles) and average speed (km/h or mph). It displays the result as "E.T.A. IS X:XX AM (or PM)" and then asks the user if he wants to do the calculation again.

The program is fairly straightforward, but a few points are worth mentioning.

Firstly, there's the use of alpha labels. All labels consisting of letters, with the exception of the single letters A — J and a — e, are global labels and can be jumped to from anywhere in the calculator's memory. The single-letter labels mentioned, however, and numeric labels, only have effect within the current program.

This means that if multiple programs exist in memory, they can use labels like 00 or B repeatedly, without getting mixed up. This also accounts for the use of the RTN and END instructions in the program; RTN is a subroutine return, or at the top level of the subroutine stack, a program end or stop. END has the same effect, but also partitions one program from the next in memory.

Like An Elephant...

The 41 maintains all programs and data in memory, even when switched off, so that programs have to be erased using the CLP instruction, which deletes everything from the global label specified back to the previous END and forward to the next END.

The use of prompts, which makes up the greater part of the program, allows the machine to be used by completely untrained staff. All they have to do is give the machine the information it wants, and press the R/S (Run/Stop) button.

The actual calculation simply divides the speed into the distance, giving the time as hours and a decimal fraction of an hour. However, we want the answer in hours and minutes, so the HMS instruction converts the trip time into hours, minutes and seconds. The HMS+ instruction performs addition of hours, minutes and seconds.

The ATIME instruction is not part of the calculator's standard repertoire; instead it is provided by the plug-in TIME module described below. This converts the time in the X register into a correctly formatted string in the ALPHA register, complete with AM or PM indication.

The XEQ 'Y/N' instruction calls the subroutine beginning with label 'Y/N'. This appends the phrase 'Y/N?' onto the end of the string in the ALPHA register, prompting the user to reply with a Y or an N. Depending on the response it will set or



reset flag 1, which the main program uses to decide whether to go round the loop again.

Perhaps the most striking thing about programming the HP-41 is that no longer need one decipher cryptic keycodes consisting only of numbers. Instead each instruction line is displayed in full, in English. This makes programming an absolute pleasure instead of the frustrating exercise it sometimes is with lesser machines.

Interesting Add-ons

Above the display, mounted at the 'rear' of the calculator, are four slots for plug-in modules.

These slots are the key to the real power of the calculator. They can be used to add extra memory to the 41C, or plug-in read-only memories containing applications programs. Other peripherals include a magnetic card reader, optical bar code wand and printer/plotter.

Those peripherals were made available soon after the release of the calculator. However, earlier this year, HP announced a new set of plug-in extensions which make the calculator considerably more powerful. For example, the Time Module adds a clock/calendar and stopwatch to the calculator, together with extra functions and facilities to make it more useful.

The clock/calendar module can be set up to display time in 12 or 24 hour formats, and the date in US or European formats. The clock runs continuously, and can be read by programs, or can even cause programs to execute at a particular time. An alarm feature allows the user to set alarms for any date or time in the future, repeating at any time interval after that.

Each alarm can either simply beep and display the time, display a 24-character message or run a program. In the latter case, the program can either turn the calculator on and run itself, or if it has a

high enough priority, interrupt another running program. The alarms are stored not in the Time Module, but in the calculator's main memory, independent of programs and data, so that there is plenty of room for alarms.

The stopwatch times down to one hundredth of a second, and has full facilities for storing up to 319 lap times or splits. On switching out of stopwatch mode, the lap times remain in the registers so that they can be printed out or manipulated by programs.

The stopwatch runs in background while the calculator is being used, and can be started, stopped, set and read by programs.

The module is even capable of calculating its own drift and applying a correction factor to keep itself accurate! Finally other functions allow calculations with dates and times, return day of the week for a given date, and so on.

The Extended Functions/Memory module is another interesting extension. The added functions fall into three main categories: programmable equivalents to functions which are not programmable as standard, functions to manipulate registers and flags, such as block moves and flag storage, and functions which search for characters and strings in the ALPHA register or convert ASCII to strings (like BASIC's CHR\$, VAL and so on).

This module also provides some interesting mass storage functions. It contains 127 registers of memory, and two more Extended Memory modules can be added, each with 238 registers. However, this memory is not directly accessed in the same way as the calculator's main memory. Instead, it is organised as files, in much the same way as BASIC organises disk files on a microcomputer.

In fact, since the 41 has a couple of external mass storage devices in the form of the card reader and digital cassette

drive (see below) perhaps the best way to think of these modules is as an M-drive!

Three types of file can be created: data files, ASCII files and program files. Program files are straightforward, as you might

expect. Data files consist of register information, and are read and written through the calculator's X-register. ASCII files are the most complex, consisting of text, organised into records.

There is full provision for creating files, positioning the files pointer (allowing random access) and reading and writing records. Records can also be appended, inserted or deleted.

As an example of how an ASCII file can be created and maintained, here's a simple telephone directory program.

The power of the HP-41 extends beyond these simple plug-ins, however. The latest series of extensions to the calculator are really quite amazing.

Using a special interfacing technique called the Hewlett-Packard Interface Loop (HP-IL), up to a theoretical maximum of several hundred devices can be connected in a daisy-chain around the calculator.

A number of HP-IL devices are now available, and more are planned. Those currently available include a printer/plotter, digital cassette deck with 131 Kbytes capacity and a video display which makes program editing particularly easy.

For engineers, a particularly useful piece of gear is a new digital multimeter with HP-IL interface and alphanumeric display. Using this in conjunction with a 41, Time module and cassette deck, the equipment can make periodic voltage measurement readings, convert them to, say, temperature and write them to tape for later printing.

The HP-IL devices can all be powered down into a standby mode and activated by the calculator, and the 41 can switch itself off, relying on the Time module to activate the program at the appropriate times.

Other Hewlett-Packard machines also use HP-IL, notably the HP-85, 86 and 87 series of computers, so that data can be transferred between the HP-41 and any of these devices. The new HP-75C briefcase computer also has HP-IL built in.

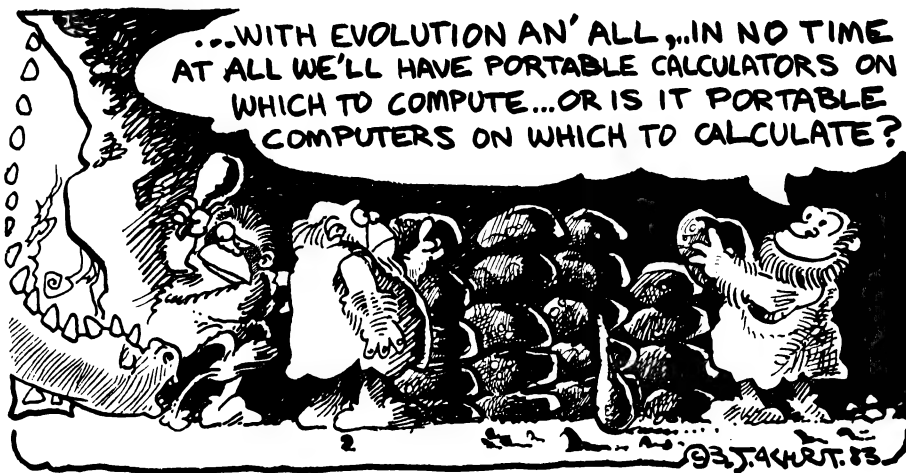
With these various options, then, the HP-41C or CV is a very impressive machine. Although it uses a calculator-style language, in every other respect it is a computer.

Mine goes with me everywhere, as it contains a list of appointments, reminder alarms, two telephone directories, personal budgeting and client time accounting data plus more conventional material like hex/decimal conversion and financial analysis programs.

Perhaps the best recommendation a reviewer can give a product is to buy one — on which basis the fact that I have two can be considered significant.

I got my HP-41CV and Extended Functions/Memory module from Metropolitan Business Machines in North Sydney, and the Time module from BBJ Computer Shop in Crows Nest. The HP-41CV is priced at \$497 (THE 41C IS \$383) including tax, while the X Functions module is \$123 and the Time module is \$123.55. □

01	*	LBL "TEL"	Global label to start program
02		SF 27	Set user mode
03		"TEL. DIR."	Tell user what this is
04		PROMPT	
05	*	LBL A	*** Append names and numbers
06		XEQ 00	Subroutine to get file name
07		RCLPTA	Get the file pointer
08	*	LBL 03	Target for loop
09		XEQ 02	Get name
10		APPREC	Append it onto file
11		"TEL?"	Prompt for telephone number
12		XEQ 01	General alpha input subroutine
13		APPREC	Append phone number onto file
14		GTO 03	Keep going round
15	*	LBL a	*** File create section
16		"FL SIZE?"	Nominate the number of names
17		PROMPT	
18		2	Two record required for each entry,
19		*	so double to get file size
20		XEQ 00	Get a file name into ALPHA, filesize is
21		CRFLAS	already in X, and create ASCII file
22		GTO 03	
23		LBL B	*** Get an extended memory directory
24		EMDIR	This lists all files with type and size
25		RTN	
26	*	LBL C	*** File list routine
27		XEQ 00	Get the file name
28		0	
29		SEEKPTA	Set pointer to beginning of named file
30	*	LBL 04	
31		GETREC	Get a record
32		AVIEW	Display it
33		GTO 04	
34	*	LBL D	*** Delete entry
35		RCLPT	Where is the pointer in the file?
36		INT	Back to beginning of this record
37		1	
38			Back to beginning of previous record
39		SEEKPT	Set pointer there
40		DELREC	And delete name and number records
41		DELREC	
42		RTN	
43	*	LBL E	*** Search for a particular name
44		XEQ 00	Get file name
45		0	
46		SEEKPTA	Open file with pointer at record zero
47		XEQ 02	Get name
48		ASTO 00	Store it in registers 0 and 1
49		ASHF	
50		ASTO 01	
51	*	LBL 05	
52		CLA	Get back the name
53		ARCL 00	
54		ARCL 01	
55		POSEL	Search for it in the file
56		X<0?	_1 if no match
57		STOP	
58		INT	otherwise back to beginning of record
59		SEEKPT	and set pointer there
60		GETREC	Retrieve record
61		AVIEW	and show it
62		PSE	for a second
63		GETREC	Get the next record
64		AVIEW	display it
65		STOP	and hold it there
66		GTO 05	
67	*	LBL 02	Subroutine to get name
68		"NAME?"	
69		GTO 01	
70	*	LBL 00	Subroutine to get file name
71		"FL NAME?"	
72	*	LBL 01	General routine to get ALPHA back
73		AON	
74		STOP	
75		AOFF	
76		END	



Specifications and Report Card

Unit:	HP-41C & HP-41CV Pocket Calculator
Made By:	Hewlett-Packard
Processor:	CMOS, presumably 8-bit, proprietary
Clock Speed:	N/A
RAM:	41C — 448 bytes, 41CV — 2240 bytes
ROM:	Plug in Application modules are 8K and 16K
I/O:	4 slots, plus expansion through HP-IL
Languages:	RPN
Keyboard:	35 key, calculator style
Display:	12-character LCD
Graphics:	User-definable character set on optional printers
Peripherals:	Printers, card reader, digital cassette, video display, digital multimeter, bar-code wand
Expansion:	Through Extended Functions/Memory modules
Best Points:	Fits under an airline seat (?), vast array of support software
Worst Points:	Won't quite run CP/M (?)

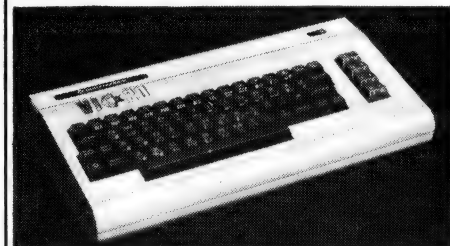
Ratings:	excellent	very good	good	poor
Documentation:	✓	(possibly world's best)		
Ease of Use:		✓		
Functionality	✓			
Support:	✓			
Value-for-money:		✓		
Extras Included:	Keyboard overlays, module holder, reference card, standard applications programs			
Options:	Applications modules, Extension modules, other peripherals, Solution Books, User's Library, newsletter			
Price:	\$497 (CV), \$383 (C).			
Review Unit from:	Metropolitan Business Machines, North Sydney			

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COBOL Questions

I AM A first year data processing student at Sydney Tech but do not know much about hardware at the moment. I am thinking of buying a microcomputer that would run COBOL or BASIC/COBOL.

1) What 'brands' in the lower price range are available in Australia and what are their approximate prices?

2) I can't fully understand why COBOL needs a bigger memory than BASIC and why the former must always be loaded from a disk and not 'built-in' like the latter.

3) Are there really many versions of COBOL and does each require a different storage capacity compared to others? Which version is the 'industry standard' or the best?

4) Is it true that COBOL can run only on the Z-80 microprocessor and that it is the 'industry standard' for microcomputers?

5) Is it true that you can buy a cheap BASIC microcomputer, get it converted to a terminal and then subscribe to use facilities of a distant mainframe (COBOL) for some real-time fees? If so, what are the expenses involved and what companies are in this hook-up business? Will it be cheaper than buying your own, say, medium-capacity COBOL micro?

ROLAND VERGARA
Asquith, NSW

In order: none of the low-cost microcomputers on the market anywhere in the world run COBOL. This is partly because COBOL is a business language intended to operate on disk files, and you don't get disks on low-cost microcomputers, and partly because most COBOL compilers cost about as much as a small micro anyway, since businessmen can afford to pay more (the logic of

which escapes me, but then Microsoft's pricing policies always have been a bit difficult to follow).

I don't understand why BASIC should always be 'built in' and not loaded from disk, thereby leaving space for other languages instead. Some people make a nice living out of boxes which move Tandy's built-in BASIC out of the way so that they can run CP/M. COBOL is loaded from disk because that's the sensible way to do things once you've got disks on a system (see 1).

Despite the best efforts of the US Navy, there really are many COBOL compilers around. Fortunately, the main differences between them are missing or 'unsupported' features; COBOL features must always work the same way, otherwise it just ain't COBOL.

IBM will be most offended at the suggestion that it can't run COBOL (point 4). Microfocus COBOL is extremely transportable, a la UCSD Pascal. After eight years writing about microcomputers, I understand less than ever what an 'industry standard' is. Zilog undoubtedly feels the Z-80 is the 'industry standard' for something, just as Intel probably feels the same way about the 8080 and MOS Technology about the 6502. I wonder if anybody's ever asked the industry?

Why buy a computer and convert it to a terminal? A terminal is cheaper and needs no modification. Seriously, you can run COBOL programs on a timeshare bureau, but that is not a good way to learn COBOL. Bureaus are more interested in getting you to run their programs, which keeps their programmers employed. Surely you can get some COBOL work

done at the Tech for free? The cheapest microcomputer alternative I can think of would be an Osborne running either Nevada COBOL or NPS (Naval Postgraduate School) COBOL (which comes with ALGOL for free!).

Two Questions

I HAVE two questions on different subjects, and perhaps you can help...

• CP/M; I'm confused and I know a number of other people are. Although I've read some articles on CP/M I am not clear. Can I take a CP/M disk from say an Apple and place it in a Sirius or TRS80 or Commodore C64. Are disks interchangeable in program or sequential files.

• MicroBee; I decided to take your magazine's suggestion and learn BASIC through your series of articles "Basic For Birdwatchers" and came across the two following lines in Chapter One:

```
10 R=5
20 PRINT "THE
CIRCUMFERENCE IS";
2*3.14159*R
```

to which the MicroBee replied
"15 28318
MIXED MODE ERROR

referring to the users manual for the error message it read: "The line being interpreted has a mixture of integer and real numbers in it. The methods of fixing ... INT or a FLT Function". Referring to these functions even confused me more. How do I get around it?

The next problem was this:

```
3 PRINT 24 + (4-2))
MICROBEE ERROR
MESSAGE
"UNPAIRED BRACKETS
ERROR"
```

Can you help please!

MERVIN DOUGLAS
Putney, NSW

Oh boy, I don't blame you for being confused; quite a few computer companies who use CP/M seem intent on keeping you that way.

Firstly, there are currently two different types of CP/M: CP/M-80, which runs on the 8080, 8085 and Z-80 microprocessors, and CP/M-86, which runs on the 8086 and 8088 microprocessors. Programs are not interchangeable between the two without rewriting, while data files, subject to the next limitation, are.

The second problem is that disks are generally formatted by the computer and the format is not necessarily compatible with anything else. In the 13cm world incompatibility is the rule rather than the exception.

All competently designed CP/M systems with 20cm disks can read IBM format single sided single density disks. That's why, although some people are putting amazing amounts of data onto 13cm disks, I still stick with my big, old-fashioned clunky 20cm disks — and laugh at people who have trouble getting third-party software for their machine.

As for your second problem, try:

```
10 R1 = 5.0
20 PRINT "CIRCUMFERENCE IS"; 2.0 * 3.14159 * R1
```

That should fix it. Read the bit in the manual about naming variables in MicroWorld BASIC — which is a bit non-standard in this regard.

For the next problem line, there's a value missing:

```
3 PRINT 24 + (3 * (4-2))
```

which should work. In BASIC, you can never have (and * together like (*.

THIS IS THE COMPUTER THAT WALKS TO WORK...

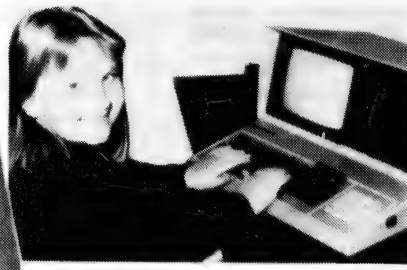
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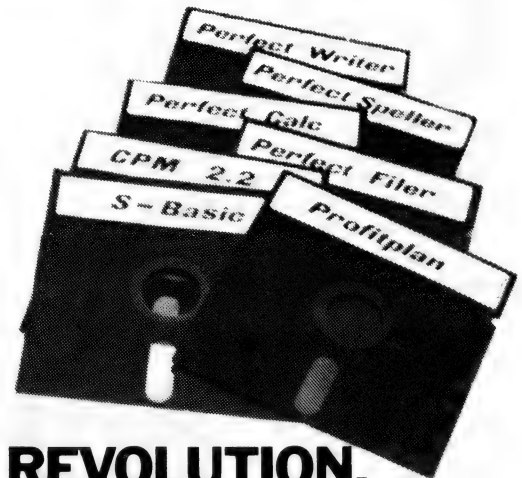


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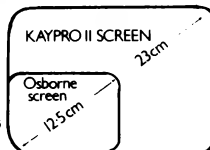
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Intelligent Interfacing

By Stephen D Page

THE CONVERSION of a typewriter to a letter-quality printer is gaining popularity among individuals and companies, because of the saving in cost as well as the benefits of being able to use the machine for 'off-line' work.

Micro-80, an Adelaide firm, has for some time been distributing, through Olivetti dealers, an interface which enables any 'member' of the Olivetti electronic typewriter family to operate as a printer for most microcomputers which have a Centronics parallel interface port. Recently, the company released the product — the Micro-80 Interface — on the open market.

The Olivetti daisywheel typewriters are reliable, powerful and well-designed. They are controlled by a Z-80 CPU, and feature a buffered keyboard, a short memory to facilitate corrections using the lift-off ribbon, a 'second keyboard' switch which enables an alternate character to be typed (including a pounds sign and diacritical marks for German, French and Spanish) and the availability of some useful characters, such as square brackets and a vertical bar.

Some models have automatic centring, paragraph indentation, right-justified decimal tabulation and automatic vertical lines for tables. The expensive ET221 has a screen for in-memory corrections, and features boldface and white-on-black printing. All models have a striking design, in white on black. The daisywheels come in a range of very attractive fonts, in spac-



ings of 10, 12 and 15 characters per inch.

The Micro-80 Interface package contains a socket that fits quickly and neatly to the back of the typewriter. The interface unit itself is in a plastic box with a short cable which plugs into the socket provided on the typewriter.

Characters sent by the computer are placed on the address lines of a PROM in the interface unit, and the typewriter is sent a code identical to that produced by the corresponding character on its keyboard. Timing circuits in the interface ensure that the typewriter is fed characters at an acceptable rate.

Unfortunately, the Micro-80 unit suffers from a number of problems. Several characters on the typewriter are unavail-

able via the interface, including close square bracket, half-space, tab, cents sign, fractions and the control switches. A more carefully designed PROM might have mapped some of the 'spare' ASCII codes into these keyboard characters.

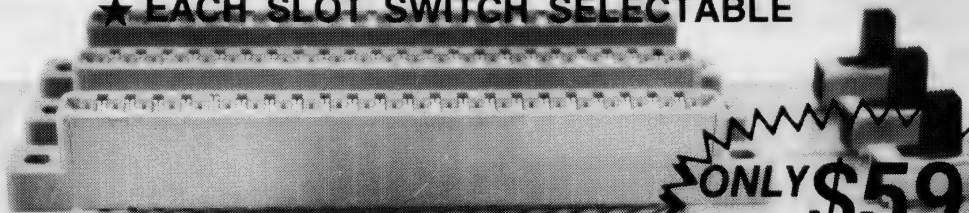
The documentation supplied with the interface is, unfortunately, substandard. In my manual, a page of essential installation photographs was missing, various nonexistent switches were described, the protocol suggested for an Apple was wrong, and there was no indication that the wiring on the 36-pin Centronics socket (described incorrectly as a 345-way card-edge connector) is quite different from the standard numbering.

Fortunately, after the initial difficulties were solved, the typewriter and interface produced excellent results, ideal for word-processing. The printing speed is slower than that of 'normal' printers, but the Olivetti's buffering ensures that it is fast enough for most applications. For listing programs with 'greater than' and 'less than' signs, uparrows and braces (Pascal sources) and backslashes, it is necessary to write a short program to convert these characters into something printable.

The Micro-80 Interface has had some problems, but, with a little care and thought, the company should be able to solve them all. The Olivetti electronic typewriters are fine machines — for low-cost, high-quality, printed output, the Micro-80/Olivetti combination must be strongly recommended. □

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Tandy's LDOS Revealed

By Richard Newcombe

DURING the latter part of 1981 Charlie Butler, the editor of *The Alternate Source*, one of the better American TRS-80 user magazines, is on record as having said: "The world seems to be switching to LDOS (fear not, NEWDOS fans, I still have not succumbed!)"

In April 1982, Butler wrote: "for my applications, LDOS is the best product on the market, and also the best documented".

Now comes news that Tandy has adopted the LDOS as the extended disk-operating system for more demanding TRS-80 users (it is also the DOS used for its hard disk drive). Tandy will be writing all future software with LDOS features and operations in mind.

Not only does this bridge the difference between the Model I and III in disk and program formats but also will re-establish a set of standards for disk systems. More recently, there have been serious incompatibilities developing between the various DOSs. The only other really serious DOS, NEWDOS 2.0, was not designed with compatibility in mind (particularly on the Model III).

As software writers always go first for the mass market (and compatibility), NEWDOS will now lose ground to DOS-PLUS and LDOS, and will have to change direction to compete in the long term (yet another version?).

The way is now open for a lot of sophisticated utilities that use LDOS features to be available to the average user as they are generally supplied direct to users by Logical Systems Inc, Misosys, Powersoft, Lobo and Galactic Software. Some of the most impressive software I have seen to run under LDOS is from Misosys, including a real jewel in its macro assembler and also a C Compiler.

