

your computer

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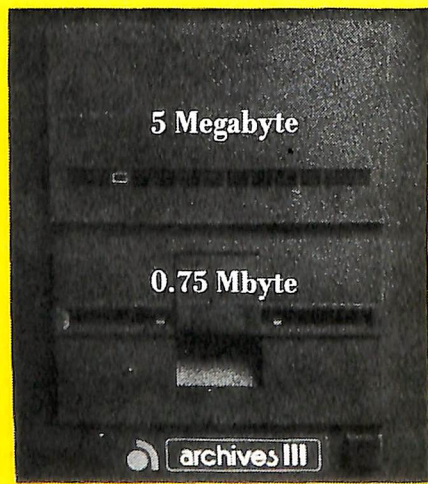
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inside your computer

Vol 1, No 7, January 1981

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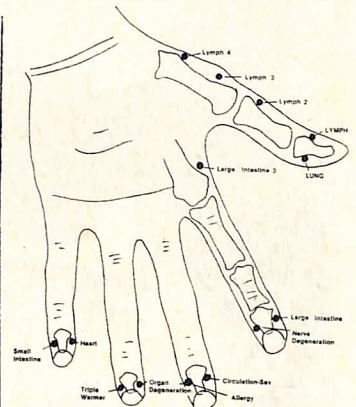
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An open forum for clubs and user groups.

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



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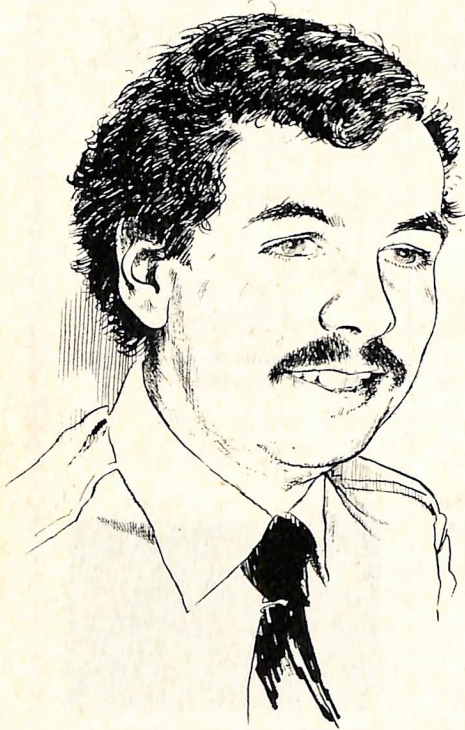
1 3 4 SMALL HUMANIDS (4)					
PETRADRAM'S OPTIONS					
FLIGHT SHIELD P JARRY					
R SUN					
CHARACTER	NAME	CLASS	AC	HITS	STATUS
1	DRACLOUSE	CLERIC	10	100	ALIVE
2	DRACLOUSE	CLERIC	10	100	ALIVE
3	DRACLOUSE	CLERIC	10	100	ALIVE
4	DRACLOUSE	CLERIC	10	100	ALIVE

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editorial



THE SUDDEN resurgence of interest in CP/M continues to amaze me. Just when the pundits were telling us CP/M was a fossil, the tide has turned.

Part of the explanation was Microsoft's release of the SoftCard, which allowed Apples to run CP/M. This gave Apple owners capabilities they hadn't even dreamed of.

Another reason for the comeback was the sudden rash of mini and word processor manufacturers who decided it was time they launched a micro, and didn't have the time or resources to write an operating system, languages and utilities. Latest to join the rush is DEC, whose acceptance of CP/M is the final stamp of approval.

In addition, CP/M offers sophisticated development tools — COBOL, Pascal, BASIC, C, powerful sort utilities, data base management systems. For years, CP/M hackers have been writing an incomparable amount of systems software, which is there for the using.

This opens up a marvellous opportunity for Australian software houses and authors. Here's an operating system with a user base bigger than any other, and apparently growing exponentially. It needs accounting packages, financial planning software, inventory packages, order scheduling and other software.

Now is the time for the applications packages. The market is there, the tools are there, the skills are here in Australia. What are we waiting for?

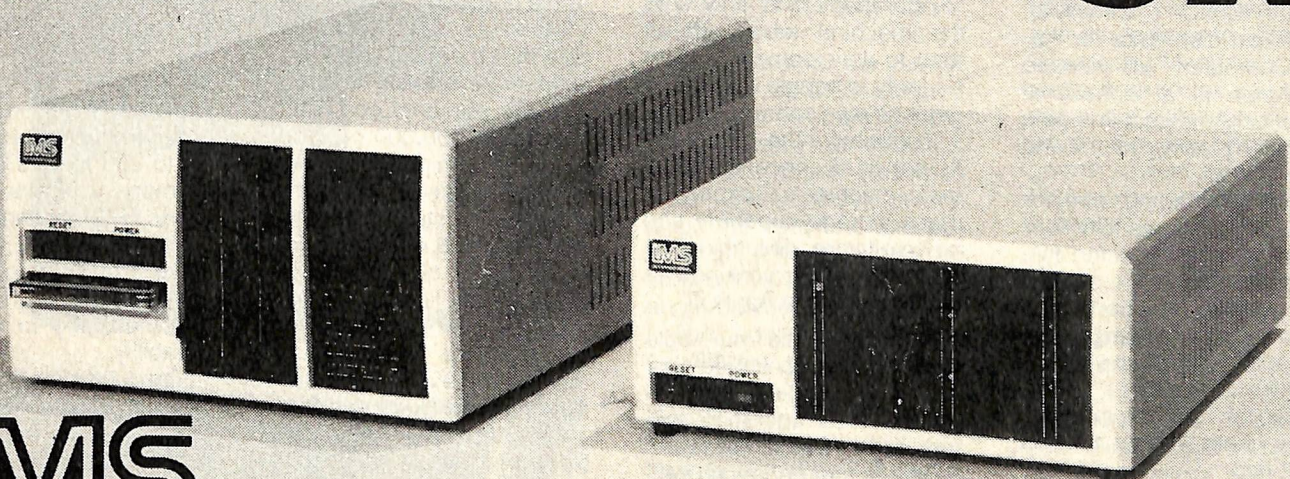
—Les Bell

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INTRODUCING... SX



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COMPUTERS

THE 8000SX WITH:

CAPACITY: 10, 20, or 40 Megabyte plus two double sided double density slimline drives and tape drive backup. You've seen the familiar Series 8000 computer, now you can have the same rugged reliable system with an integrated 8" Winchester hard disk and tape backup drive, not to mention the slim (two drives in the space of one) double sided drives.

THE 5000SX WITH:

CAPACITY: 5.5Mbyte Winchester plus two Quad Floppies. If you know our Series 5000 table top computer line, you know that good things come in small packages. Now, with the introduction of the 5000SX, big things come in small packages. One integrated package can contain two double-sided quad-density floppies plus a 5.5 Megabyte Winchester hard disk drive (or other combination).

BOTH THE 8000SX AND 5000SX FEATURE:

SPEED: Load 20K in less than 1 second. Not only does our high performance Winchester subsystem include error detection with automatic error correction, its extreme speed is comparable to that of large mainframe hard disk systems. A 20K program loads in less than one second, about 10 solution speeds up your applications programs.

EXTRAS: You'll be glad you have them. The 5000SX comes standard with lots of extras, starting with a fully terminated 12-slot S-100 Motherboard, (on which there are 7 spare slots for your use!). Add to that, 64K Dynamic RAM modules with parity of course, and receptacles for your CRT and Printer that turn on with the main power switch. Plus a convenient up-front reset switch, built-in mains line filter and more.

EXPANSION: Room for expansion is so important. You can add multi-processor boards, memory, terminals, printers, up to three hard disks, in fact most any S-100 compatible sub-system.

SOFTWARE:

OPERATING SYSTEMS: There's one to suit your needs exactly. TurboDOS - the operating system that is single-task, single-task with spooling printers, multi-tasking and multi-processor networking, can handle up to 2 Gigabyte of on-line disk storage, gets up to 35% more data on a disk, is completely CP/M compatible, and allows random access files up to 67 Megabytes in size. It is many times faster than CP/M, and yet it does read-after-write and verify-after-seek. - Something that other operating systems cannot do without intolerable performance degradation.

CP/M, MP/M - of course.

MARC - the Unix style (CP/M compatible) operating system.

UCSD Pascal 1V - for both 5000 and 8000 systems

MVT-EFAMOS -- single processor multi-tasking system

Micro-COBOL - the professional COBOL system for micros

LANGUAGES AND APPLICATIONS PACKAGES: Too numerous to list here, call us!

QUALITY: So good it's warranted for two years! There isn't room on the page to even scratch the surface of the IMS International story. However, our two year warranty is a dead giveaway that we produce rugged, top quality, professional equipment. We do things right the first time, so they don't come back to us. The truth is, we have fewer returns within our two year warranty period than other manufacturers have within their 90-day warranty periods. For full details, and the location of your IMS International dealer, call us today, or write:

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your computer news

New Apple III

ELECTRONIC Concepts, Australian distributor for Apple Computer, will release the Apple III at a national dealer conference cum Apple exhibition planned for the end of this month.

Elcon managing director Mr Rudi Hoess has told *Your Computer* the expected five megabyte hard-disk system (see 'What's Happening at Apple', *YC* November) will be available with the new machine.

"We can't see the machine being viable without it," said Mr Hoess.

He said the new Apple III, with operating system, languages and screen would be priced at about \$5000, before tax. Price including the hard-disk system would be about \$9000, before tax.

The machine will be available with configurations giving 128 or 256K of internal memory.

Due to bugs in the first Apple III, Apple Computer Incorporated has taken some flak over that machine, according to reports from the United States.

A release of the first machine had been expected in Australia during 1981 — in fact, *YC* May 1981 included a description of the machine from an Electronic Concepts "launch".

However, Mr Hoess told

YC as we went to press that his company had only sold the machine (about 20 all told) to development houses — "only to people who would get their own software up".

Publicity for the new Apple III in the US concentrates on the machine's expanded mass storage capability and new software, describing the machine: "as a more powerful version of the Apple III".

A press release from Apple Computer Inc continued:

The new Apple III features an improved operating system, more reliable hardware, seven new or enhanced software packages and lower prices than the earlier product. In addition, Apple III supports up to 256K bytes of internal memory.

The expanded storage capability is provided by the new Apple III/Profile personal mass-storage system. Designed to be integrated into Apple III systems, Profile is a five million-byte, Winchester-type, hard-disk system which gives Apple users nearly 35 times the mass-storage capacity of a single floppy disk.

"The new Apple III/Profile combination is an important development in our efforts to develop versatile and dependable hardware and software solutions to professional users of personal computers."

said A.C. ('Mike') Markkula, Apple president.

Markkula said tests indicate that the new Apple III is even more reliable than the Apple II personal computer, more than 300,000 of which have been shipped. The Apple III proved more reliable in simulated customer environment use and in an on-going 'out-of-box' quality control audit from finished stock. "This is truly significant because Apple III is a much more complex machine than Apple II", Markkula said.

The Apple III is targeted at traditional Apple customers in business, professional management, and education. Because of its greatly increased mass-storage capacity, the new Apple III is also particularly well suited for OEMs (original equipment manufacturers) and system integrators who need larger data storage capacity.

The usefulness of the Apple III is further expanded by a total of seven new or enhanced application programs. One such program, Access III, allows Apple III computers to communicate with large mainframe computers. Apple IIIs for the first time can be used as remote data processing work stations, accessing information from the larger data base and returning completed work to the central computer.

Other new or enhanced programs just introduced include Apple Writer III for word processing; Visicalc III and Business Graphics III for preparing and analysing detail business information; Business BASIC and Pascal III for developing advanced application programs; and Script III for formatting Pascal text into layout-perfect printout.

In addition, an updated version of Mail List Manager will soon be available for maintaining mailing lists and printing labels using an Apple III/Profile system.

"The combination of these products makes the Apple III an ideal solution for enhancing the productivity of professionals in the business world," said Markkula.

Apple III can be expanded up to 256 Kbytes of internal memory, using the latest 64 Kbyte RAM technology. This new technology provides more information storage with lower power consumption, resulting in enhanced reliability.

The additional memory also enables users to run larger, more sophisticated programs than previously possible.

New DEC Micro

THE WORLD'S largest manufacturer of minicomputers — in fact the company that invented the mini — has joined the growing ranks of companies making micros. Digital Equipment Corporation (DEC) has announced a personal computer option to its popular VT100 display terminal.

The VT100 is a smart terminal with some neat features. It has all the usual smart terminal features, plus a few tricks of its own, including super-smooth 'soft' scrolling.

DEC originally designed the VT100 with a small card cage inside to take various options, such as graphics circuitry. The standard power supply is deliberately 'beefed-up' to cope with expansion.

The VT18X upgrade will sell for \$2800. It includes a Z-80-based processor board with 64K of RAM, a dual double-density disk unit with 320K of storage, connecting cables, diagnostic disk and documentation.

A second dual disk system is \$1500 extra. CP/M sells separately for \$285 (a bit on the steep side, we'd have thought).

DEC has arranged with

New Year Delays

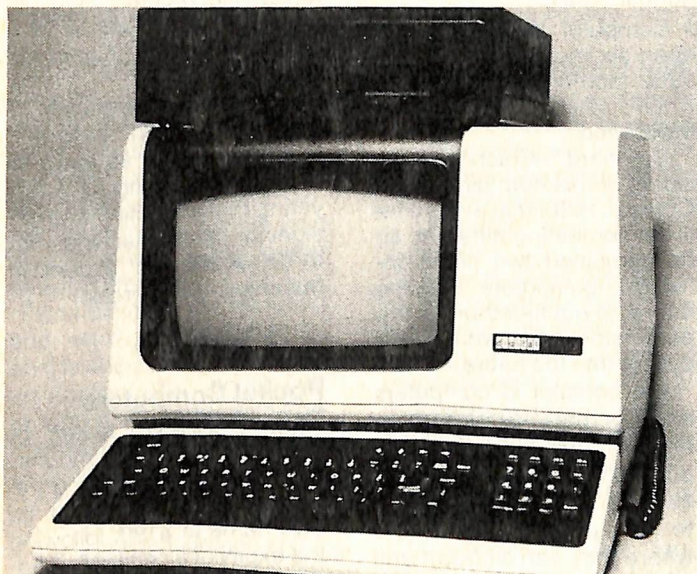
IT IS said that some lucky people are able to take holidays over the Christmas/New Year period, and this includes people who work on the production of *Your Computer*.

While we don't begrudge them their rest and recreation, it does mean this issue — and the February issue — of *Your Computer* will be around two weeks late on the news stands.

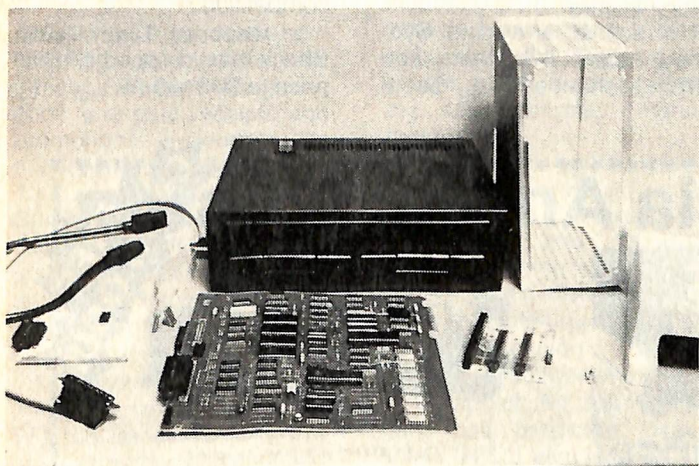
We hope these delays don't cause any inconvenience and look forward to your continued readership in the New Year.

For the coming 12 months we have planned some interesting reading giving you more software reviews and increasing our user columns. There are also many features planned from our staff in the US and Britain, and lots more information on the happenings on the Australian scene.

The staff of *Your Computer* wishes you all the best for the coming 12 months.



The Digital Equipment VT18X option with the VT100 terminal



The VT18X, the inside story.

Lifeboat Associates for its range of CP/M software to be available for the new machine. DEC's OEMs and resellers, who will handle the machine, will also sell Peachtree software.

The prototype we saw was certainly easy to use, with a good 'feel' to it. The BIOS offers the user several choices on power-up, including the ability to use the machine as a straight terminal. This is where DEC believes the market for the product lies — in offices where a manager already has a terminal, but could use some local intelligence for jobs such as financial planning.

At this point little bells began to ring in your reporter's mind. DEC is well known for its work in the field of distributed processing, particularly for its DECnet software and the DDCMP protocol.

Digital Research, which brought you CP/M, also has an interest in distributed processing, its product being CP/Net, which the VT18X can run.

More to the point, Digital Research owns a large DEC mini, one of DEC's mainframe-size VAX machines. DR has written a program which allows the VAX to function as the network server (central node) in a CP/Net network. What was the pos-

sibility (probability more like) of DEC and DR getting their heads together?

On confiding our suspicions to a top DEC staffer, it was clear he knew exactly what we were talking about. "DEC and Digital Research have a very close relationship," he confided, and added that he wouldn't be surprised if there wasn't an announcement soon.

The addition of CP/Net capabilities to a DEC mini would allow the mini to act as the storage back-up to the VT18X, allowing large files to be maintained on the central computer and accessed as required by the micro running programs under CP/M.

The combination would be powerful indeed, and of great interest to those organisations currently owning DEC minis who want to give executives some local computing power.

Incidentally, for those who favour the VT18X in a stand-alone application, but don't like mini-floppies, a mini-Winchester is in development. And the VT100's graphics option can be added along with the VT18X, giving a stand-alone graphics computer. □

Josephson Junction

IF YOU haven't heard of it yet, it won't be long before you will! In computers, it's a new type of solid-state switching which manipulates binary data.

The switching speed of ICs and transistors is limited by heat. The Josephson Junction is a miniature solid-state switch that is kept extremely cold — near absolute zero — to allow for the highest speed possible.

Computers using the JJ are much smaller (since the switches can be spaced closer together) and can operate at speeds of up to 30 times faster than ICs!

The more studious of our

regular readers may have noticed in the November issue a reference to "Joseph's Injunction Machine". Well, we're here to tell you that is not a breakthrough in hardware for law firms: the gremlins were simply doing their job on a reference to the Josephson Junction. □

Computer Law Conference

A RECENT conference of the Computer Law Association (USA) concluded that protection of software from illegal use has a long way to go before it will be adequate.

Computer programs and chips with stored programs are usually classified as concepts (abstract mathematical formulas) rather than products.

The US Supreme Court has ruled that concepts are not patentable.

Other problems to be overcome include whether source code copyrights apply to object codes, whether microcircuit designs can be protected, whether databases can be copyrighted, and even how one goes about finding qualified lawyers, courts and copyright/patent office personnel to deal with computer technology. □

The Penputer!

YOU'VE PROBABLY heard of Pentel Pens, but we'll bet you've never heard of the Pentel Penputer!

It is a Japanese-made microcomputer without a keyboard; apparently for those who don't type.

You use a pen to press on items arranged on a pressure-sensitive overlay sheet and manipulate the data with the pen point, while watching the results on a video screen. □

More Computer Waves

THE POPULAR swing to home computers has now reached epidemic proportions, according to computer authority Bernhard Kirschner.

Mr Kirschner, managing director of Computer Wave, speaking at the opening of the company's second Sydney city retail outlet, commented: "The market in home computers has now moved from the hobbyist and enthusiast to mums, dads and kids".

"The massive boom in colour television in the mid-seventies is now becoming the home computer boom", he said.

Computer Wave, which calls itself Australia's first retailer designed specifically for non-technical people who want to learn about comput-

ers, has opened a second store in Sydney's Mid City centre (opposite Centrepoin in Pitt Street) because of the enormous interest created at its first store in Myer. There are quite a number of computer retailers supplying the home market which deal with hobbyist and enthusiasts and people who know quite a bit about computers. But our predictions are that the real growth in this industry will be computers for home use by mum, dad and the kids.

It is becoming as necessary to understand computers as it is to be literate, as we race towards a computer based society and the family with a computer at home will be better placed to cope with this exciting future," said Mr Kirschner.

Computer Wave opened in Myer's Sydney store in

August, 1981.

Computer Wave plans to open six more stores during 1982, some directly owned, while others will be franchised.

Bernhard Kirschner decided, on his 40th birthday in October 1980, that it was time to do something different, so he combined two of his interests, computers and the future, to put together a computer store that would help people into the future.

His concept is computers are now ready to come home and his idea is to show the public that there is no reason to be afraid. The best way is to invite people into the store where they can sit down and fiddle with the computers at their leisure.

Kirschner arrived in Sydney nearly five years ago from Johannesburg, South

Africa. He recently sold his chain of Print shops to concentrate on the Computer Wave concept.

He is an accountant by training, worked programming computers as early as 1961, did teaching for a few years, then inventing and designing office machines for three years (an expensive but enjoyable exercise). □

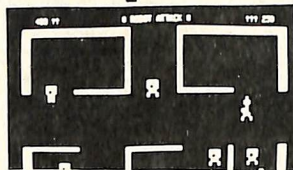
Pocket Computers

THE JAPANESE maker of the TRS Pocket Computer, Sharp, is now marketing the device in the US under its own name at \$199, following the expiry of a contractual agreement prohibiting such competition.

In response Tandy/Radio Shack has dropped the list price to \$US169.95. □

Compshop Australia Announces

FREE CATALOGUE



ROBOT ATTACK

Robots from the planet "Jidy" have captured one of Earth's invaluable space stations. Alarms scream out "ROBOT ATTACK". Boldly you transport yourself to this station. Robots materialize in every corner. You fire at them with your laser until every last one is destroyed. Cautiously you enter the next compartment. Again Robots appear and there's lots more of them this time!

For TRS80 Mod 1/3 & SYSTEM 80 16K tape ..\$19.50



LUNAR LANDER

Six astronauts are stranded on a desolate planet. You must undock from your command module and maneuver your rescue shuttle through the asteroid field to save them. You can only save one at a time, and each landing burns away parts of your landing sites.

For TRS80 Model 1/3 & SYSTEM 80 16K tape...\$19.50



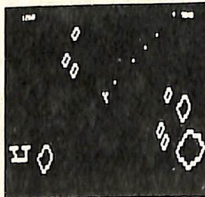
ASYLUM is an adventure like no other. In addition to the famous 3D graphics that have made Deathmaze and Labyrinth best-sellers, ASYLUM accepts full sentences as well like "put the box under the bed." To leave you will have to deal with guards, fellow survivors, doctors, the infamous Crazy Carpenter and much much more. So don't expect to get out soon!