Apart from different programming languages and computer brand loyalty, disk-operating systems must be one of the all-time greats for generating heated arguments verging on total bigotry.

TRSDOS is the standard, but the others provide extra capabilities and varying degrees of upward compatibility. For a variety of reasons, including simplicity of use, DOSPLUS is also very popular and must be recommended, particularly if all manner of fancy extras are not needed by the user.

LDOS was originally created from a need arising from the fact that, at the time, there was no DOS for the TRS-80 that

supported both single- and double-density and also 13cm, 20cm and hard disks.

Lobo Drives International required such a DOS for its LX-80 interface and LDOS subsequently arose from a debugged and enhanced form of VTOS4.0, although the present version is essentially all-new code.

I have fiddled with other DOSs, including NEWDOS-80 and NEWDOS 2.0, but unfortunately the latter has, with the Model III, become noticeably more incompatible with the TRS-80 operating system and vectors for machine language programs. Therefore, it took some forethought before jumping into the proverbial can of worms and buying LDOS. The final deciding factor was the quality of the LDOS backup, including the 100-page quarterly with its topical discussions, hints and user articles.



LDOS is upward compatible with TRSDOS and, in particular, uses Tandy's advertised I/O vectors, which certainly cannot be said of NEWDOS 2.0. A great part of its flexibility comes from the device independence, which allows LINKing, ROUTEing, FILTERing, COPYing, APPENDing and SETting of devices and files, as well as creating your own new logical devices.

As LDOS was intended to run with double-density disks and hard disks, provision has been made for easy manipulation of files and not be confronted with a screen full of unwanted data. For example, *DIR/CMD (MOD)* will list only those files with the extension CMD and have been written to or MODified since the last BACKUP.

BACKUP \$\$\$\$AUG\$/SCR:0 :1 (X) is one I use to copy all the SCRIPSIT (/SCR) files for the month of August from drive 0 to drive 1 without a system disk in drive 0 (that is, using the 'X' option).

It is also possible to copy from double- to single-density as the command can re-construct the files. The wildcard characters \$\$\$\$ is the format I use for the contributors name and the last \$ is for the article number (presuming more than one).

BACKUP -/CMD:0 :1 (NEW,D='06/01/82—'), another slightly complicated example; the *-/CMD* will exclude all CMD files. The NEW will force backup of only those files not already on the destination disk. The American-style date, 06/01/82—, means only files with creation or MOD flags on or after June 1 will be included.

PURGE \$\$\$\$JUL\$/SCR:1, and *PURGE /SCR:1 (D='07/01/82—07/31/82')*: Being able to use the same parameters as the commands (including MOD dates) means you can clean up a disk in a single operation, avoiding multiple KILLS. The first example cleans out files used for a previous newsletter. The second example is somewhat different, in that only those /SCR files that have been MODified during July will be PURGED.

These examples probably give you some idea of the flexibility of the system, but, until you are familiar with the commands, the standard TRSDOS commands produce the expected results. The user is not limited by the disk format, as LDOS looks at the disk and determines if it is single/double density or single/double sided, even if these are changed after power-up or initialisation of DOS.

One thoughtful nicety is the ability to restart a disk drive after it has been timed out (for example, if you forgot to put a disk in drive 0) by pressing SHIFT BREAK, thus avoiding a loss of system status through rebooting. If there is any danger of running out of disk space when much data is coming in continuously, placing 'I' after the filespec will force continuous updating of the directory and prevent a null file (if the disk space full error is generated).

System Configuration

As with other DOSs this command, or its equivalent, has many functions. Among those in LDOS are: defining special drive characteristics or disk driver

routines (as necessary for hard disks), configure for sending TRS-80 graphics to the printer (using the MX80/FLT for the Epson printer), adjust the LDOS system to run with certain speed-up modifications and so on.

Without going into too much detail, two aspects of the SYSTEM command are especially worthy of mention. SYSTEM (SYSRES=n) will allow certain LDOS SYSTEM overlays to reside in high memory, which will speed disk I/O operations as these modules will not have to be loaded from disk. In addition, it allows a non-DOS data disk with more space for files (and is also not cluttered by the DOS files) to reside in drive 0. For dedicated operations, more disk storage is available.

SYSTEM (SYSGEN=ON) creates a disk file of all system configurations and all utilities in high memory (the whole of the contents of protected memory are stored in the CONFIG/SYS file). When the system is BOOTed, the system is very rapidly configured to that desired from without having to wait for a DO file to load and set all the utilities and devices individually.

These are the main areas involved:

- All FILTERing, ROUTing, SETting LINKing of devices such as printer and RS232.
- All SYS overlays in high memory.
- All active background tasks (SPOOL, CLOCK, DEBUG).
- Any special utility routines in high memory.
- Other states including VERIFY (ON/OFF).

When A Printer Isn't...

Probably central to LDOS's qualities is its device independence which has, until recently, been more in the domain of mainframes and it takes a while to fully appreciate this one. It is possible to ROUTE or LINK devices such as the display, RS232 and printer. LINK produces simultaneous connections between devices as compared to reROUTEing. Phantom devices can be created or, in fact, it may be a disk file for example, the output to the printer can be directed to a named disk file.

In essence, device independence allows the redirection of I/O in any way without having to rewrite the machine language I/O drivers. For example by LINKing the RS232 to a user-defined device (which could ultimately be a disk file, or printer), all data passing through is diverted in the desired fashion. Again, it is even possible to use LPRINT from BASIC to send data to the RS232 output.

A very functional use I have found for the ROUTE command enables SCRIPSIT to act as a page-oriented word processor. By this means, I can view the 'printed'

product before the hard copy is printed. A ROUTE *PR TO filespec/SCR sends the printed output to a disk file.

This can be read with SCRIPSIT and the text is displayed justified, indented, centered and complete with headers and page numbering (2 bytes in SCRIPSIT need to be changed as this program does not recognise 0AH, which is sent to the printer). Using this method, you can avoid the annoying problems such as having tables split between two pages or have a heading on the last line.

One of the most useful aspects of LDOS is the FILTER and SET commands. With these all data passing between devices (and files) can be scanned, changed or acted upon depending on content. A number of filters and drivers (for example, printer and RS232) are provided and the manual gives a very comprehensive account of the basic machine language format such that you can customise your own.

The keyboard driver (KI/DVR) can print from the keyboard all 128 ASCII codes or characters, most space compression codes, most graphic characters and also the alternate special characters. There is

also a separate filter package available that provides for ASCII to EBCDIC conversion, DVORAK keyboard and so on.

Again for some examples:

*FILTER *PR USING SLASH0/FLT* will filter the device *PR (printer) using a program that intercepts every 'O' and causes the printer to backspace, slash the zero just printed and resume with the next character. Incidentally, the SLASH0/FLT program is one of the many utilities and tips provided in the LDOS quarterly.

*FILTER *PR USING PR/FLT (C=80, X-LATE=X'0C0D)*: another printer filter is used that is part of the LDOS package and it allows many parameters, such as form width and indent, to be set. Additionally, characters can be trapped and replaced using XLATE.

This example is one I use for downloading information from a mainframe. Apart from setting 80 columns, the top-of-page control code 0CH is replaced with a line feed 0DH. As a result, paper is saved since every cleared screen does not result in a new sheet of paper (one line feed only is produced on the printer).



SET *KI TO KI/DVR (TYPE,JKL): This keyboard driver activates the screen-print option and a 128-byte type ahead buffer that functions during disk I/O. A proficient typist can virtually ignore disk I/O or even the printer operations (if the SPOOLer is active).

Two other filters can be used simultaneously, one being the key stroke multiplier (KSM) and the MiniDos. The former allows the user to predefine all alphabetic keys as string input, such as the commands previously mentioned.

By pressing the CLEAR key and a letter, the string appears on the screen and can be automatically entered. Another use of this would be to predefine all alphabetic keys as BASIC reserved words to speed program writing. The MiniDos again uses predefined keys to execute a DOS command from within any program (to which control returns after).

LDOS Utilities

CMDFILE is one of those ever-popular utilities for transferring programs from tape to disk, changing the initial load address with an offset routine and also indicates the load addresses of all the program modules.

This latter aspect is very useful for those programs that load into several areas of memory, as disassembly and the like can otherwise be very confusing. Additionally, it is possible to put the offset address only on that part of a program that does not load below 4200H (the specific cut-off address is set by the user). Also, one can append a number of programs together into one module to be saved as a single file that will then be loaded as if they were one.

LCOMM is a sophisticated terminal program that cannot really be done justice here. Among the expected features are full/half duplex, echo of received characters, handshaking, file downloading, built-in menu, built-in spooler, extended ASCII codes and so on.

PATCH is also an interesting feature, in that two formats are used. One is the direct patch which permanently changes designated bytes. The other produces a module of code that is attached to the end of the program and this only alters the original program at run time. The latter has the advantage of being able to be removed easily using the "PATCH filespec YANK" option to resurrect the original program.

DEBUG is familiar in its original form but has some extended options built in. Included are block moves of memory, block compare, full block with a specific value, input or output to a particular port, jump over a byte during program execution, direct typing of ASCII characters into memory and disk sector read/write commands (including the directory).

In a sense, job control language is a form of "DO filespec" and executes a series of DOS commands with some frills. Essentially, it is a way of writing a program using LDOS commands. In particular, a selected (and possibly also user defined) sequence of DOS commands can be executed from a BASIC program. It is a unique feature and certainly not a gimmick. Conceptually, it is at first a little hard to comprehend but it is invaluable for complicated and dedicated uses.

Specifically, there are a number of particular features, including:

- Conditional statements that act on input to cause branching to other predefined sections.
- Input from the operator during run time (together with flashwd messages, timed delays or action being taken at a specific time). An ALERT option provides eight different programmable tones that can be sounded (via the cassette cable) to indicate what stage the job has reached.
- Labels that define entry points or logically discreet parts of the file.
- An INCLUDE option allows the JCL files to be included during run time.
- The various labelled parts of a JCL file can be executed from a BASIC program to which control returns on completion.

For example: `CMD'DO JOBFIL/CL (✓FIRST,NEWFILE)` will execute from BASIC, the JCL file 'JOBFIL' starting at the entry point 'FIRST' and pass the variable 'NEWFILE' (a file name) to the job stream. The JCL file can be created using BUILD or a text editor such as a Scripsit.

For professional application, this feature is invaluable and can take a lot of responsibility off the less experienced operator.

LBASIC

Obviously, any serious contender in the 'New improved DOS' stakes has to cater for the frills generally offered in relation to disk files and disk BASIC. Variable-length files are there and the commands can prevent a file being OPENed (created) if it does not exist or, conversely, prevent it from only being OPENed if it does exist already (the creation of new file was intended).

Sequential files have also been enhanced and it is possible to write to the end of a file without having to load it into memory and then modify it (as with random files, OPEN can be made conditional on whether or not the file already exists). A facility is provided to reset the end of file pointer back and reduce the file size.

The line renumbering and cross-referencing utilities are also very versatile. The latter, in particular, is very well designed, allowing the information to be sent to the printer or a designated disk file (any or all line numbers and variables can be cross-

referenced, being displayed in a most readable fashion).

Another aid to debugging is a single-step facility for BASIC which, once invoked, uses the spacebar to advance one statement at a time.

`RUN'filespec',V,linenumber...` Most DOSs offer the option of retaining variables between programs, but here we can also specify the line number where execution should start.

Happily, we also see the RESTORE nnnnn, which resets the DATA pointer to the beginning of the said line. I can now lay to rest those clever POKE methods of restoring the DATA pointer to a predetermined line.

As TRSDOS has progressed, so have the number of CMD'?' commands. With LDOS, any DOS command that does not affect protected memory can be executed from LBASIC. Apart from directory commands (with full control of options as if you were still operating under the DOS), one can do such things as `CMD'filespec'`. Remember, also, that the Job Control Language also can be executed from BASIC.

One interesting example is `CMD'SCRIPSIT/CMD'`. The surprising part is that once in SCRIPSIT, one can exit with BREAK END and return directly to the BASIC program that called it and continue with the next statement, as if no exit from BASIC has occurred. This also applies to VisiCalc, which opens the possibility of a very interactive combination with BASIC programs.

Documentation

The documentation took around 18 months to write and occupies some 300 pages. Extreme care has been taken in setting out such that the eye is not overwhelmed by detail and cramped print. Extensive examples are given to explain finer points and options. The biggest drawback is that every section is numbered separately to allow for future insertions as changes are made, and a detailed index is not provided.

The technical sections are so well written that it provides many insights into TRSDOS as well. Little is left untouched including a section of some eight pages describing how special driver and filter programs work and interact with the operating system. There are two sample listings to show the basic requirements and for some special applications little modification would be necessary.

With its user support and very reasonable disk update fee, I'm sure Logical Systems Inc will have much less trouble with software pirating than most suppliers.

If you already have LDOS and do not have a great amount of feedback from other local users, I would be glad to hear from you. Any enquiries can be directed to me at 36 Sturt Street, Adelaide 5000. □

VECTOR 4

VECTOR 4 SPECIFICATIONS

Central Processing Unit:

Processors: 8-bit Z-80B® and 16-bit 8088
(single or multiprocessor operation)
Clock Speed: 5.1 MHz
Memory: 128K Dynamic RAM Standard
Expandable to 256K

Video Display:

Screen: 12 inch high contrast green phosphor
20 KHz Horizontal, 60 Hz Vertical
Alphanumeric: 24 Lines x 80 characters
High resolution 16 x 13 dot matrix
High Resolution
Graphics: 640h x 312v pixels (B/W)
Gray Scale
Graphics: 160h x 312v pixels, 16 levels of gray
320h x 312v pixels, 4 levels of gray
Color Graphics: External RGB Monitor
160h x 312v pixels, 8 colors
320h x 312v pixels, 4 of 8 colors

Keyboard:

Detached, with 8035 auxiliary processor. Capacitance keyswitch with 91 keys, including 15 programmable special function keys, cursor control keys, and 10-key numeric pad for rapid data entry.
Coiled cable with Interface

Input/Output:

Serial Keyboard
Centronics Parallel Interface
Qume/NEC Parallel Interface
RS-232 Serial Printer Interface
RS-232 Communications Interface
RGB color signals
Programmable Tone Generators and Speaker
S-100 expansion slots

Disk Drives:

Type of Disk:	5¼" Floppy	5¼" Winchester
Total Capacity:	630 Kilobytes	5 Megabytes
Transfer Rate:	250 Kilobytes/sec	5 Megabytes/sec
Rotation Speed:	300 RPM	3600 RPM

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your computer



tutorial

Understanding Assembler Part X

Last month, Les Bell developed a hex dump routine, the first function of a monitor program. This month, he continues development with input/output routines, a command interpreter and incorporation of the dump routine...

NOW THAT we have a working hex dump routine, we can set about constructing a monitor proper.

As mentioned previously, this will perform some of the functions performed by CP/M's BDOS, so that programs written to run under it will be transportable to CP/M. Furthermore, following the CP/M practice of having a separate BIOS (Basic Input/Output System) which varies from machine to machine will allow us to simplify transportation between machines.

This month, there's very little theory to follow, just code to examine, so let's get into it...

As always, the first part of the program defines the constants which will be used — in this case mostly ASCII characters which will be used to edit input and control output. We also define the prompt character and the location to jump to when exiting the monitor; in this case, the CP/M warm boot location.

```
; 8080 / Z-80 monitor routines
;
```

```
ctrc   equ    03h      ; control-C for abort
acr    equ    0dh      ; carriage return
alf    equ    0ah      ; line feed
ctrh   equ    08h      ; backspace character
tab    equ    09h
ctrs   equ    13h      ; control-S for pause output
ctrx   equ    18h      ; control-X erases input line
clear  equ    1ah      ; TVI 910 clear screen cmd
```

```
del    equ    7fh

prompt equ    '>'
buflen equ    128
exit   equ    0000h
```

Now here's the program itself. We start with the initialisation routines which first load the stack and then jump to the machine dependent part in the fake BIOS. This does initialisation of hardware.

```
title    'monitor rev 1.0'

org      0100h

monitor:
    lxi    sp,stk
    call   boot
```

On return from the initialisation we enter the monitor proper. This consists of a simple loop which moves to a new line, puts out the prompt, inputs a line from the terminal and then interprets that line.

```
mon1:    call    crlf
          mvi     c,prompt
          call    putch
          lxi     h,buff
          call    getln
          lda     buff
          cpi     acr
          cnz     scanner
          jmp     mon1
```

This is an unusual approach for a monitor program: rather than input a line and interpret it, most simply input a character and then jump immediately to the appropriate routine.

I have chosen this approach because it is more general, and it can be used to interpret multiple lines of commands in a buffer, rather like a program. In this respect, this monitor is more like a PILOT interpreter than a monitor.

The advantages are that we have more general code which you can re-use in your own programs, and which can be easily expanded into an interpreter for a simple language. The disadvantage is that the monitor will be rather larger than normal.

Here's the routine which gets a line into the buffer for later interpretation. It is reasonably sophisticated, and allows simple line editing: in other words the backspace key works, and a control-X will delete the line, returning the cursor to the beginning of the line.

It also performs automatic case folding (though this is easily disabled for more general applications), and will automatically return to the calling routine when the 128-byte buffer is full.

```
getln: mvi     e,0      ; character counter
getln1: call   conin    ; get a character
       cpi     ' '      ; is it a control char?
       jc      getln4   ; yes, jump to handler
       cpi     'Z'+1    ; is it lower case?
       jc      getln2   ; no, carry on regardless
       ani     5fh      ; otherwise fix it
getln2: mov     m,a      ; store char in buffer
       mvi     a,buflen ; get buffer length
       cmp     e        ; have we reached it?
       rz      ; yes, return to caller
       mov     a,m      ; retrieve character
       inx     h        ; bump buffer pointer
       inr     e        ; and counter
       mov     c,a      ;
       call    putch    ; echo char
       jmp     getln1

getln4: cpi     ctrh     ; is it a backspace?
       jz      getln5
       cpi     ctrh     ; is it a control-X?
       jz      clline
       cpi     acr      ; or a CR?
       jnz     getln1   ; if not, ignore it.
       mov     m,a      ; otherwise, emit CRLF and return

crlf:  mvi     c,acr
       call    putch
       mvi     c,alf
       call    putch
       ret

getln5: ; control-H (backspace) handler
       mov     a,e
       ora     a
       jz      getln1
       mvi     c,ctrh   ; print backspace
       call    conout
       mvi     c,' '    ; then a space
       call    conout
       mvi     c,ctrh   ; then another backspace
       call    conout
       dcr     e        ; count down
       dcx     h        ; back up buffer pointer
       jmp     getln1   ; get next character

clline: mvi     c,ctrh   ; control-X (clear line) handler
       mvi     c,ctrh   ; print backspace

clline1:
       mov     a,e
       ora     a
       jz      getln
       call    conout
       mvi     c,' '    ; print space
       call    conout
       mvi     c,ctrh   ; print backspace
       call    conout
       dcx     h        ; back up buffer pointer,
       dcr     e        ; count back a char
       jnz     clline1  ; to beginning of line
       jmp     getln    ; and start all over
```

A special character output routine is used which also checks the input status.

If a character is present it is read, and if it is a control-S, output is paused, otherwise output aborts. Once paused, any character will restart output except control-C, which will abort it.

```
putch: call    conout
       call    const    ; test for input character
       ora     a        ; set flags to test for zero
       rz      ; no character, so return
       call    conin
       cpi     ctrs     ; control-S?
       jz      pawz     ; yes, pause
       jmp     monl     ; no, halt
pawz:  call    conin
       cpi     ctrc     ; control-C?
```

```
jz      monl          ; yes, abort
ret
```

Now we come to the heart of the monitor, a simple interpreter.

This simply starts at the beginning of the line and reads the first character, which must be a single letter command. If it's not, an error is flagged. Once the command has been identified, control is passed to the appropriate routine.

This is done by reading the address from a table (in alphabetical order) and then jumping to that address by using the PCHL (load program counter from HL) instruction.

This is the same basic principle as used by high level language interpreters in executing 'tokenised' languages such as BASIC.

You'll notice that almost all the entries in the table point to the error handling routine. Only the D (dump) and E (exit) commands have been implemented, but more will follow.

```
*****
*                                     *
*                               simple scanner                               *
*                                     *
*****

scanner: lxi     h,buf
       mov     a,m      ; get a character
       inx     h        ; point to next
       shld    cursor   ; and save cursor
       sui     'A'      ; convert to table index
       jc      error    ; if less than A then error
       cpi     'Z' - 'A' + 1 ; if > 'Z' then error
       jnc     error
       add     a        ; double A
       lxi     h,table  ; point to start of table
       mvi     d,0
       mov     e,a      ; put offset in DE
       dad     d        ; and add it to HL
       mov     e,m      ; get low byte
       inx     h        ; get high byte
       mov     d,m      ; get it into HL
       xchg
       pchl

table:  dw      error    ; A
       dw      error    ; B
       dw      error    ; C
       dw      dump     ; D
       dw      exit     ; E
       dw      error    ; F
       dw      error    ; G
       dw      error    ; H
       dw      error    ; I
       dw      error    ; J
       dw      error    ; K
       dw      error    ; L
       dw      error    ; M
       dw      error    ; N
       dw      error    ; O
       dw      error    ; P
       dw      error    ; Q
       dw      error    ; R
       dw      error    ; S
       dw      error    ; T
       dw      error    ; U
       dw      error    ; V
       dw      error    ; W
       dw      error    ; X
       dw      error    ; Y
       dw      error    ; Z
```

```
*****
*                                     *
*                               error handler                               *
*                                     *
*****
```

```
error: mvi     c,'?'
       call    conout
       call    crlf
       jmp     monl
```

To match this simple scanner there are several routines which will be used by the command routines to interpret the command line in the buffer. The first of these skips over spaces

and delimiters until it finds a meaningful character.

Note that it regards a carriage return as an error, and should therefore only be called when an argument is expected. Thus a missing argument will be correctly flagged as an error.

```
*****
*                               *
*               scanner tools   *
*                               *
*****

spskip:                ; skip over spaces and delimiters
        lhld    cursor
spskl:  mov     a,m
        inx     h
        cpi     acr      ; no cr expected, error
        jz      error
        cpi     ' '
        jz      spskl
        cpi     ','
        jz      spskl
        cpi     tab
        jz      spskl
        dcx     h
        shld    cursor
        ret
```

The getparm routine reads a string of ASCII digits from the buffer and converts them into a 16-bit binary value in HL. It returns when it runs out of digits.

```
getparm:                ; get hex parameter
        push    d
        push    b
        lxi     h,0
gp1:    call    getchar
        call    gp2
        jc      gp3      ; if carry set, we're done
        dad     h         ; multiply HL by 16
        dad     h
        dad     h
        dad     h
        ora     l         ; and add A to HL
        mov     l,a
        jmp     gp1

gp2:
        ; convert ASCII to binary, return with carry set if
        ; not a valid digit.
        sui     '0'      ; remove ASCII offset
        rc      ; character < 0
        cpi     'F'-'0'+1
        cmc      ; complement carry
        rc      ; character > F
        cpi     10
        cmc      ; complement carry
        rnc      ; ok, number 0 - 9
        sui     'A'-'9'-1
        ret

gp3:
        ; character not hex
        call    ungetch   ; put it back for next routine
        pop     b         ; clean up the stack
        pop     d
        ret
```

Getchar and ungetch are loosely modelled on the C language library calls.

The function of getchar is to get a character from the buffer, advancing the cursor as it goes, while ungetch does the reverse (by the time a routine knows a character is no use to it, it has read it, and must replace it for the next routine).

```
getchar:                ; get character from buffer
        push    h         ; save HL
        lhld    cursor    ; get cursor
        mov     a,m        ; get character
        inx     h         ; point to next
        shld    cursor    ; save cursor
        pop     h         ; restore HL
        ret

ungetch:                ; back up cursor
        push    h         ; save HL
        lhld    cursor    ; get cursor
        dcx     h         ; move back
```

```
        shld    cursor    ; save cursor
pop     h             ; restore HL
        ret
```

This dump routine is virtually identical to last month's, except for the code at the beginning which gets the dump addresses into DE and HL by reading the buffer line.

Also, notice that output is done by calls to putch with the output character in the C register.

```
*****
*                               *
*               dump            *
*                               *
*****

dump:
        call    spskip
        call    getparm    ; get start address
        xchg    ; put start into DE
        call    spskip
        call    getparm    ; get finish
        xchg    ; DE <- finish, HL <- start
d0:     push    h         ; save base pointer on stack
        call    hl6      ; print initial address
        mvi     c,tab    ; and tab
        call    putch
d1:     mov     a,m        ; get byte from memory
        call    h8       ; print a space
        mvi     c,' '
        call    putch
        inx     h         ; point to next byte
        call    d8       ; have we reached the end?
        jc      d2       ; dump remaining ascii
        mov     a,l
        ani     0fh      ; mask lower bits
        djnz    d1       ; if not zero, keep dumping
d2:     mvi     c,' '     ; else space and keep dumping
        call    putch
        pop     h         ; get base pointer
d4:     mov     a,m        ; get char from memory
        ani     7fh      ; strip msb
        cpi     ' '     ; if less than space
        cm      d7       ; replace with a dot
        mov     c,a      ; move into C
        call    putch    ; and print it
        inx     h         ; point to next
        call    d8
        jc      crlf     ; exit with a CRLF
d5:     mov     a,l
        ani     0fh
        jnz     d4
        call    crlf
        jmp     d0

d7:     mvi     a,'.'
        ret

d8:
        ; reached end yet?
        mov     a,e
        sub     l
        mov     a,d
        sbb     h
        ret
```

```
*****
*                               *
*               hex output routines
*                               *
*****

hl6:
        mov     a,h
        call    h8
        mov     a,l

h8:
        push    psw
        rrc
        rrc
        call    h4
        pop     psw

h4:
        ani     0fh
        adi     '0'
        cpi     '9'+1
        cp      hadj
        mov     c,a
        call    putch
        ret
hadj:   adi     'A'-'9'-1
        ret
```

This fake 'BIOS' contains the hardware dependent input/output code for the particular machine used.

You will need to re-write it for your machine; the only thing that must stay the same is the jump table at the beginning. Although the jump table is not used by routines inside the monitor, it will be used by application programs.

```
*****
*                                     *
*               fake bios             *
*                                     *
*****

data    equ    0e3f8h    ;data port
stat    equ    0e3f9h    ;status port
rbf     equ    00000100b ;receive buffer full bit
tbe     equ    00001000b ;transmit buffer empty bit

pio     equ    20h        ; parallel I/O chip (8255A)
lstat   equ    pio+2
ldata   equ    pio+1
pcont   equ    pio+3

; JUMP TABLE
fbios:  jmp     boot
        jmp     wboot
        jmp     const
        jmp     conin
        jmp     conout
        jmp     list
        jmp     punch
        jmp     reader
```

The boot routine performs hardware initialisation; in this case, setting up the registers of an 8255 parallel I/O chip to act as a Centronics printer driver. Later, we will add more functions to this routine.

```
boot:   mvi     a,10101100b ; set 8255 mode
        out     pcont
        mvi     a,00000101b ; set group b mode
        out     lstat
        mvi     c,clear
        call    conout
        ret

wboot:  jmp     monl
```

The console status routine is, obviously, highly hardware dependent.

If you are using a serial terminal with a UART chip, your const routine will look somewhat similar to this; if you have a machine with an integrated keyboard, a /a Apple and Tandy, it will be a call to the input routine together with some code to return the right result in A.

The same comments apply to the console input and output routines. If you are using a UART chip, note that you shouldn't

need the CMA instructions, which are used in my system because the UART supplies inverted data onto the bus, a hardware peculiarity of my system.

```
; console status routine, returns 0 if no char,
; 0FFh if character avail.

const:  lda     stat
        ani     rbf    ; mask rbf bit
        mvi     a,0    ; if no data, return with zero in A
        rnz
        dcr     a      ; otherwise put 0ffh in A
        ret          ; and return

; console input routine

conin:  lda     stat    ; get status from UART
        ani     rbf    ; mask rbf bit
        jnz     conin  ; wait for character
        lda     data    ; get character
        cma          ; adjust for negative bus
        ani     7fh    ; strip high bit
        ret

; console output routine

conout: lda     stat    ; get status from UART
        ani     tbe    ; mask tbe bit
        jnz     conout ; wait for buffer to empty
        mov     a,c    ; move character into A
        cma          ; adjust for negative bus
        sta     data    ; and send it
        cma          ; make positive again
        ret

list:   in      lstat   ; get lp status
        ani     2
        jz      list
        mov     a,c
        out     ldata
        ret

; other functions dummies for this example

punch:
reader: ret          ; return

buff    ds      128
        ds      64
stk     equ     $
cursor  ds      2

end
```

That completes the first version of the monitor. Next month, we'll go on to add more functions, such as changing memory locations and running a program. □

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Unix Against CP/M

THERE CONTINUES to be a lot of discussion about Unix as an end user operating system as distinct from a programming environment. The following commentary, an informative comparison between Unix and CP/M, was originally published in Kelly Smith's now defunct CP/M-NET newsletter in July 1981. Kelly has given his permission for me to reproduce it here.

Though the comparison is between Unix and CP/M 2.2, many of the points are just as valid in terms of comparing Unix to CP/M-86 or MSDOS.

Of course in the time since this was first published both sides have improved their standing. MP/M-86 and Concurrent CP/M-86 have moved at least some distance towards Unix in terms of power and flexibility while the Unix software base has expanded as more implementations of Unix arrive on the scene. Now it's over to Richard Conn to expound his ideas on Unix and CP/M:

CP/M and Unix: A Matter of Choice

An interesting discussion and controversy concerning the selection of an Operating System (OS) for a microcomputer based office automation system has recently taken place between and within members of DARCOM (US Dept of the Army Readiness Command) and others on the ARPA Network. Central to the controversy are two basic groups—those for the CP/M OS and those for Unix/Unix-like OS's.

This is the first such controversy I have observed that has taken any significant proportions, and with the advent of the new 16-bit microprocessors such as the 8086, Z8000, and 68000 and the 'Unix-like' operating systems such as OMNYX and Xenix, the question of staying with CP/M or going to the Unix environment is going to arise with more and more frequency.

Unix (first released by Bell Labs in 1969) has recently been hailed as the 'Operating System of the 80s' by several people, and I feel that now may be a good time to outline a comparison of CP/M 2.2 and Unix for future reference. Note that this comparison involves traditional Unix (not necessarily identical to the yet to be released Xenix).

Having done some research on and used both types of operating systems, I offer the following discussion for general dissemination. This discussion is divided into two parts — (1) a brief comparison of Bell's Unix and CP/M 2.2 and (2) a brief

discussion of the criteria for selection of the OS and my recommendation.

Unix And CP/M 2.2

The accompanying charts give a basic comparison of several key points of the Unix and CP/M 2.2 Operating Systems.

Data for the Unix part of the comparison was extracted from *The Bell System Technical Journal*, July-Aug 78, Vol 57, No 6, Part 2, ISSN 0005-8580. Data for the CP/M 2.2 part of the comparison was extracted from *Digital Research CP/M 1.4 and 2.0 Documentation* reprinted by Morrow Designs. The data presented is edited and augmented by comments from my personal experiences.

Commentary

From the point of view of a hacker (such as I consider myself to be), both CP/M and Unix are outstanding operating systems to experiment with and study. Systems programming on each is relatively easy to do, and both exhibit an extreme level of extensibility which may be utilised by systems programmers.

By this I mean that both OS's can be modified, tailored to a specific application, with a great deal of ease at the systems programming level. Each is flexible enough to be used to create a 'virtual machine' of the system programmer's design which can react in almost any way desired.

The particularly intriguing aspects of Unix to me are:

- The tree directory structures; using these, each user's projects and files can be logically grouped and organised as the user and/or his manager desires and special work environments, each with their own set of commands, can be easily created.

- The Shell (command interpreter) can be easily replaced, so specialised shells or even menu-driven command environments may be created with ease.

- Device transparency and redirectability is an outstanding concept! This allows instances such as a program which by de-

Unix	!	CP/M 2.2
* No Unique Version	!	* Unique Version
At least 5 versions exist:	!	Version 2.2 (Precisely Defined)
1. "Standard" maintained!	!	
by the Unix Support Group at !	!	
Bell Labs	!	
2. PWB/Unix (Programmers!	!	
Work Bench)	!	
3. Version 6 (distrib. !	!	
by Western Electric)	!	
4. Version 7	!	
5. The version currently!	!	
in use by the Computing	!	
Science Research System at	!	
Bell Labs	!	
* Multi-user/process	!	* Single-user/process
* File Size Limit	!	* File Size Limit
== 1e9 bytes (depends on	!	== 8e6 bytes
version); e=10 to power	!	
* Supports Random Access Files!	!	* Supports RA Files also
* Targeted to the PDP-11 Fam !	!	* Targeted to 8080/Z80
* Tree Directory Structures	!	* Dual-Level Directory
(Indefinite number of levels!	!	Structure (USER/DIR or
and Path Names)	!	SYS) and Limited Path (A:FN)
* Links Allowed	!	* Links Permitted (Extension)
(Different dir entries pt to!	!	
same file for disk space save)!	!	
* Device Transparency and Re-	!	* Device Transparency and Re-
directability Complete	!	directability limited to
(I/O routed to/from files	!	terminal I/O
and terminals with equal ease)!	!	

fault sends its output to the terminal (such as a directory program) to be forced to channel its output to a different device, a file, or even another process; the potential for applications of this facility is enormous!

- Parallel processing and co-routines are commonplace; this provides the very nice ability of a user to, say, initiate the printing of a file while he goes off and does something else — better yet, one user may issue several commands to be executed concurrently while he does something else.

- Conditional executions (ANDF, ORF), language constructions in the command language (IF, WHILE, FOR, CASE, and so on), and parameter and command substitutions (Shell variables) are novel and interesting concepts.

On the other hand, the intriguing aspects of CP/M to me are:

- The ability to divide logical projects and work files into user areas, with each user area having its own set of files and commands (any number of which may be transparent to the user); in a single user environment, this seems to be just as reasonable and useful as the tree structure of Unix.



your CP/M computer

By Bill Bolton

- The ability to replace the CCP (with some difficulty); this can be done easier in Unix, but it is not outside the scope of a system programmer to do this with CP/M (I have done it, making a major modification which greatly enhances CP/M's power — command execution of COM files under my new CCP searches the cur-

rent user area on the current disk, falls to user 0 of the current disk if not found, finally falls to user 0 or drive A: if not found, and finally issues an error message). This new CCP significantly places CP/M in a competitive mode with Unix in command execution (Unix traces up the tree for command execution).

(The CCP Richard is referring to is now available in the SIG/M User Group Collection as ZCPR...also the commercial program 'Microshell' is a CCP replacement which provides this facility as well as Unix-like I/O redirection — Bill.)

- CP/M's terminal I/O is redirectable, and this buys a lot of flexibility for the user; Unix, however, is equally redirectable and even more so.

- CP/M is very small, leaving much of the microcomputer's memory for the transient programs and utilities; size is sometimes a problem, but with the new microprocessors and their megabyte addressing capabilities, it should no longer pose such a problem.

- Finally, and perhaps most importantly, a wide variety of relatively high-quality software (screen-oriented editors, language

User Interface Comparisons		Other Items	
Unix	CP/M 2.2	Unix	CP/M 2.2
* Command Interpreter "Shell"	* Command Interpreter "CCP"	* Reliability - Good	* Reliability - Good
* Shell Easily Replaced	* CCP Replaced with some difficulty	* Security - Fair	* Security - Poor
* Not Part of Kernel	* Not Part of Kernel	* Use of HOL 90-95% in C - OS 95-100% in C - Utilities	* Use of HOL 60% in PL/M - OS 90% in PL/M - Std Utils
* Full Command Language is relatively complicated	* Full Command Language is simple	* ARPANET Interface (NCP) currently available	* No Equivalent (except for terminal pgms)
* All commands have redirectable I/O (<,<<,>,>>)	* Only terminal I/O is redirectable	* Extensive document preparation facilities ed - simple char-oriented editor Are there any screen-oriented editors or formatters? troff, nroff - formatters with macro expansion eqn - mathematical expr preprocessor tbl - table preprocessor spell - spelling check	* Extensive document prep facilities ED - simple char-oriented editor WM, EP - screen-oriented editors WS, MW - s-o edit/format TFS - formatter with macro expansion No known equivalent SPELLGUARD - spell chk
* More extensive wild cards (?,*,[cl-c2],[cl...cn])	* Simple wild cards (?,*)	speak - voice output diff - file comparator	No known equivalent FILCOM - file comparator
* Interprocess information transfer (pipes); coroutines	* No equivalent	* Online instruction learn -- tutor online help?	* Online instruction PILOT - CAI language HELP - online doc
* Type-Ahead	* Type-Ahead possible via BIOS	* Exotic applications yacc - compiler-compilers others?	* Exotic applications MUMATH - symbolic algebra
* Parallel processes	* No equivalent	* Languages C, FORTRAN 77, BASIC, SNOBOL, APL, ALGOL 68, PASCAL others?	* Languages C, FORTRAN IV, BASICS, APL, ALGOL 60, PASCALS, LISP, MUMATH, MUSIMP, PILOT, PL/I, COBOL others?
* Indirect command files; no limit to arguments (sh file arg1 arg2 ...)	* Indirect cmd files; 20 argument limit (submit file arg1 ...)		
* Conditional Execution (ANDF - &&, ORF -)	* No equivalent		
* Construct Execution if ... then ... else case ... in ... while ... do ... for ... do ... until ... do ...	* No equivalent		
* Shell Variables (Param sub) ex: user=myfile print \$user	* No equivalent		
* Command Substitution ex: d='pwd'	* No equivalent		

systems, communications systems, and so on) is currently available for CP/M, and I have not seen such quality systems yet being prepared for systems like Xenix (whose specs are not even out yet); there will be a definite lag before (and if) Xenix and other such systems obtain the software base currently in existence for CP/M!

Criteria for Selection

In making such a selection of operating systems, I feel that there are five basic questions which should be considered in the evaluation. In short, these questions are:

1. Is the OS adequate to meet the needs of the user? Is there enough memory for the required utilities and applications programs to run in (considering the memory management schemes employed by the OS)? *Very important* — is the OS responsive? (In the microcomputer age, I consider the time of the user/programmer to be much more valuable than the time of the machine, and an OS/machine which in any way slows the user down due to its lack of responsiveness should be re-evaluated).

2. Is the OS extensible (user-customisable for his particular application)? If I don't like the form of the command language or the commands of the editor, can I change these to meet my tastes? If I want a menu-based user interface, can I create one?

3. Is software produced under the OS on machine A easily transportable to the same OS on machine B (allowing, of course, media compatibility)? Source code generally is transportable provided the language is standardised (like C on Unix), but is the binary (including the OS 'hooks') also transportable as in CP/M?

4. Are software tools (editors, compilers, debuggers, and so on) available and effective for the target class of users?

For instance, I would much rather give my secretary a screen oriented editor which is easy to use as opposed to a character oriented editor in which she has to worry about the position of an imaginary cursor.

The tool should be easy to use, people should be quickly and inexpensively trained to use it, and it should be efficient (fast, capable, and requiring as little overhead as possible). Also, if I currently have an existing tool base which my people are already trained to use, I should think carefully about moving to a new OS just because it is new or promising.

5. Finally, is the software easily maintainable and reliable? Tools are seldom perfect, and improvements are constantly coming out. I would like to see the ability to modify my tools if I desire (I own them, don't I?) and be supported by the vendor as new releases emerge. Also, I want to

use proven, time-tested tools which I can rely on extensively.

Hence, reader, from my point of view, presented are the primary attributes of Unix and CP/M 2.2 and my basic set of criteria to judge these systems by. Coming from a largely CP/M environment (I already have CP/M as a base), Unix would win hands down (looking through the eyes of a hacker). Unix is a fantastic software tool which supports many interesting and exciting features, and, regardless of the use I put the Unix system to, I still have my CP/M base to support my current applications and interests (also including hacking).

The above statement, however, was from the point of view of a hacker with a CP/M base. The question posed, however, was from the point of view of the creation of a new system to support office automation. This is a management system in a manager's environment, not a hacker system in a programmer's environment. To make a choice for the manager, let's fall back to the five criteria outline above.

In my opinion, both operating systems come out about even in the first three items. Both Unix (Xenix?) and CP/M are generally adequate, extensible, and support transportable software for the automated office environment. In both cases, tools may have to be designed for specific needs (like XMSG for Unix mail and CBBS software for CP/M mail). Software support from systems programmers will probably be required to design and integrate the tools necessary for an automated office system.

Item four is perhaps a key point in the decision. CP/M already has a relatively-large base of quality tools for the target class (secretarial/managerial) of user.

From my observation of automated office environments such as my own CP/M environment, AUGMENT of Tymshare, and NLS under TENEX and TOPS-20, I note that the majority of the time (at least in my case, and I suspect most others) is spent in the electronic mail system and the editors. Consequently, tools for these environments must be most effective, allowing the user to get his job done in a minimum amount of time with a minimum amount of effort.

I am currently employing menu driven mail systems and fast screen-oriented editors for these functions, and I feel that (design-dependent, of course), these are the most productive alternatives available today. Specialized terminals designed with the editors in mind (such as DNLS Workstations) are a good goal, but general CP/M screen editors such as WordMaster, WordStar and Magic Wand are already available, reliable, field-proven and tested, and reasonably effective (I spend little time waiting on them/giving

commands and more time composing than I do with more conventional editors). I have not seen comparable field-proven software for the new Unix systems (they are not even out yet).

Finally, the fifth item, that of software maintainability and support, is concentrated on support from this (office automation) level. Your environment probably will not have systems programmers readily available, so you will probably be largely dependent on vendor support. Again, reliable, field-proven software is a big plus.

Two additional points should be brought out at this time as well: (1) the philosophy question of the state of the art; and (2) the philosophy question of the use of the new microcomputers (microprocessors).

Concerning the state of the art, Unix (Xenix?) is definitely closer to it than CP/M, but the operating system is just the resource manager of the computer system, not the key to the computer system.

The key to the system lies in the tools (utilities) which run under the operating system! These tools must be reliable, easy to use, and efficient in human terms.

From my observations, editors are the most instrumental of tools, and the WordMaster and (particularly) WordStar editors are the most powerful, reliable, and efficient editors I have seen (with the possible exception of EMACS on MIT and the DNLS editor). Such are already available under CP/M, and I know of no comparable editor under Xenix.

Concerning the philosophy question, many people still look at computer systems and operating systems from a 'conventional' point of view. The computer is typically viewed as an expensive resource which must be used as efficiently (in terms of computer throughput) as possible, but the microprocessor has changed that.

Under CP/M, I am currently running two microcomputers (total cost is under \$15,000) quite effectively. These machines and their software are designed to serve me, and to obtain a maximum of effectiveness for the user (measured in terms of minimum wait on the computer), operations such as number crunching programs and print spooling are sent to the second machine.

Too many times I have worked in environments such as a dual CYBER, DEC-10, or VAX where the machine's throughput was considered above the individual's effectiveness, and the responsiveness of these machines to me was far less than that of my own microcomputer!

I hope you consider this point; individual effectiveness and usefulness should be of prime concern, and consider the idea of supplying the single individual with more

than one processor/machine. Many of the pro-Unix types may cling to the old (machine-throughput) school of thought, but much is to be said for the user-effective (made possible by the low cost of the microcomputer) school of thought. The multiprocess capabilities of Unix are nice, but I consider multiprocessor capability to be nicer still!

In sum, my recommendation is to go with CP/M if your need is immediate. If not, wait and see what the Unix-like systems have to offer in reliability, tools, and competitively marketed (competition is very important for quality) software.

'Something better' is always coming out, but buying 'the best' (most recent?) software at a given time is not necessarily the best decision in the long run. New software is frequently field-debugged (not always, of course), and you should be wary of opening yourself up to do the debugging when you are trying to get a job done.

Further Comments, From Ted Shapin

Richard Conn has written a very interesting comparison of CP/M and Unix. Although my experience is only with CP/M, there are a few things that should be added to his report.

First, while Unix is proprietary to Bell Labs (and licensed by Western Electric) it is 'escaping' into the public domain. An active users group called the 'Software Tools' group has grown up around the book of that title written by Kernighan and Plauger. The book described the programming of some Unix-like tools in RATFOR. RATFOR is a FORTRAN pre-processor that has a syntax resembling 'C'.

The users group has greatly expanded and enhanced the RATFOR tools to include many of the Unix tools such as a shell, screen editors, pipes, and so on, and transported the system to many different computers.

You can get information on the Software Tools Group from Debbie Scherrer, Lawrence Berkeley Laboratory, University of California, Berkeley, CA. 94720. This approach embeds Unix-like tools in a host operating system.

Another source of Unix-like systems are those that were written independently of any Unix systems and hence are not

subject to Western Electric licensing. A complete 'C' compiler was written by a programmer at the Mark Williams Company in Chicago. The first system is for the PDP-11, the second for the Z8000. Bill Plauger's company, Whitesmith's in New York, has also written a 'C' compiler and a Unix-like system it can sell independently of W.E. licensing.

As far as CP/M editors go, I have heard very good reports of an editor called MINCE (*MINCE stands for 'Mince is not complete EMACS'; how's that for a self referencing system — Bill*) that is sold by a small company called Mark of the Unicorn started by people who recently graduated from MIT. They also sell a text formatter called AMETHYST that is like SCRIBE that runs on the DEC-20.

A Reply From The Unix Camp

Not all CP/M-NET readers were happy with Richard's Conn's analysis of the situation and the following month David Ungar weighed in with the following reply:

The discussion comparing Unix and CP/M is difficult to answer objectively. I have used both, although I have used Unix much more. Anyway, the problem is these comparisons don't convey the flavor of the system: the underlying worldview of the original design that no amount of fancy user-level software can completely mask.

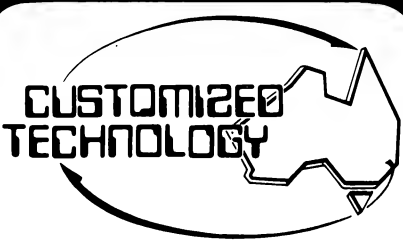
Unix has a 'delete' key that aborts a user program without any special code in the user program. CP/M has this polling philosophy towards I/O (just look at the BDOS interface) that makes it hard to poke programs in standard ways.