ASYLUM, LABYRINTH & DEATHMAZE are for TRS80 Mod 1/3 & SYSTEM 80-with 4 arrow keys-16K Tape \$19.50

StarFighter

The Penultimate Space War Game is Here! The SC-78503 Starfighter craft is the most sophisticated known to man. You as the pilot are instructed to rid the galaxy of the dreadful PRC Craft to insure life as we know it. You start out as a NEW PILOT and have access to the Training Simulator (on tape 1). Then you progress to your MAIN MISSION (tape 2). Speed and sound effects enhance the graphic action of this tactical game. Can you take the pressure!?

For TRS80 Mod 1/3 & SYSTEM 80 16K tapes...\$32.50



SUPER NOVA

Asteroids have surrounded your ship. You must shoot the asteroids as well as any of the five types of alien space-ships. Use your thrusters for full movement and rotation of your ship - if you are overwhelmed, you can even jump to hyperspace! Written in fast machine code with superb graphics. This game is GREAT!

For TRS80 Mod 1/3 & SYSTEM 80 16K tape...\$19.50

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YC 1/82

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The Big Men Wang

REFLECTING the Victorian Football League administration's professional attitude is its investment in an integrated computer system from Wang Computer to handle the growing clerical load at the league's Melbourne headquarters.

Combining both computing and word processing tasks on the one system, the VFL's installation is configured around a Wang VS with 256 Kbyte CPU. It includes three workstations dedicated to computing and two for dual use, a 90 Megabyte disk drive, a 600 lpm printer, and a high-quality daisy-wheel for word processing output.

Apart from day-to-day accounting expected by any thriving commercial organisation and gate receipts and promotional expenditure to account for, the VFL has over 1000 people on its payroll, including both permanent and casual staff. It has a vast spread of statistics to monitor and collate each week of the season from twelve clubs each fielding in excess of 1000 players.

For the last 12 years the VFL has relied on a mixture of manual methods, accounting machines and typewriters to handle the load, augmented only by an outside computer

bureau for the organisation of mailing lists. □

Datapoint's Datashield OFFICE computer supplier Datapoint expects to reduce maintenance calls to its 1000 Australian installations by up to 20 percent, following a \$500,000 deal with 3M Australia.

Under the deal 3M will supply its Datashield Services of inspection, cleaning and reporting on the condition of magnetic disk packs and cartridges for two years, said the national sales and marketing manager of 3M's Data Recording Products, Mr John Threlfall.

Mr Threlfall said Datashield engineers would make inspections at least twice a year and clean media at least once, using Randomex equipment, which is also used by big US computer manufacturers.

An inspector unit is used to find contaminant build up on data surfaces and checks for unbalanced and distorted packs. Cleaning is done with an automatic cleaner which uses a continuously filtered detergent solution.

National support manager of Datapoint, Mr John Duggan, has predicted Datashield would eliminate up to 20 percent of maintenance calls which could be blamed on dirty media. □



With Wang equipment easing the load, the big men are flying.

APPLE SOFTWARE from micro-Educational

You have the best micro computer. We have the best software. Here is our listing from SOFTALK TOP THIRTY, followed by the best of the new programs.

TOP 30

1	<input type="checkbox"/> VISICALC 3.3	219.50
2	<input type="checkbox"/> RASTER BLASTER	32.95
3	<input type="checkbox"/> APPLE PANIC	32.95
4	<input type="checkbox"/> DB MASTER	245.95
5	<input type="checkbox"/> PFS	109.50
6	<input type="checkbox"/> GORGON	42.95
7	<input type="checkbox"/> SNEAKERS	32.95
8	<input type="checkbox"/> DOS 3.3	65.00*
10	<input type="checkbox"/> EPOCH	37.50
11	<input type="checkbox"/> HIRES 3 (CRANSTON MANOR)	39.95
12	<input type="checkbox"/> SNOGGLE (PUCKMAN)	29.95
13	<input type="checkbox"/> ULTIMA	43.95
14	<input type="checkbox"/> OLYMPIC DECATHLON	29.95
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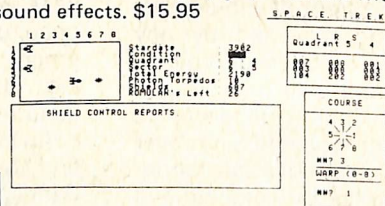
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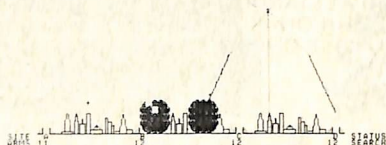
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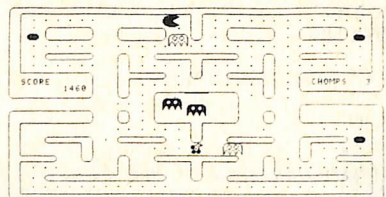
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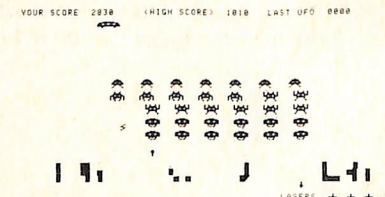
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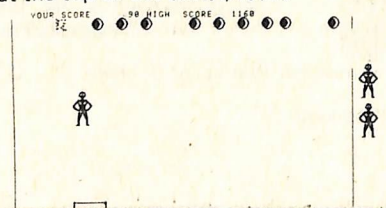
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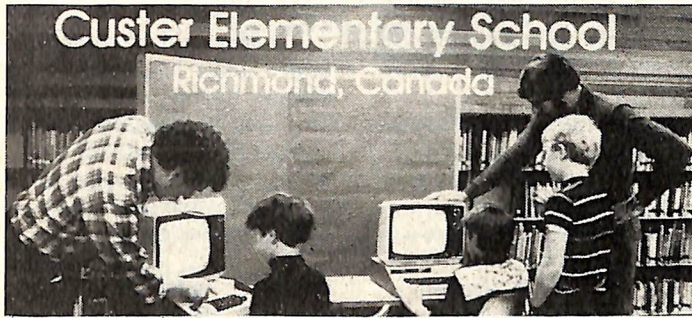
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Ohio Scientific education system similar to the equipment sold to Queensland schools.

Education Market

THE SALE of 28 Ohio scientific systems to a group of nine North Queensland high schools has secured the TCG Group a 'significant position' in the marketing of micro-computers to educational institutions, according to Mr Mike Barraclough, a director of TCG.

The sale marks TCG's dedicated entry into the education market, following the recent restructuring of the group's marketing programme in which increased efforts will be directed towards computer education.

It also coincides with TCG's new Ohio Scientific pricing structure, in which the prices of the Superboard and CIP were reduced by 33 percent. Unit price of the CIPs constituting the major part of the north Queensland order was under \$500.

"Our commitment to education has previously been fairly low key. We are now expanding our role within the education community and plan to substantially develop sales within this major market," Mr Barraclough said.

"Ohio Scientific computers have always held a large proportion of the general education market overseas. We see no reason why this should not be the case in Australia and shall be backing our considerable price advantages by the enhancement of our back-up field engineering and support service in this area."

The purchase of 28 CIP and two C8P computers was

co-ordinated by Mr Brian Dobinson, mathematics master at Heatley State High School in Townsville. The contract provides for supply to schools in Brisbane, Bundaberg, Ingham, Townsville and Charters Towers.

"The CIPs were selected as the most suitable models of those evaluated to fulfil our philosophy of providing hands-on computer experience for as many students as possible," Mr Dobinson said.

"Our ultimate aim is to reach a ratio of two students per computer. The competitive prices of Ohio Scientific mean this is a realistic objective.

"The basic computer requirements within educational institutions are to be able to provide a reliable system giving as many students as possible access to a computer," he said.

"Most systems are currently too highly priced for the majority of schools to be able to provide across the board practical access for students. Unless prices become more competitive, computer education will be held back considerably," he said.

The systems will be used at Heatley High to provide access to disk computing for students; for in-house administration purposes including the recording of individual time-tables for every teacher and for every student; to locate those teachers free at one time and to locate all rooms spare at one time; and to generate report cards for all pupils.

An accounting system is currently being investigated to transfer general school accounts from a manual system to computer. The other schools involved in the purchase will be using similar applications, according to Mr Dobinson.

"We shall also be offering our facilities for use by the community," he said.

"This year we are opening a maths centre for community computer courses. With assistance from TAFE (Technical and Further Education) we will be holding evening courses for the general public aimed to teach an appreciation of computers and all aspects of computing."

It has also been decided 'in principle' to develop a school-based Ohio Computer users Group in Townsville, Mr Dobinson said. □

Restauranteur's Aid

SANYO Office Machines has released a locally developed system that is said to provide tamper-proof control, faster customer service and far greater kitchen efficiency for restaurant operators.

The system's heart is a modified ECR 710 intelligent stand-alone point of sale terminal used in conjunction with Sanyo's SMP 301 matrix printer.

When a meal is ordered, the waiter takes to order to the cashier, who places the guest account slip into the SMP 301. All the register's keys are preset by code for every menu item. Simultaneously with the register keys being pressed, the kitchen printer produces a fully alphabetical order with the table number and the complete order.

The system will print selectively. Bar orders do not appear on the kitchen printer.

Mr Roger Price, Sanyo's DP product manager, says the system is already operating successfully in restaurants throughout Australia.

One of its main advan-

tages is the chef knows immediately what orders have been placed by all the tables. The system can even handle name variations like 'rare' and 'medium rare', due to its full alphabetic printing capability, and waiters cannot 'fiddle' meal orders.

Mr Price says that the company's restaurant system puts 'meal accountability, versatility and accuracy within the reach of the restaurant owner'.

The program supplied with the ECR 710 terminal is also capable of reporting department analysis by item quantity and value; transaction totals; selective hourly totals supplying total turnover per hour; percentage by department related to total turnover; individual cashier totals; operator reports; and daily, weekly or monthly reports. □

CASE Buys In

COMPUTER and Systems Engineering (CASE) of Rickmansworth, England, a leading supplier in the data communications market, has set up an Australian company as part of a plan to expand its overseas markets.

CASE is the UK market leader in data and message communication systems. It is the leading European manufacturer of concentrators and data multiplexors, supplying products into the commercial and government sectors, as well as to Telecom authorities.

Other CASE products include modems, data switching equipment, local data networks, terminals, word processors, message switching and electronic mail systems.

The new company, CASE Communication Systems, is owned 58 percent by Australian financial institutions and residents, and 42 percent by CASE UK. The major Australian investor is the National Mutual Life Association of Australasia. □

Blue on Schedule

THE RAT RACE is on! IBM has already produced about 15,000 personal computers and outlets (such as ComputerLand) have them in stock.

Various newsletters from computer clubs around the US report the units being demonstrated at their meetings.

Industry insiders, however, feel the 15,000 units will be snapped up fast and demand will far outstrip availability. IBM says it plans to market 100,000 the first year, which would put it up around the leaders almost immediately!

Although the computer (based on the Intel-8088 16-bit microprocessor) is expandable to 256K of RAM, three configurations seem to be more or less standard:

- 40K ROM, 16K RAM, audio cassette and RF modulator for TV hookup for about \$US1600;
- 48K RAM, one 13 cm disk instead of cassette, and RS-232C I/O for about \$US2385;
- Same as above, but with 64K RAM and additional 13 cm disk drive for 320K of on-line storage for about \$US3045.

There is an additional \$40 charge for system software and another one-time charge for communications software.

Apparently the biggest advantage of the IBM personal computer is also its biggest disadvantage — the 16-bit MPU. Although far more powerful than any of its 8-bit competitors, software compatibility will be a problem.

The disk operating system is a Microsoft Advanced DOS', although a special 16-bit version of CP/M is coming. The available printer is simply a thinly-disguised Epson MX-80. □

Boom, Or Bust?

MANY different — and disagreeing — studies of the US personal computing in-

dustry have recently been released; sold, for big bucks by market research firms. The disagreement among them is so vast you might as well throw darts and save your money.

Future Computing of Texas says sales of the IBM PC will exceed \$1billion within three years and that the big two' (Apple and Radio Shack) will be hurt. But Venture Development of Massachusetts says the big two have nothing to worry about since IBM doesn't have the distribution channels and software support of its competitors, and that IBM will expand the total market. Level I systems (those under \$20,000) will show the highest compound annual growth rate, with shipments increasing 33.5 percent annually through 1984.

International Resource Development (Connecticut) says the public could totally desert home computers, much in the way it has abandoned home video games. It says 90 percent of low end computers bought by individuals lie unused on dusty shelves.

One thing that is agreed upon, however, is people in small businesses will be the big market for small computers. The big two both have new direct marketing plans targeted to this market to compete with IBM's marketing strategy, much to the dismay of some of their retail outlets. □

Business Package

A NEW microcomputer system aimed at the small business market has been launched by Sanyo Office Machines.

The company offers its Sanyo-IMS Business System at a recommended price of \$8950, including printer, CP/M and one fully operative system program. For exam-

ple, buyers may select payroll, debtors, inventory or creditors as an initial package.

Sanyo says the under \$9000 package would provide any small business with an initial data processing system which can be easily expanded as additional data processing needs develop.

The company's data processing product manager, Mr Roger Price, says the Sanyo-IMS system is also ideal for larger corporations which may not wish to use its main computer for payroll or specialised programs.

Software packages have been specifically designed for Australian small business, and include invoicing, stock control, debtors, creditors, general ledger, payroll and word processing, plus a wide range of standard CP/M software, thus providing access to an enormous range of

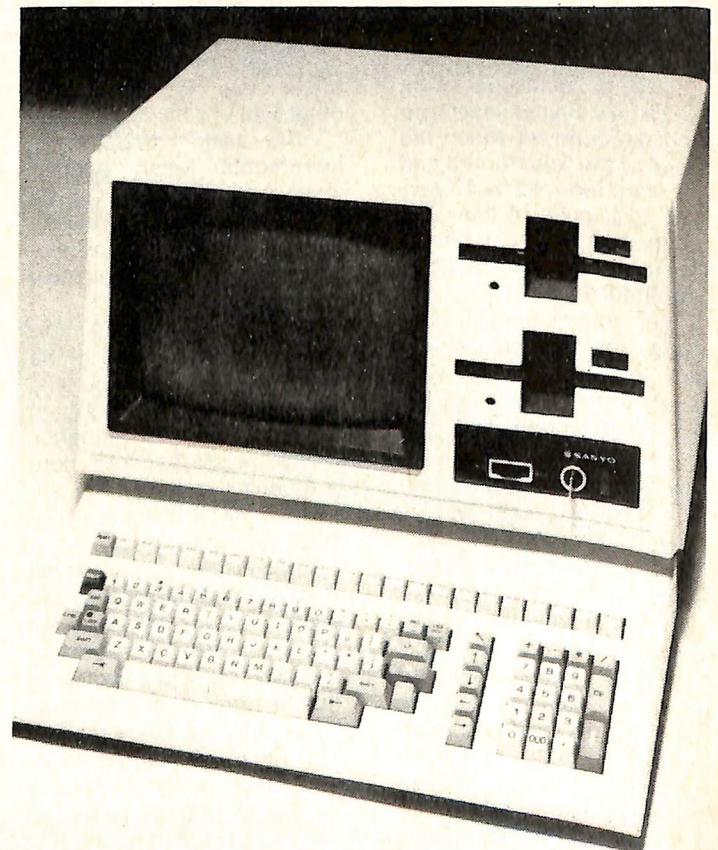
programs.

A high level of 'program and data integration' is claimed for the system. A major menu enables the selection of various modules, such as accounts receivable, accounts payable or stock control, for example.

The MBC 2000 microcomputer is an integrated desk-top design accepting two disk drives with 12cm single-sided double-density disks. Up to two external floppy disk drives can be added.

Hardware can also be used as an intelligent terminal for asynchronous non-procedure data communication with a host computer.

An ASCII keyboard is detachable and has 22 programmable function keys, the high-resolution green screen can display up to 1920 characters. □

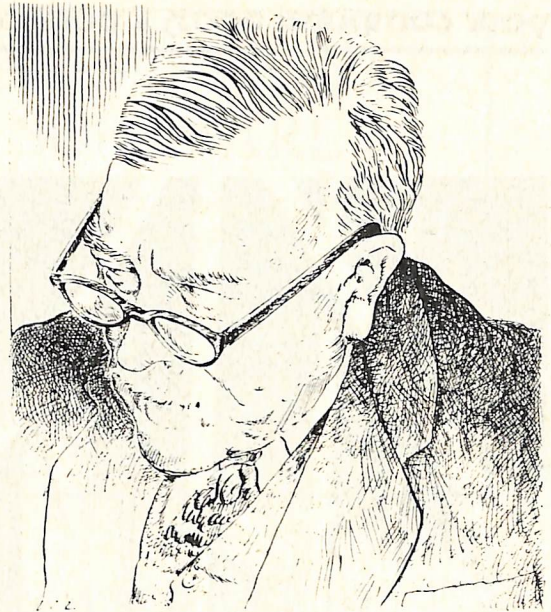


The Sanyo-IMS Business System incorporating the MBC 200 microcomputer.

CYBERNETICS RESEARCH

IN 1948 DR NORBERT WEINER PROPOSED THAT ALL PURPOSEFUL BEHAVIOUR WHETHER OF LIVING OR INERT MATTER, SHOULD BE STUDIED WITHIN THE SAME FRAMEWORK. THE WORD IS DERIVED FROM THE GREEK "KUBERNETICS" MEANING STEERSMAN. ON THAT DAY "CYBERNETICS" WAS BORN.

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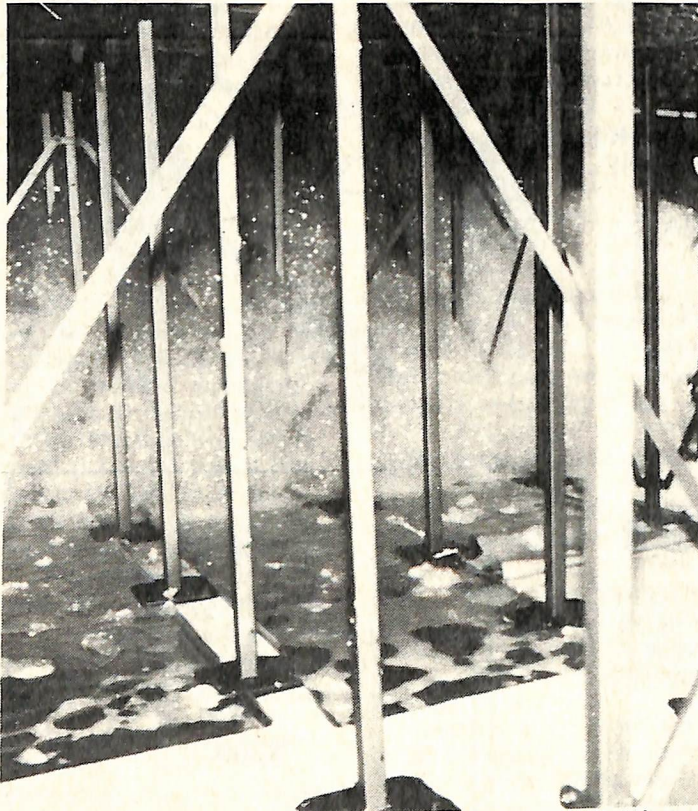
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Using the computer to test the effectiveness of foam fire fighting.

Fire Protection

WHILE THE use of foam to fight certain types of fires is now accepted practice, tests with high expansion foam to combat fire in specialist applications — such as computer installations — is showing positive results.

At a recent workshop for computer users, fire protection authorities and insurance officials convened in Melbourne by national consulting engineers Stastra Page and Associates, the effectiveness of high expansion foam in tests staged in the UK were illustrated dramatically in a video tape presentation.

The workshop was presented by Mr Frank Simmons, FCIBS, MASHRAE, a director of Tilney Simmons International Limited — the UK affiliate of Stastra Page and Associates.

In response to increasing demand for specialist fire protection systems for installations of computers and

other electronic equipment, Stastra Page and Associates investigations revealed that one of the major factors of concern is damage to equipment caused by extinguishants and the down-time resulting from equipment restoration and clean-up. The UK experience of Frank Simmons and the CIBS committee is encouraging to Australian computer users and insurers.

High expansion foam is a fast moving aggregation of bubbles resulting from the mechanical expansion of a foam solution — chemically similar to domestic detergent — by air or other gases with a foam-to-solution ratio of up to 1000 to one.

When generated in large volumes, high expansion foam prevents air — necessary to continued combustion — from reaching the fire. Water carried by the foam is converted to steam at the point of fire (thus absorbing a great deal of heat by the burning

materials) and reduces oxygen concentration by dilution of the air.

The foam is distributed by a fan in the foam generator, pushing the foam forward through the room or floor void. Full-scale tests have demonstrated that foam generators can fill the floor void under large computer rooms in about two to three minutes. □

Sinclair Challenges

APPLE (23 percent), Tandy/Radio Shack (16 percent) and Commodore (10 percent) sell half of all the microcomputers sold in the US. But that could change now IBM is in the picture and little-known Sinclair Research of Cambridge, England is coming on strong.

The Sinclair ZX-81 personal computer will soon become the world's largest-selling micro! Production has reached 10,000 units a month at a former Timex plant in Dundee, Scotland.

As IBM increases its market share, insiders predict Atari and Commodore will be squeezed from widespread distribution. (Sinclair is sold only by mail order in the US).

According to a recent article in the Wall Street Journal, Sinclair's ZX-81 will be test-marketed by American Express. AMEX has a \$140 million mail order business through its 9.5 million cardholders, and the \$149.95 computer might prove popular.

Clive Sinclair, the English electronic inventor, said recently he had sold 100,000 of the ZX-81 personal computers in the past six months and "we'll sell 40,000 in December alone!"

That's more than TRS and Apple combined!

Sinclair started young, at 22, and has no college degree. He has only about 30 employees worldwide, but he expects the company will do \$40 to \$50 million in sales in

1982 alone. The ZX-81 can be produced cheaply as it has only four custom ICs in it. A \$100 printer is planned, and floppy disk drives and colour capabilities are being explored. □

Security A Problem

SCIENCE NEWS reported in its October 17 issue that it is "possible to wiretap a data transmission line with only \$1000 worth of equipment bought at a computer store", and that a personal computer can be used to "mix fraudulent messages with legitimate fund transfers".

This news, and much more like it, has government and commercial institutions very concerned about data security.