Berkeley Unix has a job control facility that permits the user to take any job (a pipeline of processes) and suspend it, re-start it in the background, or move it into the foreground. Thus, from any interactive program, one can stop it, and enter commands to the command interpreter without any code in the interactive program.

Unix has 'toolbox' facilities that let one combine programs in unexpected (by the applications programmers) ways. Pipes, the absence of OS-supported file formats, redirection, tools that support applicative programming (SORT, UNIQ, and AWK especially) provide the user with a friendly, powerful environment that allows one to shape the software to the human's needs, rather than vice-versa.

Finally, Unix may not have thousands of 'cottage' programmers out there plugging away with applications, but instead it has hundreds of researchers (such as Aho) building tools: there are many screen editors; there are several Pascals; there are word-processing programs that are simply amazing (such as AWK, an interpreter with both regular-expression matching and procedural language). TROFF and TEX are just two of the formatters available. Software control tools allow you to change any file and recompile everything that depends on it (and no more) with just one command.

Unix is not the be-all and end-all of Operating Systems, but it is the only reasonable choice for a 16-bit machine. If you can afford it, (and memory prices are going down all the time), you should get it. □



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Tandy's Educational Authoring

By Jim Rennie

AS A DEVOTED Apple II owner since Christmas 1981, I'm not necessarily the best person to review a new program for a TRS80, but I can claim to be relatively objective. John Barrett asked me to write about Author I after using it extensively before the Australian Computer Conference in August.

John had offered (*Your Computer*, March 1982) to provide a review of author languages in a later article; this review is a part of that commitment. The disk I used was a pre-release version loaned to me by Tandy to provide a view of the latest in TRS80 authoring methods.

I don't intend entering the debate of whether authoring languages are necessary, as I believe that anyone serious about creating educational programs needs either to be an experienced programmer or have access to an author language. Experienced programmers can also benefit from the use of an author language, but the constraints imposed by some languages tend to put the more experienced offside. If we are to use an author language, then it must have facilities to make program creation easier for the novice and the more experienced.

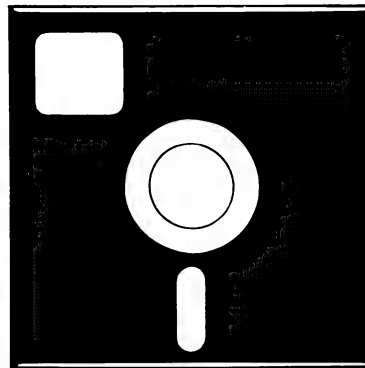
Tandy will shortly release a package called Author I, designed for use on the TRS80 Model III or Model I with at least one disk drive and a minimum of 32 kilobytes (48k is preferred). The package contains four major programs which allow the author to create a lesson, try it out, and set up student file and access systems.

The package is easy to use, with menu-driven access within each major program and plenty of helpful comments and error trapping of incorrect inputs. The programs are screen-oriented, meaning that you type what you want on to the screen as you go, and see immediately the effect of your efforts.

Compared to other authoring systems (such as Apple Pilot), where you have to create a set of program statements, then run them to see what the effect is, Author I is decidedly easier to use.

Author mode is the main mode for creating and editing lesson material. Before entering anything, you should have drawn a sketch of the flow of questions

your computer



SOFTWARE REVIEW

and text from one frame of information to the next, and also written out what is to be included in each frame. After booting the Author program, you are asked to choose whether you wish to add pages, or review and edit pages. Assuming this is your first use of the system, you will want to Add Pages, starting from frame 1.

The Add Pages option allows you, through another menu, to add a text, question, glossary or control page. A text page is the written material of the lesson and can include graphics and special characters. A question page is actually two pages of information supplied by the author. It includes the correct answer (which can be single letter, word or sentence), hints to be given if a student answers incorrectly, labels for use in providing a test score, and a method of controlling the number of tries allowed for the question.

Glossary pages are used to provide the student with a Help facility when words that may be unfamiliar are encountered. The author defines each difficult word on a Glossary page and the student can at any time call for the definition of the word. Finally, Control pages are used to direct the flow of the lesson. This is potentially the best feature of the package for the teacher looking for a method of individualising instruction. The program can be branched to different parts of the les-

son depending on scores obtained on prior questions or on an answer to a specific question. As each lesson frame has a unique number, it is essential to plan the sequence well in advance to take advantage of the system's capacity.

One nice feature of the system is the use of the break key as a method of indicating that you are finished with that page. When pressed in any mode, the program stores the information already on the screen as the required information for that frame, then, after incrementing the frame counter, clears the screen and returns you to the Page Select menu ready for the next frame.

Having written your text, question and control pages, you can then review them to see them as a student would. This is achieved by exiting from the Add Pages program and entering 'R' for Review and Edit. Again, the Review program has been well thought out, allowing a Search for either a particular page number or for a Key word or phrase (up to 20 characters long).

Once you have found the frame you wish to view, single letter key strokes allow you to move forward or backwards in the lesson to see the progression from one frame to the next, and to Edit a page or Insert or Delete a page from within the prepared frames.

Once in Edit Mode, the cursor moves into the text field and changes can be made to the written material. The cursor is controlled by the arrow keys but some care is needed to ensure you don't delete text by accidentally moving the cursor over it. Other facilities available include the ability to move blocks of text up, down, left and right; the ability to delete single lines; clear the screen; change from upper to lower case; and to toggle the cursor to either graphics or special characters mode.

SHIFT-@ causes the graphics mode to be enabled, in one of three further sub-modes: Drawing, not drawing and erasing. Each sub-mode is accessed by pressing 'O', '.' or 'ENTER'. The graphics available are the standard Block mode graphics that TRS80 owners love (my Apple is harder to program, but I do prefer dot-

addressable graphics).

Pressing SHIFT-@ again gets a third graphics mode called Special Graphics Characters. These are a collection of useful figures, including little stick men, arrows, pointing hands and some of the Greek letters that abound in mathematics and physics. This program uses the available graphics capability to its fullest, and gives the author very powerful editing facilities with just a few keystrokes.

So far I have concentrated my comments on the authoring/editing functions, as these are the elements that tend to consume so much time when creating courseware. The other programs on the Author I disk include Teach, Student and Print/Verify. The last is obvious, allowing you to get hard copies of programs for that rare occurrence when a disk crashes, and to Verify programs when created.

The Teach program is the normal mode for allowing the student to run any program that he is supposed to access, that he has not yet completed. Access to the program is through student name (surname, then first name), then through the standard Tandy password system. This process is well thought-out as it prevents students from accessing confidential information and from wasting time on programs that are not designed for them. It also prevents students from re-doing a program that is completed, overcoming the objections sometimes aired that there is no guarantee that what is recorded is the first try at a program.

These lock-out devices and other features are enabled by the use of the Student program. After booting Student, the teacher creates a class list for each program, adding passwords that can be unique for each student, and disabling the

BREAK key if required. Each time a student accesses a specific program, a record of the time taken and of scores on the questions answered is automatically entered in the student file for that program.

All these features add up to a powerful method of controlling access to each program and of monitoring student progress through a teacher-defined path. I have only mentioned some of the more obvious features of this set of programs and I could add quite a long list of other options and functions.

The amount of care with which the program's features have been provided is a

credit to Tandy and I hope the disk is available soon. I am sure Author I will be received well by those who have struggled valiantly with BASIC programs that never seem to work, or with pre-written software that rarely matches your educational goals.

When will it be available? Mike Lehman, Tandy's Educational Services Manager, assured me it will be released in Australia in early 1983 at possibly less than \$200.

For that price, and with the features available, I'm almost tempted to sell my Apple and buy a TRS80. Well, almost... ☐

Software Report Card

Program:	Author I
Made By:	Tandy Corporation (USA)
Useful for:	Creators of courseware/teachers
Hardware Req'd:	TRS80 Model III or Model I (minimum 32k with one disk drive)

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

Price: Approx \$200

Note: Only pre-release software and part handbook were available to preview

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Super Dick's Super 80

By Robert Tanton

EVEN THOUGH the Dick Smith Super 80 kit computer has been available for 18 months or so, there has been little published comment about it.

I became the owner of one of these machines in November 1981. I am a pupil at Deakin High School in Canberra, where we have a TRS80, two Apple II and six Sinclair ZX81 computers. However, it wasn't easy to get adequate time on the school machines, and a home computer seemed to be the way round the problem.

At the time, the Dick Smith Super 80 seemed to be a reasonable solution. We built it from the board, purchased from Dick Smith Electronics, and components bought in separately from numerous sources. It features S100 bus, 48K RAM and BASIC in ROM.

The basic kit, at \$239, is a very limited machine. An extra \$12.50 gives you BASIC language on tape, but, with a loading rate from the cassette of 300 baud, it takes a long time to get the 9K BASIC into memory. The best option is to pay \$49.50 for BASIC in ROM.

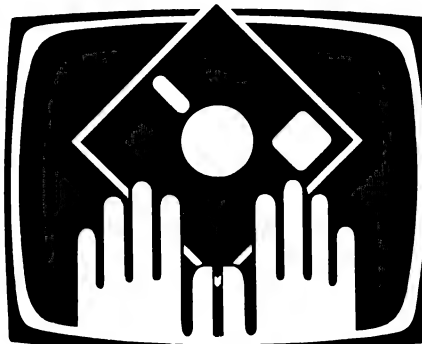
To be worthwhile, you really need the case, plus the IC socket set to make the chip replacement and trouble-shooting easier. This will set you back \$364, but you'll have a machine with positive-feel Qwerty keyboard, 16K RAM and 12K ROM. The ROM contains both the monitor and BASIC programs.

Other features available at extra cost are an S100 expansion bus; a lower-case character generator with inverse video and limited graphics; a serial/parallel input-output board to plug directly into the S100 expansion socket; and 32K extra RAM. This brings the total cost of the computer up to \$562. Add another \$19 for the BASIC manual and the technical manual.

Despite its initial promise, and an advertising campaign that has promoted it as a games and business computer, the machine has many limitations for serious use. However, these are offset by some very good features for the beginner, not the least of which is the actual experience of building a computer and getting it up and running!

With no graphics on the standard character generator, many interesting games cannot be played on it. Even the

your computer



OWNER REPORT

new character generator is limited with its Low-res graphics, although the inverse video could be useful.

However, help may be at hand, as El Graphix, of Croydon, Victoria, is marketing two chips with different graphics for the Super 80, and costing \$10 less than the price of Dick Smith's alternative offering. Unfortunately, the El Graphix chips don't provide lower-case letters or inverse video.

The second major drawback is that software support has not appeared, even though more than a year has passed since the introduction of the machine. If you happen to read this, Dick, let's get some good software on the move for the Super 80!

While it is possible to type in programs from other sources, whether for games or

other purposes, two more drawbacks become apparent. Most games need a larger screen size than the 32 columns by 16 lines provided by the Super 80 — particularly games like Super Star Trek.

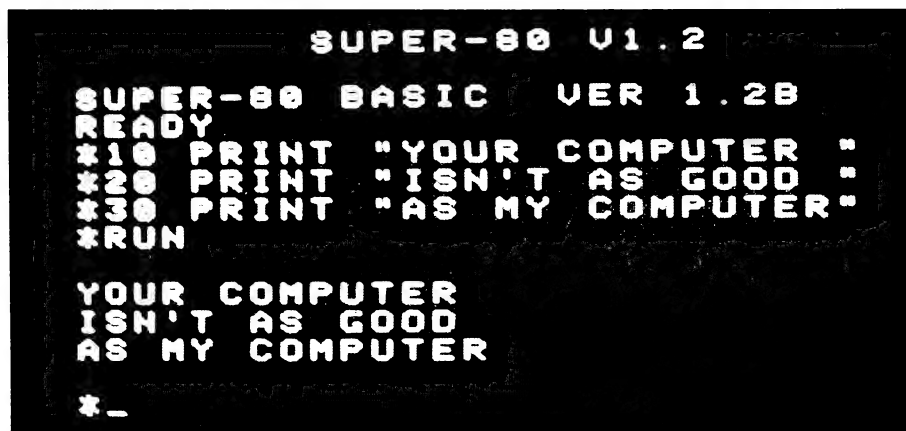
It also means that the computer is not much use as a low-priced word processor, although Dick Smith Electronics says the system is quite capable of running CP/M.

And the other drawback? The computer uses a development of Tiny BASIC. Although it is 9K, it is sufficiently different from most published programs (usually in Microsoft or Tandy BASIC) to need major modification of many programs.

It seems to be similar to the 12K Microworld BASIC used on the MicroBee, and apparently based on the old Dartmouth standard — which, as one reviewer has commented, is best forgotten. For the beginner who is not yet familiar with programming, such changeover can be a daunting task.

While this must deter some would-be purchasers, it might be argued that the machine is primarily intended for the person wanting to get first-hand knowledge of computer hardware and software. However, the beginner will certainly encounter problems in implementing the BASIC, though the Super 80 does have an excellent and easily used EDIT mode to correct mistakes.

The technical manual is excellent, particularly in its test procedures during insertion of chips. However, I didn't follow these but used the simpler test routine published in 'Electronics Australia'



(September 1981 issue). This proved straightforward, and the machine worked perfectly at first switch-on.

The only problem was with setting up the cassette interface, which wasn't as easy as it appeared from the instructions. Saving was no problem, but repeatedly a 'H' (Hardware) error message was produced during loading from the cassette, despite the correct voltage being set on the 711 comparator. Trial and error finally saved the day.

The BASIC manual is in two parts, a teaching aid followed by a description of the various functions. Both sections need re-writing for the beginner to programming, as in many places they are not clear to the novice.

As it stands, the manual is of moderate standard; to supplement it, the user needs the second edition of David Lien's 'The BASIC Handbook'. This is particularly useful for the ways it gives for simulating functions that the Super 80 doesn't support.

The main advantage of the Super 80 is in the monitor mode and machine code. In monitor mode, the only error report is a simple 'EH?' but at least you can really explore the computer.

Using the H command, you can see

what is in memory — see what makes your program run. Using the 'E' command, machine language programs can be typed in, and run at least 10 times faster than in BASIC. And using the 'O' command you can make the computer do almost anything. This monitor mode is the one that many personal computers don't provide, so you can't really explore them.

Mind you, the rather pitiful monitor manual produced for the Super 80 isn't a lot of help to the novice. It presupposes a lot of prior knowledge of computers and, like the BASIC manual, needs revising for the novice.

Overall, the Super 80 is a very good project for a beginner in computing, despite the drawbacks I've mentioned. The lack of reasonable documentation forces you to learn about the computer, and exploring the Z80 machine language is really exciting. Before getting into this area, though, I'd recommend the purchase of Rodney Zaks' book 'Programming the Z80'.

If you're looking for a games or business computer, the Super 80 shouldn't be on your list. But if you're after an inexpensive means to learn about programming and Z80 machine language, this is a good computer for you. □

Specifications and Report Card

Unit:	Super 80
Made By:	Dick Smith Electronics
Processor:	Z-80
Clock Speed:	MHz
RAM:	16 K, expandable to 48K
ROM:	2 K with monitor only, 12K with monitor and BASIC in ROM
I/O:	Television modulator (Channel 1), keyboard, cassette. S100 optional, with option of board for serial and parallel interface.
Languages:	BASIC, Machine language
Keyboard:	QWERTY, positive feel
Display:	32 × 16 upper case; lower-case generator option available with inverse video and some graphics

Ratings:	excellent	good	very good	poor
Documentation:				✓
Ease of Use:			✓	
Functionality				✓
Support:				✓
Value-for-money:				✓
Price:	\$239 (basic kit)			

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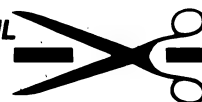
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Apple Keyboard Update

By Steven Zanker

THERE ARE three important screen characters not available from the keyboard of the Apple — the left bracket (CHR\$(91)), the backslash (CHR\$(92)), and the underscore (CHR\$(95)). The program described here will make these available.

You should be familiar with hexadecimal numbers to understand this article, as all figures are in hex unless otherwise stated.

On page 62 of the Apple II Reference Manual, several subroutines in ROM (Read Only Memory) are described. At FDC0 there is a subroutine called 'RDKEY', which is stated as the standard input subroutine. While ROM cannot be changed, the description mentions that the subroutine whose address is stored in locations 38 and 39 (56 and 57 decimal), is called by 'RDKEY'. This, as mentioned, is usually 'KEYIN' located at FD1B. So we now have the basis of the program: change the pointer in 38 and 39 to a RAM address, and rewrite the 'KEYIN' subroutine so that it will swap three control characters for the three screen characters.

In the following input lines, do not type the first character (either ']' or '"') as they are only to remind you whether you should be in BASIC or Monitor mode. Type:

[CALL-151

to enter the monitor. Now display the values of 38 and 39 by keying:

*38.39

Instead of displaying 0038- 1B FD, with the Disk Operating System (DOS) in effect 0038- 81 9E appears, which points to 9E81 (remember, high byte follows low byte), a location in DOS.

By changing the values of these locations, you will disable DOS for input. You see, DOS is an add-on extra; it is not part of the initial system. It is located in RAM and is loaded from the disk when you switch on or 'reboot'. Because it is an 'extra', it must seize all data flow. When you type 'RUN HELLO' the command never reaches the BASIC operating system, because DOS has seized, used, and wiped it from the keyboard buffer. Therefore these values must not be changed.

However, somewhere within DOS there should be a set of pointers referring to 'KEYIN' (FD1B), otherwise with DOS in

effect, you would not be able to use the keyboard. Enter

*AA55.AA56

and the computer should respond with:

AA55- 1B FD

1B FD are the required values, so AA55 and AA56 are the required locations. We can change the values of the two locations with no effect on DOS.

Now type in the machine language program which will alter the pointers, and provide a new 'KEYIN' subroutine:

```
*300:A9 0D 8D 55 AA A9 03 8D 56 AA 60
00 00 E6 4E D0 02 E6 4F 2C 00 C0 10 F5
91 28 AD 00 C0 2C 10 C0 C9 9D D0 03 A9
DB 60 C9 9E D0 03 A9 DC 60 C9 99 D0 03
A9 DF 60 60
```

and press return. There should be a space between each pair of digits after the address '300:'. For a 32K system, replace the fifth and tenth pairs of digits (both AA) with 6A. Now save the program by typing:

*BSAVENEWKEYIN,A\$300,L\$36

and press return. You can now execute the routine by typing

*300G

or re-enter BASIC by typing

*ctrl-C

then pressing return, and keying

[CALL768

The left bracket can be accessed by each ctrl-shift-M keypress, the backslash by ctrl-shift-N (or ctrl-uparrow), and the underscore by ctrl-Y.

The keys can be changed for any of the three characters. In the monitor the locations are 321, 328, and 32F; in BASIC they are (decimal) 801, 808, and 815. To the chosen character value taken from pages 138 and 139 in the Applesoft manual add 80 (128 decimal) and poke into memory. By placing the value A5 (25+80) or (dec) 165 (37+128) into 321 (801 (dec)), the percentage character will be swapped for the left bracket.

Pressing reset will return the keyboard to normal. To reinstate, type 'CALL768' or '300G'. The program, if saved on disk, can be BRUN without loss of any BASIC program, it remains in effect when keying in a program, and during program execution. □

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your KAYPRO computer

By Jeff Richards

WELCOME to our newest column, specifically prepared for Kaypro II owners.

Through this column we hope to provide Kaypro owners with useful advice and tips to permit them to get the best use out of their machines. Because the Kaypro II is designed to run under CP/M then anything of interest to CP/M users will be interesting to Kaypro II owners, but we hope to concentrate on features of the machine that are different and unique. We will also be dealing with techniques for implementing some of the CP/M enhancements on the Kaypro II.

Firstly, terminology. Since there seems to be no such animal as the Kaypro I, all future references will simply be to Kaypro.

Most owners would be aware that the heart of their machine is actually the ubiquitous Ferguson BigBoard, originally designed by Jim Ferguson and distributed in Australia both as a single board kit and as a complete system by Rod Irving.

The board layout has been rearranged, and a few features left out, but the internal logic is identical. Of course, the Xerox 820 is also a BigBoard, but the changes that Xerox made are a bit kK extensive. Nonetheless, the vast amount of information available for the BigBoard and the Xerox 820 will be of interest to Kaypro users.

One initial difficulty Kaypro users face is the availability of CP/M disks in 13cm double density format. One way around this is to use the communication facility provided with the Kaypro to download files from 8 inch machines or RCPM services, while another alternative is to use the software distributed for the Xerox.

However, many distributors of CP/M software are already providing it in a format suitable for the Kaypro, and with the rapidly growing number of machines 'Z!' field the availability of software in this format is likely to increase rapidly.

With any CP/M machine the availability of the source of the BIOS (Basic Input Output System) is of critical importance. Unfortunately, Kaypro distributor President Office Machines has so far chosen not to distribute the BIOS source with the machines (don't be fooled by the SBIOS.-ASM file on the master disk — this is just a copy of the CP/M skeletal BIOS).

The BIOS is available as part of the TINKER kit, but the price is exorbitant. Nonetheless, we hope to spend some time examining the BIOS and the way it works. The system storage areas will be of special interest.

The monitor source code also appears to be unavailable, but in this case the pro-

cedure for using the routines in the monitor, even without the source, is very straightforward.

Unfortunately, unlike the original BigBoard and the Xerox, the monitor is not copied into RAM in high memory. This means it is not possible to modify the monitor 'on the fly'. However, as most of the functions are parameter driven it is possible for user programs to modify the parameters to achieve the desired effect. In a future column we will examine the procedure for downloading the monitor into a disk file.

For those interested in making monitor changes permanent we will describe a simple EPROM programmer that uses only four chips (plus the EPROM) and can be driven from the parallel port. The programmer could also be used to blow a revised character generator EPROM if you have requirements for special screen characters (the Greek characters are very fancy, but not particularly useful).

In a future column we will also develop the algorithm for calculating the absolute RAM address corresponding to a relative screen address, thus providing user programs with the ability to perform very fast screen updating. Unfortunately this algorithm is not simple, as hardware assistance has been utilised to ensure an acceptably fast rate of screen scroll. But the analysis of the screen RAM map and the scroll register provides an interesting insight into the internals of the Kaypro.

Unlike many CP/M machines, the Kaypro comes with the IOBYTE fully implemented. This is a standard CP/M memory location that contains information about the physical peripheral device that is currently assigned to the logical CP/M device — it is this byte that gets altered by the CONFIG program. In future columns we will be discussing how user programs can modify the IOBYTE so as to redirect output to any of the available devices.

The capability of the Kaypro to interface with peripheral devices is simple but powerful. Connection to the outside world is via one PIO (parallel input/output) device. The PIO is configured as a Centronics port, but can be used as a simple 8-bit output port. The serial port can be programmed in a large variety of ways to interface to almost any serial device. Details of programming these devices will be covered in future columns.

Eighteen of the Kaypro keys can be assigned alternate codes. In a future column we will discuss how user programs can assign these key codes, and how the

CP/M SUBMIT facility can be used to set up appropriate assignments and then execute the applications program, saving a fair amount of tedious operator typing.

A first question for many Kaypro owners will be 'Can the machine be expanded?' The answer, as might be expected, is 'Yes — within limits'. Provision has been made on the PCB for a chip that will decode the two disk drive select lines, enabling up to four drives to be used with no change of software, but none of the hardware has been installed. This will perhaps be an option sometime in the future.