The answer is, of course, data encryption. Cryptology used to be monopolized by the government; to a certain extent even commercial cryptology in the US is still under the control of the National Security Agency (NSA).

Reportedly, after IBM announced its Data Encryption Standard (DES), a very powerful coding system, the NSA asked the company to water it down a bit so NSA computer could break it! But the IBM DES is reportedly still strong enough to withstand commercial codebreaking attempts.

Theoretically, only 'Big Brother' will be able to break these codes, and insists on being permitted to do so.

The IBM DES is expected to be outmoded soon, when Stanford University finishes its research with a two-key cipher — which will require both a receiving and a sending key.

The NSA will probably insist on overseeing this research as well and could conceivably prosecute, say, an academic scientist who invents a code the NSA can't break. □



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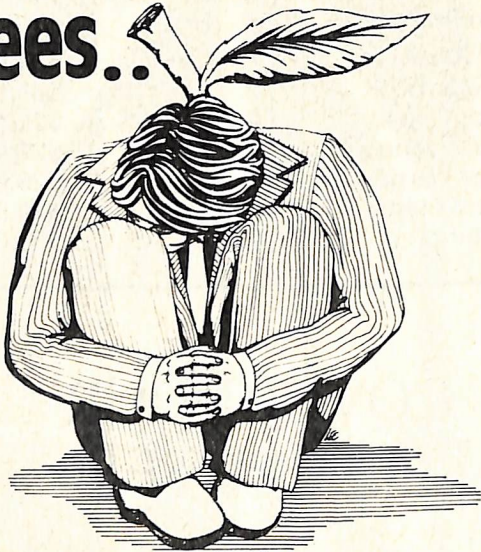
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David Brown, branch manager
of the Sydney Logic Shop.

Browne Has Logic

DAVID L. Browne has been appointed Sydney branch manager for The Logic Shop.

He has had extensive administrative and EDP experience, including spells in the Australian Army, an advertising agency, and most recently with Toltoys.

David will provide advice on the best hardware and software solutions for individual, professional and business data processing needs. The range of quality brands to provide these solutions includes Apple, DEC, T.I., NorthStar, Qume, OKI, Centronics, Sendata, and Televideo.

Married, with three children. David is a keen student of Australian wines (*Aren't we all... — Ed*).

New Diablo 620

DIABLO SYSTEMS has announced a low-cost daisy-wheel printer which offers a number of first-time ease of use features.

The Diablo 620, which features print speeds up to 25 characters per second, is the first of its kind to offer 'drop-in' plastic printwheels with automatic ribbon and printwheel positioning sensors. These printwheels, offering an average two-year life, can be easily inserted by an operator without referencing special markings or notches.

The printwheels also can be interchanged without removing the new long-life ribbon cartridge, which offers twice the capacity of Diablo's existing multistrike ribbon.

Print quality is equal to that of the Diablo 630, recognised as an industry standard.

Available in volume quantities from February, the new Diablo 620 features full 132-column, 37cm (15inch) wide carriage. The new modular printer also features a mean time to repair of 15 minutes and 2,500 hours between failures, under typical office usage.

For further information contact BDS Computer Australia at 445 Toorak Road, Toorak, Victoria, 3142. □

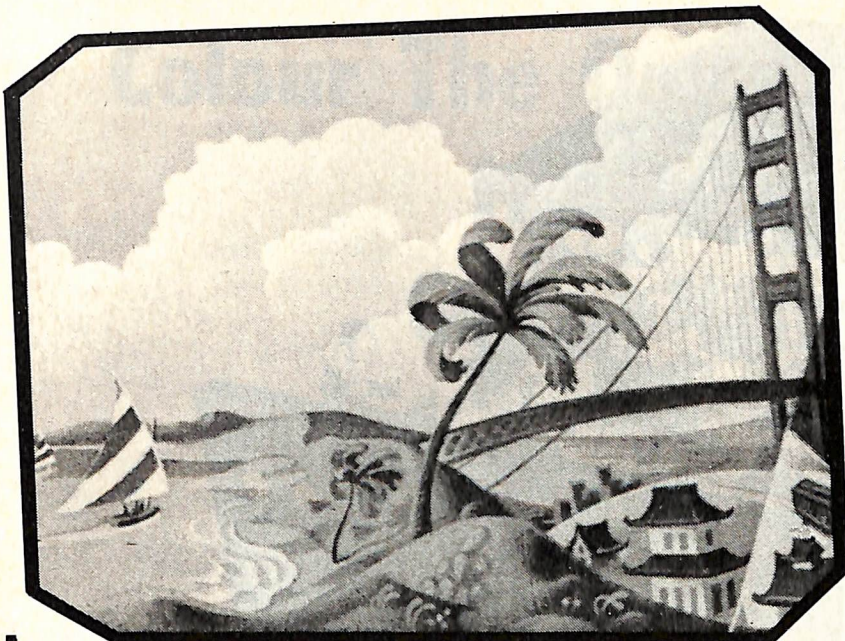
Postal Group Sort

CYBERNETICS Research has announced a new utility program is available with Sandy's Word Processor.

Postal Group Sort enables mass mailing of letters or production of labels in the special postal group order required by Australia Post for bulk mail discount rates. This is not the same as postcode order!

As the discount for bulk mail is substantial, this feature is a must for anyone using a sizable mailing list.

Postal Group Sort is standard in all packages dated from 25/11/81. Updates will be supplied for \$20, on the return of old packages. The Postal Group Sort is documented in the file 'New Features'. □

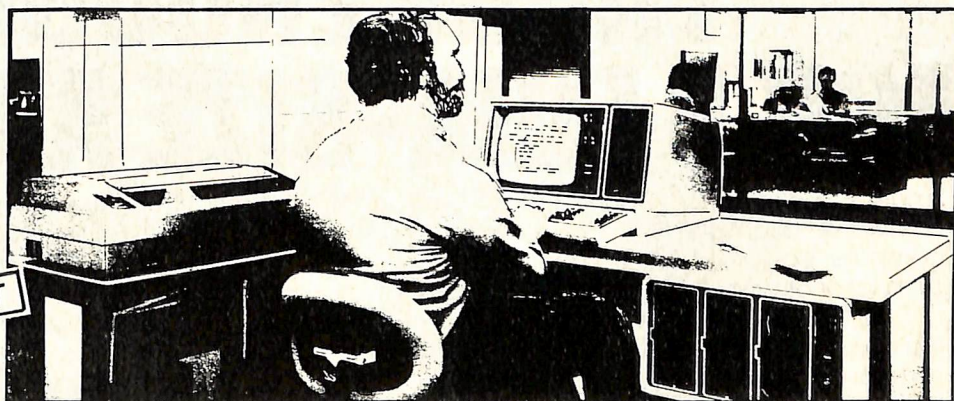


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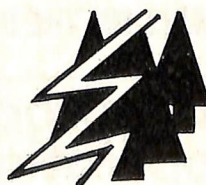
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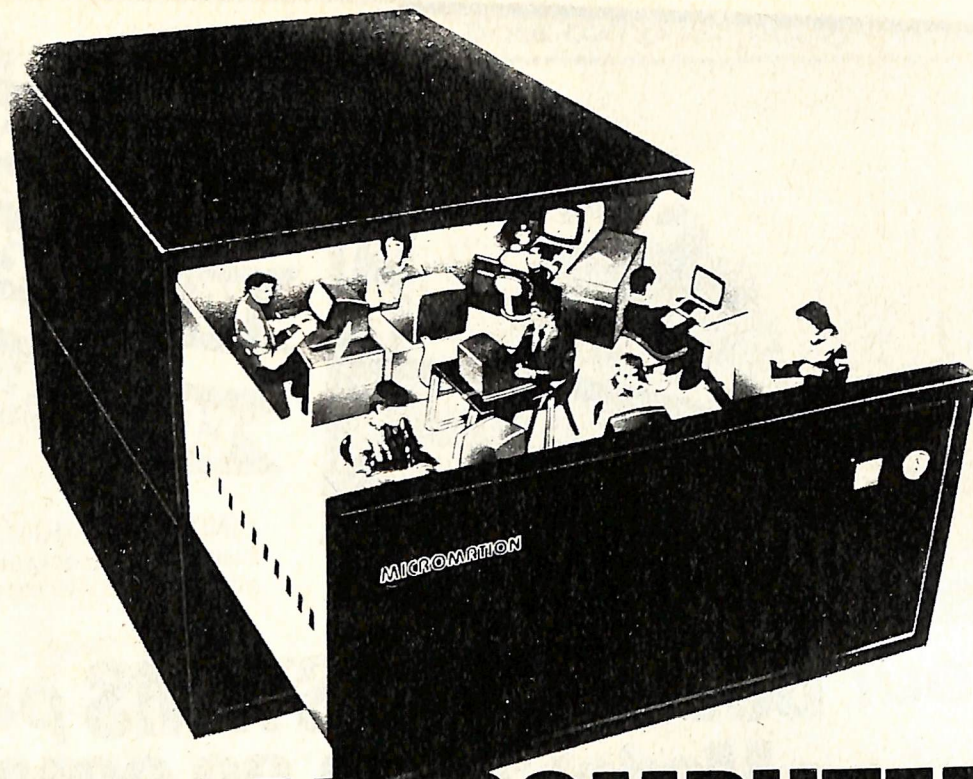
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Colour The Opposition Green, It's Tandy's Colour Machine

Tandy's TRS-80 Color Computer has finally arrived in Australia. LES BELL took a pre-release sample home to put it through its paces.



your computer REVIEW

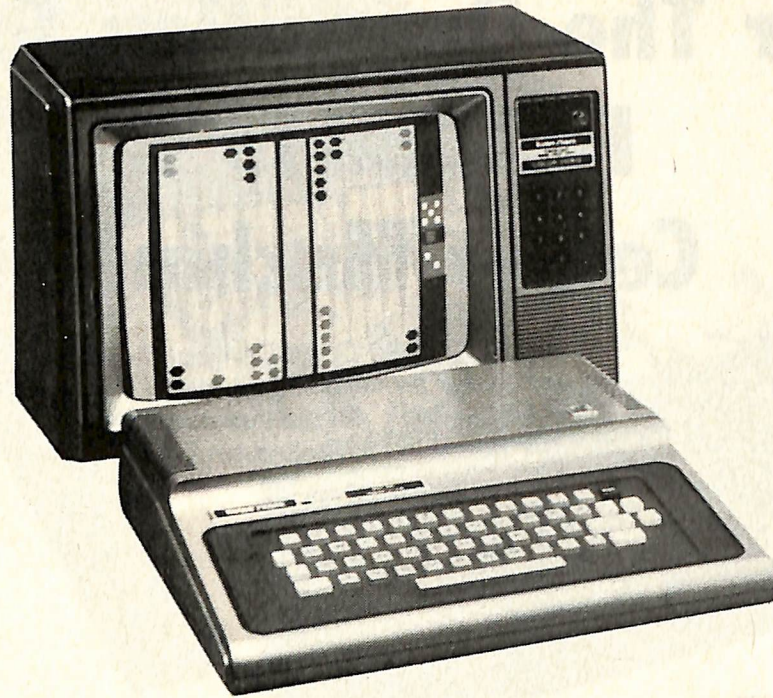
STRUTH, what do you call this thing? I would no more think of calling it the Color Computer than I would call Sydney Harbour, Sydney Harbor.

However, Radio Shack has the proprietary naming rights, so I guess we're stuck with it.

The TRS-80 Color Computer has been on sale in the US for almost a year now. It hasn't exactly set the world on fire, but that's much more difficult to do now compared to the heady days when the Model I was released. In those days, one didn't critically examine the merits of new

personal computers, one simply marvelled that a consumer-oriented company like Tandy was releasing a computer at all.

Times have changed, and these days it's not enough just to sell a computer. That computer has to compete with the



machines already on the market which have built up a strong user/software base. So it must be good — but not so good that it's too expensive. It must work right first time — no matter how complex. And it must be different — but not so different that software is completely untransportable from other machines.

In short, the aspiring new entrant in the computer market faces not technical problems, but marketing compromises and dilemmas.

The Color Computer scores highly on all the criteria mentioned above. It offers advanced features — particularly in colour graphics and sound, but also in other areas. The machine works, and seems to be pretty well bug free. It is different from previous TRS-80s, but uses Microsoft BASIC and will run many programs without modification.

Key to the Story

The Color Computer is bigger than the TRS-80 Model I. It has a 53-key QWERTY keyboard (no numeric pad), with an enclosure extending behind it which makes it rather more like the Apple II in shape. The unit is sealed, with no bus assembly inside, and uses single-board construction.

The keyboard is not a microswitch type like that found on the TRS-80, Apple and other computers/terminals. Instead, it is a large calculator-type keyboard, probably using sprung metal contacts behind the keys (although I didn't look as I had visions of the whole assembly flying apart). In this respect it is like the TI-99/4, but the keys had a better 'feel' and were quite easy to use.

At the back of the unit is a row of DIN connectors for cassette interface, RS-232C serial interface and two joysticks. To the left of these is a phone plug, which is the radio frequency output to the television. This connects to the antenna input of the set, using a cable supplied.

At the left of the back panel is the on/off push-button, and on the right is the reset switch.

On the right side of the computer is a slot which accepts plug-in ROM modules. If no module is present, the computer will power-up in BASIC. But if a module is there it will jump to the code contained in it and play a game or run a program.

By the way, the case is still that awful silver plastic. I like technology, it keeps me in work, but sometimes we technologists come up with the most amazing pieces of technocrap. The amazing hyperglitter NewSee spaceage hitech silver plastic case of the TRS-80s is a case in point.

It's cold, unfriendly and looks cheap and brittle. I'm amazed Tandy/Radio Shack persists with it, because it probably loses more sales than any other feature/problem/bug of its machines.

On the Inside

Inside the machine the electronics are very different from the TRS-80 Models I and III. The processor chip is no longer the familiar Z-80; instead it's the Motorola 6809E, a rather more powerful chip in this kind of application.

The 6809 offers quite an improvement in applications like graphics manipulation, and without it some of the features of the Color Computer would have been impos-

sible. Of course, the change means machine code (system) programs for the earlier machines will not run on the new one; but that would have been the case regardless, due to the new colour display circuitry. Besides, who'd want to play black-and-white games on a colour machine?

Perhaps they anticipated that I might raise an objection to their machine on the grounds of a consequent software drought, so the gentlemen at Tandy supplied me with no less than 13 games and applications modules. More on those later.

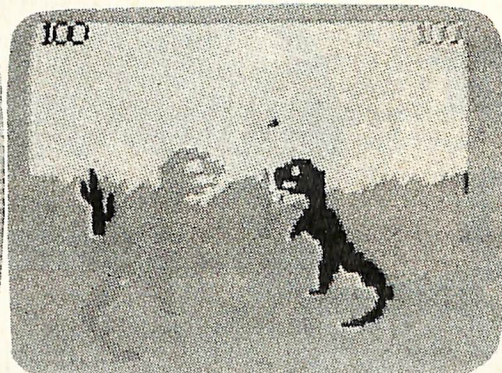
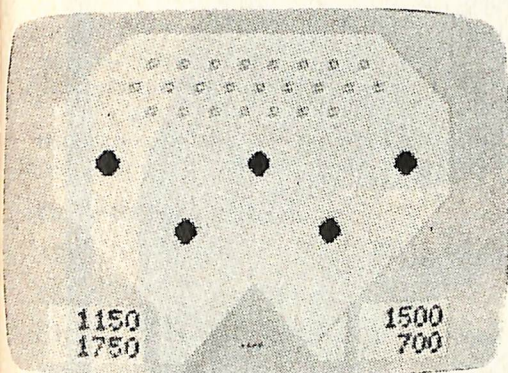
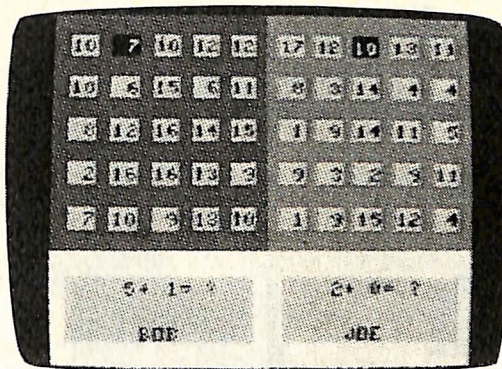
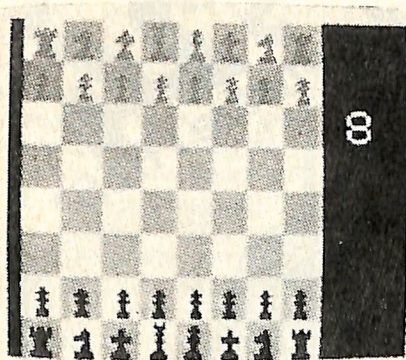
The message is that there's no shortage of software for the Color Computer — games and simple applications, that is.

Nevertheless, it does mean many of the more serious applications programs written for the other TRS-80s, such as word processors, database managers and accounts packages can't be run on the Color Computer, or be easily converted.

If you want to run those packages, this is not (yet) the machine for you. As Tandy would no doubt point out, it's not *meant* to be. In any case, there is quite a lot of good software around for other 6809-based systems, much of it better than most TRS-80 software. If it's ported across to the Color Computer then CC owners may have the last laugh.

Now, About the Graphics

The screen can display nine different colours: black, green, yellow, blue, red, buff, cyan, magenta and orange. These are specified by the digits 0 to 8 in colour



commands. Maximum resolution is 256 by 192 under Extended Color BASIC, which is quite respectable, and as we'll see later, very easy to use with the powerful graphics commands in BASIC.

Resolution is lower under Color BASIC — only 64 by 32, similar to the Model I/III graphics. In between, there are several other modes.

The BASICs (there's two) were written by Microsoft. Color BASIC is 8K in size and unlike Level I BASIC uses full-length keywords, which are completely compatible with the 16K Extended Color BASIC. Because the 6809 code is rather more compact than Z-80 code, 8K BASIC would translate to around 10K and the 16K BASIC is probably equivalent to around 20K. Take away some code for colour graphics control and you can probably get some idea of the range of features in the BASICs.

The review machine had Extended Color BASIC with 16K of RAM. A 4K model is also available but, frankly, you'd outgrow it in no time. In this review I'll describe mainly the features of Extended Color BASIC — the smaller BASIC has all the usual functions you'd expect.

The New Keywords

Color BASIC is quite close to TRS-80 Level II BASIC, though there are a few new keywords (see our table).

AUDIO ON/OFF, for example, connects/disconnects the sound coming from the tape recorder to the television speaker. CLOADM loads a machine-code program from tape and allows the user to specify an offset for the load address (6809 object code can be relocatable). There is no SYSTEM command; instead a 'system-style' tape would be loaded using CLOADM and then run using the EXEC command. This runs the machine code program at the specified address, or the address last CLOADM'ed if no address is specified.

Cassette file handling is much more like disk files, with the addition of OPEN, CLOSE and the EOF function.

Two joystick ports are provided. Unlike the Atari joysticks, which are just switches, the Color Computer joysticks are potentiometers, offering true proportional control, to borrow some radio-control parlance.

This feature is used to good effect in some games, particularly 'Skiing'. The BASIC JOYSTK command reads the horizontal or vertical coordinate of the left or right joystick. I suspect the analogue-to-digital conversion is done under processor control, another area where the extra power of the 6809 is useful.

MOTOR ON/OFF allows the cassette motor to be enabled without fiddling with plugs, while POINT, SET and RESET all work like the commands on the TRS-80

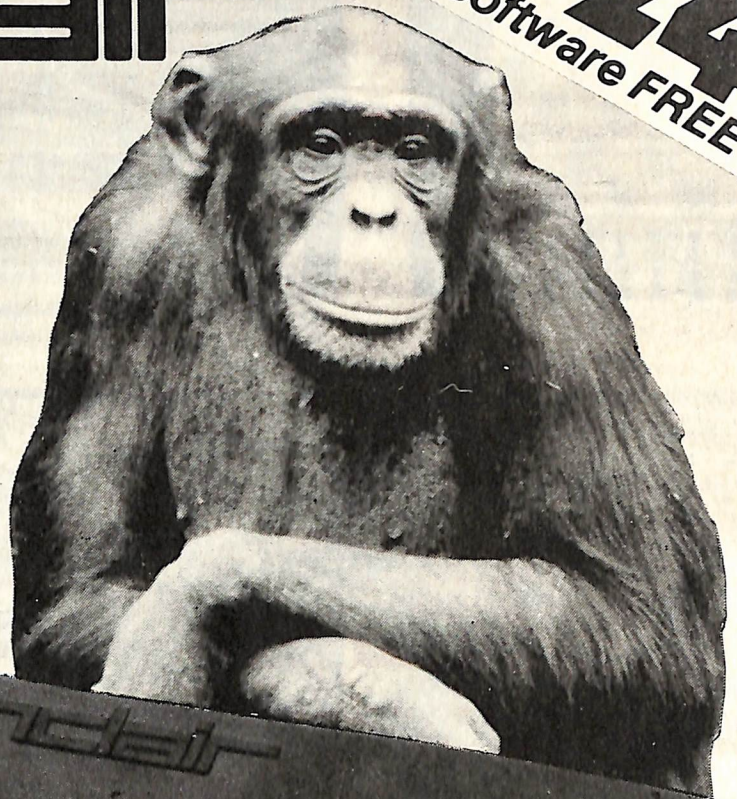
Specifications and Report Card

Unit:	Colour Computer
Made By:	Tandy/Radio Shack
Processor:	MC6809E
Clock Speed:	895 MHz
RAM:	16 Kbytes
ROM:	16 Kbytes
I/O:	Cassette, RS-232C, printer
Languages:	Color BASIC, Extended Color BASIC
Keyboard:	53 key, 'calculator-style'
Display:	32 × 16 alphanumeric, black on green background
Graphics:	256 × 192, nine colours
Peripherals:	N/A
Expansion:	N/A
Best Points:	Excellent graphics commands, games ROMs
Worst Points:	Small display, lack of non-Tandy software
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Model I, with the addition of a digit to specify colour. For example, SET(31,15,4) would put a red dot at the centre of the screen. The graphics screen is 64 'points' wide, by 32 down. The graphics circuitry maps bytes into blocks of four pixels, each of which must be the same colour.

In case you thought the Color Computer also spoke PDP-8 assembly language, the SKIPF instruction is used to advance the tape to the desired program, listing the names of programs it encounters. The SOUND command generates a note of specified pitch and duration.