The data and port control lines for port B of the GP (General Purpose) PIO are brought to pads on the PCB, so it would be possible to install a connector and use it. The lines are not buffered, however, so it would be risky to use it as a general purpose device. A clock with its own battery would be an ideal application — the interrupt driven I/O structure would make it possible to continuously display the time on the screen.

Port B of the System PIO (which would have been the keyboard input on the original BigBoard) is also brought out to a row of pads on the PCB, but the same comments apply as for the GP PIO. The documentation indicates that Request-to-send and Data-terminal-ready for Port A of the SIO are also available at PCB pads, but this does not appear to be the case. It would be pointless anyway, as Port A is used for the keyboard.

Video signals are also available at PCB pads, so an external monitor could be driven. Interestingly, the address space in bank 2 between the top of the EPROM and the bottom of screen memory is fully decoded, although no provision has been made for installing extra EPROM or static RAM in this area. A possible future project is to add additional EPROM by piggy-backing onto the existing chip.

Finally we come to the standard software supplied with the Kaypro. As this has just been completely revised not much is known about it at the moment, but we hope to be able to provide detailed information on the standard software, with hints, tips and techniques for extracting the maximum performance from it. Other software, not particularly designed for the Kaypro but suitable for it, will also be covered.

We are hoping for considerable feedback from Kaypro users, both as requests for topics to be covered and information about the machine and how to use it. As one of the neatest, most powerful, and

most cost effective CP/M machines available on the market today it has considerable interest for both business and hobbyist users and, with your assistance, we hope to be able to sustain and encourage that interest. □

TABLE 1 - I/O port PCB pad designations.

PCB Pad	Device	Port	Signal
E7	GP PIO	B	D0
E8	GP PIO	B	D1
E9	GP PIO	B	D2
E10	GP PIO	B	D3
E11	GP PIO	B	D4
E12	GP PIO	B	D5
E13	GP PIO	B	D6
E14	GP PIO	B	D7
E15	GP PIO	A	PSTB
E16	GP PIO	B	PSTB
E17	GP PIO	A	PRDY
E18	GP PIO	B	PRDY
E27	SYS PIO	B	PRDY
E28	SYS PIO	B	D1
E29	SYS PIO	B	D0
E30	SYS PIO	B	D3
E31	SYS PIO	B	D2
E32	SYS PIO	B	D5
E33	SYS PIO	B	D4
E34	SYS PIO	B	D7
E35	SYS PIO	B	D6
E36			GND
E37	SYS PIO	B	PSTB

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your TRS80 computer

R.G. Stevenson

IT SEEMS the newer recruits to hobby microcomputing are less interested in building assorted electronic bits into computers than were their earlier compatriots. I've noticed such kits are now marketed on 'the thrill of building', as opposed to the earlier ploy of saving money. And with the drop in price of ready-to-go computers the cost saving has also lessened.

The reason I mention this here is that with the Model I no longer being sold, the obvious choice is gone. And I imagine some readers of these columns will not have made up their minds yet, so I offer the advice to beware of a kit if you are not buying it just for the fun of assembling. Not that I see anything wrong with such a reason, just that I suggest an analysis of one's motives before buying.

Several builders of such kits have been highly delighted that they've had something to keep their attention for many moons, but those same people are the first to admit they'd not have attempted it had they not the expertise to fix any faults they developed. And in one case this meant re-designing the circuitry to use locally readily available components.

High Resolution

At last Tandy has brought out high resolution kits for the Models II and III; it will be interesting to see how much support these get from other manufacturers of Tandy support equipment. For this is where the previous alternatives, however good they were, seem to have failed.

Unless the individual was prepared to do it all himself there was no practical use for such items, as they were all incompatible and thus had no common pool of programs from which to draw and add.

And just imagine without some form of graphics utility the tedium involved in producing something as detailed as a photograph. Some of the already marketed high-res mods are indeed spectacularly impressive, and some software provided does make it easy; now with Tandy having set a standard maybe we'll see something common at a lower price?

System 80 Problems

Following the advice of earlier columns that System 80 owners with (only to be expected) incompatibility problems should contact John Ross at 12 Lindley Road, Greenacres, 5086, I'm pleased to report that I've had unsolicited letters from some who have done so, and who have wanted to pass on their appreciation

...which is why I've repeated this message.

They've also seen fit to become postal members of The Adelaide Users' Group, which is another reason for the repeat. It also means I've had less 'desperates' on the phone pleading for assistance — not that I mind, but all I can do is to pass on John's name.

It does seem that the common problem has been inability to write and read tapes for either Scripsit or EDTASM+; John has had total success with both of these, as well as with numerous other things I've not kept a list of.

The sad thing in some cases has been the frustrations experienced before reading and taking this easy way out. Which is all the more reason for joining your local Users' Group — the sole purpose of most such groups I imagine is just this; to help each other by putting people in touch.

Hitachi and CoCo

If we believe the adverts we would be delighted that Hitachi's next offering in our particular field of the market will be compatible with the Tandy Colour Computer.

However, does 'compatible' mean in the sense that the System 80 and the Model I are 'compatible'? I don't know; all I suggest is that it may pay not to blindly accept the words at face value. And the obvious place to ask is at your local Users' Group.

In itself it is interesting to see that the buyers of the CoCo are generally more 'family' than buyers of other hobby computers. Which appears to mean less 'computer widows', and more ladies interested in the hobby.

What Shall I Buy?

If, like me, you have numerous people who see your hobby, want to join, and want to be told what to buy, have you thought of the 'pre-loved' market? As previously reported, the daily paper is still the best source, and cheapest too, since often the advertisers don't know the extremely low rate of depreciation of such equipment.

Now there are computer stores that take trade-ins, which means another source of cheap systems. And possibly technical advice to go with it. Yes I assume there will be some less honest among the reputable ones, just as there are some less honest used car dealers; the advantage is that the hobby-

computing market is fairly close-knit and word gets around.

I personally can vouch for the honesty of Micro 80, one of the advertisers in this magazine. And to my mind this is the way to do business; people who've been honestly looked-after when they want to spend a few hundred dollars on their hobby have come back when they want to spend some thousands on their business. Which is not to say you'll get more than you pay for, just that you will get what you pay for.

I'm sure that most Users' Groups you contact will not hesitate to pass on re-counts of such satisfaction. So at least keep this in mind as an alternative when a friend asks how to join you having seen how your euphoria is produced.

New Generation Computers

At last there seems an answer for those of us who've wanted something more 'powerful' (Time says that's trendy computerese!), but have been loath to desert our well-known and loved Model I with its amazing amount of published information, tips and documentation.

Tandy and Lobo are each bringing out what seems to be a 'super computer'; at least it seems thus to us Model I lovers (no Les, a Model I lover is not what you thought!).

Not having the specifications of the other to hand, I can only comment on those of the 'Max-80' from Lobo Drives International. The major point is that it has Model I ROM which can be switched out to enable standard CP/M from disk, of which there is a choice of 13 or 20cm, or mixed, or hard disks. Not wanting to repeat what you've already read I won't go on here, just say that now there's light for us confirmed Model I'ers.

Accurate Timing

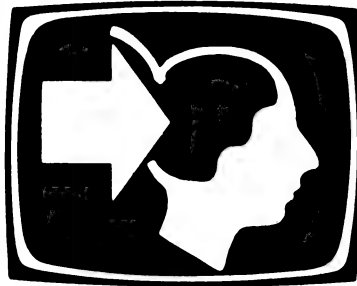
For some unaccountable reason, I've lately been subjected to programs which attempt accurate timing of externals (such as RTTY interfaces) from BASIC.

It all seems too ludicrous, and I've no explanation why, but I'm here to tell you that it won't work.

Apart from BASIC being too slow, there are actually inaccuracies in our clock speed. In machine-code these are bad enough (up to six percent), but when combined into BASIC it's just unacceptable.

Cont'd on Page 74

your computer



tutorial

Basic For Birdwatchers

Part XIV

A tidy printout is the goal of almost every programmer; it makes programs so much nicer to use. In this part of the series, Les Bell introduces Microsoft BASIC's PRINT USING statement...

MANY BUSINESS PROGRAMMERS will quote one of the principal virtues of COBOL as being its ability to neatly format output so that the columns all line up, there are commas between three-digit groups and so on. If that's all that's keeping COBOL alive, then BASIC will soon knock it off its pedestal, as this chapter will show.

Microsoft BASIC, as described in this series, offers an extension of its PRINT statement called PRINT USING, which gives the programmer almost complete control over the way results will be printed. It can be used to print two types of data: numeric and string.

The basic format of the PRINT USING statement is: *PRINT USING (format string);(expression list)*.

Note that the format string can be either a string constant enclosed in quotes, or a string variable, such as A\$. The expression list is formed in just the same way as a standard PRINT statement.

Numeric Data

The major application of PRINT USING is in printing numbers, primarily in commercial reports, and as we shall see, its features are oriented to this area.

The way PRINT USING works is that the format string specifies a field format using a special set of characters. To take

the simplest example, the '#' symbol indicates a numeric position. So, for example:

```
PRINT USING "###.##";23.477
```

will produce the result 23.48.

If the number to be printed has fewer digits than there are numeric positions, then the number will be right-justified (that is, pushed to the right) and preceded by spaces as necessary.

The decimal point character inserts the point at the appropriate position. If there is a numeric position in front of the decimal point, it will always be filled, with a zero if necessary. Digits after the decimal point will be rounded if necessary, as shown above.

Accountants traditionally represent negative balances with a minus sign at the right-hand end of a number, while the scientific/mathematical world puts it at the left. With PRINT USING, either format can be used.

If no action is specified, BASIC will put a minus sign at the beginning of a number as usual. However, if a minus sign is placed at the right end of the formatting string, then negative numbers will be printed with a trailing minus sign. Positive numbers are unmodified. For example:

```
PRINT USING "###.##- ";345.23,-234.12,-.678
145.23 234.12- 0.66-
```

Notice also in this example that the format string contained spaces which were also reproduced in the output.

If the sign is always required to be shown, a '+' sign can be placed at either end of the format string. In this case, positive numbers will be printed with a '+' sign

at the appropriate end, and negative numbers with a '-'. An example:

```
PRINT USING "+###.## ";72.37,4.712,-20.05
+72.37 +4.71 -20.05
```

When people write numbers down, they commonly separate the digits before the decimal point into groups of three separated by commas. PRINT USING can do that, too.

A comma before the decimal point will perform digit grouping into threes, but note that a comma at the end of the format string will be taken literally as a comma.

```
PRINT USING "#####.##";6543210.98
6,543,210.98
```

In the printing of financial reports, most of the numbers printed will be dollar values, and it would be nice to have '\$' signs printed at the beginning of each number.

No problem; a double dollar sign at the beginning of the format string stands for two character positions, one of which will be occupied by a dollar sign when printed:

```
PRINT USING "$$#####.##- ";452339.37,230120.45,-128792.04
$452,339.37 $230,120.45 $128,792.04-
```

A common requirement is to do cheque printing, and here certain precautions must be taken to prevent fraudulent alteration of cheques.

A double asterisk will cause leading asterisks to be printed before a number, so that there is no room for additional digits:

```
PRINT USING "*****.##- ";23.45,-.6,16
**23.45 ***0.6- **16.00
```

In the same fashion as the double dollar sign, the asterisks do stand for character

...A TIDY PRINTOUT IS THE GOAL
OF ALMOST EVERY PROGRAMMER...

...IT MAKES
PROGRAMS SO
MUCH NICER
TO USE...

...NICER...

IS THAT
ALL THE
AMBITION YOU
HAVE IN THIS AGE
OF UNPARALLELED
EVOLUTION?!



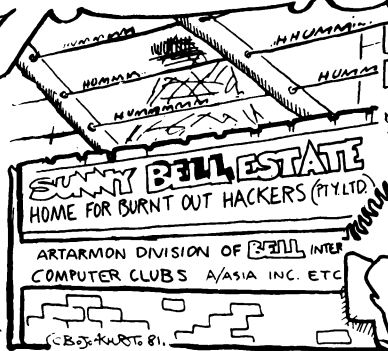
IT'S NOT THE \$ SIGN THAT
COUNTS! IT'S THE + OR -....
...GET UP!..HAVE A
GO!..TAKE ME IN
1982 FOR INSPIRATION...

WHO ELSE
STARTED A
HOME FOR
BURNT OUT
HACKERS?!

...& GAVE
THEM A
REWARDING
ROLE IN
SOCIETY?!

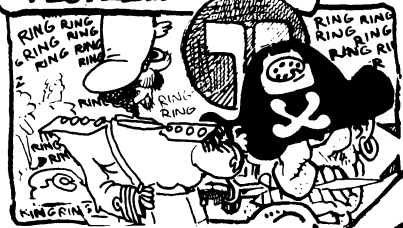


OTO!
GOSUB!
PADDLE CONTROL!
POKE 220F\$#K!

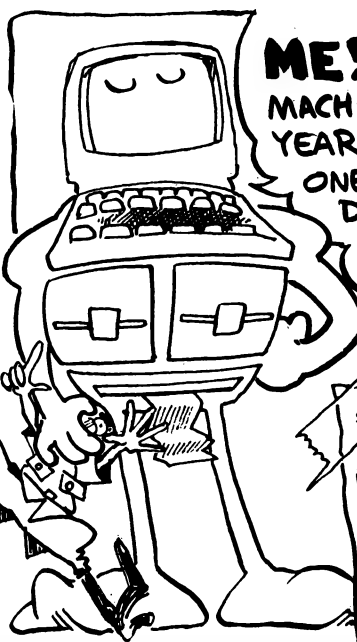


WHO ELSE VALIANTLY
STROVE TO RESTORE THE
TELECOMAS TO THE
PEOPLE?!

...WHO ELSE IS SO
LOVED BY HIS SUBJECT
FELLOW MAN?!

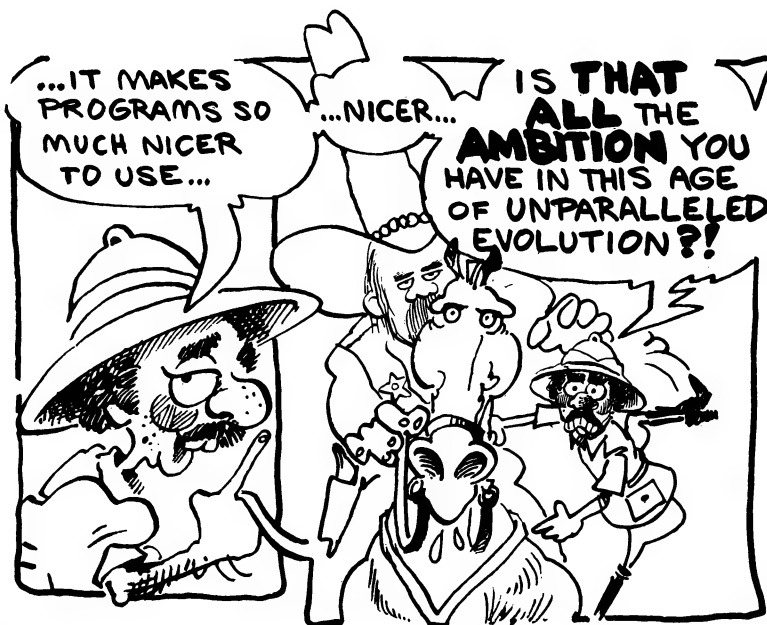


...WHO SHOULD BE
"TIME" MAN OF
THE YEAR?!



ME!... "TIME"
MACHINE OF THE
YEAR!..I'M THE
ONE WHO'S BEEN
DOING ALL
THE
EVOLVING!

SUB-EDITOR'S
NOTE:
HOT TIPS FOR
1983 "TIME"
MAN OF THE YEAR
ARE VIDEOS THAT
PLAY ONLY R. REAGAN
RE-RUNS; POTATO
PEELERS & SOLAR
POWERED
VIBRATORS...



positions.

These two formats can be combined into the '**\$' format:

```
PRINT USING "***$###",.88-";23.45,230120.45,2390.00
*****$23.45 $230,120.45 **$2,390.00
```

In case you are wondering '\$\$' has no meaning as a format string, and will be ignored by your BASIC.

For scientific types who want to force every number printed into exponential or scientific notation, a series of four carets (up-arrows) after the digit position characters forces E-format. The four carets allow room for 'E+dd' to be printed:

```
PRINT USING "+.##*****";123.45
+1.23E+02
PRINT USING "+.#####";123.45
+.1235E+03
```

If you require one of these formatting characters such as the up-arrow to be output as part of a numeric field, it can be printed using the underscore character as an escape. So:

```
PRINT USING "_###";24
#24
```

Overflow of the field length is possible, in which case, BASIC will print the number as best it can, preceded by a percent symbol.

String Fields

String field lengths can be specified using a very simple format; a format string consisting of backslash, n spaces and another backslash, specifies that n+2 characters from the string will be printed.

If there are not enough characters to fill the field, then the string will be left-justified and padded with spaces to the right. For example:

```
5 AS = "HELLO THERE"
10 PRINT USING "\ \";AS
20 PRINT USING "\ \ \";AS
30 PRINT USING "\ \ \ \";AS
40 PRINT USING "\ \ \ \ \";AS
50 PRINT USING "\ \ \ \ \ \";AS
RUN
HELL
HELLO
HELLO TH
HELLO THERE
HELLO THERE
OK
```

To print only the first character of a string, use the format string '!'. For example:

```
PRINT USING "!";"Now is the time"
N
```

Finally, in some situations, you might want to output a variable length string field through a PRINT USING statement. To do this, use the format string '&'. Here's an example:

```
PRINT USING "&";"Now is the time"
Now is the time
```

PRINT USING can also be used to print to disk files; just use:

```
PRINT#n USING <format string>;<expression list>.
```



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Continued from Page 69

I don't refer to inaccuracies between units, but in the same one with variations in temperature over an extended operating session.

RF Shielding

This seems a popular topic with more Radio Hams entering Our hobby daily, and of course wanting to combine both hobbies. And for them it's a two-way problem.

For not only does the computer cause interference to radio reception (particularly at close range), the radio transmission can wipe out the whole of memory.

Following the article on this very subject in August Electronics Australia several have done various things. I myself have tried with total failure! The most successful I've heard from is Ray Barrington, 17 Gordon Street, Bega, 2550 — I suggest you contact him direct to find out if your situations are parallel.

Ray was in the situation of having a micro-wave dish (communications version, not cooking type!) above the street, and for many moons had been plagued with unaccountable spontaneous reboots. He'd tried all the power-filtering imaginable with no effect. All he did was to

wrap his expansion interface in aluminium fly-wire mesh, connected to a mesh mat beneath his CPU, and earth the lot. He reports 100 percent success. And cheaply too!

The other idea is to spray the plastic case with metallic paint and earth this, as is done with some of the current newly released micros. I've not had reports on the success of this method, but am anxious to get some. Or indeed any cures for this problem.

There are of course complex procedures for fitting capacitors to offending tracks on the CPU board, using a spectrum analyser and other unimaginably sophisticated instruments not found in the average garden toolshed. What I'm looking for is a simple solution that even I can accomplish. For your advice you'll be rewarded with having your name spread to who-knows-where in this column.

Screen Display

A simple method of screen display of information printed on successive lines from within a loop is to use the print-at statement. Because the whole concept is somewhat tedious to spell out in detail here, I just point out that it's a technique worth thinking about till it becomes apparent whether or not it's an alternative.

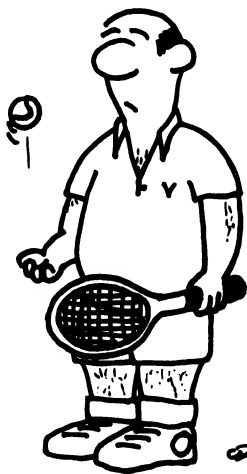
The whole idea is to initialise S to zero at the start, then increment it each time a new line of information is ready to be printed, and PRINT @ S*64+T, where T is the TAB position. In effect S is controlling the row down the screen, T is controlling the column across the screen.

As I said, simple, but maybe relevant. Also relevant is the use of cursor control codes, in particular 29 (go to start of screen line), 30 (erase to end of screen line), 31 (erase to end of screen).

I know that many think such techniques are in the advanced programmers repertoire and therefore something other programmers do, but it need no be so. At least it's worth a try to discover how easy it is to use the powerful functions we've been provided on our system.

Also of use, but not so much, is the codes above CHR\$(191) which allow printing of spaces without having to put them into a string and print the string. The point not covered in the manual is that you may not know just where on the screen the cursor will be, so you cannot specify a TAB position, but you do want to space over a given amount. The idea is that by PRINT CHR\$(200) the cursor will move over 9 positions. Yes, possibly a little academic, but at least think about it before condemning the idea. □

HOW TO RECOGNISE E.D.P. PERSONNEL.



LESSON #1.

THE DATA-BASE ADMINISTRATOR.

HOW TO RECOGNISE E.D.P. PERSONNEL.



LESSON #2
THE ASSISTANT PROGRAMMER.

HOW TO RECOGNISE E.D.P. PERSONNEL.



LESSON #3
THE COMPUTER OPERATOR.

your computer text file

No Planes, He Complains...

IN YOUR feature article, you have a program called Micro-Navigation by Trevor Jones. Could you ask TJ to do an article on Air Navigation as I'm not interested in boats. I've got a ZX81, with 32K booster.

I have a Commodore N60 Navigation Computer (hand held), which I bought in England over four years ago, but I want to work the programs out on my ZX81. However, I can't think of how to feed the information in.

In the past I wrote for information on the Lotto game for the ZX81. The article was written by The Archer Bugtrap (RD Greet) as an answer to Rod Stevenson's article. As yet I still haven't received a reply.

R WEBSTER
Tuggerawong, NSW

Unfortunately, we cannot set ourselves up to solve individual programming problems for people — we'd never get the magazine out...

We can only provide ideas, information, and generalised applications; after that, it's up to the reader. Perhaps another reader can help, and if so we'll pass it on.

HOW TO RECOGNISE E.D.P. PERSONNEL.



LESSON #4
THE APPLICATIONS
PROGRAMMER.

Calendar Bugs

IT HAS been brought to my attention by an enthusiastic programmer that the program I submitted in the August 1982 issue of *Your Computer* contains 'bugs'.

The program was an Apple Calendar generator which appears on page 61. It was discovered that the calendars were only correct between the years 1901 and 2000, so listed below are the following modifications to correct this defect:

The errors lie in the algorithm used to generate the calendars so it has been replaced by a mathematical formula.

1. Delete lines 120 to 230;
2. Delete line 295;
3. Add lines 150 to 200 as shown on the listing below.

MODIFICATIONS:

```
150 M = 365 * C + 1 + INT
      ((C - 1) / 4) - INT
      (.75 * (INT ((C - 1) /
100) + 1)))
160 J = M - INT (M / 7) * 7
180 IF J = 0 THEN J = 7
200 Z = J:M = 0
```

I would like to thank E C Prosser of Mullumbimby for his kind letter regarding the problems and I regret any inconvenience caused.

GEOFF W BLACK
Capalaba, QLD

Overseas Spectrum

I AM a 2nd year student of Mudgee High School and have become interested in computers.

After reading your very informative article concerning the 'Sinclair ZX Spectrum' in the August issue of *Your Computer* magazine, I have decided I might buy myself one with money I have saved.

I noticed in your review, that you said you had ordered your computer from overseas, and I was wondering if you could tell me where you ordered it from, how much it cost (including postage and so on), is it a 16K or a 48K model and if it can be used on Australian TVs.

Any other information not included in your article would be greatly appreciated.

BRUCE DANIEL
Mudgee, NSW

VIC Expansion

BROWSING through a recent edition of a popular American computing magazine, I found an ad which featured an 80 column expansion unit for the VIC 20, with a forty column conversion switch, and also many ads for other quality hardware, such as a 64K RAMpack.

The 80 column unit retails at \$US199 and is available from Quantam Data, Costa Mesa, California.

Obviously, this hardware will arrive in Australia in the near future, but will it arrive with a more expensive price tag, if so how much more?

Will the VIC 20 be incorporated in *Your Computer's* monthly columns?

S ASHLEY
Homebush, NSW

You Goofed!

I WISH to voice my disappointment in the article 'MicroBee BASIC' by Eric Lindsay (Oct 82). I can understand typing errors but complain about the inaccuracies found in that article.

1. Microsoft BASIC the machine code starts with an absolute address pointing to the start of the next line (Z80 — reversed bytes), then the line number (2 bytes — reversed), then the tokens and ASCII information with a zero to indicate the end of a line or multiple (2-4) zeros to indicate the end of the BASIC program.

2. In Microworld BASIC code starts with a line number (not reversed thereby line 100 would be stored as 00 64 hex), then an offset byte which is added to the program counter to indicate the start of the next BASIC line. (This is the reason BASIC may only have a maximum of 255 or less characters per line.) Next comes the code as tokens and ASCII.

3. With reference to the paragraph, 'Those who have run listing 1', you will find that there is a pointer (see (2) above). It is not 'TRICKY', and the reason why PEEK and POKE receive and store numbers ranging from 0-255 is because it's an 8-bit machine.

4. The next paragraph is totally confusing also it is NOT EASIER but mandatory to have data reversed because the Z80 instruction set is laid out this way.

BILL VISSER
Mangerton, NSW

Free Software?

I WAS just reading past issues and came across a mistake in the August 1982 issue. The review by Peter Sandys on page 31-32 of Pursuit of the Graf Spee, is printed as 6995 dollars.

By the way, what do you do with the software once you have reviewed it?

BERT RICHARDS
Sydney, NSW

We give it back to the people who own it....why?

No CoCo Info

I AM A newcomer to microcomputers and to your magazine, and I have only owned my TRS-80 Colour Computer for a short while now, but already I have encountered

a problem that I know many other TRS-80 Colour Computer owners and users must face also. The problem is one of lack of information.

I have looked in many different computer books and magazines but have been unable to find substantial information relating to such things as programs and so on as are listed for many other brands of computers even the TRS-80 Models 1 and 3.

As I have limited knowledge on programming I think it would be a great benefit to me, and other TRS-80 Colour Computer users if you could (if possible) try to include more information in future issues.

A computer without programs is like a cassette recorder without the cassettes, practically useless, and being a teenaged student with an extremely limited budget, I cannot afford to buy too many pre-programmed tapes or to be filling my

blank tapes up with useless programs that I have had to make up myself. I hope you can assist me to overcome this information problem.

GERARD SHEA
Port Macquarie, NSW

Wider VIC

I NOTICED a mention of a 40 by 25 converter for the VIC 20 in your September issue.

Could you please inform me of the availability or likely availability of this add-on, and others mentioned in your article?

JANET BURT
Murray Bridge, SA

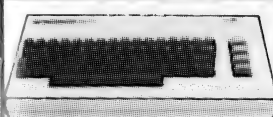
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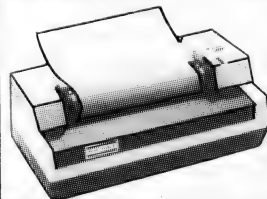
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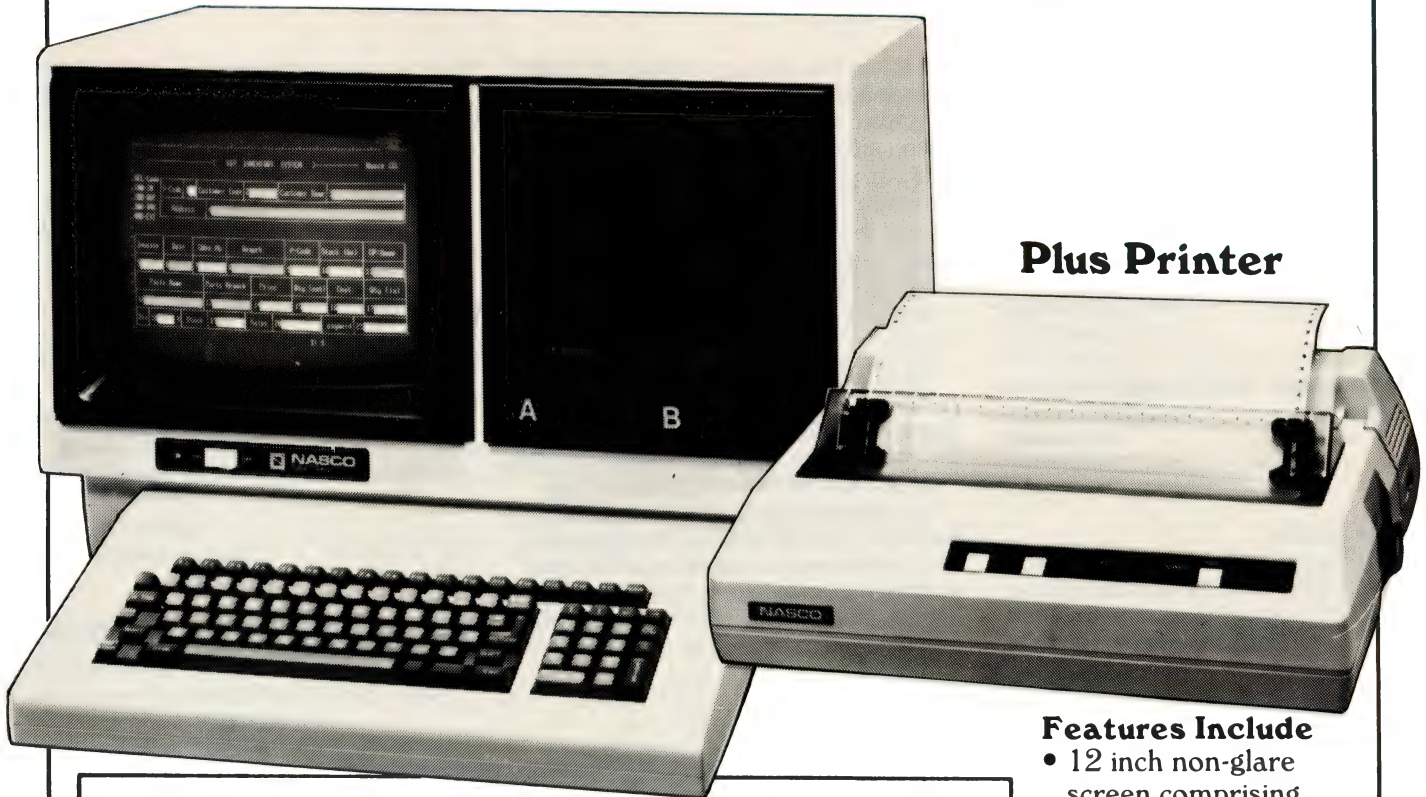
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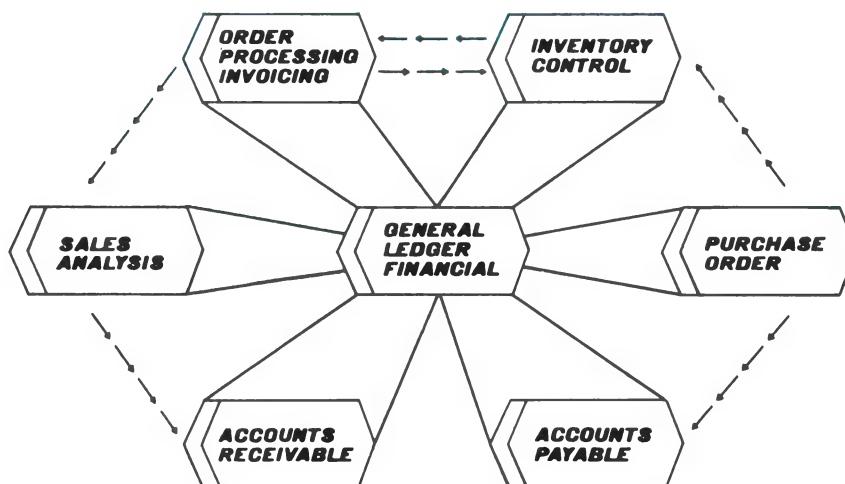
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your computer text file

Spectrum Before Egg?

WITH excitement I read an advertisement for ZX-Spectrum Software from Cameo Electronics on Page 90 of your November 1982 edition.

Does this indicate an Australianised Spectrum is available in Australia yet, or is Cameo confusing everybody with a 'chicken before the egg' offer?

Please reply promptly, as I wish to buy this excellent machine and familiarise with it before I start school next year (February).

Do you have any comments on the East London Robotics SP80 on-board RAM expansion to 80K and the Fuller Micro Systems 'FD' Spectrum keyboard and case (Page 82 'Electronics and Computing' October 1982 and page 23 'Computing Today' October 1982 respectively)?

TONY TIBBS
Cairns, Qld

See the Sinclair column in this issue for your answers...

MicroBee Users?

WE HAVE a MicroBee and am interested to see if there is a Users Club yet. As there are several letters from Bee owners in *Your Computer* who would perhaps like to form a club, we would be interested to start a club.

My son is a student at RMIT doing a computer science course and has been helping me to learn how to use this computer. We are slowly building a collection of programs for our use, but have found converting other programs to be a problem because of bugs the Bee doesn't like.

A Users Club would be a great way to get this machine better known if there were a bigger selection of software available.

If anyone is interested, drop us a line at the address below, and we'll see if we can get the ball rolling.

Our Bee has an Editor/Assembler, 32K RAM, and is hooked to a Dick Smith GP-80 printer. We have found it to compare very well with other makes except for the lack of software.

Our Address is: Bill and Mark Belton, 12 Highcliffe Close, Tullamarine, Vic, 3043. Phone (03) 338 7363.

BILL BELTON
Tullamarine, Vic

And for you, sir, the answers are in the Bee column this issue...

Spectrum Again

I REFER to an article by Graham Webber in the August issue of *Your Computer* in which the author states that he has already ordered a Spectrum computer direct from the UK and is eagerly awaiting its arrival.

I would be most grateful if you could contact Graham Webber on my behalf, and ask how he has managed to order it direct. I wrote to Sinclair Research on July 28, 1982 to request export prices, and received the reply on September 6 to the effect that they were unable to supply direct due to existing agreements with Australian agents.

I am most anxious to obtain a Spectrum, but am reluctant to wait (a) many months before they are available in Australia, and (b) pay the greatly inflated Australian price when they do become available here.

If Mr Webber can tell me how he intends beating the system, I would be most grateful.

DAVID MELDRUM
Brighton, Vic

Graham Webber replies:

Unfortunately, I have to tell you that you may have a problem. As your letter says, Sinclair Research refuses to send a machine to Australia because of its agency arrangements over here.

This attitude is actually to be admired, because the agency has probably had to go to considerable expense in advertising and so forth, and therefore should be entitled to some proceeds from all machines sold in Australia.

So it would seem the only way to get around the problem is to use the same method I have had to use. That is, find somebody in England who will order the machine for you and then send it on when it has been delivered.

Perhaps you could correspond with one of the many ZX Computer clubs that have been formed. Their addresses are available in most editions of the British computer magazines. Not only will you be likely to find somebody sympathetic to your needs, but you'll also have a valuable source of program material.

More For Mr Webber!

CONGRATULATIONS on the purchase of the new Sinclair ZX Spectrum. I am a 14 year old student who intends to buy a Spectrum. The review written by yourself in August's edition of *Your Computer* was most comprehensive and entertaining.

However, you neglected to mention a very important point concerning all British made computing systems.

The television network utilised by the United Kingdom is based on PAL UK. However, our television system uses PAL Pacific. Therefore, the ZX Spectrum will not operate on an Australian-produced monitor, or television if used with a modulator, so unless your unit has already arrived from the UK, the main feature of the Spectrum will be a source of disappointment for you.

As far as I can see, the only way around this difficulty is to purchase a British monitor, or undergo an expensive conversion.

M S MORRIS
Somerton Park, SA

Not quite so...and here's why:

There are a number of colour television systems in use in the world today. The two major systems are NTSC and PAL. NTSC is the system that is used in North America. PAL is the system used in most other parts of the world.

The two major PAL systems are PAL M and PAL D.

PAL M is the system used in many parts of South America including Argentina. This is really a hybrid system, a sort of compromise between PAL and NTSC. It is a 525 line 50Hz system.

PAL D is the system used in the UK, Australia and most of Europe. PAL D does vary, however, in different countries. The variation is to do with the sound sub carrier. In the UK they use what is known as System G, 6.8MHz. We in Australia use System B, which is 5.5 MHz.

The result of this difference is that VCR machines made for UK consumption will not work very satisfactorily in Australia as far as the audio reproduction is concerned.

Computers, however, are a different story, since we are only interested in video output.

I hope that the above explanation will set your mind at rest.

your VIC computer

By Andrew Farrell

THE TIME has come to show the many critics of the VIC-20, sitting out there behind their \$5000 128K CP/M systems, just how much power you can squeeze out of 3.5K for a mere \$299. Not to mention a mountain of tips and programs for the VIC.

Being an Apple hacker before I recently purchased my VIC, 3.5K came as a bit of a shock to me after using 48K for two years. The next shock came when I saw programs such as Space Invaders happily load into the VIC from cassette and then play the quality of game I'd expect from an Apple.

Many of the early VICs experienced problems in heating and power; however, the latest models seem to have overcome this and they also have a slightly different keyboard which is spongier in feel.

One problem still remains and varies in its intensity depending on your TV and location. Yes, the great RF modulator is still giving us sore eyes and testing our patience as we attempt to get the perfect picture. After some thorough investigation I have found many strange cures to this problem, a combination of which is usually the best solution. If you're still trying to get it right why not try...

- Wrapping your RF modulator in aluminium foil.
- Connecting a short length of heavy wire to the modulator casing and positioning it to gain the best picture.
- Re-locate the modulator relative to the VIC and the power supply.
- If you have an Arfon expansion unit place the modulator on top of the casing above the power unit.
- Place a wire between the modulator casing and the connection case from the wire between the modulator and the TV.

Once you've got your picture right you can sit back and start enjoying yourself. There is plenty more new equipment coming from the States fairly soon. American magazines are packed with ads for cheap extra memory boards and expansion ports. These can also be expected in Australia shortly...more soon.

Something must be said about a book which I recently purchased called 'Innovative Computing' by Clifford Ramshaw which has a collection of 30 games for the VIC with complete listings and program structure notes. The games all fit in the standard VIC and are also available on

cassette. Titles include Chess, City Bomber, Golf, Dungeon and Squash. I am very impressed with the programs I've typed in so far.

VIC Tips

Here are a few interesting SYS calls and pokes which you may find useful:

SYS 64802 — produces a cold start, cleaning up any messy pokes you may have made.

POKE 650,X — controls the repeat function of the keyboard. When X is 0 only the cursor keys repeat. When X is 255 all keys repeat — other values of X produce intermediate results.

PEEK (197) — return the matrix coordinate of the present keypress. It's 64 if no key is being pressed.

POKE 775,200 — put this in your program and once it's run you — or a nosey friend — can't list it...unless

POKE 775,199 — so you can list it again.

US Software

The recently opened Computer Spot at the MLC Centre in Sydney is now distributing a wide range of software from the US and it expects much more to be available in the next couple of weeks.

Soon to come is a BASIC Compiler, Assembler, Mini-Pilot and Vigil program-

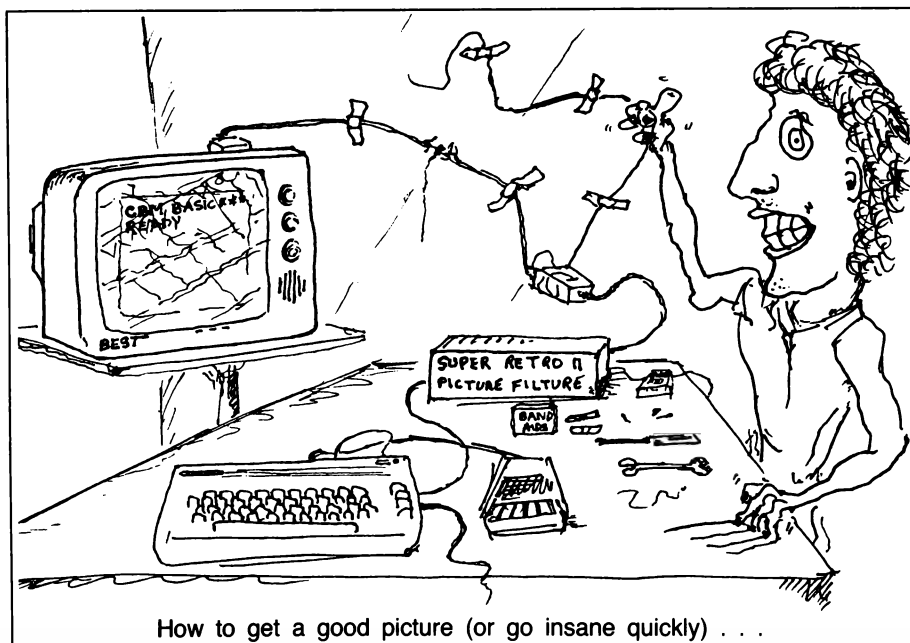
ming language not to mention plenty of the latest games — including adventures. Many of the new games require the extra 3K expansion cartridge; however, I think that it is probably a worthwhile investment.

The night before we went to press I test ran some of the soon to be released software from the Computer Spot. First into the cassette player was Cosmic Crusader, which I instantly recognised as a version of Star Raiders (the game which helped make the Atari computer famous).

Although the game is not as complex the basic idea is still there. The graphics were exceptional — even if the invaders did look like a bunch of hairy monsters up close. One of the best shoot 'em down type games I've seen on the VIC yet.

I've always loved a good adventure with plenty of surprises but I never expected to see one on a 3K computer complete with flashing lightning, roaring thunder, exploding dynamite and 3D graphics! That's what you get when you play Grave Robbers where you have to 'explore an old deserted graveyard and actually see the perils that lie beyond'. Very original and very addictive.

More reviews coming — when I buy the extra memory. In the meantime, if you've got anything you think we should know, or any programs (free of bugs!) please send them in to me care of *Your Computer* magazine. □



How to get a good picture (or go insane quickly) . . .

COMDEX is a dealer show for the microcomputer industry. Its held twice a year in the USA and I went to the Fall '82 COMDEX in Las Vegas at the end of November. COMDEX is all microcomputers and it's *big*! Someone said there were 10.5 km of carpet in the aisles and I can assure you that I trod every one of them at least once, many of them several times.

I had two days at COMDEX and it was barely enough to see everything. You need the full four days to get into it properly. I'd intended to go back to many booths for more detailed discussions but just never made it.

COMDEX Fall '82 was notable for 3 things:

- The number of new 8086/8088 and 68000 16 bit based micros.
- The lack of any significant software for the 68000 machines except for UNIX.
- The lack of much significantly new or innovative in the eight-bit micro area.

Another interesting thing was the number of MSDOS program vendors who now seem to be rushing out CP/M-86 versions of their programs. For instance a CP/M-86 version of the Lattice C compiler is due soon.

The only interesting piece of 8 bit software was CACHE/Q. This is a cache buffering software add-on for any CP/M 2.2 system. It is said to offer significant speed improvements. Infostar is MicroPro's new information manager which supposedly ties all its other products together. Ashton-Tate has a new Financial Planning Language and a Business Planner called 'The Strategist'.

Godbout/Compupro announced and demonstrated a new M-Drive H product. This is an M-Drive which is port mapped rather than using existing memory. The M-Drive H will work with all the Godbout supported processors and operating systems and has 512K of dynamic memory per board.

Godbout had a 4 megabyte M-Drive H plus floppy plus hard disk system on show running under CP/M 8-16 (a single user version of MP/M 8-16 which should be available in the next few months — a Concurrent CP/M 8-16 is a possibility too). MP/M 8-16 systems were also on display. MP/M 8-16 runs CP/M-80, MP/M-80, CP/M-86 and MP/M-86 applications programs concurrently with the original 'type' of the program being transparent to the user. It available now — in fact, it is being used to bring this column to you, both by me and *Your Computer*.

The Morrow Designs Micro Decision low cost system was almost impossible to see, the crowds around the booth were so dense. This looks like a very nice package in that you get a standard RS-232-C serial terminal in the price as well as all the applications software that we have come to expect with this class of machine.

Osborne had the Australian-designed 52/80/100-column video on display along with reliable double density. It looked good.

KayComp had the KayPro 10 on show, the anticipated hard disk version of the KayPro II.

There were a lot of IBM-PC look-a-likes on show — to me they all looked too much alike. While there is obviously a lot of room to manoeuvre in the 8088 marketplace it's a pity there's not a bit more diversity in computer design.

I was surprised there weren't more 'true' 16 bit 8086 processors in machines. Even though the 8088 processor is often referred to as 16 bit it's really a bit of sheep in wolves clothing. The 8088 is internally almost (though not totally) identical to the 8086 and it executes the same instruction set but it communicates with the outside world via an 8 bit data buss just like an 8085 or Z80.

Of course my prime interest was to look at the new NEC APC products — the footnote at the end of this column will explain why. The two exciting things were the Digital Research colour graphics software, including screen dumps to a 'Printacolor' three-colour dot matrix printer and a 10m hard disk for the APC for under \$US3000.

There were a lot of APCs spread around the show, mostly running colour/graphics programs. It seems to me that it is possible to create ghastly text displays with the over-use of colour on screen. However, with careful selection coloured text can be very effective. Error and warning messages flashed in Red are difficult to ignore!

There is simply no way that I can convey all that I saw at COMDEX, let me simply say that I brought back one suitcase that was totally filled with literature collected. I shudder to think how many forests worth of paper were handed out there.

BDS C Compiler

While in Boston I got together with Leor Zolman, author of the BDS C compiler. Leor has been working at upgrading the

compiler and it is now up to release 1.50. The good news for Australian BDS C fans is that it will now be locally distributed by Archive Computer Services in Brisbane.

The version 1.50 package comes on two 20cm disks with a completely new manual. That's too much new material for me to handle updates on the casual basis that I have done previously. Archive Computer Services has agreed to handle updates to existing BDS C users as well as selling new copies.

Peter at Archives says he will keep the update cost as low as possible; and he is able to supply software on nearly all disk formats whereas I could only handle 20cm disks. Leor has withdrawn the exclusive distribution agreement he previously had with Lifeboat Associates and it should now be more widely available throughout the world.

The completely revamped Version 1.50 manual (at last) includes an index, table of contents and contiguous page numbers as well as just being easier to read due to clearer printing! The manual now formally includes a number of tutorials that were separate additions which not everyone seemed to have. This includes File and Console I/O tutorials, CASM information, Long Integer Package information, TELED information and CDB information.