Cleverly Extending

The 16K BASIC offers even more commands. Some of these are especially powerful graphics commands.

For example, CIRCLE (x,y),r,c,hw draws a circle with centre at point x,y; a radius r; of a specified colour c; with a

height/width ratio, hw, of 0 to 4. You can even specify the point at which the circle will start and end!

COLOR sets both the foreground and background colour. CSAVEM is the converse of the CLOADM statement — it writes a machine code file to cassette (hooray!).

DLOAD — well, I'm not quite sure what DLOAD does. The manual is a bit terse and uncommunicative about it. From the evidence I've pieced together, it appears to download a BASIC program from another computer at either 300 baud or 1200 baud, software-selectable. Very handy.

One of the most important, no *the* most important graphics command is DRAW. DRAW will draw a line from a starting point, of specified length and colour. It will also draw to scale, draw blank lines, draw non-updated lines and execute substrings in a macro-processor type of way.

GET and PUT are not related to the random-access file I/O statements found in disk BASICS. Instead, they transfer the graphic content of a rectangle to/from an array for storage or manipulation.

LINE draws a line from a start point to an end point. Like DRAW, if the start point is omitted, it just carries on from the previous end point. LINE also allows the foreground and background colours to be specified; and it can draw a box between the end points, even filling the box in.

PAINT is used to 'colour in' areas of the screen, from a given point to a border of another colour. PCLEAR n reserves n pages of graphics memory, while PCLS clears the screen to a specified colour.

The PCOPY statement will copy graphics pages from a source to destination: this could be the key to some startling animated graphics. PMODE selects the resolution and the memory page to start on. SCREEN switches between the colour and graphics screen.

Color BASIC Keywords

ABS	ASC	AUDIO	CHR\$
CLEAR	CLOAD	CLOADM	CLOSE
CLS n	CONT	CSAVE	DATA
DIM	END	EOF	EXEC
FOR/NEXT	GOSUB	GOTO	IF/THEN...ELSE
INKEY\$	INPUT	INT	JOYSTK
LEFT\$	LEN	LIST	LLIST
MEM	MID\$	MOTOR	NEW
ON GOSUB/GOTO	OPEN	PEEK	POINT
POKE	PRINT	PRINT@	READ
REM	RESET	RESTORE	RETURN
RIGHT\$	RND	RUN	SET
SGN	SIN	SKIPF	SOUND
SOUND	STOP	STR\$	AB
USR	VAL		

Extended Color BASIC Keywords

ATN	CIRCLE	COLOR	COS
CSAVEM	DEF FN	DEFUSR	DEL
DLOAD	DRAW	EDIT	EXP
FIX	GET	HEX\$	INSTR
LET	LINE	LINE INPUT	LOG
MID\$	PAINT	PCLEAR	PCLS
PCOPY	PEEK	PLAY	PMODE
POS	PPOINT	PRESET	PRINT USING
PSET	PUT	RENUM	SCREEN
STRING\$	STR\$	SQR	TAN
TIMER	TROFF	TRON	USR n
VALPTR			

And The Word Is...

Our machine was supplied with three volumes: *TRS-80 Color Computer Operation Manual* (really a booklet); *Getting Started with Color BASIC*; and *Going Ahead with Extended Color BASIC*.

The operation manual gave all the hardware details necessary to plug in, switch on and enjoy. This must be pretty close to a fool-proof computer.

The other two manuals are the best yet from Tandy. Due to the power of the machine, they cover a lot more material than previous manuals, and are better for it. They avoid a lot of the tacky 'friendliness' which characterised the Level I manual, but still progress at a helpful pace. My only criticism is they're not spiral bound and won't lie flat — big deal.

Players, Queue Here

The best feature of all about the Color Computer is the selection of plug-in games and applications modules.

I'm often accused of being 'hung-up' on big S-100 and business machines. Maybe so, and with that thought in mind I've discovered something Tandy/Radio Shack and I seem to agree on: if you're going to have a 'toy' computer, it should be one you can have lots of fun with! (the difference between men and boys. . .)

As I've mentioned above, I received 13 games ROMs with the computer, and they kept me up almost all night. Here's a brief run-down.

My vote for the best fun was the 'Skiing' game, although maybe that's just nostalgia for my discovery of Thredbo last season. I'm glad there was nobody around to see me, because as I was playing I suddenly realised the muscles in my legs were tensing and relaxing and I was swaying around in my chair in a most peculiar way!

SAMPLE PROGRAM #8

```
1 '*** UNFOLDING BOX ***
2 '
5 PCLEAR B
10 PMODE 3,1
15 PCLS
20 COLOR 6,5
25 DRAW "BM100,100U30NR30E15R30NG15030G15NU30L30"
30 PAINT (105,95),B,6
35 PAINT (135,80),B,6
40 PAINT (110,65),B,6
45 SCREEN 1,1
50 FOR X = 1 TO 500: NEXT X
110 PMODE 3,5
112 PCLS
115 COLOR 6,5
120 DRAW "BM100,100U30NR30E20R30G20D30NL30F20L30H20"
125 LINE (100,100)-(70,95),PSET
130 LINE -(70,65),PSET
135 LINE -(100,70),PSET
140 LINE (70,95)-(40,65),PSET,B
145 LINE (130,100)-(160,95),PSET
150 LINE -(160,65),PSET
155 LINE -(130,70),PSET
160 PAINT (95,95),B,6
165 PAINT (105,95),B,6
170 PAINT (135,85),B,6
175 PAINT (45,85),B,6
180 PAINT (115,65),B,6
185 PAINT (125,114),B,6
190 SCREEN 1,1
195 FOR X = 1 TO 500: NEXT X
200 GOTO 10
```

This program creates a box and opens it.

The idea is to get down the slope — ideally through all the gates, though certainly without going off the course — in the shortest possible time. The course appears in perspective in front of you, and disappears and reappears as you rise and fall over the hills and dips. A joystick is used to steer your motion and can be set up to provide a simple steering and speed technique, or to provide a 'delayed' effect much (indeed, uncannily) more like the real thing. Sound effects add to the fun.

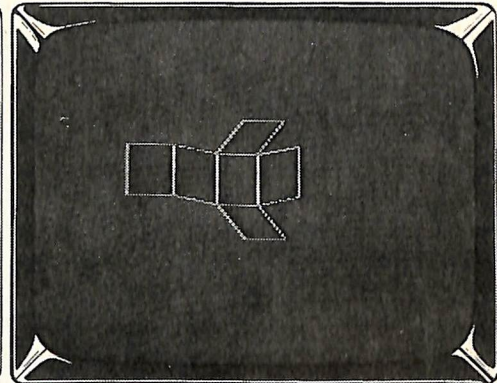
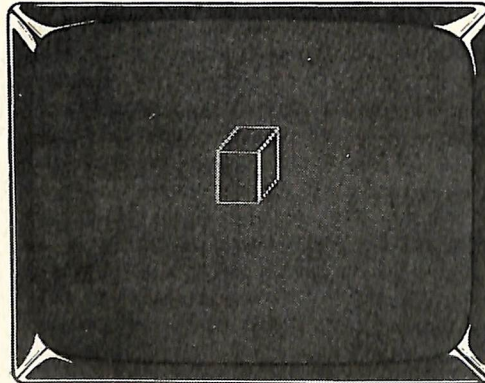
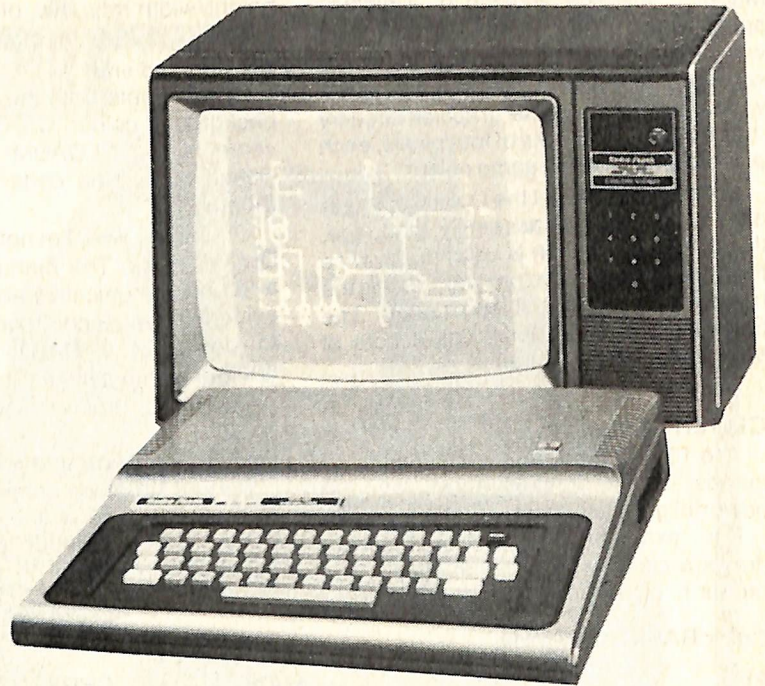
Meanwhile, In Space...

'Project Nebula' is a variation on the classic 'Star Trek' game, in which you roam around the galaxy, vanquishing the enemy. In this game, however, you have full joystick control of your craft as you fire at the enemy. The game is a real test of skill. Inevitably, because of the similarity, this game invites comparison with Atari's 'Star Raiders'. It seemed to me that this game was faster paced and Atari's had better graphics. For example, the screen on the TRS-80 is completely green, compared with the coloured view on the Atari.

'Quasar Commander' is a variation on the same theme, although somewhat slower, and with graphics that seemed somehow 'jerkier'. While another favourite of mine was 'Dinowars', in which each player controls a dinosaur and attacks the other. The animation is excellent, as are the sound effects.

The 'Pinball' ROM was interesting. Although it presented a much simplified version of a pinball machine and ran slowly compared to Bill Budge's 'Raster Blaster' on the Apple, it has an interesting feature in its ability to allow the player to re-design the machine. Using this feature, I was able to create some very strange machines.

'Color File' is a kind of stripped-down database program; a kind of electronic

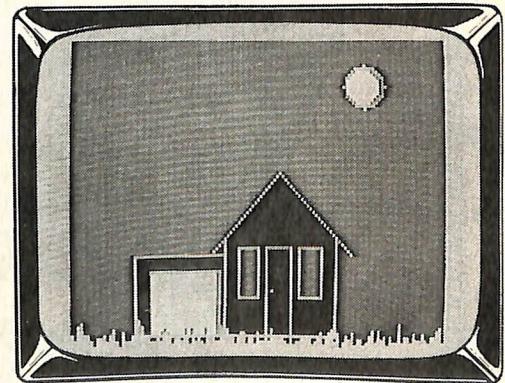


notebook, if you like. Since all operations take place in memory, with only 16K you can't work on the large databases which would make such a program really useful. It comes set up with seven pre-set file types: addresses, warranties, home inventory, investments, car maintenance, medical history, resume/curriculum vitae. There's also an option allowing you to define your own files.

There really isn't room to describe all the other modules here, but no doubt you can see them at a Tandy store. They were: Personal Finance, Bustout, Backgammon, Football, Typing Tutor, Checkers, and Chess.

Pressed for an Opinion

Throughout the review the machine behaved flawlessly. The display was reasonably clear, although colour displays never seem to be as clear as those on b/w machines. In particular, I couldn't get enough contrast on the black letters/green background text display, but that was probably because of the television set and not the computer. In any case, if you're thinking of buying a Color Compu-



ter, you won't just take my word for it, but have it demonstrated at a store.

I liked the Color Computer. It has a powerful BASIC with some easy-to-use graphics features and copes nicely with the interface to machine code. The manuals are excellent, and you can do a lot with it. It doesn't require an expansion interface to add a printer or RS-232C interface, either.

If I was buying a personal computer for home use, the Color Computer would be a serious contender for my dollars. □



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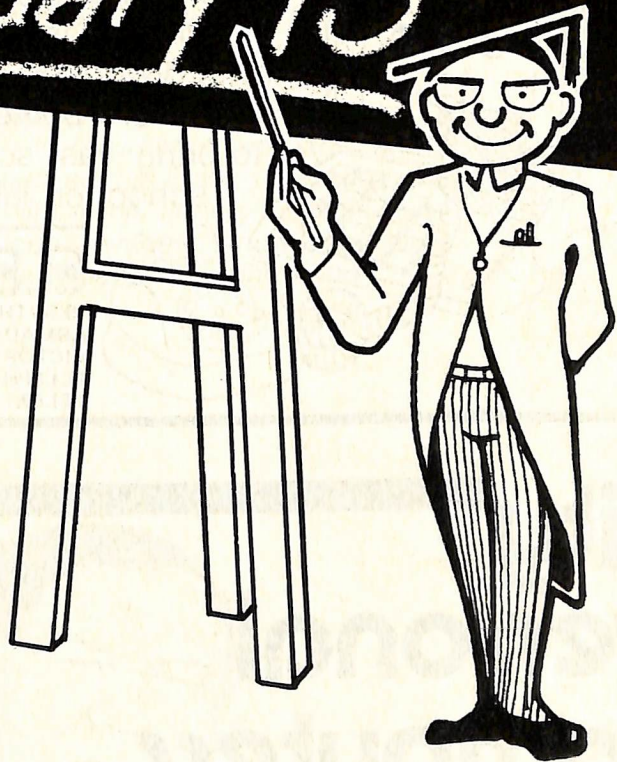
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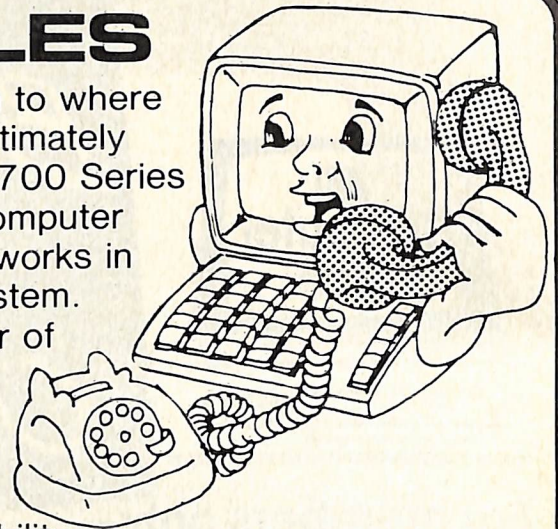
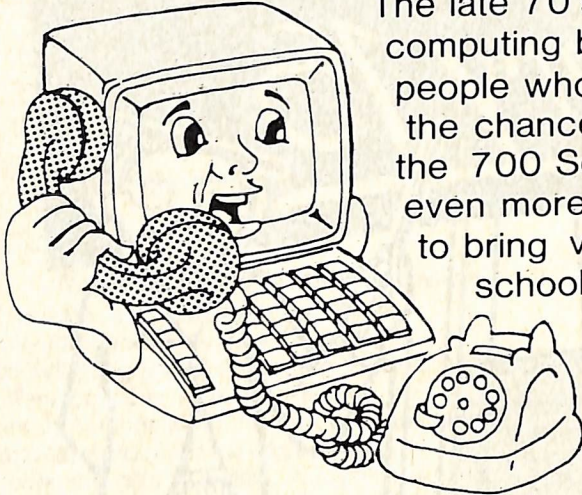
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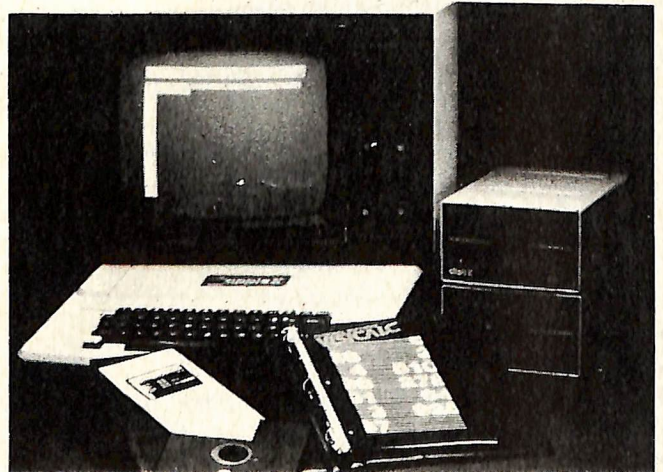
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THE COMPUTER TYPESETTING STORY

At most of our editorial staff meetings — at least the ones we hold at the office — the topic of features on how computers have been applied in traditional industries has come up. Inevitably, one of the journos turned micro-punchers (as opposed to micro-punchers turned journos) comes up with the 'obvious' story idea — computers in newspapers.

Then Frank Linton-Simpkins, who has installed computers in

newspaper offices, returned from his latest sojourn and paid us a visit. . . A true professional with the Remington manual, Frank paused momentarily to adjust his pith helmet and produced this suitable pithy piece on computer typesetting — in just one shift.

In between some barbs at the sub-editors Frank's crossed pens with in his time, you might even learn something new about how newspapers are produced.

FOR ALMOST 20 centuries the art of printing and typesetting remained unchanged. For the first 15 of those centuries it was exclusively eastern, invented by either the Chinese or the Koreans.

Just who actually invented the art is still a matter of conjecture. If you are a Korean then it was the Koreans, if Chinese, then it was the Chinese. In fact, the only thing that's certain is Caxton was about one and a half millenia behind the people of Korea (the Chosen people) and almost the same temporal distance behind the Chinese.

But even taking the last 500 years of the history of printing there was little change, except to swap from wood to metal letters.

Type-setting for books wasn't a time-dependent thing. If it took three months to set the type for a book then no-one cared because it was still enormously faster than having the monks in some abbey make copies in longhand. But with the rise in the interest in news — an extension of the age-old human instinct to pry into the affairs of others — and the arrival of the newspaper, something had to be done.

Mind you what was done took more than 400 years from the time Mr Caxton made up his pages on a marble block, (incidentally, the term 'the stone' is still used today to describe where pages are made up on old style hot-metal newspapers).



What happened was the introduction of a sort of typewriter which could cast a whole line of print at once. Thus was born the Linotype machine, and many and varied were the battles by printers and print workers to block its introduction.

Before going on, it might be as well to describe just how a newspaper that hasn't moved to computer typesetting (and there are a good many which still haven't) actually transfers the major literary works of its journalists into columns of print for an avid (but diminishing) public to buy and read.

First, the journalist sits down at a typewriter (most newspapers never had enough and there was a constant search for the perfect machine — Remingtons, from the 1940s and 50s were preferred, so a journalist might chain and padlock his to some fixture).

Having gained a typewriter, the journalist transfers what he has heard from someone else into typewritten form. He normally types only one paragraph on each of the 23 by 74 centimetre pages.

Shuffling The Pages

The reason for the tiny pages is the 23 by 74 size fits exactly into the holder of the most widely used Linotype machine. The one paragraph per page allows the next man in the chain to re-adjust the order of paragraphs, by shuffling the pages.

After the journalist has done the writing, he re-reads the story with growing apprehension and despondency, corrects the placement of 'is' and 'es' to the best of his ability, and then hands his story to a man called a sub-editor. The 'sub' corrects his other spelling mistakes, cuts off the bottom three paragraphs and swaps the introduction and the conclusion for each other. (*Okay Simpkins, that's another three pars out — Ed*) Muttering maledictions about the state of journalism, the sub sends the story, with a new first page giving typesetting instructions, down the chute to the man in charge of the Linotype machines and operators. The operators take the story and type it out again, to form a series of lines in the typeface and to the column width ordered by the sub-editor.

The lines of metal are in mirror image form. They are assembled into trays called galleys. After ink has been spread on the type in the galleys, a piece of wet paper is rolled over them to form what is called a 'galley-proof'. This is sent back to the sub-editor for checking. He marks corrections on the proof and the Linotype man casts them for insertion into the type in the galleys.

Meanwhile, upstairs where the exalted people live, a senior sub-editor has designed a page layout to fit the stories in. He does this after the advertising department has said where it is placing its ads.

The page design is then taken down to 'the stone'.

There, in large metal frames, the type from the galleys is fitted into a page-sized metal frame. At this point it is discovered that the stories do not exactly fit the design, so much vitally important prose is cut out to make everything fit.

Complex and really rather crazy isn't it, but that is only part of the story. After the page has been made up in its frame, and photo and ad blocks inserted, the frame is taken to a special press and a cardboard matt is made of the page. Later this matt is distorted into a half-cylinder, and more type metal cast onto the cardboard to form a half-cylinder which fits on the drum of a rotary press.

Unnoticed Miracle

When a hot-metal newspaper gets out each day it is a minor miracle that passes unnoticed, even by journalists.

But it is obvious that the above process could not continue for much longer without newspapers going broke even faster than they are now. Someone, his name is thankfully lost in the mists of history and anyway I'd hate to have it on my conscience, decided that computers might be of some use in preparing newspapers for printing.

Thus was born the concept of computer typesetting, and much strife has followed the introduction of this inevitable technological breakthrough.

At first the computer typesetters concentrated on making systems that would produce a paper tape for use by automatic linotype machines. But this approach was a dead-end, because it didn't really come to grips with the main problem.

The computer/photocomposer approach was more promising, and this is what most working typesetting systems now use. But ultimately this will also have to go, so characters can be directly formed in the manner of computer output

microfilm units. That in its turn will pass to electrostatic ink jets, or something similar.

Eight-bit Manipulation

When the first computer typesetting systems were being developed, many computers cost vast amounts of money. The Digital Equipment Corporation was making a minicomputer which cost a fraction of larger machines. It made and still makes excellent machines, with an ideal word length for analogue to digital conversion and instrumentation tasks — 16 bits.

DEC's machines continue to hold the lion's share of computer typesetting, but since typesetting involves the manipulation of single eight-bit characters, the 16-bit word length is not without problems. A byte-oriented machine would seem more logical. In fact, although the process wasn't given the name, the first men to write typesetting programs were the pioneers of word processing. Sadly word processing techniques have now outstripped the typesetters, and this too has passed the notice of the practitioners of the printing art.

Under the old system, with hot metal, the same data was often keyed into the operation at least twice. This is poor data-processing practice and wouldn't have been countenanced for a moment, even in the punch-card era. But even now many computer typesetting systems still commit the unpardonable sin of automating manual processes one by one, without trying for a total system design which would take full advantage of the facilities offered by computers.

Perhaps a look at one of the two main typesetting systems in Sydney might be instructive. The system at John Fairfax, publishers of the Sydney Morning Herald and The Sun, was designed rather a long time ago, and this has to some extent left the system behind the latest techniques.

It can be taken as being composed of four elements: data entry, data storage,



phototypesetting and system software. All four elements were supplied by different makers. Data entry was, until three months ago, being handled by ECS Australian-made terminals, with 16K bytes of local storage and some logic supplied by a microprocessor. Data storage is handled by disk store, operated by five Digital Equipment minis. Typesetting is by Hell Digisets and the software by a Dutch-based software firm.

Communicative Terminals

The Fairfax system belongs to the philosophic group that likes many terminals all talking to the central computer system. The other plan is to have a few dumb terminals talking to a number of minis, which in turn talk to a large central site system.

It is often true the latter system offers faster screen response times and greater protection against total failure. The problem with the use of intelligent terminals is while most of the editing and message establishment is done on the terminals, they are likely to be slower than the mini nodes of the other system. In the case of some terminals, the screen refresh times are often slower too.

One definite advantage with the Fairfax system is that it's possible to continue working on the terminals when the central-site system is down. Work is accumulated on floppy disks and transferred to the central store when the computer comes on to back up.

Stories within the Fairfax system are identified by a job number, which can have up to 10 characters. The first seven identify the actual story, then comes a slash, then two numbers to identify the version.

One peculiarity of the Fairfax system is every time you transfer your story back to store after working on it, you get another version. Thus on the day you are working you might have up to eight versions. Each of these versions can be accessed by the journalist who wrote them.

One would have to be a working journalist to fully appreciate how good an idea this is, but suffice to say few other systems make access to earlier versions of your story as easy. Such access makes the necessary re-writing and corrections so much faster and easier that many journalists find their stories are of better quality than was the case with other methods.

'If Only' Department

Ideally, each journalist ought to have his own terminal and these terminals ought to have fairly large screens with about 80 characters to a line. The terminal ought to offer the facility for the journalist to scroll through an entire story without further access to main store. The software/hardware combination ought to

A Journo's Lament

LOOK HERE you fellows out in Software-land, what are you doing to the sensitivities of ageing (okay, old, if you insist) journos like me? I'm not the least bit happy with your fancy technology turning the good old 'Sydney-or-the-Bush' style of newspapers into sterile, electronic certainties.

What brought that little outburst on was an item I read in the news section of the November issue of *Your Computer*. It told how the TCG Group has released yet another text editing system for the newspaper industry. Shame on all you electronic boffins who've never known the exciting uncertainties and crises, compounded by eccentric human editors, of producing a newspaper.

You are draining-away the printer's ink from the very heart of journalism with your digital devotion and monitor masochism.

VDTs, those green-eyed monsters of progress, are the antithesis of everything oldies like me grew up to believe was journalism. I'd like to make a passionate plea for a return to the old ways — reasonably controlled insanity. However, I realise there is no chance of this so, along with the rest of my generation, I will have to live with my memories.

The first newspaper that took a chance on making something of my rather doubtful qualifications spent its days conservatively informing the good citizens of a New Zealand provincial city. But its editorial office was inhabited by some pretty weird people.

The editor (and owner) sat grumpily in his ivory tower office recalling earlier days when reporters cycled up to 32 km (that's 20 miles damn you!) in a day in search of a story. He grudgingly accepted that it was more efficient for a reporter to use the company car to attend council meetings, or whatever, in towns on the fringe of the circulation area — roughly a 45 km radius.

One of his sons was the cable sub (one who sub-edits stories arriving 'on the wire'). But his particular field of expertise was taking race results over the phone. He was most famous, though, for his occasional nights spent locked up in his backyard chookhouse. Those were the times when his rather overbearing wife

decided she didn't want him in the house with her and used her superior strength to banish him to a night with chicks of another kind.

The chief sub was a former Presbyterian theological student. He'd been expelled after being found in a drunken stupor draped over a tombstone. Forced out of the church, he turned to journalism and the wholesaling of illicit whisky — the famed Hokonui firewater from distilleries hidden in the Hokonui Hills in the far south of the Shaky Isles.

There is one body of opinion which suggests New Zealand's earthquakes are not caused by subterranean geological movements, but by the shattering effects of drinking Hokonui. I wouldn't swear to that, though.

This newspaper, which defied all the rules of logic and sanity, miraculously appeared on deadline day after day. It also supported a senior reporter who was fighting a losing battle with the bottle. Even so, he still managed to churn out perfect handwritten copy: He couldn't type for the simple reason that he couldn't co-ordinate his fingers with the keys.

He could not have survived in a world of VDTs. Surprisingly, his fingers remained unscarred all the time I knew him, even though he cut his finger nails with a razor blade. . .

Apart from wrestling each day with hangovers, the editorial staff had also to contend with some rather unusual edicts from the editor. These were handed down via his spinster secretary, whose popularity with reporters was based solely on her willingness to let us hit the petty cash tin to an amount equalling our wages — and sometimes more.

Those were the days when newspapers were newspapers and reporters were eccentric individuals. Despite all, the news of the day was produced and the readers, judging by circulation and company profits, were satisfied with the product.

All I can do now is bow to progress and study Les Bell's tutorials in *Your Computer*. □

—Fred Symes

have a facility to provide a spelling dictionary (as most male journalists are poor spellers), a facility to perform a global search, some information retrieval capability, some minor arithmetic capability and some way of easily handling tables.

It should also have a facility which doesn't encourage the operator to prefer re-typing to using the 'move' command sequence when he wants to move paragraphs around.

Naturally, no typesetting system so far seen has all these things; and remember, that's just on the input side; we haven't even come to actual setting.

It is interesting that all the above facilities are available on a number of word processing systems, while the giant (relatively speaking) typesetting systems don't have them all yet.

The problem is, a typesetting system must handle many more variables than a

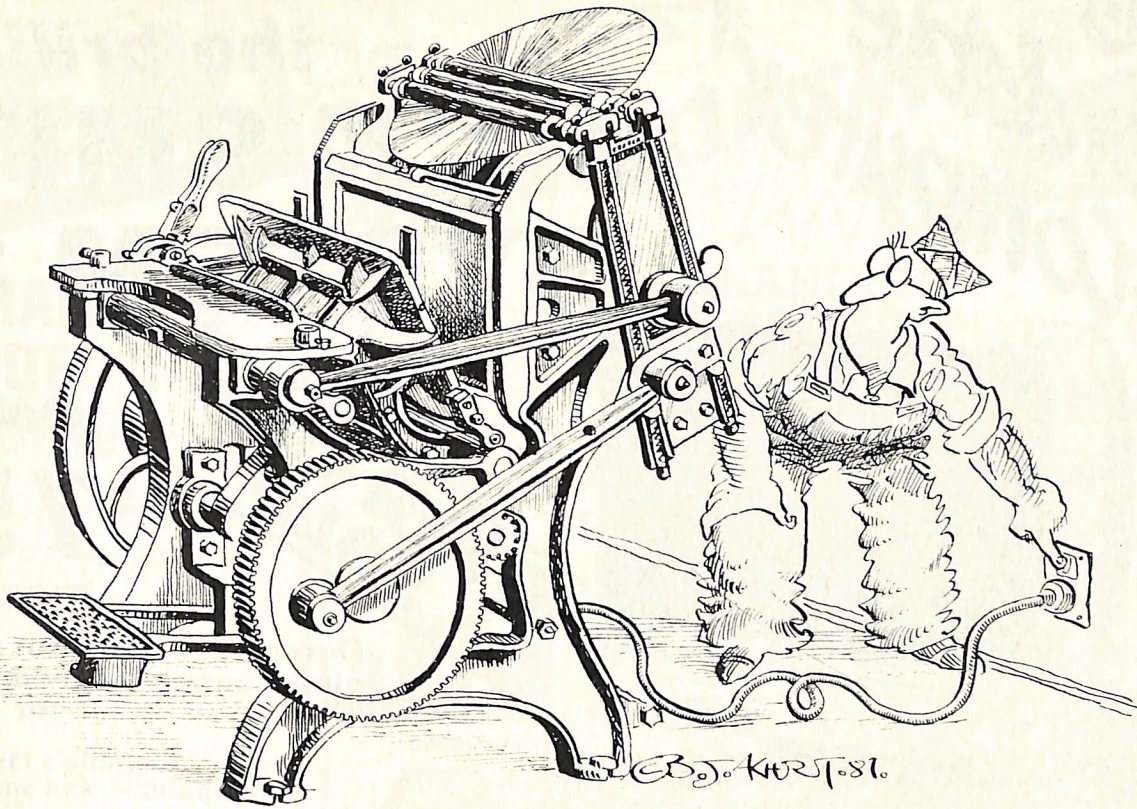


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word-processing system. For a start there are all those different type sizes, then there are the various column widths.

Finally, there is the sheer volume of processing. Looking at a recent issue of the Sydney Daily Telegraph, I counted five different column setting widths in the first four pages, and so many type face and size variations throughout the paper that it was idle to make a count.

The Sub's Wicked Way

After a story has been written and the sub-editor has had his wicked way with it, it will be sent for setting. The central-site computer takes the story and the setting instruction from the sub-editor's terminal and generates instructions to the phototypesetting machines. These instructions have to specify the column width, the typeface and the type size, so each story could generate any number of setting instructions.

The story has to have headlines, these will be specified to be so many lines of a certain size and a certain typeface. Then there may be some subheads, which will have a different type size but usually be in the same face as the main heads. Finally, there will be the story itself, or the 'body copy' as it's known.

Within the body copy there will be some one or two word 'cross-heads', to break up the mass of type on the final page and make the task of reading it easier. These will be of a different type size and possibly

face to the other heads.

You can begin to grasp the magnitude of the task facing the writers of typesetting systems after all that.

But we are still faced with making the copy fit into the page, and selling the paper to the reluctant buyer (who often only wants to gaze at female newsreaders and not be bothered by having to turn pages).

Prior to the sub-editor issuing the setting instructions for the story, he will have already had the computer tell him how long it will be when it is on the finished page. He does this by telling the terminal how wide a column he wants it on and what size typeface he will use. The computer re-adjusts its margins to the width and size of face he has set and tells him how many column centimetres it will make.

Appalled by this length the sub then goes through and cuts out all the adjectives and adverbs. I believe a sub-editor specified the language Newspeak in George Orwell's *1984*! This not being enough, he then removes the conclusion, and the story then fits the hole he had in mind. Mind you, he has forgotten to allow for a centimetre for each cross-head.

Avoiding Computer Blues!

But his work is not over yet. When you set margins and justify, some words won't fit on the line and have to be hyphenated, leaving possible obscenities.

The sub-editor takes a rapid look down the right and left edges of the story to see if the machine has left any bums, tits or sexes. This process of hyphenation and justification has to be performed on each line in each story, and also on the headlines. The size of type specified for the headlines by the sub-editor may not fit the space, so the computer has to inform the sub-editor before he tries to have to have it set.

There are some extremely complex calculations which have to be performed to provide the correct instructions for the phototypesetting machines. And all this work has limited the facilities provided at the input end, simply because the resources to adapt word-processing ideas to typesetting have not been available.

Once all the processing has been done and the instructions and story material sent to the phototypesetting machine, the work usually goes well. In fact, in most typesetting systems the phototypesetting part is the one least likely to cause trouble.

It gives you a photo-positive on bromide paper. This is glued to a paper form the size of the page and the photo blocks are added. The whole thing is then photographed again and one gigantic printing block made from the paper form. After that, the process of making up a printing drum proceeds in almost the same manner as it did in the old hot-metal Linotype days. □

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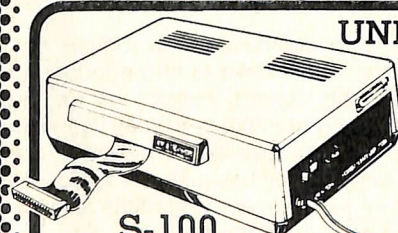
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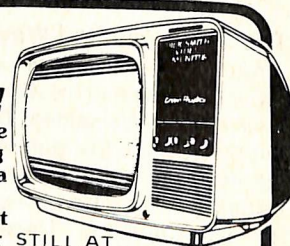
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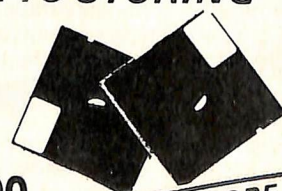
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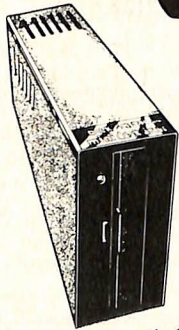
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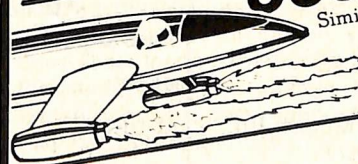
The objective of this graphical game is to rescue the stranded astronauts from the planet below. You must manoeuvre your craft through the meteor belt. Absolutely brilliant! X-3697.

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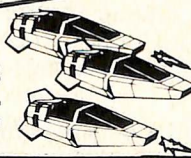
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HEARD ON THE BUS

By LEON YENDOR

Handicap or Headstart?

AS THE International Year of Disabled Persons is now over, it might well be time to reflect on how our industry treats these folk and what opportunities they might be missing.

This theme was triggered by a radio commercial I recently heard which referred to blind computer programmers. There is no doubt that being blind would make the learning of programming much tougher and I greatly admire those who have overcome the loss of what is to me the most vital physical sense in my profession.

I cannot conceive how these folk do without the sight of screens and printout so vital to the debugging process. Especially if they make some of the beautifully hidden bugs I seem to create from time to time.

Meanwhile, my train of thought led me to think there are, at times, some handicaps in the normal sense which could aid a programmer, or at least make programming a viable career for those who have the required level of intelligence.

Often, when I am really trying hard to get through a large task, I am distracted by various noises. And if my concentration level is high enough to withstand those there is the inevitable telephone call.

If you are deaf, I sympathize, but in this line of work you could well capitalise on your affliction by selling the idea of how the reduced distraction and interruption would assist your productivity. You will need to find a way to learn the subject without attending lectures, but there are some very good books and the swarm of low-cost microcomputers now on the market provide an affordable way to get the vital hands-on experience.

This availability of low cost machines also provides a way to set up your own cottage industry: writing microcomputer software and selling it by mail-order or through dealers, who are always in need



of new programs to go with their hardware.

Spared The Hassles

Working in this way at home solves problems for a large number of the handicapped. Those with physical problems are spared the hassles with transport, either public or private, and considerable cash savings in fares or petrol.

If you consider this option, you should consult someone expert in tax matters on the deductibility of various home expenses and the best manner to finance your hardware purchases.

There is no guarantee you will get rich and there is probably room for some of the support and self-help organisations to set up training courses. But if you can only get started you will most likely find you are a computer junkie like the rest of us. And if that means you become a self-supporting professional, you will have done much for your own esteem and to help others realise there is much they can gain from their own efforts.

A tremendous boost could be given to the disabled if the rest of us were to realise, as an industry, the great contribution that could come from giving handicapped people the appropriate training. With terminals at home or stand-alone

micros they would be really great employees. In my experience those handicapped workers who come to the work-place are at pains to prove how reliable they are, and I think the same could be said for the ones who are housebound.

The benefits to both sides are considerable. The employer would gain an employee keen to prove that a handicapped worker could be a valuable asset, with no worries about lateness, absenteeism, extended coffee breaks, or chat sessions. No extra load on parking space or other facilities would occur.

Gaining Self-Respect

The employee on the other hand gains a real income, self-respect and a freedom from the feeling that taking pension or charity money is demeaning. Until you know a disabled person well, you don't realise just how much most of them hate to be forced to need those hand-outs.

When a few people and organisations make this breakthrough, there will be a snowballing effect. It will lead to better training for people with specific problems, probably provided by their own support groups. The most valuable contribution that can be made to the cause of the disabled is to reduce the effect of their problems, by making a contribution towards their independence. They'd rather not need charity, and that kind of help is more needed by the totally incapacitated.

As a two-sided effort is needed to lift this kind of thing off the ground, I can only urge those it can benefit to make this kind of article known to the business organisations and training centres which can help. I am sure you can convince our kindly editor to release this page from copyright for the purpose of promoting such a cause. *(It's done - Ed)*

Those of you with handicaps who've made it could also write about your experiences for the benefit of others. Knowing someone else has succeeded may be all that's needed to start another on a worthwhile career.

Editor's Note: This page is free of copyright. Photocopy it and stick it on noticeboards, give it to your employer and circulate it as much as possible.

TRS-80 GAMES

Or Bell Pulls the Pin

At the end of a hard day at the keyboard, even LES BELL likes to relax with a few games. Here's his report on three games for the TRS-80...He managed to survive.

your computer SOFTWARE REVIEW

MANY YEARS ago, I took a solemn oath never to have any games on my system -- otherwise I would never get any work done.

I relaxed the rule a little by adding Adventure to my software library, principally because people kept asking 'what does it do?' and my replies of 'well, I've got this amazing sort utility' or 'look at this nifty forms package' didn't evoke much enthusiasm. Nonetheless, that has been the only game allowed on my system, and I've kept my vow.

However, having a TRS-80 at home has allowed the opportunity to have a little fun without breaking my word. I was right about the work — this article is in place of the TRS-80 assembly language programming series and introduction to TRS-80 graphics I was supposed to be working on!

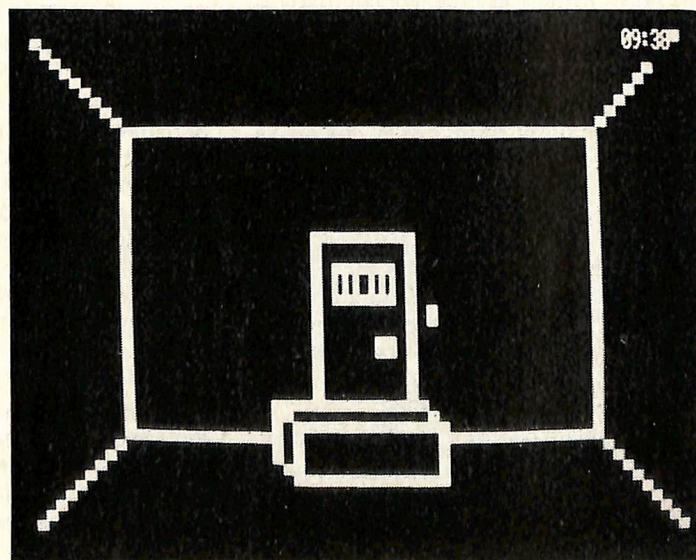
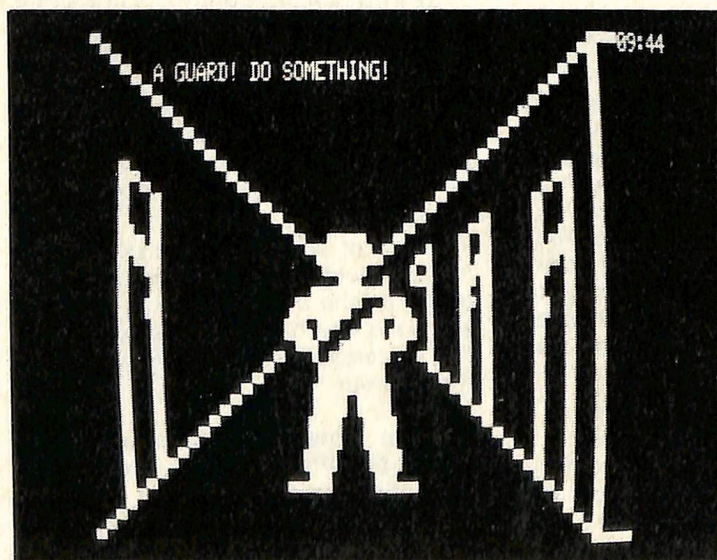
Asylum

The first game I tried, Asylum nearly drove me into one. I was almost a prime candidate for the padded cell after my first few hours of playing this game. The problem was, I just couldn't get out of the cell where the player starts the game. I tried everything I could think of, but just couldn't get out.

At the beginning of the game, you're in a cell. In front of you is a box. Opening the box, you find a grenade. Pick it up. Examine it. It has a pin. Examine the door, the walls, the light switch — there's nothing unusual. So how to get out?

To my logical mind, the answer was obvious. I pulled the pin and threw the grenade. I should have known better. My first game of Asylum had lasted six minutes.

In the next six hours, I blew myself up countless times. Matt Whelan, of course, escaped on the first attempt. That boy knows too much for his own good.



Asylum is, as you've guessed, an Adventure-style game for the TRS-80. It's available on cassette in two versions, one for 16K systems and one for 32K systems. The problems are the same in both cases; the 32K version has longer messages and a larger vocabulary.

Notable Graphics

The most notable thing about Asylum is its 3D graphics. Movement is controlled by the cursor control keys. The up, down, left and right arrows respectively move you forward, turn you 180 degrees and turn you left and right 90 degrees. As you move, the scene changes in perspective.

In a cell moving forward brings the wall closer. Making one forward move too many results in the screen going dark, accompanied by the message 'SPLAT!'.

The asylum is peopled by inmates and guards, who will ask you questions and react to your answers, sometimes by such frustrating acts as putting you in a straight-jacket. Some of the questions can be perplexing. I mean, how do you answer 'DO YOU WANT TO BUY A TUBA?'.

Asylum has an extensive vocabulary. The most frustrating thing about it is its 'VOCABULARY' command which displays the words it knows -- three pages of them in the 16K version. Seeing the words it knows is both helpful and frustrating, as you can see words but can't imagine uses for them.

Although Asylum only recognises the first four letters of a word, it will accept long sentences, using prepositions (under, to, with, on) as well as compound sentences using 'and'. It also understands the words 'all', 'everything' and 'except'.

Games can be saved on cassette and reloaded to allow you to continue.

As you play Asylum, a clock is ticking away in the top right-hand corner of the screen, at a rate of one minute every 40 real-time seconds. The objective is to escape before the asylum is closed at 5.30

pm. I still haven't made it.

Asylum was written by Frank Corr Jr and William F Denman Jr and produced by Med Systems Software. Our review sample came from Compshop Australia in South Melbourne, where it costs \$19.50.

Now will somebody untie this '!#\$%&' straightjacket! □

Gobbleman? Oh, Really?

Gobbleman for the TRS-80 is reminiscent of Snogging on the Apple. It's one of those games where you have to guide yourself around an on-screen maze, all the time trying to avoid the Gobble Men who are randomly roaming around trying to eat you.