There are a stack of enhancements to the compiler. For me the most important one is the general ability to specify the user area in which a file will be located as part of the file specification in every area of the whole BDS C package. Also the compiler can now be patched to look at a specific drive and user area for the necessary compiler support files during a compilation. This is very good news for hard disk users or others who make use of user areas.

Attention has been given to the error messages the compiler spits out and it now is much more civilised about reporting multiple errors when there was only one initial error.

Version 1.50 will no longer run under CP/M 1.4 — version 2.0 or later is now a necessity. CLINK now has an option switch which can be set to avoid a warm boot at the end of C program execution (NOBOOT.C is still provided for those who prefer to use the L2 linker). The -f option in CLINK is now reversed in function so that all functions are loaded from CRL files specified in a CLINK command line unless -f is specified. All low level I/O now uses the CP/M-80 version 2.2 ran-

dom record read and write calls, which will allow files up to 8M to be accessed (rather than 256K as previously). This also means that the explicit random I/O file functions (read, rwrite and so on) are no longer needed since their functionality is now included in the standard library functions (read, write and so on).

The seek function can now be made to seek relative to the end of a file. The run time package has been modified so all existing CRL files will need to be recompiled with the Version 1.50 compiler. The hardware related defined constants in BDSCIO.H have been split off into a new header file called HARDWARE.H so that system dependent parameters can be kept separate from general ones. The console and modem port definitions have been changed to a more general form to allow for both I/O and memory mapped ports.

Distributed with the compiler is a C program debugger called CDB by David Kirkland. The compiler now includes an extra command line option switch to generate special symbol tables and code sequences to allow the debugger to monitor program execution and handle breakpoints at arbitrary points in the code. There is also a new communications utility distributed with the compiler package. It is called TELED, and uses the Christensen protocols for RCPM communication (as used by YAM and MODEM).

West Coast Ramble

After Boston I headed for the San Fernando Valley area of Los Angeles. This is the home of Priority One electronics, one of the companies who have those mouth-watering ads for hardware in the back of US magazines like BYTE. I was after a couple of things that I just couldn't get in Australia that I knew Priority One had in stock.

The store is a bit like a Dick Smith store except that is full of professional quality microcomputer parts and systems. They had several complete Godbout, Morrow, Dual and CCS computer systems on display and available for hands-on evaluation by customers.

Of course the full range of board-level products was on display as well. The most mouth-watering part for me was the 'parts' section where there were bins full of things that are hard or impossible to obtain in Australia (like wall plates with DB-25 cut outs, and daisywheel storage

binders for instance).

Priority One has an almost completely computerised packing and dispatch system, even using a computerised scale to weigh outgoing packages to determine shipping charges. It runs its main business system on a pair of Alpha Micro computers as well as having CP/M systems doing dedicated tasks in many areas.

It's been my experience in Australia that many companies in the computer retail business don't make efficient internal use of the products they sell to others, so it was exciting to see what can be done when a computer retailer does apply the full power of the current technology to retailing.

My next stop was with Kelly Smith, the SYSOP of the CP/M-NET RCPM system, probably the most heavily used RCPM system in the world (800-plus calls a month). As it turned out Kelly's RCPM phone line had been cut off while he was away at COMDEX so the CP/M-NET system was temporarily off line while I was there. The CP/M-NET system runs on two 5+5 hard disks (5M fixed plus 5M removable) and has a tremendous amount of material on line at any time.

Kelly and I went over to see Trevor Marshall's RCPM system. Trevor is running the ETI modem on Bell system frequencies and I can assure that all the features of the design do really work as I've now seen them running. Apparently a few errors crept in between the original design work and the publication of the articles in ETI. I think that most of the correct information has now been published in the errata section of ETI.

Microsoft's MSDOS

I've had MSDOS running for several days now and am starting to get a bit of a feel for it as an operating system.

My initial reaction is that both it and CP/M-86 in their current forms are not really much different from CP/M-80 in terms of facilities available. I'm more convinced than ever that the real battle for dominance in the 16 bit operating system war is yet to start. Neither MSDOS Version 1.25 or CP/M-86 Version 1.1 are worthy combatants in that they are hardly coming to grips with the power of the 8086/[[processor. Concurrent CP/M-86 is here for some computers and MSDOS Version 2 shouldn't be too far off. Once both operating systems and UNIX (or UNIX look-alikes) have been im-

plemented on a number of machines the competition will be really on.

For someone upgrading from CP/M-80, MSDOS is both exciting and frustrating. In some areas the command syntax is sufficiently different from CP/M to be dangerous while in others the differences are worthwhile improvements. I had no trouble in transporting several Microsoft BASIC-80 programs across to MSDOS BASIC.

The implementation of MSDOS on the NEC APC can read data files from standard CP/M single density 20cm disks so it was easy to transfer existing BASIC-80 source files into MSDOS files. MSDOS includes the MACRO-86 assembler package which appears to be very nice from the description in the documentation (which incidentally is much better than the Macro-80 documentation, though it still has frustrating gaps).

Other C Compilers

The January '83 issue of BYTE magazine has a further series of benchmarks using the Sieve of Eratosthenes. The authors concentrated on C and PASCAL compilers this time.

Amongst their comments was a general complaint about the transportability of PASCAL programs (an ISO Standard for PASCAL exists) while they were surprised at the ease of transporting C programs (for which no formal standard exists). Anyone who is interested in C or PASCAL should take the trouble to read that article as it contains quite a lot of interesting information.

Lately I've been using the Computer Innovations C86 compiler for CP/M-86. This compiler is a fairly complete implementation of the Kernighan and Ritchie book and seems quite robust. At present the I/O library is still a bit weak but more functions are appearing with each release. The compiler is mostly upward compatible from the AZTEC C compiler for CP/M-80 and they make a good pair for anyone who is looking at developing applications for CP/M-80, CP/M-86 and MSDOS use.

Leor Zolman says that the AZTEC C compiler is probably the best bet for anyone who needs a fairly complete implementation of C for CP/M-80. Leor's trade-off with his BDS C compiler is towards providing a useable selection of features together with very fast compilation rather than towards ever providing a

full implementation. There is no doubt that the BDS C compiler has the by far the shortest compilation cycle of any microcomputer language.

The Lattice C compiler for MSDOS is on its way to me. When I spoke to its author at COMDEX he indicated that there are some option switches which set up a BDS C compatibility mode so that it should be easy to transport the mass of BDS C public domain programs up to MSDOS. Time will tell how difficult this is, but I certainly hope that it is possible.

C Puzzle Book

That 'C Puzzle Book' I referred to recently in this column is now available in Australia at a recommended retail price of \$20.25.

I guess your favourite bookshop or the OTechnical Bookshop in Sydney or McGill's in Melbourne would be a good place to try. Failing that you can get it direct from Prentice/Hall of Australia, 7 Grosvenor Place, Brookvale, NSW, 2100.

PAMS News

I've picked up some public domain software from Leor Zolman and Kelly Smith which should be available from my RCPM system around mid-January. I'd like to thank *Your Computer*, which is now providing some hardware support for my RCPM system. Thanks Matt!

Please note that the RCPM connection notes are no longer available (for the time being).

As I write this the Gippsland RCPM system is awaiting Telecom to install an auto answer modem, so it will probably be on-line by the time you read this.

Details should be available on the Sydney RCPM or Melbourne CBBS or in this column next month. Its also possible that another Sydney system may be on-line within the next few months too.

Where I stand

I have just started working for NEC Information Systems Australia as Technical Product Manager for its Advanced

Personal Computer (the 8086 Business Computer).

Up to now I've just been an end user of CP/M-80 and CP/M-86, however now I've moved over to the supply side of the micro industry. I've always been fairly critical about the level of support that most computer suppliers give their products, but now NECISA has given me the chance to put its money where my mouth is and provide it with a good centre of competence for supporting its 16-bit machine.

Obviously I won't be doing too many more hardware reviews due to potential 'conflict of interest' concerns but there are plenty of other topics in the microcomputer industry to write about! It's up to you to judge how that affects my impartiality as far as this column goes (personally I don't intend to let it make a jot of difference).

One obvious advantage is that I will be much more deeply involved with 16 bit micros and should be able to keep you better informed about what is developing in that area.

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BRUER PYM 2380

your MICROBEE computer

By Richard Pakalnis

YES, THAT'S me up there, but I don't look that sleepy all the time. It was done early in the morning while we were still in the office...

Letters, letters, lots of letters. Thank you. You will have undoubtedly noticed that handy pull-out Pocket-Programs booklet in the centre of the last issue. If you sent in a program it's probably in there...if not; well, that's show business. Watch for it in coming issues instead.

Cursor Control

David Downs Jnr of Numurkah, Victoria responded to my call for user suggestions.

He writes: The MicroBee cursor can be altered in two ways. You can alter the flash rate and/or the height of the cursor.

POKE 220,1-15 will leave you with a non-flashing cursor. POKE 220,1 will give you a full-size cursor, while POKE 220,15 will produce a non-flashing standard Bee cursor.

POKE 220,64-79 will flash the cursor at 3 1/3 hertz, while POKE 220,96-111 will flash it at 1 2/3 hertz. The normal Bee cursor is 111.

Keyboard Troubles

Chris Hooker of Lawson, NSW, writes: "I have a problem with dodgy keys. I'll hit the '=' key and get nothing out of it, the next time it will throw up two or three symbols. This happens with a couple of other keys as well. How can I fix it?"

Well, Chris, I had the same problem so let me quote the solution from MicroWorld Report:

A number of users have complained that some key switches are not operating correctly and have a different 'feel' to others on the keyboard. Most times this is due to the fact that the base contacts in the mechanism have not seated correctly during soldering. To correct the fault press the key down firmly and, using a soldering iron (disconnect the battery first), resolder the corresponding pins at the base of the PCB.

All pins protruding through the PCB must be at exactly the same height for correct operation.

It's also worth looking around IC4 and IC7 for dry joint or socket problems.

Chris also upgraded to 32K and had the 'Editor-Assembler' fitted, but does not know what to do with it. We suggest you buy Rodney Zaks' *How To Program The*



Z80 or other books on Z80 assembly language programming.

TV Or Not TV?

Mr B Stafford of Rocklea, Queensland, describes in vivid detail four major problems he has encountered with the use of the Bee. Briefly they are ghost images on his video monitor, tape saving problems, lack of software for the Bee and detailed books on how to program the Bee.

I went to Applied Technology to get the correct answers. First, your monitor which you stated is an Applied Technology-supplied converted television.

"Though it produces good images, they'd be a lot sharper and more definable if I could just get rid of a sort of ghost image problem. If I set three dots on the screen in low-res graphics side by side the left dot of the line appears double the brightness of the other two dots. Then, just to the right of the last dot, there appears a 'shadow' that is less half the illumination of the monitor background."

Applied Technology needs to know what brand of TV you were sent. Also what video circuit is in the Bee, is it the old or the new version? They suspect the video output may be too strong or the coupling between the Bee and the monitor is not suitable. If your problem hasn't been corrected by now, call Colin Mackinnon between 6 and 9pm on (02) 634 6259 and he will assist you.

The second problem concerns the inability to save programs on a National Panasonic RQ-337. It loads okay but no SAVE.

Here we need to know how old your

recorder is and when the heads were cleaned and demagnetised last. Don't forget also there is no REMOTE control plug to work. One plug is for SAVEing programs and plugs into MIC or AUX. The other is for LOADing programs and plugs into the EARphone jack. Also beware with a recorder where the earphone jack had the signal coming out of what is normally the earth side of the plug. Ensure the microphone jack is the correct way around. When the two plugs from the Bee with a common earth are plugged in together you short out the recorder. After a SAVE, if you listen to the Binary Code through the speaker, there should be no other background noises other than that generated by the code itself. Check your connections carefully.

The third problem concerned the lack of software and manuals to cover the graphics editing. The range of software available is being increased all the time, and most of it is noted in MicroWorld Report or Applied Tech's new series of four-page ads in this magazine.

You should be receiving MicroWorld Report periodically, if not write to MicroWorld Users Group, PO Box 311, Hornsby N.S.W., 2077. That goes for everybody else out there too.

Modified For TV

Austin Sather of Ulverstone, Tasmania, was unsure whether to buy a monitor or to convert a black and white television.

Applied Technology has a handout on TV conversions — it's inexpensive, but if you burn your fingers with a soldering iron (like me), then buy a monitor.

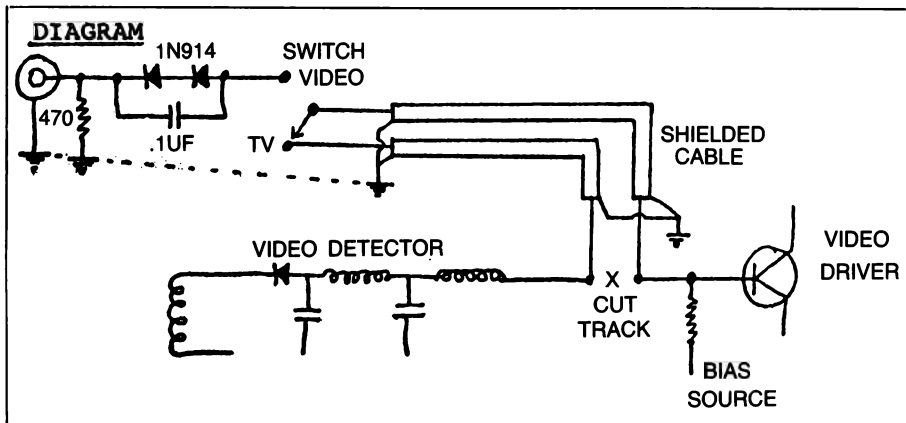
Reproduced in part is Applied Technology's formula:

To achieve the best results from your MicroBee with its 64 characters per line you need a special monitor. If you cannot afford one of these then the next best thing is a modified TV set.

Note there are some TV sets you cannot convert so a circuit diagram of your set is needed first.

Parts required are: 1 RCA Socket to connect the video from the MicroBee, 1 470 OHM 1/4 Watt resistor, 2 1N914 diodes, 1 .1 uf monolithic capacitor, 1 spdt switch (to watch normal TV) and 2 feet of shield cable. All these can be mounted in the set near the aerial input.

If in doubt, phone Colin Mackinnon (Or buy a monitor — green screen at that.)



Power Packs

Relax, all is well. If you cast your mind back to October, you'll remember I mentioned power pack problems. I have been assured all is cured.

The problems occurred with the very first batch and they weren't from Arlec. Failure rate from the new Australian supplier is very, very low. So if I caused consternation in the group, please pardon me.

User Groups

Yes indeed, little hives are springing up everywhere; if you are the secretary of a user group please write and give me your details so we can let everyone know.

Melbourne: To start the list we have 'The uBug Catcher' for MicroBee owners and friends (including DGZ80 too!) care of Richard Collett, 26 Alexander Crescent, Fern Tree Gully, Vic, 3156.

Here is a club that has got its act together under the President, Grant Forest. The uBug group produces a monthly newsletter (16 pages) which gives vital information on Bee usage — how to rescue garbled programs, merging MicroBee programs from cassette, speech synthesisers and lots more.

Melbourne membership is \$15, non-city membership is \$12 and a \$10 tape library fee. uBug meets every second Wednesday of the month from 7pm to 10pm at

Burwood Teachers College (next door to the netball courts).

Albury-Wodonga: Eric Eulenstein from Albury has advised me there is a Users' group there. So write or call Albury/Wodonga District MicroBee Users Group, care of Eric, 202 Kooba Street, Albury, 2640. Phone (060) 25 1601.

Adelaide: Ross Savvas has just written in to tell us about the MicroBee Users Club of South Australia (MUCSA) in the hope that potential members will get in early to form a strong group.

He can be contacted at 26 Denman Terrace, Lower Mitcham. Phone 277-7697.

Perth: This is for you, Mike Oborn — get in touch with Altronics at 105 Sterling Street, Perth, 6000. Phone (09) 328 1599.

Mike has put in a nutshell what this column is all about. He states: "There appear to be no MicroBee User Groups (except for the MicroWorld Users Group) or special interest groups within other microcomputer clubs where owners and prospective owners can discuss their problems and ideas with others. At least this appears to be the case in Western Australia."

"I would like to think that through your column we MicroBee owners could at least get in touch with each other, even if not to the extent of forming user groups.

Mike can be contacted after hours (6-9pm) on (09) 447 5366. □

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BRUER PYM 2298

By Peter Sandys

Apple Bookkeeper

ONE OF the main features of the Apple is its versatility. The Apple has a wide variety of programs that other computer companies envy.

Through design or otherwise to get the best value out of your Apple is to fully utilise the wealth of programs available.

To use the Apple as a dedicated accounts computer is in effect limiting its potential. If the volume of transactions is so great that your computer is being tied up all day on accounts then the Apple is limited because of the small capacity disk drives. You can go to the hard disk but this is expensive.

The Apple is very well suited to small accounting functions and preferably where these functions can be batch entered. This frees the machine for other uses within the company, like financial modelling, word processing, business graphs, data file handling, job costing and so on.

Up to now there has been a very limited availability of simplified account packages

for the Apple. It has had all the fancy accounts packages like General Ledger, Accounts Receivable and the rest, but many are too comprehensive (read complicated and/or expensive) for some users.

It is for this reason that the Bookkeeper is an ideal program for the Apple II. It does not pretend to be a full accounting package, but is essentially a computerised cashbook. I say essentially because it has a few extra features which make it more than a cashbook.

Capacity: 1500 transactions, cheques or deposits, with an average of two distributions per transaction; 100 distribution accounts; three distributions per transaction; password protected.

System Requirements: Apple II 64K, 2 Drives, 80-column card, printer.

The program is well written, using a menu option to select what you require. It is user friendly and self prompting. Apart from direct menu selection and informa-

tion entry the user has only a few keys to remember (note: Ctrl means hold the control key at the same time as the letter after it):

Ctrl-Q, quit processing the function you are on; Ctrl-C, confirm and process; Ctrl-D, delete displayed record; Ctrl-P, print screen; Ctrl-X, clear contents of current field where cursor is; Ctrl-A, display the next record or number in sequence; and Ctrl-R, Replicate relevant information.

Good Sorts

The sorting capability is fast and accurate, and you can search under any criteria.

Being Australian designed, it corresponds to our procedure, accepting the day-month-year date format. This is displayed as, for example, 14-Oct-1982.

When a cheque enquiry is made and the cheque has been reconciled, the entry is flagged. Another nice feature is the abil-

ZX81 & Spectrum

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Spectrum GULPMAN: this is GULP II plus colour and sound and is already a favourite for Spectrum. \$19.95

Spectrum 48K MASTERFILE — the long asked-for equivalent to THE FAST ONE, with even more features which include separate files and full menu-driven report building. Almost total machine code. Yes, we will support the microdrive when they arrive. With full documentation and sample file, \$35.00

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ity to print any screen to the printer by the use of the screen dump facility of Ctrl-P.

In designing Bookkeeper, the programmers left it up to the user to define whether a cheque is a debit or credit, with the same option for the deposits (the program automatically adjusts the deposits to being the opposite of cheques).

This means that the program has enormous capability to be used for small trust accounts. It can also be used as a small debtors ledger, because deposits can be allocated to the same account as the cheques are. In other words each distribution account can be credited or debited.

The only criticism, and it's minor, is that the program does not directly allow the entry of bank or periodic charges. By this I mean that you cannot call the entry a bank or periodic payment — you need to allocate a series of numbers which do not clash with cheque book numbers. However, that's not so hard — cheques can be entered as six digit numbers and deposits as three, with payments and bank charges as four digits — say 1000-2000 for period payments and 3000-4000 for bank charges. ☐

Software Report Card

Program:	Bookkeeper			
Made By:	CSD			
Useful for:	Small businesses			
Hardware Req'd:	Apple II, 2 drives, 16K expansion, 80 column display			
Ratings:	excellent	very good	good	poor
Documentation			✓	
Ease of Use			✓	
Speed			✓	
Functionality			✓	
Support	✓			
Value-for-money	✓			
Extras included:	N/A			
Options:	N/A			
Price:	\$350			
Review copy from:	City Personal Computers			



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MTM Pty. Ltd.	175 Parramatta Rd. NSW 2038	ANNANDALE (02) 569-5500
DeForest Software	26 Station Street VIC. 3131	NUNAWADING (03) 878-5684
MW Software	199 King William Rd. SA 5061	HYDE PARK (08) 272-3777



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How To Buy A Personal Computer: This book written by C Shrum explains what you need to know and gives comparisons of 24 popular PCs. Send \$3.95 Chq/MO or OZWAY Consultants, PO Box 1639, Nth Sydney, 2060.

How To Make Money From Your Microcomputer: This book written by C Townsend explains how to; develop and sell your software, develop and sell your hardware, sell systems as a consultant... Plus many more great ideas. Send \$22.50 Chq/MO to OZWAY Consultants, PO Box 1639, Nth Sydney, 2060.

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For Sale: One only TRS-80 Model 1, keyboard and case. Keyboard in working order. \$35. Phone (049) 45 3616 ask for John.

Burroughs B80: 60Kb, 2(1MB) disk units, VDU, 60CPS Printer, (180 column); R Quaas, Ashdown Street, Sunnybank Qld, 4109. Phone (07) 345 6783.

Sell: Single board 6502 computer, 48K RAM plus BASIC, full keyboard, graphics etc. \$450. Phone (09) 401 4652 a/h.

MicroBee: Document Editor (Typed). Ideal where high powered (and high priced) word processor would be an overkill. Full 17 page instruction manual and listing \$10 — plus tape \$15. Financial Manager (FIMAN) provides statement of personal finances with dissections of expense categories, etc. Instruction manual and listing \$8 — plus tape \$13. Both programs feature save/load of keyboard entered data. Both can be user modified to suit specific needs. Mail orders to B Proctor, 27 Roberts Avenue, Mortdale, 2223 (enquiries (02) 579 6867, evenings). Prompt return guaranteed.

Sell: Apple II Europlus with sculptured keyboard, green phosphor monitor, 16K RAMcard, Microsoft Softcard, disk drive, and tape archiving. \$3000 or best offer. R West, (03) 20 2150 after hours.

OSI C1P: 20K RAM, P 1/2 Digit MicroSort BASIC, assembler, extended monitor, on disk. Single disk drive, case power supplies, etc. \$850 o.n.o. Phone Paul Shortis (07) 205 3666 (after 5.30 pm).

System 80: 16K, monitor, programs, books, speaker, etc. Only \$600. Phone (08) 356 6580. Must sell.

Exchange: Your Apple Lisa Assembler with my fascinating graphic games. Contact B Souksisavanh, 2/43 Milton Ave, Sth Cllton, Vic 3169.

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Wanted: Service manual and or circuit for National Ranger 7 inch TV Model TR505DU. L L Farragher, PO Box 75, Longreach, 4730.

System 80: 48K, 800K disk (2 by MPI B92), LC mod. Green screen, GP-80 printer, NEWDOS-80 V2, books, manuals etc. Any offers? Phone Steve (076) 97 6320.

Second Hand Computer Market: 1000 disks @ \$3.60 each. 100 binders \$3.50. 10 floppy disk storage boxes \$54.00. 2 MX80 printers new \$700+. 4 Apple/Super 80's etc. If you want monthly information on the second hand market. Send us a self addressed envelope with what you are seeking also details on what you

are using. Greg — (03) 578 6108; PO Box 254, St Kilda West, Vic 3182.