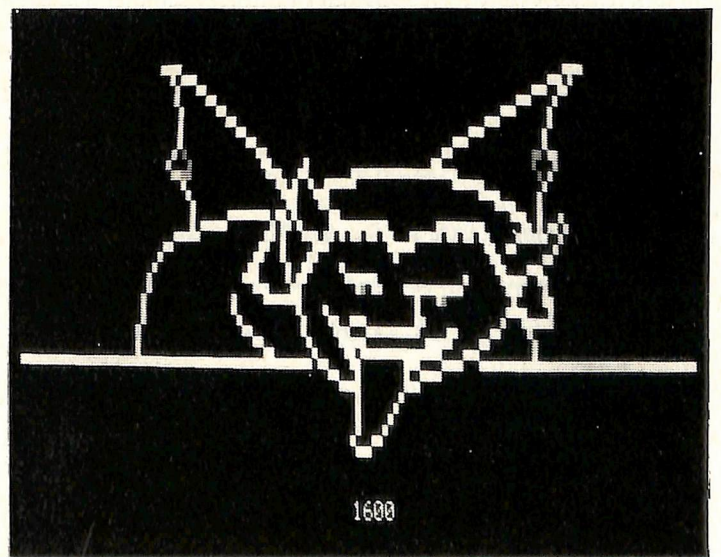
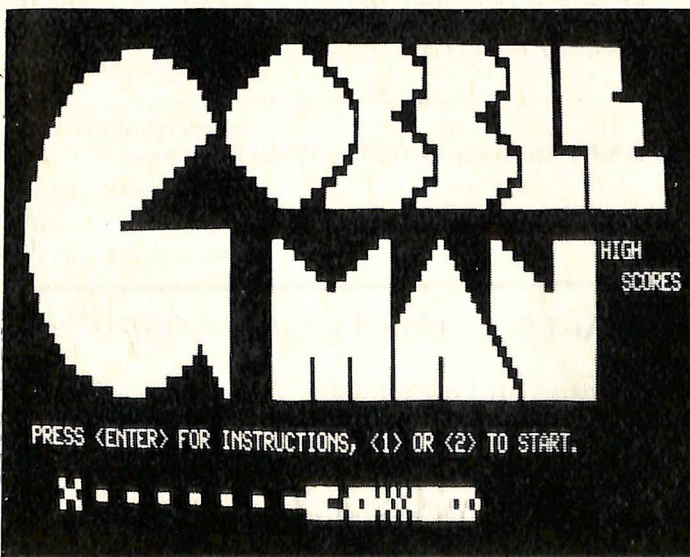
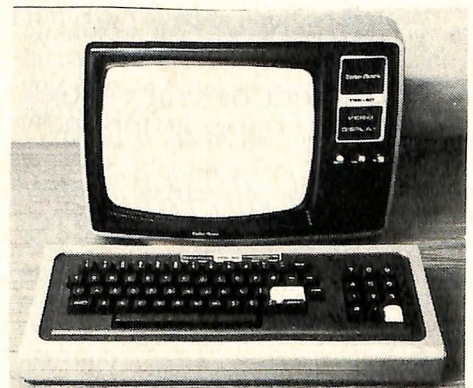
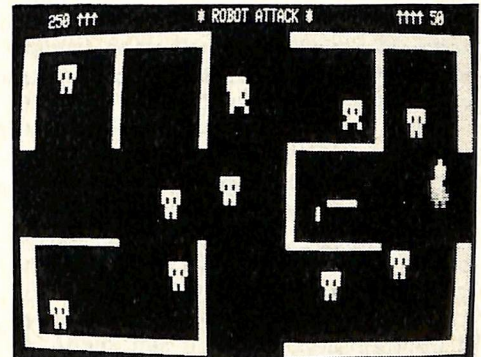
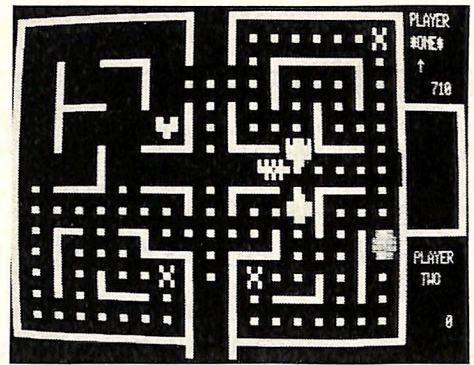
The maze is full of energy dots, which disappear as you encounter them. The object is to 'eat up' as many energy dots as possible (another way of saying, visit as much of the maze as possible) while avoiding the Gobble Men.

Your 'man' is under control of the cursor control keys. It will keep on moving unless it encounters an obstacle (like a wall) so you can't pause for breath! However, every so often, the Gobble Men change shape, and you can then gobble *them* up, increasing your score by hundreds, even thousands at a time.

Need I say, every time I play, I get eaten by the first monster to come near me. As panic sets in, I inevitably confuse the cursor keys and hurtle straight into the waiting jaws of the Gobble Man! I think even writing interrupt handlers is easier than this!

(I'm working on a new game where the object is to write 100 lines of assembly language faster than the Evil Algol Compiler can generate it. Mind you, I'd probably lose in that too!)

An amusing part of the program is the opening graphics, which portray the Gobble Man as a kind of devil, wings flapping behind him as his tongue flicks at the creatures below.



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Games Software Report Card

Program:	Asylum			
Made By:	Med Systems			
Available for:	TRS-80 Models I and III			
Ratings:	excellent	good	okay	well, maybe
Ease of Use		✓		
Speed		✓		
Entertainment value		✓		
Educational value			✓	
Documentation		✓		
Value-for-money		✓		
Holds interest for	Too flaming long!			
Price:	\$19.50			
Review copy from:	Compshop Australia, South Melbourne			

Games Software Report Card

Program:	Gobbleman			
Made By:	Beam Software			
Available for:	TRS-80 Models I and III			
Ratings:	excellent	good	okay	well, maybe
Ease of Use		✓		
Speed	✓			
Entertainment value		✓		
Educational value			✓	
Documentation		✓		
Value-for-money		✓		
Holds interest for	Longer with a group			
Price:	\$19.50			
Review copy from:	Compshop Australia			

Good fun, even if I am hopeless at it!

Gobble Man was written by Veronika Megler and Philip Mitchell, and produced by Beam Software. Our review copy came from Compshop Australia. It sells for \$19.50. □

Attack The Robots, Again

The poor old robot gets it again! Because people who write computer games are generally nice people, and don't like violence (especially hurting people), they don't like violent games. But because people who *play* games seem to love violence, destruction and plenty of action, somebody has to cop it. It can't be a human, so the poor old robots become the target of all our pent-up aggro.

The intro to this game scrolls up the screen after the style of the intro to Star Wars, and takes absolutely ages. It explains that evil robots (Asimov's Laws notwithstanding) have taken over one of Earth's space stations. It's your job to invade the station and conquer the robots.

Again, this program uses graphics to portray the situation. The space station is a mini-maze, and you move about it using the cursor arrows. Diagonal motion is possible by pressing two keys at once. Alternatively, the I J K M key diamond can be used (which I found more logical) or, if you want to be really smooth, a joystick can be used.

To fire at the robots, press the space bar or 'F' and aim using the same keys. You must avoid the robots, their laser fire, and also the walls, which are electrified. You get 50 points for every robot destroyed. For every 5000 points accumulated, an extra humanoid will be added to your army (another way of saying 'free play').

In all my attempts at the game, I was never able to get much above 650 points, mainly because after I'd wiped out a couple of robots the enemy flagship always appeared and wiped me out quick-smart!

Perhaps it's because I covertly sympathise with the robots, but I seemed to run out of humanoids awfully fast, without making much of a dent on the robots. Thank goodness they were only humanoids; I could never have coped with the guilt if they'd been human. Anyway, I'm on the robot's side; I tend to side with the underdogs. Robot Lib!

Games Software Report Card

Two players can play the game, which also keeps track of the ten highest scores.

Robot Attack was written by Bill Hogue and Jeff Konyu, and produced by Big Five Software. Our review copy came from Compshop Australia, where it costs \$19.50. □

Program:	Robot Attack			
Made By:	Big Five Software			
Available for:	TRS-80 Models I and III			
Ratings:	excellent	good	okay	well, maybe
Ease of Use		✓		
Speed	✓			
Entertainment value		✓		
Educational value			✓	
Documentation	✓			
Value-for-money		✓		
Holds interest for	Till the booze runs out			
Price:	\$19.50			

Review copy from: Compshop Australia

sinclair ZX81

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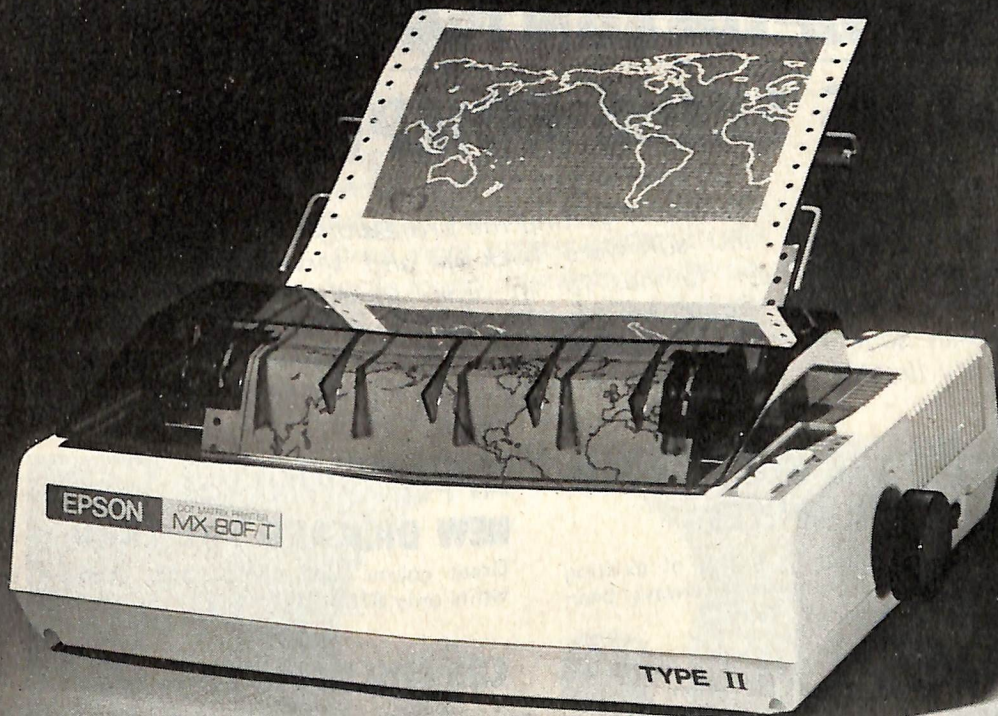
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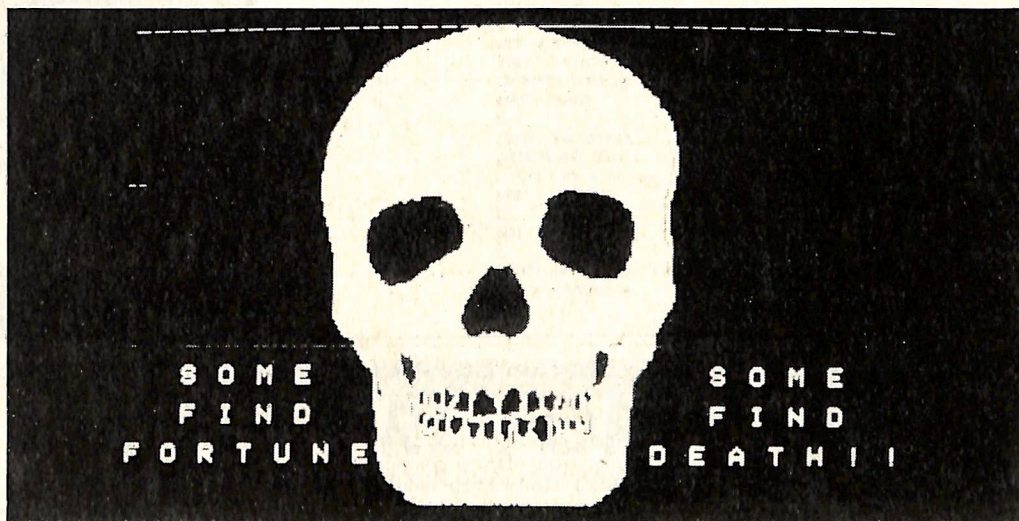
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APPLE PLAY - Three to keep the doctor away!

If the Your Computer staff has one thing in common, it's that the members need no invitation to indulge in Adventure-type games. Three more games written for the Apple found their way into the office recently and were promptly tested by the entire staff, including the most avid player of all — our itinerant tea-boy.



your computer SOFTWARE REVIEW

RECENTLY WE'VE tried three excellent games on the Apple: Wizardry, Ultima and Southern Command. The first two are dungeons and dragons-type games, while Southern Command is a battle simulation based on the Egyptian-Israeli conflict of 1973.

Ultima is a single-player program by Lord British, of Akalabeth fame. You are on a mission, although we can't tell you what it is as this in itself is part of the quest.

There are three different modes in which you, the adventurer, become involved.

The first involves travelling around an island discovering how to survive and develop your character by improving his strength, agility, wisdom, intelligence, charisma, and stamina — attributes similar to those of the dungeons and dragons characters.

You also need to watch your supply of

food, which can be replaced in towns for a modest fee. This brings in a further complication, that of obtaining the gold you need to trade with the town merchants and quench your thirst.

You'll also find castles, which can contribute to or detract from your adventure depending upon your ability to concentrate, bargain and add to your assets without paying.

There are also four islands for you to explore — when and if you obtain enough gold to purchase a vessel to take you there.

The second area you must explore for your initial survival is the underground dungeons. These are of the same style as Akalabeth, although the results can be different. In these dungeons you pit yourself against the monsters to gain experience, hit points (your ability to withstand

attacks) and wealth.

The third area of exploration is Space where you do battle in your starfighter against innumerable odds for the glory that will eventually be yours.

One hint: if you are not capable of excelling yourself in the art of space fighting, you might as well not play the game — without this ability you will never complete your quest.

The Hi-res graphics and complexity make Ultima an interesting and absorbing game. It's also one for long winter nights or for wet weekends. Ultima is not a simple game — it involves much thought and time commitment.

The fun of not knowing what the aim of the game is and the discovery of many answers just when you are about to drown your frustrations in drink make Ultima one of the ultimate games for the Apple.

Games Software Report Card

Program:	Ultima			
Made By:	California Computer			
Available for:	Apple II			
Ratings:	excellent	good	okay	well, maybe
Ease of Use		✓		
Speed		✓		
Entertainment value		✓		
Educational value			✓	
Documentation		✓		
Value-for-money	✓			
Holds interest for	Weeks			
Price:	SN/A			
Review copy from:	City Personal Computers			

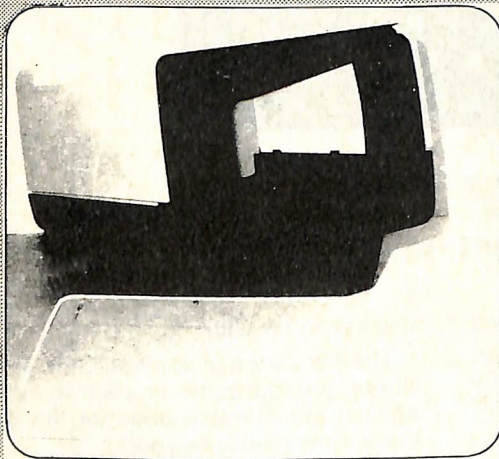
A Wizard Outside Id

Wizardry is another dungeons and dragons simulation game. It doesn't have Ultima's graphics emphasis, but can be played by from one to six people, each having his own characters.

Of all the dungeons and dragons simulations produced for the Apple (or for any other computer), Wizardry is the best we've seen.

It is written in runtime Pascal, which means it will run on any DOS 3.3 Apple without the need for the language system or 16K RAM card, yet it has the speed advantage of the language.

Wizardry lets you create and control a large number of adventurers, who then go



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The two keyboards housing have been designed to accept two sizes of keyboard sub-assembly. The smaller housing takes the compact standard

QWERTY alphanumeric assembly of up to approximately 100 keys, while the larger one accepts the standard QWERTY key layouts plus additional keys such as numeric pads and special function keys for work processors or other applications.

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The standard enclosure accepts a variety of disk drives. The low line assembly, for example, will accept up to four mini floppy disc units.

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off in search of loot and glory. As the characters become experienced in caving and battling the evils found in the dungeon they can develop and improve their skills. There are various kinds of characters you can develop:

Mage — a wizard or sorcerer who can use magic spells.

Fighter — can use any armour or weapon and is extremely good at armed combat.

Priest — holy man who can cast spells,

fight, and dispell the monsters.

Thief — not always trustworthy, but can open chests and find traps which hinder a party.

Bishop — one who has abilities of both Priest and Mage. He can identify magical items.

There are other types of adventurers but these are only available as you progress through the game.

Over the course of many adventures

you are able to map out the maze and finally wrest from it the secrets and the treasures. This in itself will take months. So far our best resident adventurer has yet to go further than the fourth level of what we are told is at least eight levels deep.

To play, you first boot the reverse side of the disk, which enters the Pascal language and produces a Hi-res title page. You then reverse the disk and boot

WIZARDRY PLAYER STATISTICS

STRENGTH.....		GOLD	
INTELL		EXPR	
PIETY			
VITALITY.....	LEVEL ...	AGE	
AGILITY	HITS .../...	AC	
LUCK	STATUS		

EQUIPMENT *=equip, -=cursed, ?=unknown.

1) ..	2) ..
3) ..	4) ..
5) ..	6) ..
7) ..	8) ..

SPELLS

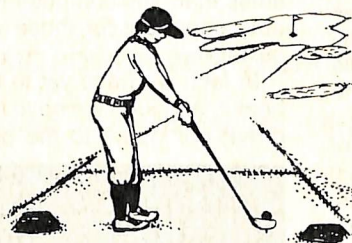
MAGIC			
PRIEST			
PRIEST	MAGE	PRIEST	MAGE
KALKI - BLESSINGS ..	HALITO - LITTLE FIRE	2 MATU - BLESS & ZEAL	DILTO - DARKNESS
DIOS - HEAL	MUGREF - BODY IRON	CALFO - I RAY VISION	SOPIC - GLASS
BADIOS- HARM	KATINO - BAD AIR	MANIFO- STATUE	
MILWA - LIGHT	DUMAPIC- CLARITY	MONITO- STILL AIR	
PORFIC- SHIELD			
3.			
LOMILWA MORE LIGHT	MAHILITO BIG FIRE	4 DIAL - HEAL MORE	MORLIS - FEAR
DIALKO- SOFTNESS/SUPPLE	MOLITO - SPARK STORM	BADIAL- HURT MORE	DALTO - BLIZZARD BLAST
LATUMAPIC IDENTIFICATION		LATUMOFIS CURE POISON	LAHALITO FLAME STORM
BAMATU- PRAYER		MAPORFIC SHIELD(BIG)	
5.			
DIALMA- HEAL GREATLY	MANORLIS TERROR	6 LORTO - BLADES	LAKANITO SUFFOCATION
BADIALMA HURT GREATLY	MAKANITO DEADLY AIR	MADI - HEALING	ZILMAN - DISPELL
LITOKAN FLAME TOWER	MADALTO FROST	MABADI- HARM INCREDIBLY	MASOPIC - BIG GLASS
KANDI - LOCATION		LOKTOFEIT RECALL	HAMAN - CHANGE
DI - LIFE			
BADI - DEATH			
7.			
MALIKTO WORD OF DEATH	MALOR - APPORT		
KADORTO RESURRECTION	MAHAMAN - GREAT CHANGE		
	TILTOWAIT - (NUCLEAR FISSION?)		

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Games Software Report Card

Program:	Wizardry			
Made By:	Sirtech			
Available for:	Apple II			
Ratings:	excellent	good	okay	well, maybe
Ease of Use		✓		
Speed		✓		
Entertainment value	✓			
Educational value				✓
Documentation		✓		
Value-for-money	✓			
Holds interest for	Weeks and maybe months			
Price:	\$42.00			
Review copy from:	City Personal Computers			

the scenario before 'rolling up your character' for your first adventure.

Prior to setting out you join forces with other adventurers; your own or those of your friends. It is interesting to note that while these characters are stored on the one disk you can protect your character from unauthorised use by a password, which must be entered before it can be included in any adventure.

After equipping your party with the best that your limited funds can obtain, you are ready to venture forth. On entry to the maze the display on the screen is in colour — although it is limited to a small graphics window in the top lefthand corner. This would, on paper, appear to a limiting point, but when you play the game you'll find it is not.

At this point you find it is important to develop a mapping system as without this aid it will be almost impossible for you to find your way out of the maze again. And it is essential for the first adventures to be of a limited duration as the strength of your characters will be low and they need to develop.

After a successful trip, you can even have your party recuperate and build up its strength by staying at the Adventurers' Inn. There, for a small fee, your party can rest and (if their experience warrants it) individuals can be elevated to a higher level and gain new skills.

The display is limited with its graphics, but it also provides the current statistics of the game. You can see the characters and their status at all times.

When a confrontation between your characters and the monsters occurs, you are given the option for each character to

either run, fight or cast a spell. If any member of the party elects to run, all will be forced to do so.

Each character has a different position in the adventure party. This is decided upon before you set out. The first three are the only members who can be directly involved with the fighting. If you wish to change the order, this is possible. However, this cannot be done until the fighting has been resolved.

The way a battle is resolved is for the computer to take into account the relative strengths of both warring parties, the armour classes, any magic spells cast, and luck. These are constantly flashed on the screen so you can monitor the battle.

To sum up, some of special features of Wizardry are: multi-player, five races, eight classes, hundreds of magic items, hundreds of monsters, 3-D maze, special goodies that can happen only once in a game, more than 50 spell types to cast, and the ability to protect your character from illegal use by password protection.

Another bonus is that there will be new scenarios (to which you can transfer your characters) released in the future.

Southern Command

This is a program by Australia's own master of war-gaming, Roger Keating.

It is distributed by Strategic Simulations and is a progression from Keating's earlier games, Conflict and Apocalypse. That's not to say it's a rehash or modification — it is developed on the same lines with newer techniques and faster action.

Southern Command is a simulation of the crossing of the Suez Canal during the Yom Kippur War. It uses a 39 by 28 hexa-

gonal grid map, which can be overviewed and then inspected in more detail. Roger uses scrolling to enable you to look at each specific location and the placement of units.

Roger uses many of the traditional concepts developed for war games over the last 20 years. The hex structure of the map is now used in almost all war games, as it allows movement and combat to be regulated without the loss of realism.

In Southern Command it is possible for a player to instruct his units to move and attack during his opponent's movement phase. This is a welcome departure from the normal war-games approach. When the computer is playing against you in the solitaire game it uses this tactic regularly.

A further refinement is that of hidden movement. This adds a further dimension to the tactical decisions you have to make. As a unit is moving it can sight enemy units which have been hidden. This is limited to a maximum of five hexes distant, and in certain terrains this will be even less. This feature adds a new dimension of realism to the game.

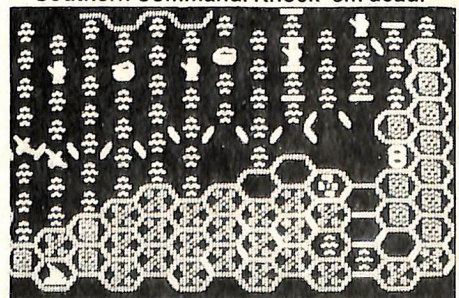
Roger's attention to detail and his aim for realism is evident throughout the game. For instance, the infantry is the strongest of the units as during the 1973 war the anti-tank weapons were at their peak. In some cases Israeli tank battalions lost 50 percent of their strength within an hour of battle, due to the accuracy and newness of the weapons.

The game is written almost entirely in machine language so the computer can finish a move in around 60 seconds, whereas a player will take at least 10 times that. The computer is also a formidable opponent for those wishing to play solitaire.

In fact, we have yet to find out how to beat it, although we have managed to improve our game to the point where the



Southern Command. Knock 'em dead.



Israeli army might at least find an opening for us in the kitchen.

It is a colour game, although with the selection of the black and white mode it is possible for those who spend their money on programs instead of colour cards to enjoy it just as much.

The program comes with a rule book, disk, two mapboard cards, a game info card and four coloured pens. The disk can boot directly on either the 3.3 or 3.2 DOS systems.

War in the 80s

Finally, Roger gave us some notes on his next game, which will (hopefully) be available around May.

In this game the scenario is Europe in the early 80s — 1980s — with the United States fighting against a Russian invasion.

It will incorporate a number of changes and improvements. The player will be able to hand over to the computer the movement of some or all of his units. This will allow him to call up his reinforcements rather than having to move them across the board.

The key structure will be improved over the 40-plus keys that are required in Southern Command. Roger says it will require a lot of study before you will be able to play the game and many more hours to develop a winning strategy. It will be one to look out for.

Games Software Report Card

Program:	Southern Command			
Made By:	Strategic Simulations			
Available for:	Apple II			
Ratings:	excellent	good	okay	well, maybe
Ease of Use			✓	
Speed		✓		
Entertainment value		✓		
Educational value				✓
Documentation		✓		
Value-for-money	✓			
Holds interest for	Weeks			
Price:	\$45.00 (estimated Australian price)			
Review copy from:	Author — Roger Keating			

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Zen And The Art of Educational Software

A major application for microcomputers is in education, and many Apples and similar micros have found their way into schools. Here, former impudent schoolboy LES BELL looks at the popular Zenith Education Systems software package series.

your computer SOFTWARE REVIEW

ODDLY ENOUGH, I seem to be the person around YC whose school-days were most recent; maybe that's why I was given the job of reviewing this courseware for use in schools.

Unfortunately, I was never a very good pupil and never a teacher at all, so my comments about this software must be read with that in mind.

Zenith Educational Systems is based in Bankstown, in the south-western suburbs of Sydney, and supplies a broad range of educational and games software for Apple computers. Some of this software is imported from the US, and some of it is locally written.

Some of the software is written by ZES itself, and is the subject of this review.

The Zenith software falls into the category generally known as Computer Aided Instruction (CAI). In other words, it's intended to be used in teaching subjects unrelated to computers, such as biology, geography and English. ZES supplied us with three different modules: Chemistry (Gases 1), Biology (Digestive System), and English (Phrases and Clauses).

Being an engineer by background, I decided to test both the software and myself on the Gases module first. I thought I could still remember some of the rules that relate P, V and T (pressure, volume and temperature to the uninitiated).

In my usual manner, I thrust a disk into the Apple and booted it. It responded by asking for my student ID. I tried all kinds of answers to this, but eventually read the manual to discover that since I was going to add a new student record to the disk I was playing the part of the teacher, and should type in TEACHER.

The system then displayed a menu, from which I selected option 3, 'CREATE/AMEND STUDENT RECORDS'. The system then prompts the teacher for all the information required; student number,

name, surname, module ID (why does it want that?), question (what does that mean?), and two comments which are displayed to the student when he/she first logs into the system.

I was rather puzzled that the system prompted the teacher to enter the module ID. After all, there's only one module on a disk. I was equally puzzled by the QUESTION: prompt. Is this the question the student should start at, finish at, or what?

An Apple for Les?

The manual was decidedly unhelpful on these matters: it spends a lot of time explaining what numbers to type in response to menu displays (which is obvious from the menus themselves); but it never really explains what these more mysterious prompts mean. Black marks for the manual, ZES. Take a thousand lines and sign up for our Users Manual Writing Course after hours.

Eventually, after creating a student record for myself, I returned to the main menu and ran the student interaction program. More frustration. It seems the computer doesn't know I exist.

Back to the manual, where under 'Obtain Student Reports' I find the Eternal Truth: 'A valid student number consists of up to eight characters of which the first must be S'. Why didn't they say so earlier?

Fume. Fix that, and then back to the student interaction program. This time, success! On to the first question.

And here we come to the crux of the matter. This isn't really a computer aided instruction system at all. It's a computer aided **testing** system. It asks questions, one after another, but it doesn't actually teach anything, except by random trial and error.

It is still necessary for the teacher to teach the material, which is quite possibly the way it should be. Somebody who

doesn't know the course material (like me, as I discovered) can only fumble through the module, like a blind man trying to run a maze.

Given that axiom, the material is excellent as a testing system. It will measure a student's comprehension of what he has been taught quite accurately, and present a summary of his performance to the teacher.

It will also function as a teaching aid, in the sense that we learn by rehearsing knowledge. By thinking about the questions the system poses, the student is reinforcing his memory of what he has been taught.

Bell Reveals All

Each module consists of two types of question: normal questions, which test the student's understanding of a topic; and revision questions, which are posed when a normal question is incorrectly answered. Revision questions serve as hints to aid in answering the associated normal question.

Revision questions do not provide all the facts necessary to correctly answer the associated normal question. Despite repeated attempts at some questions in the 'Phrases and Clauses' module, I was unable to ascertain what answer was required of me. Nor, for that matter, was a lady with a BA(Hons) in Linguistic Science, and an expert on grammar! Remembering how frustrated we became, I wonder how kids must feel?

For all that, the system does work well. The program asks a question, then offers the student the opportunity to refer back to any associated diagram, to accept a hint, or to go on and answer the question. In some places, even though there is no diagram and no hint, the system still gives the student the option of answering the

question. This threw me at first. I assumed I should just answer the question and typed my response. You've got to keep your wits about you!

```

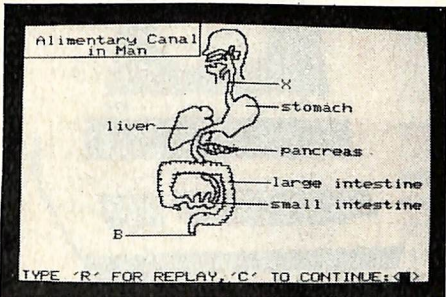
DIGESTIVE SYSTEM
THE FOLLOWING OPTIONS ARE AVAILABLE -
1. ENTER STUDENT ID
2. GENERAL STATUS REPORT
3. SUMMARY RESULTS
4. DETAIL REPORT
5. REVIEW OF STUDENTS ANSWERS
6. CLASS REPORT
7. EXIT
ENTER YOUR CHOICE <1>

```

```

STUDENT ADDITION
STUDENT NUMBER <S4 > ARE AVAILABLE
STUDENT <WHEELIEWUNDA
FIRST NAME <MATRIX DOTTY
MODULE TO <FOOD >
QUESTION <10 >
COMMENT
YOU'RE A REAL PROBLEM CHILD
BSEE IF YOU CAN GET ONE RIGHT THIS TIME
ANY MORE ADDITIONS < >

```



Questions can be either multiple choice, or open-ended. The latter will require spelling skill on the part of the student as computers are not tolerant of poor spellers! The questions seemed to be well graded and to follow a logical exposition of the subject, for each of the modules we tried.

The graphic displays in the modules are particularly good. Charts of the digestive tract, for example, were quite clear, though not up to textbook quality, of course. The use of graphics makes possible teaching of subjects otherwise impossible.

```

Q 10 DIGESTIVE SYSTEM & COMPONENTS
SELECT THE CORRECT ALTERNATIVE
A B C OR D TO THE FOLLOWING QUESTION
FOOD ONLY UNDERGoes CHEMICALLY CHANGED INTO
ITS SIMPLEST SOLUBLE FORM IN ORDER TO
BECOME AVAILABLE TO THE BLOOD STREAM. THIS
PROCESS IS CALLED
(A) DEFACATION
(B) LIQUIFICATION
(C) DIGESTION
(D) ELIMINATION
ANSWER PLEASE <C
CORRECT!
WELL DONE !

```

```

Q 10B DIGESTIVE SYSTEM & COMPONENTS
COMPLETE THE FOLLOWING SENTENCE WITH
ONE WORD
THE MECHANICAL AND CHEMICAL BREAKDOWN
OF FOOD IS A PROCESS KNOWN AS
OPTIONS
1 ENTER ANSWER
ENTER YOUR CHOICE <1>

```

At the end of a lesson the student sees any final messages the teacher has left for him, and is then given an opportunity to send a message to the teacher (I imagine some of those would make interesting reading!).

The most advanced part of the system is the analysis and reporting facility. This allows the teacher to review statistics about each student's performance.

The Electronic Report Card

The summary results show the number of normal questions attempted (on both first and second tries), the number correctly answered, and the same information for revision questions. The second page of the display gives the number of hints taken for each question attempted, the average response time per question, the maximum response time, and the most difficult question.

A detailed report shows, for each question, whether or not a hint was taken, the time taken to respond, and whether it was correctly answered.

The teacher can also examine the answers the student gave. The system does not, incidentally, provide the teacher with the correct answers. These are available separately from ZES on receipt of an SAE.

Finally, a summarised class report is available, showing the average class mark, average response time, and most difficult question.

That's a lot of raw data. Not being a teacher, I don't know how much of it is directly useful. I guess if you're trying to determine a student's problem area, you could use all the help you can get; but for most students I would think much of the information is redundant.

There doesn't seem to be any way of printing reports, so that they can be taken away for analysis. This means tying the computer up, possibly during time when a student could be using it.

The major problem I can see with this system is scheduling students' time so all those in a class can have a go at it. This might be easier in science classes, where some of the work is done in experimental labs and students can leave group activities for half an hour or so. In regular classes, such as geography and English, this is not so easy to arrange.

So there it is. I still harbour some reservations about the utility of such a program, but I found the ZES courseware to be a good test of my knowledge.

At \$29.95 per module it is not expensive and well worth trying out. I guess to a large degree its usefulness depends on the statistical sophistication of the teacher, and his ability to derive useful information from the performance data it accumulates.

Recommended for further investigation.

Software Report Card

Program: ZES Courseware

Made By: Zenith Educational Systems

Useful For: Computer Aided Instruction

Hardware Req'd: Apple II, one disk drive

Ratings:	excellent	good	well, maybe	poor
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Documentation

Ease of Use

Speed

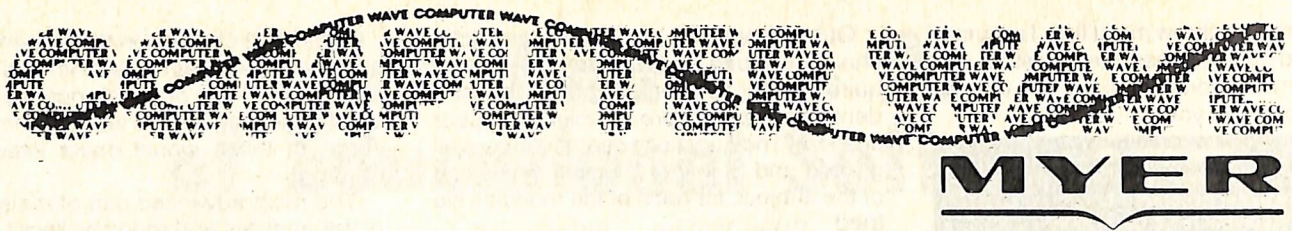
Functionality

Support

Value-for-money

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Review copy from: Zenith Education Systems, PO Box 505, Bankstown 2200



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Australian Micro

THE AUSTRALIAN computer manufacturing industry has climbed another step up the ladder of technology with the launch of a powerful but low-cost single-board desk-top microcomputer, the Datamax 8000.

The primarily OEM targeted unit has been designed by a Chinese-born Australian electronics engineer, Chin K. Kwong. It is being manufactured at the Manly, NSW, plant of his privately backed company, Datamax.

The machine has been under development for the past two years and has completed six months of successful field trials. It is the first in a line of special Datamax computers being designed and built in Australia for Australian conditions.

The Datamax 8000 is claimed to have more Australian content than most local computer manufacturers and assemblers in Australian use in their products. Yet it incorporates the most advanced hardware available in the 8-bit microcomputer field in a unit claimed to have a high degree of reliability, through unique design features.

The design permits mass production, allowing Datamax to retail the 8000 for around only \$6000, according to Mr Kwong.

Key element of the design is the 40cm by 25cm single board, carrying a Z80 CPU featuring 158 instructions, including 16-bit arithmetic; 64K bytes of high-speed dynamic RAM, with the option of using the new 64K RAM chips to lift on-board capacity to 256K bytes; a double density floppy disk controller which handles up to four floppy disk drives; and circuitry for two parallel ports, four serial ports, IEEE 488 GPIB instrumentation interface, floating point arithmetic processor, hard disk adaptor, S100 Bus adaptor and a calendar clock with battery back-up.

Input/output peripherals connect directly on to standard connectors located on the board. Diagnostic tests for vital functions have also been built-in to speed servicing.

The board and its associated heavy-duty power supply is housed in an attractive but rugged desk-top cabinet, along with two double-sided Y-E Data floppy disk drives, providing two megabytes of disk storage. □

Laser Printer

DATAPoint Corporation has introduced a new Laser Printer, the 9660, to offer a combination of high print quality, document throughput and maximum versatility for its ARC (Attached Resource Computer) local network users.

Designed for the office environment, the 9660 uses an electro-photographic printing process and a high resolution laser scanner controlled by powerful electronics and software. From a workstation anywhere in the network, a user can initiate the printing of documents with specific selections of type fonts and page orientations.

The user can also specify the use of any combination of the five types of paper that can be simultaneously loaded into the Laser Printer's input drawers, with routing to specific output drawers.

"In fact, the power of the 9660 is such that simply calling it a 'printer' is actually inaccurate," says Datapoint managing director Robert Kaye. "Considering its variety of type fonts and printing styles, it is almost a new breed of office typesetting machine."

The print images are formed from a dense matrix of tiny dots, or 'pixels'. Pixels are arrayed 480 to the inch horizontally and 240 vertically, allowing executive correspondence print quality.

The actual printed images

are formed by converting the data stream into a modulated laser beam that is swept across a photo-sensitive image transfer drum in the electro-photographic printing assembly.

The transfer drum is then exposed to dry toner, and picks up the image to be printed. The toner is transferred to bond paper or transparency material, and the fuser assembly fixes the image to the paper.

The 9660 can print on either or both sides of the paper. Printing is performed at a rate of 20 surfaces per minute (about 1,300 lines per minute!) — an extremely high throughput for a correspondence quality printer. Graphics or multiple type faces can also be used, with only minor decrease in printer throughput.

The electronics of the 9660 centre around a sophisticated interface processor, a text video processor, a control processor and associated memory elements.

Standard memory is 128K bytes, and can be expanded to a maximum of half a megabyte to allow more on-line character sets. □

Record by Facom

FACOM Australia made record sales of \$25 million in the first six months of the company's current financial year.

Announcing the sales results for the six months to September 30, 1981, the managing director of Facom, Mr Mike Rydon, said the result was up 100 percent on the previous first six-month sales record of \$12.5 million, registered in the period to September 30, 1980.

Mr Rydon said: "This sales result, which is significantly ahead of target, is largely attributable to market acceptance of the latest addition to the 'M' series mainframe systems — the M180N — and Facom's continuing penetration of new geographic markets."

Mr Rydon said Facom's Japanese parent company, Fujitsu, had such faith in the potential and stability of the Australian market that it had injected a further \$4 million capital, to lift its direct investment to \$13 million. At the same time Fujitsu had provided Facom Australia with \$6 million in long-term loans, with a further \$1 million to be made available before the end of 1981. □

Apple Family

APPLE computer, represented in Australia by Electronic Concepts, has introduced a new personal computer merchandising program designed to meet the needs of the entire family. Apple's Family System combines hardware, software and manuals into a highly marketable package geared for the first time computer user.

"As the personal computer consumer market expands, the percentage of first-time users walking into personal computer stores rises. The bundled Family System eases both the customer's decision making and the dealer's sale," said Rudi Hoess, managing director of Electronic Concepts.

"Apple has provided the most thorough, ready to use and easy to use package on the market," Hoess added.

Electronic Concepts, for Apple, is supporting the Australian wide network in this new merchandising program by providing national advertising, point-of-sale displays, brochures, co-op advertising, and training on the two new software programs (Personal Filing System and Personal Finance Manager).

The Family Systems have been available through Apple Computer dealers since December, 1981. The suggested retail price is \$2495 (sales tax not included). This price is consistent with the US price for the same configuration. □

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Satellite Apathy?

THE BUSINESS community had not yet fully recognised the opportunity or the responsibility Australia's proposed communications satellite presented, according to the general manager of Business Telecommunications Services, Mr Peter Holmes aCourt.

He expressed this view when addressing the annual conference of the Australian Computer Society, NSW Branch, at Terrigal.

Mr Holmes aCourt said one of his aims was to "engender a degree of urgency into your consideration of these complex issues".

He said BTS, a private company owned by 12 leading Australian companies, had been formed last year to help private enterprise organise its role in the emerging telecommunications environment. The greatest growth in telecommunications in the next decade would be in business services, and these needs were best identified and met by business itself. □

Program Pirates Nabbed

IT'S OFFICIAL: program pirates can be successfully sued in Australian courts.

Last month, Computer Solutions, in Brisbane, took action against Random Access Pty Ltd for what it alleged was the illegal use of its word processing software for the Apple II.

The court found in favour of Computer Solutions, and ordered Random Access to destroy the offending programs.

According to Ian Phillips of Computer Solutions, the battle lines are now established and it is likely that many more cases of this kind will be seen in Australian courts.

"We have found the law is definite and strong on the point of copyright," Mr Phillips said. "We didn't know what the law was when we first launched this case, but

now we know and we are on the look-out for anyone copying our programs.

"And in future we won't refrain from going for damages and costs."

Mr Phillips said many Australian manufacturers of software had been waiting on the outcome of the Computer Solutions case before taking their own legal action.

He said the future of the Australian software market was in the balance, and if program pirates were not stopped many small concerns would go to the wall.

In his attempt to catch the program pirates, Mr Phillips has taken an advertisement in *Your Computer* offering a \$500 reward to anyone who can provide information resulting in a successful prosecution of program pirates.

"We have had several reports of copies of our software being seen in schools, but our informants were not prepared to give full details and we couldn't take action," he said.

"We are also on the look-out for people copying software produced overseas. We will hand over any evidence of this kind to the manufacturers." □

Expanded Print Option

AN EXPANDED print option providing 42 type sizes for the 160 cps matrix printer has been introduced by Datapoint Corporation. This option allows the programmer to design and download custom character fonts.

The option now available, will be offered as an add-on for Datapoint's model 9621 and 9622 matrix printers; and it can be ordered with new printers or installed as a field upgrade by Datapoint customer service technicians in those existing units previously outfitted with a Matrix Enhancement Kit.

The firmware allows the user to invoke the new printing options through software control directly from a compu-

ter keyboard.

The height of the characters is controlled by the line spacing value and the user can select from eight line spacing values.

The horizontal spacing value determines the width of the characters, and the user can select from six horizontal character spacing values.

To thermally protect the printer, the firmware automatically slows down the printing throughput when exceptionally dense characters are called for.

The firmware options are invoked through a menu-driven software package supplied with the option. The program resides in Data-point's Disk Operating System, queries the user as to which print option is desired and presents an appropriate menu of alternatives on each step of the procedure.

The 160 cps matrix printer, which comes in serial and parallel interface versions, is designed to provide low-cost dot matrix printing for dispersed business locations. It provides a 132-column format, bi-directional printing and print head slewing for maximum throughput.

The standard character set includes all 96 ASCII characters on a nine by nine dot matrix with lower case descenders and true underlining. □

The Card Game

NATIONAL distributor of greeting cards and stationery Peter Davis has made substantial time savings in invoicing and stock control, as well as gaining other unexpected benefits, by installing a microcomputer.

His task of invoicing and issuing statements became such a time-consuming component of the work routine that order-processing often suffered as much as six weeks' delay. So he spent 18 months comparing the available computers before making his decision — on an Adler Alphatronic.

"My invoicing time is down from 11 hours to a mere 80 minutes a week. Other sections of my business have benefitted. Paperwork is a breeze", Peter says. And his leasing cost is less than that of employing a junior office girl.

He can call up detailed data on all his customers, including their buying pattern, by

volume and product, and credit status, printing out or displaying information that tells him his cash flow and profit situation.

The Adler Alphatronic reflects, it's claimed, the developmental work that has gone into the company's marketing in the computer field. Adler's objective, it says, has been to market a sound, reliable and competitively-priced micro computer of great versatility.

Full data is available from Adler offices in all states, where software, backup maintenance, servicing and training facilities are also provided. □

Betting System

PROMINENT track expert and Canberra bookmaker Clem Hincksman has developed a new computer system which holds form guide data for more than 15,000 racehorses currently operating on NSW racetracks.

The system was developed from a previous computerised form guide, which Mr Hincksman designed to run on Ohio Scientific C3C hardware, supplied by Australian Computer and Electronic

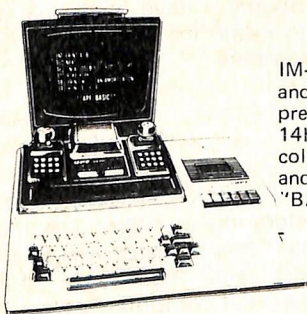
Systems (ACES), Canberra agents for the Ohio range.