Apple Pal Colour Card: with RF Modulator as new condition \$100.00. Phone (03) 758 3332.

For Sale: Atari VCS, 3 sets controllers. 11 cartridges, game library, all packaging and instructions. The lot — \$450. (02) 344 5369.

Homemade 2650 Computer: software, junkbox, \$850. 16K ZX81 (excellent condition). Printer (not working) \$450. David Wheatley, 4 Martin Crescent, Milperra, 2214.

Wanted: Epson MX80 or MX100 printer F/T II or F/T III. Phone Steve, (02) 726 8034.

For Sale: Secondhand — Apple 48K, \$700; Apple Drive and controller, \$300; Integer Card, \$100; Pal Colour Card, \$100; Electrohome Video, \$200. New — Apple Parallel Interface, \$100; Pascal Language Card, \$100. Everything in good working condition. Worth \$1600, will sell the lot for \$1200. Phone Suzanne McOrist on (057) 65 2315.

For Sale: Apple II Plus computer, with 48K RAM, 1 disk, Apple graphics tablet, tape recorder and over \$1500 worth of programs. \$3000. Phone (02) 387 2127.

Green Screen Monitor: New, 12', 18MHz. Ideal for 80 column micros. RCA type input. Manufacturer's Warranty. \$275. Telephone (02) 428 1432 (ah).

dBase II: Software (unused) and manual for Osborne I, \$600; Double density card (unused), instructions and manual for Osborne I, \$300. Phone (077) 74 5156.

Wanted: Sorcerer S100 Expansion Unit, working or not. Des Tye, 23 Yates Ave, Mount Keira, 2500. Phone (042) 29 8503.

ZX80/81: Foolproof and reliable tapes. \$1.50 per tape plus .50c postage. Padular, 22 Brand Street, Bundaberg, 4670.

ZX80: 1K RAM c/w adaptor, leads, manuals, games cassettes and book "30 Programs for ZX80". \$100. Phone (02) 645 3404.

Caverns Of Mars: for Apple II, also many others. Write for catalogue; Ban-Pit, 79 Lakeside Ave, Mount Beauty, 3699 or phone (057) 57 2097.

Continued on Page 97

FIRST ON my list of interesting news tidbits is the expected arrival of the Spectrum.

The ZX Spectrum (under another name, unfortunately) should be retailing in Australia in late February or early March at around \$400 (probably \$399) for the 16K version. I don't have a price for the 48K version.

The distributor will be Barson Computers (or rather, its subsidiary, Sinclair Computers Aust.).

If you're thinking of buying a Spectrum, it may well be more worthwhile buying the 16K version, because UK companies are already producing internal plug-in RAM packs to compete with Sinclair's own internal 32K pack (to upgrade the Spectrum from 16K to 48K RAM). One UK company, East London Robotics, is selling its 64K RAM pack, the SP80, for 50 pounds. The kit version is even cheaper at 44 pounds.

The standard 16K ZX Spectrum fitted with an SP80 gives the user 80K of RAM at around the price of Sinclair's 48K Spectrum! There will be other companies soon following with competing Spectrum RAM boards, so it will pay to watch the adverts in 'ZX Computing' and other magazines.

Quickie Software Review

Bob Mill's ZXWORDS. This program, by a Canberra ZX enthusiast, attempts to reduce the gap between the ZXs and the larger, more expensive micros with word processing capabilities. Unfortunately, ZXWORDS does not entirely succeed in this aim. It is, however, an excellent effort and is certainly a step in the right direction.

I originally mentioned ZXWORDS in this column because it was noteworthy for its lower case printing ability on the ZX printer. I still believe that the lower case (without hardware modifications) is its best feature.

The features for creating text are similar to those of word processors for larger computers — the user can underline, centre text, erase and insert, set line spacing and so on.

The text input area holds five lines of text, and when this area is filled the user must press New Line, so the text will be right justified (aligning the text on the right margin) and be placed in the upper part of the screen. The facility for editing text in the upper part (non input area) of the screen is not terribly powerful, but useable

just the same — the cursor can be moved around the text, but only the changing of characters is allowed — no direct insertions or deletions. Characters can only be inserted by overwriting the spaces between words — deletions by overwriting the characters to be deleted with spaces.

ZXWORDS lacks the facility to save text onto tape for loading and continuation at a later time, which could be a serious disadvantage for many users; also, once you are satisfied with a screen of text and have printed it out and begun on the next screen, the former page is erased — an entire document cannot be edited as a whole, again a disadvantage. Of course one has to consider that 16K is not a lot for word processing use — especially when the program itself uses up most of it!

The documentation that came with ZXWORDS consisted of three photocopied sheets of information that Bob Mills wrote using the program itself. Documentation is sparse, and much seems to be left to the user to work out.

With some practice and experimentation it is not too hard to master ZXWORDS in a few hours or so. I feel that some more documentation in a 'tutorial' style approach would be helpful, however, just to make things a bit smoother and less frustrating.

The major faults are not those of the program but essentially those of the computer — the keyboard and the printer paper, for example. The cramped, flat membrane keyboard is hardly beneficial to touch typists, and even with a full size keyboard connected typing is still fairly slow (due, I think, to the ZXs keyboard de-bounce routine which has to compensate for the flat membrane keyboard).

The printer output is not really up to word processing, either. It's aluminium coated and only 32 columns wide. Photocopies of ZX Printer output are usually much more attractive than the original output, which is some compensation.

Overall, ZXWORDS has some nice capabilities (especially the lower case), but I feel that we'll have to wait for the Spectrum and Microdrives before serious ZX word processing can develop. I liked ZXWORDS abilities, but I am too good a typist for it (modesty!) so it was too slow for me. I suggest that you should obtain a full-size keyboard for your ZX (if you don't already have one) if you feel like word processing on your Sinclair.

If the user is a slow hunt-and-peek variety typist (or has an added full size keyboard and is not too impatient), ZXWORDS is an interesting software addition, but even then one has to consider the practicality of the lovely shiny silver paper!

ZXWORDS, by Bob Mills (written in machine code and BASIC.) For the 8K ROM ZX80 or ZX81 (16K required). Around \$20. Bob Mills, 6 Peach Place, Kambah, ACT, 2902.

US Material

After all my raving about UK software and hardware I discovered I have been ignoring US ZX stuff totally. Not that there's much of it — at least, not when compared to the enormous amounts of UK soft and hardware, yet looking through a recent copy of good ol' Creative Computing I saw a few ZX-oriented ads.

The hardware add-ons consisted mainly of RAM packs — nothing new there — but the ad which caught my attention was one for adventure software from a firm called Aardvark 80. It seems to offer its adventures in a number of machine formats, including the Sinclair (I was bemused to read the adventures run on a Sinclair with 16K and 'extended BASIC' — a quaint term for the 8K ROM, I suppose). I haven't seen any of their adventures so I can't pass any judgements.

If you're interested chase up the November '82 issue of Creative Computing and/or write to Aardvark-80, 2352 S. Commerce, Walled Lake, MI 48088. Incidentally, the adventures are: Trek Adventure, Circle World, Derelict, Nuclear Sub, Pyramid, Quest, Mars, Haunted House and Earthquake (all except the last two are \$US14.95).

If you're reading this and have an OSI, TRS-80, TRS-80 Colour, PET or VIC-20, Aardvark-80 has versions of those adventures for your computer as well. I'm waiting for some bright spark to convert all the Adventure International adventures (all those raved-about ones like Adventureland, Savage Island, and so on) to the ZX81, or the Spectrum. Why not, eh? Don't forget there's 400,000 or so ZX81s!

In next month's column I may very well be reviewing the arcade-style game QS Defender, and maybe even some ZX utility programs such as Gloster Software's Datapack! Lets hope so, anyway! □

your computer glossary

Absolute: Located at a fixed address in memory.

Access: To read or write from a location in memory, or a file, or disk.

Accumulator: The major register of a CPU.

Address: A memory location.

Algol: Algorithmic Language.

Algorithm: A set of instructions which define a method of obtaining some result.

Alphanumeric: Composed of either letters or numbers or both.

Apple: The Apple 11 computer is a computer based on the 6502 microprocessor with an integrated keyboard.

Application: What you do with your computer.

Array: A set of values under a common variable name, which are accessed through a subscript.

ASM: Assembler.

Assembler: A program which converts assembly language into its corresponding machine (or object) code, which can be executed by the computer.

Assign: To make one thing equal to another.

Atom: An indivisible component of a data structure.

Attribute: A property possessed by some object, such as a file. Often attributes take the form of restrictions, such as a file being read-only.

Backup: An extra copy of a disk, tape or file taken as a precaution against damage of the original.

Backus Normal form: A special language (a metalanguage) used to describe precisely the grammatical rules of another language.

Base: The lowest number inexpressible in a given number system.

BASIC: Beginners All-purpose Symbolic Instruction Code.

BDOS: Basic Disk Operating System. The major functional component of the CP/M DOS.

Binary: The system of counting in 1s and 0s used by all digital computers.

Binary Search: A method of searching for an entry in a table by successively halving the table until all that's left is the desired entry.

BIOS: Basic Input/Output System.

Bit: Binary Digit. Either 1 or 0.

Boot: To load the operating system into the computer from a disk or tape, either initially or subsequently after running a program.

Bootstrap: To use one short program to load a longer loader program which then loads the operating system.

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

Bug: an error in a program.

Bus: A set of wires over which, data, addresses, or control signals are transferred between the central processor and memory or I/O devices.

Byte: A computer word eight bits wide. A byte in memory can hold a character or a binary

number between zero and 255 (or — 128 and 127), or a computer instruction.

C: A programming language, developed at Bell Labs.

Call: A jump to a subroutine which leaves the return address on the microprocessor stack, so that when the subroutine is finished executing, control returns to where it left off.

CBASIC: A commercial version of the BASIC language, running under the CP/M operating system.

CCP: Console Command Processor. The part of the CP/M operating system that reads a command line and sorts out what it means.

Chain: To automatically run one program after another.

Character: A letter or number, or in some circumstances, a control code such as "carriage return".

Checksum: A running total of the characters in a file, recorded or transmitted with the file so that errors can be detected.

Code:

Cold Boot: To start up a system from scratch.

Cold Start: See Cold Boot.

COM file: In CP/M parlance a command file.

Command: An instruction from the console.

Comment: A note added into a program to help the reader (or programmer) to understand its operation.

Compiler: A program which accepts as input a source file written in a high level language, and produces as output an object file containing the machine instructions which are actually executed.

Concatenate: To join two strings together, one after the other.

Conditional: A test.

Console: The keyboard and screen.

Control characters: Codes which perform functions.

Copy: To duplicate, usually for backup safety.

CP/M: A disk operating system for 8080 and Z80 based microcomputers.

CRT: Cathode Ray Tube.

Data: Information to be processed by, or output from, a program.

DDT: Dynamic Debug Tool. A program that assists the user to find errors in machine code programs.

Debug: To locate and fix errors.

Directory: A list of the programs on a disk (or occasionally tape).

Disc: A flat, circular magnetic surface on which the computer can store and retrieve data and programs.

Disk drive: The mechanical assembly which rotates the disk and positions the read/write head.

Disk Operating System: A program which operates one or more disk drives automatically and manages the system.

Display: The computer's output device at the

console, usually a TV-like display of letters and numbers.

Double Density: A method of recording twice as much information on a floppy disk.

Dump: To list out the contents of memory or a disk.

Echo: When the computer inputs a character from the keyboard, it then sends it back to the display so that you can see it was received correctly.

ED: An editor program; part of CP/M.

Editor: A program which lets you alter and correct source files and other documents.

Error Message: Tells you something went wrong, and sometimes what.

Execute: To run a program.

FIFO: First in, first out.

File: A continuous collection of characters (or bytes) saved on a disk or tape for later reloading.

Fixed Point: Counting in integers only.

Flag: A variable, sometimes a single bit, which can have only two values, used to indicate some condition.

Floating point: The kind of arithmetic used in scientific calculators.

Floppy disk: A disk, made of thin flexible mylar, and enclosed in a card jacket, which can be used for magnetic storage.

Focal: Formula Calculator. A simple language.

FORTRAN: Formula Translation. One of the first computer languages.

Garbage Collection: The process of going through memory or disk space, reclaiming all the unused space.

Global: A variable which is known to all the parts of a program.

Grammar: The formal rules of a language.

Hard Disk: A disk made of hard material, larger, faster and more fragile than a floppy disk, and capable of storing 70 million bytes or more.

Hexadecimal: The method of counting to the base sixteen.

Identifier: A label, or the name of a variable.

Index: A variable which usually points to an entry in a table or list.

Index Register: A processor register which is used to access tables and lists in memory.

Indirect Addressing: Referring to a variable which actually contains the address of another variable.

Input: To get data into the computer.

Instruction: A step the computer can perform.

Integer: A whole number.

Intermediate Code: A special kind of object code which cannot be run directly on the computer, but must be interpreted.

Interpreter: A program which examines source code a line at a time, decides what it means, and then does it.

Interrupt: To electronically drag the computer away from what it is doing in order to respond to some time-critical situation.

I/O: Input/Output.

- Kilobyte:** 1024 bytes (Kbyte).
- Kilobaud:** 1000 baud (kbaud).
- Label:** A word which identifies the destination of a call or jump instruction, or simply identifies some location in memory.
- Line Number:** A number at the beginning of a line, which identifies it in a similar way to a label.
- Link:** Part of a data item in a list, which tells the computer the location of the next data item.
- LISP:** A list processing language, much favoured by the artificial intelligence community.
- Load:** To transfer some data or program into the computer memory.
- Locate:** To "fix" a relocatable code so that it will only run if loaded in a particular location.
- Logical Device:** A device as the computer "sees" it.
- Loop:** To repeatedly execute a sequence of instructions.
- Machine Language:** The binary codes the machine actually executes.
- Macro:** A user-defined sequence of instructions which can be inserted anywhere in a program.
- Macroassembler:** An assembler which can utilise macros.
- MBASIC:** Microsoft BASIC; the BASIC used in the TRS-80, PET, Apple 11 and so on.
- Memory:** Where the computer stores data and programs internally for fast access.
- Menu:** A display which offers the operator a choice of several alternatives.
- Microprocessor:** The central processing unit of a computer, built into a single silicon chip.
- Mini-diskette:** A 5¼ inch floppy disk.
- MP/M:** A multi-user version of CP/M.
- Numerical analysis:** The art and science of number crunching.
- Object Code:** Machine code.
- Object File:** A file containing object code.
- Object Module:** An object file containing part of a program, ready to be linked to others.
- Octal:** the system of counting to base eight, or grouping bits in threes.
- Offset:** To load an object file somewhere it will not run, in order to edit or modify it.
- Open:** To give the operating system the characteristics of a file so that it can subsequently read or write it.
- Operand:** The number an operator (+, -, etc) operates on.
- Operator:** An arithmetic function or some other function which alters variables.
- Output:** What the systems produces.
- Packed Data:** Data which shares the same address, and has to be unpacked before use.
- Page:** A length of memory, typically 256 bytes.
- Parameter:** A constant which sometimes has to be varied.
- Parity:** An extra bit on the end of a character or byte for error detection.
- Pascal:** A modern structured language which may eventually rival BASIC in popularity.
- Password:** A secret word the system may demand.
- Patch:** A temporary (ha,ha) fix on a bug.
- Peripheral:** A piece of equipment the computer uses.
- Peripheral Driver:** A program which outputs data to a peripheral and controls it.
- PIP:** Peripheral Interchange Program. A CP/M utility for copying files between devices.
- PL1:** Programming Language /1.
- Pointer:** A variable used for indirect addressing.
- Polish Notation:** A method of separating operators and operands; e.g. + 5 4 is Polish Notation for 4 + 5.
- Preprocessor:** A program which does part of a job to make life easier for the program which follows.
- Priority:** The resolution of which interrupt is serviced first if two should arrive at the same time.
- Program:** A sequence of instructions which can be understood, and ultimately followed, by a computer.
- Prompt:** A message asking the operator to supply information.
- Queue:** A list in which entries are made at one end, and removed from the other.
- R/O:** Read Only; cannot be overwritten.
- RAM:** Random Access Memory.
- Random Access Memory:** The computer's internal memory which is used to hold running programs and data. The computer can both write and read RAM.
- Read Only Memory:** Memory used to store programs, which can not be erased or overwritten.
- Read/Write Head:** The small coil which reads and writes on the surface of a disk.
- Reconfigure:** To reorganise the I/O or other aspects of a system.
- Record:** A set of related data items. For example, an employee's name, address, payroll number and pay rate would form a record.
- Recursion:** The ability of functions in some languages to call themselves.
- Redundant:** Not needed or taken for granted.
- Reentrant Code:** Code which can be used by several programs simultaneously, keeping separate data for each.
- Register:** A location in the processor capable of performing logical or arithmetic functions on the contents.
- Relocatable:** Capable of being moved in memory.
- Relocatable Object Module:** Part of a larger program consisting of many such modules, all linked together and located.
- Resident:** Permanently in the system.
- Reverse Polish Notation:** See Postfix.
- RPN:** See Reverse Polish Notation.
- Run:** To execute a program.
- Save:** To store a program on disk or cassette.
- Schedule:** To decide at what stage a process should run (of an operating system).
- Sector:** A section of data on a disk.
- Simulation:** Making one system behave like another.
- Software:** Programs.
- Source Code:** The original text form of a program.
- Source File:** A file of source code.
- Source Language:** The language the source code is written in.
- Sort:** To arrange items of data in order.
- Spool:** To output a file to a peripheral.
- Stack:** A list in which both entries and removals are made at the same end.
- String:** A sequence of characters.
- Submit:** To put the system under control of a file of system commands.
- Subroutine:** Part of a program which can be accessed from several points within the program.
- Symbol:** The name of a variable or a location in memory.
- Symbol Table:** A table constructed by an assembler or compiler to give the addresses of all variables and labels in a program.
- Symbolic Name:** A label.
- System:** A collection of hardware and software, possessed of the property that the whole is greater than the sum of the parts.
- System disk:** A disk carrying the operating system.
- Teletype:** An electromechanical printer/keyboard.
- Timeshare:** Running several programs on a system simultaneously.
- Track:** The area under the read/write head during one rotation of a disk.
- Transfer:** To move data.
- Transient:** A program that is only in memory for a short time before being overwritten.
- Tree:** A list in which each data item may refer to several others.
- TTY:** See Teletype.
- Unix:** A multi-user, multi-tasking, multi-programming operating system, expected to appear on microcomputers before long.
- User:** One of the people connected to the computer.
- Utility:** A program of use to most users.
- Variable:** Named quantity that can take on different values.
- Verify:** To check that data written on a disk or tape can be read again correctly.
- Warm boot:** To reload the operating system a second or subsequent time.
- Word:** The amount of data fetched from one memory location. Typically one byte.
- Word Processor:** A system for manipulating, editing, printing and formatting texts files.
- WordStar:** A proprietary word processing program.
- Write Protect:** To remove the cover from the notch in a floppy disk so that it cannot be written on.
- Zilog:** Manufacturer of the Z-80 and Z8000 microprocessors.

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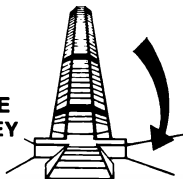
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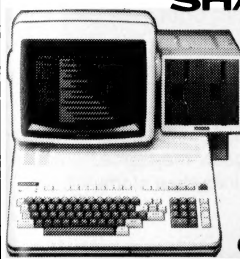
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Apology: In December '81 Reader's Classifieds section there was a mistake made in Mark Gosbee's phone number. The number given to us was (02) 807 6768, the correct number is (02) 807 2842.

your computer services

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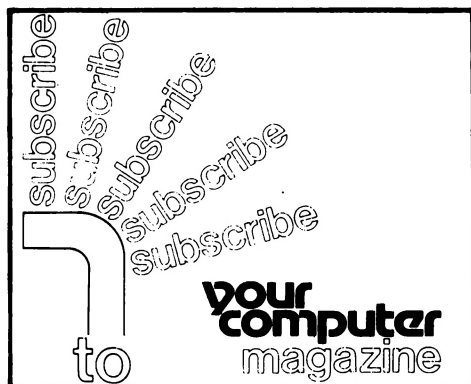
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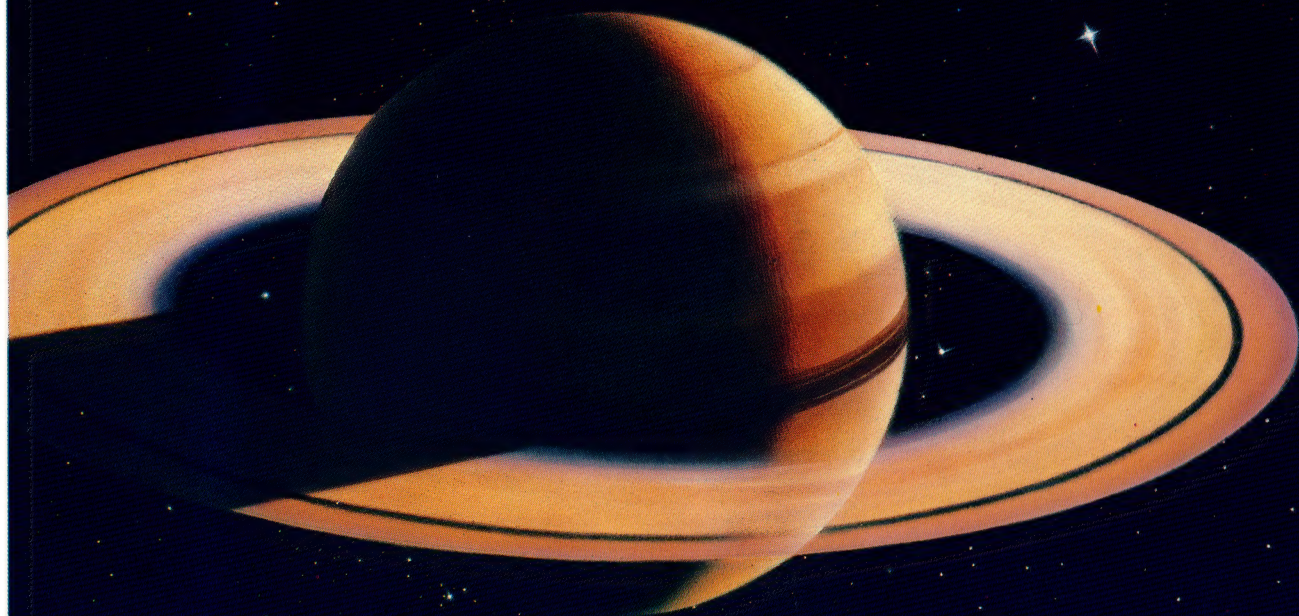
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The disks of Saturn

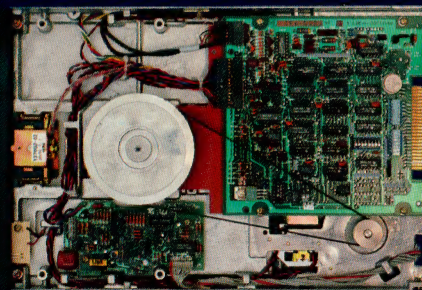
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