Mr Hincksman originally devised the system to provide a rapid assessment based on form guide over the past 18 months of any horse registered in NSW and running on both city and country tracks. The system has aroused considerable interest in the bookmaking fraternity because of its ability to call up critical data relating to weight, age, placings, performance, track condition, distance, jockeys and odds laid.

The updated system also runs on an Ohio Scientific C3C, but with increased storage capabilities. Programs were written by ACES, in conjunction with Mr Hincksman.

Enhancements include additional programs which provide mathematical calculations giving the percentage of favourites to win and their price over any given distance, at any given venue. □

The Imagination Machine



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your computer clinic

A Question

WHY CAN'T a gizmo be made to allow software intended for, say, the Apple, to be run on a Sorcerer or S100/Z-80.

The reason I ask is I am attracted to these two computers as my alternatives, but am somewhat put off by the lack of software that would appeal to a hobbyist. I'll probably still go ahead and buy one of them anyway, but I would love to know the answer.

My previous interest has been mainly in the field of hi-fi. I know it is possible to translate any kind of electrical signal into any other — but I presume that isn't the problem.

*P. DOWNER
Potts Point, NSW*

A gizmo could be made, but I guess the majority of Sorcerer and S-100 system owners just wouldn't be interested; they've got much more important things to do than play with toy computers (an indication of their thinking, not necessarily my objective assessment of the computers!).

Some time back, a US company launched an S-100 board with a cassette interface on it which would load TRS-80 tapes, but it didn't sell terribly well.

Interestingly, a gadget has been made which lets Apples run software intended for S-100/Z-80

machines, and that has proven very successful. You can read what you like into that.

Interrupt-Driven Keyboard

I HAVE an IMS 8000 with dual floppies and a Televideo 912B attached to a serial port.

Can you advise me how I might use the Z-80 interrupt capabilities to process console input characters independently of a program which is concurrently generating console output, so I can dynamically interact with a moving display?

I prefer to execute in a CP/M environment.

*J. R. HYDE
North Epping, NSW*

I presume what you are describing is the classic interrupt-driven keyboard. Basically, you will have to re-wire your serial port circuitry so the receive buffer full flag of your UART goes to an interrupt controller pin rather than a bit of a status input port.

You must now rewrite your console status and input routines to read from a buffer in memory rather than interrogating an I/O port, so the input routine reads a character at a time from the buffer. You will also need an interrupt handler routine which reads the keyboard input port

and appends the character to the input.

One problem which will result from this is control-Cs will not operate properly at times, as the buffer may contain other characters which the program will read ahead of the control-C. A possible modification to your interrupt handler would define a character which would flush the buffer, so a subsequent control-C would be read straight away.

Finally, your BIOS may need modification to disable interrupts during certain time-critical sections of code (that is, disk reads), otherwise an ill-timed key-stroke could crash the system!

American Atari

COULD I order an Atari from America and fit the PAL interface here?

*R. LANG
West Pymble, NSW*

I certainly wouldn't recommend it. US Ataris have a 110V power supply, so they'd need an auto-transformer to work here. Second, modification of the colour video circuitry of any computer is not to be tackled lightly. In any case, I doubt whether the information needed to do it would be forthcoming from Atari, and the work would probably cost more than you would save.

Number Sorter

WHAT I need is a small calculator or something pocket size into which I can feed up to 600 six-digit numbers, and by feeding the numbers into the machine it will go through them until it finds the one I'm looking for.

I have not yet heard of a calculator that can do this.

*L. M. TYREE
Albany, WA*

Without a complete description of your application I can't be sure what you're looking for, but I can almost guarantee there isn't such a gadget on the market. I do recollect Olivetti has a desk-top Logos calculator which can sort lists of numbers, but not as many as 600. Looks like there's still no alternative to pencil and paper for some jobs!

Source Plea

COULD YOU please tell me how to subscribe to The Source. I have been unable to locate the company or its address.

*C. MORGAN
Heidelberg, Vic*

Tsk, tsk! Black marks for sleeping in class! See the last two or three issues of *YC*, and then visit your nearest computer store.

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PET 4016

FEATURES

The PET 4016 offers an IEEE parallel port and an IEEE-488 bus for disk and printer communications. Also included is an eight bit parallel user port with "handshake" lines. The PET supports two Commodore C2N cassette ports for external cassette input and output. Each PET 4016 includes 18K of ROM containing BASIC and a machine-language monitor. The BASIC interpreter is activated when you turn on your PET 4016 - no loading is necessary.

12" SCREEN

40 characters wide by 25 lines long.
128 ASCII plus 128 graphic characters
8x8 dot matrix characters
Green phosphor screen.
Brightness control.

KEYBOARDS

74-key professional keyboard.
Separate calculator/numeric pad.
Upper-case alphabetic characters.
Shift key gives 64 graphic characters.

MEMORY

PET 4016: 16K (15359 net) random access memory (RAM).

POWER REQUIREMENTS

Volts: 240v
Cycles: 50HZ
Watts: 100

SCREEN EDITING CAPABILITIES

Full cursor control (up, down, left, right).
Character insert and delete
Reverse character field
Overstriking
Return key sends entire line to CPU regardless of position

INPUT/OUTPUT

Parallel port
IEEE-488 bus
2 cassette ports
Memory and I/O expansion connectors

FIRMWARE

18K of ROM contains:
BASIC (version 4.0) with 9-digit floating binary arithmetic
Tape and disk file handling
Machine language monitor

PHYSICAL SIZE

Height: 14"
Width: 16.5"
Depth: 18.5"
Shipping Weight: 46lbs



LINTON-SIMPKINS

DON'T SHOOT ME, I'M ONLY THE COMPUTER TELLER

THE RECENT problems with some staff at the Department of Social Security allegedly holding back a computer run involving pension and unemployment payment cheques is interesting.

About five years ago, when writing in another place, I visited the computer centre in Sydney operated by the department. At the time the centre had only three line printers and a workload that gave no spare time to recover if one went down.

The staff and executives would pull all-nighters and come in on Sundays to run the work. IBM did its part with top engineers on tap at all times to make sure the printers operated at maximum capacity.

In fact, the printers were being run over the time specified in the contract of sale, and IBM was ignoring many of its claims so that the work be completed. The workloads were eased, but not greatly, by the installation of extra printing capacity.

The problems must have grown terribly

because the place that was under-staffed and under-equipped five years ago now has much greater workloads, with about the same numbers of people manning it. The operators and other officers who allegedly pulled the computer plug recently are largely the same people who pulled all those all-nighters and worked Sundays five years back. Maybe they just became too tired to go on.

But let no one criticise them in my company. I saw what they were doing five years ago and they were tired even then.

You see it isn't only that 250,000 cheques are held up; the workload five years ago was into the millions of cheques per fortnight, and these days the figure isn't even calculated. How long can people go on working in a room that has no outside views and even with the best intentions in the world cannot be really soundproofed, for 50 or more hours each week?

You can only wonder what other instal-

lations around the country have this sort of workload? The Honeywell installation at the Defence Department in Canberra is one, while the manager of the Sydney Hospital installation last year worked unpaid most weekends. There are others I am sure.

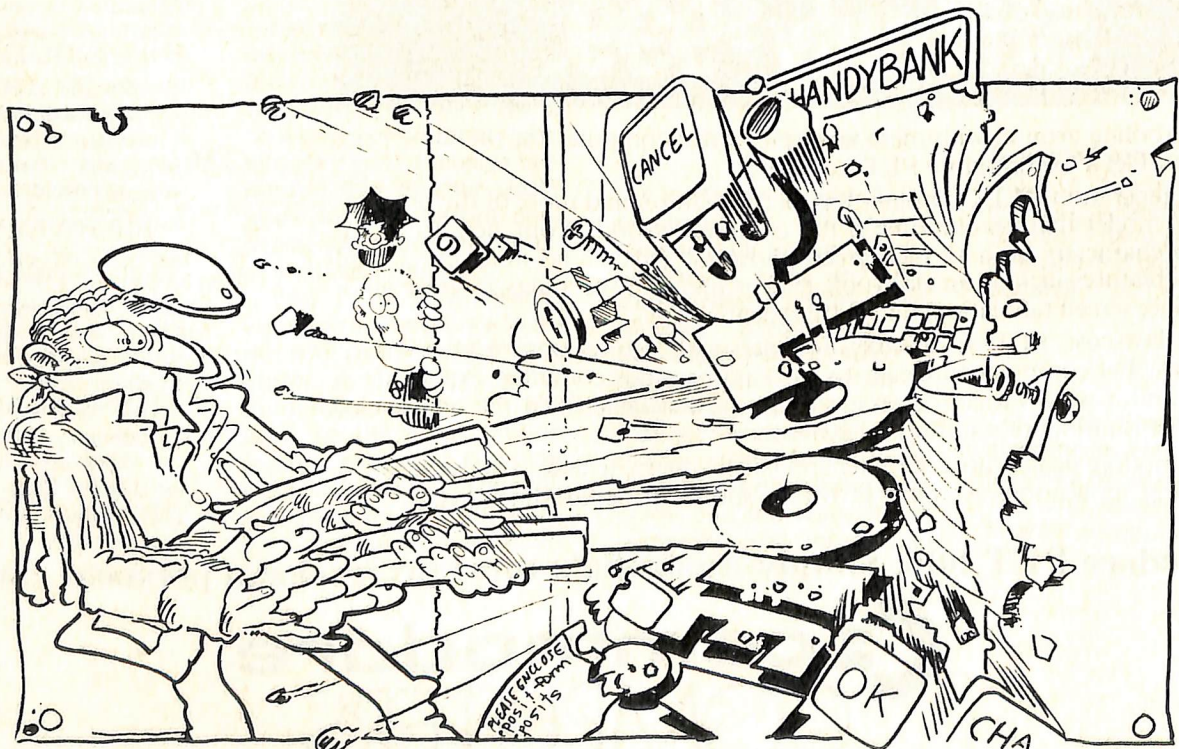
Weren't computers supposed to lighten the loads of humans?

Well from all the doom and sadness of those places where our brothers and sisters slave before the altar of the chip, let's move on to interesting things, like robbing automated teller machines and making ships' cabin reservations.

Like James Baldwin wrote, it is impossible to write about the United States, no one would believe it. I've been there many times and I still don't, and that goes for part of Canada too.

Animated Crocs and Ladies

On a recent visit to California I was



kidnapped and forced by my hosts to go to Disneyland. There, the park PR people took us to the head of a gigantic queue and on to boats to ride a sort of Rivercaves that had been badly affected by inflation.

Hundreds of animated priates attacked some rather inanimated ladies, and buildings burned with what seemed to be real flames but were probably holographs. And then we were told that all these abnormalities were controlled by a series of minicomputers. I was told the make, but my natural kindness has helped me to forget.

Much the same thing happened in the haunted mansion, and I am told the truly artificial crocodiles in a fairly unseemly copy of an African river were also operated by computer. Old Babbage, Lovelace, Pearcey et al will have much to answer for at heaven's gate!

Meanwhile, over in the eastern states of the US, a man decided he was going to rob an automated teller machine. Clutching his trusty sawn-off and holding up his cut-offs with the same hand, he placed a

note demanding money in the machine's slot.

In the manner of these machines, it ignored him. After some moments of meaningful talk he stepped back and let fly at the machine, which promptly died. He then fled into the arms of a policeman, who had been watching, too stunned to move.

Disapprove of the Method

It is true that the Bank Officers Association would approve of his motives in firing the shot, but totally disapprove of his methods. The owners of the bank and the computer company which supplied the automated teller on the other hand had nothing but condemnation. I wonder what he was charged with?

Once, in Canada, I wanted to shoot a computer. One man in Melbourne actually did shoot one in the 60s; but I was out without my magnum about me.

The miscreant computer was located on the top of the Canadian National tower in Toronto, and displayed in a sadistic

manner the amount the tower was deflecting in the winds.

South of the border, in San Pedro, California, there is a computer that handles reservations on Princess Sea Cruises.

Not only does it make your booking, it records on its files certain special requirements that you have. . . Like porridge and strawberries to be delivered to your cabin 10 minutes after you have entered with a blonde lady.

The computer can also calculate how much food will be needed for each trip, and will warn the ship's personnel when a special birthday cake will be required in number 23 cabin on 'B' deck. The computer is located on shore and communicates to the ship via satellite.

Meanwhile, as all the best intros start, back in Wynyard Square the striking or suspended computer operators from the department of social security are dodging the flak. The minister has arranged to have the cheques printed by someone with a suitable IBM computer and printers — would you believe IBM? □

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COMPUTER MEDICINE

“Doctor, Doctor, Give Me The Dews”

With the interests of our readers, medical science and his salary at heart, reporter FRED SYMES recently dared all by submitting to a ‘revolutionary’ computerised medical diagnosis.

It was a brave thing to do, as our reporter had not seen a doctor since 1961. He lives by the edict that ‘the body is sinful and must be punished’, so he was not at all certain he’d be happy with the revelations that the last 30 years of carefree living would produce. At last sighting he was alive, and coughing on a cigar.

“TAKE OFF your shoes and socks,” commanded the bearded West German doctor. It was mid-afternoon on a sultry Sydney day and I hoped the doctor knew what he was letting himself in for.

However, as he showed no obvious signs of nausea, I settled comfortably into the chair opposite him and alongside the Commodore 4032.

The doctor then strapped a leather band round my head. I looked like Hiawatha and felt just as brave. Two metal electrodes on the band pressed against my forehead and a couple of leads were plugged into a machine called a Theratest.

My bare feet were placed on two more electrodes. These also were connected to the machine that looked more than somewhat like a stereo amplifier. I was then given two microphones to hold, only they weren’t microphones. They too were electrodes.

Then followed some knob twiddling on the Theratest machine and the diagnostic program was set ready to run. The knob twiddling (actually, pressing seven buttons in sequence) constitutes what is called skin surface value measurement and prepares the scene for the real diagnosis to start.

Before describing what happened next, I think we’d better explain a few other things.

First, the doctor. He is 30-year old Hans-Joachim Kupka, of West Germany. He was in Sydney to promote his computer program, which quickly correlates and prints the diagnosis produced by the Theratest machine.

Theratest diagnosis is a form of acupuncture, without the needles, using the body’s electrical impulses to show variations to the norm, or healthy condition, of all body functions and operating parts.

Complementary Program

The Theratest system has been in use in West Germany for 20 years, but the introduction a few years ago of Dr Kupka’s complementary computer program has made it more popular. Now, about 10,000 orthodox doctors plus another 2000 naturopaths and homoeopaths have the system installed in their surgeries.

Dr Kupka claims the bio-electronic diagnosis is significantly more accurate than orthodox diagnostic methods. And he says it is considerably more comprehensive.

Not only does it reveal, say, a faulty

kidney, but it also reveals the cause, according to the doctor. Often, he added, the established method of diagnosis resulted in unsuccessful treatment of the liver (or whatever), because the real problem lay in some other area of the body.

The Theratest is also claimed to perform as an accurate early-warning system. You’re probably thinking to yourself that all this can be achieved by pathology tests, and you’re right. But the big advantage of the German system, say its promoters, is it can do the job in less than 30 minutes, without discomfort to the patient and far less expensively.

At least I think it should be less expensive. A doctor can buy the whole system, hardware, software, printer, Theratest, electrodes and the other bits and pieces for under \$8000.

Back to the diagnostic method. The initial skin surface value measurement indicates on the monitor a zone or zones of the body that require closer analysis. According to Dr Kupka it suggests areas of interference or ‘blockage’. At this stage the data on the screen is an indicator only.

Acupunctural Points

The indication might be that the zone controlled by the acupunctural points on the left hand shows a possible health problem. According to Dr Kupka, this zone comprises small and large intestine, heart, glandular system, allergy, circulation, lung, nerve degeneration and a few others.

The diagnostician then keys up the graphic scale for the left hand test. With a pen-like instrument, a 50g pressure is applied to the first acupuncture point. The pressure is increased to 350g and the reading on the Theratest is transferred via



Dr Hans-Joachim Kupka tests a patient on the Commodore computer system.

an AD converter to the computer. This information is then shown on the screen in vertical graph form. All the various points are tested in sequence.

These tests are repeated after painless electrical stimulation, and the results recorded on the graph. From the resultant analysis the doctor can see at a glance the problem areas.

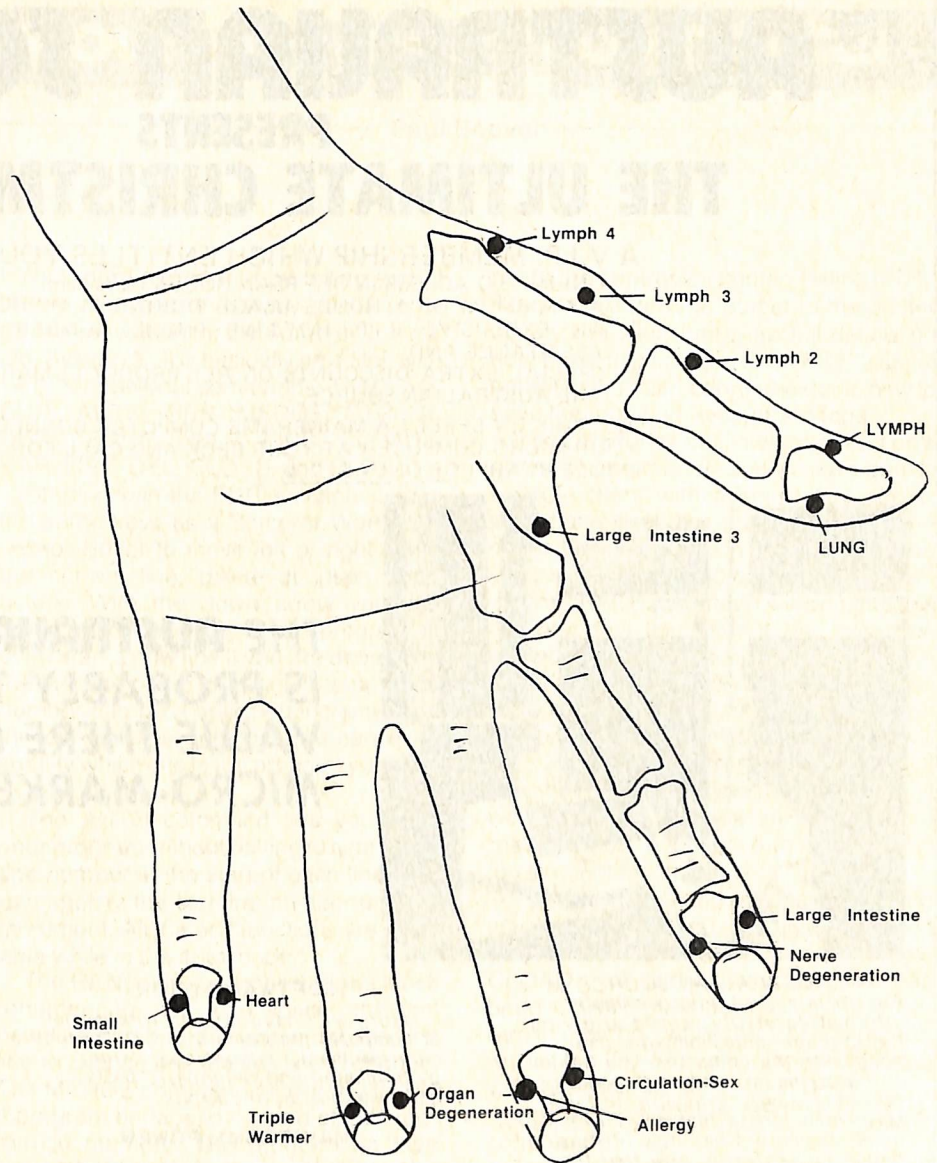
Using the information now stored, the doctor can select the correct medicines to treat cause and effect. This is done by the introduction of therapeutic agents into the test-measurement circuit and the observation of their effect on the measurement. Those agents beneficial to the condition being measured will improve the measurement accordingly.

Some naturopaths in Australia are already using the Theratest system and Dr Kupka, who recently completed his second visit to this country, says more interest is now being shown by practitioners of classical medicine. He knows it will not be easy to gain acceptance of the Theratest diagnostic method.

The program he has devised for the Theratest machine runs on a Commodore 4032 and is distributed in Australia by Pittwater Computer Sales, Sydney. Dr Kupka was invited to Australia to conduct a series of seminars by Sydney naturopath, Mr Robert Judge.

Incidentally, for those of you interested, my test showed the small intestine inflamed, the large intestine disintegrated, the heart barely beating, the glandular system overactive, allergy to biological functions, a sluggish circulation due to lack of activity, total lung congestion and complete nervous degeneration.

Unfortunately, the screen was not deep enough to take the lower points of the vertical graph form and the painless



electrical stimulation turned me into a gibbering idiot. When the machine was asked for a therapeutic recommendation

the one word was repeated ad nauseum — ABSTENTION.

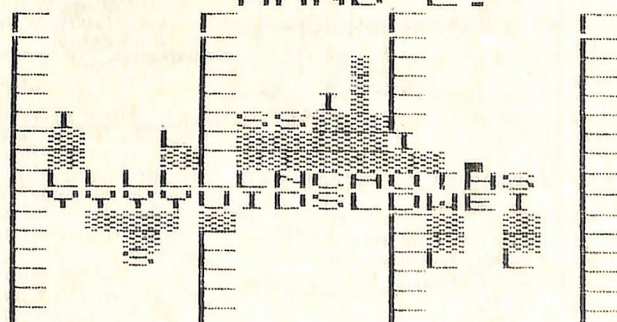
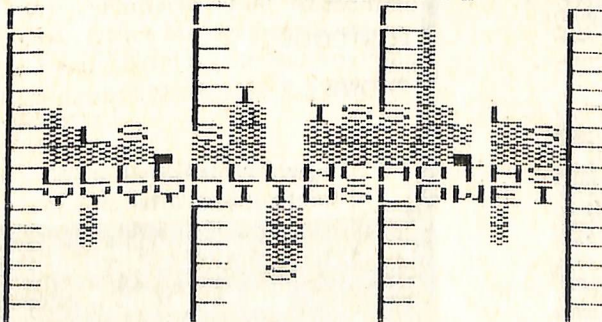
**** RESULTING GRAPH ****

EXTREME PATHOLOG. POINT (MEDICINE TEST)

LARGE INT. 3; 2 . FINGER HAND R.

HAND R.

HAND L.



THE AUSTRALIAN SOURCE

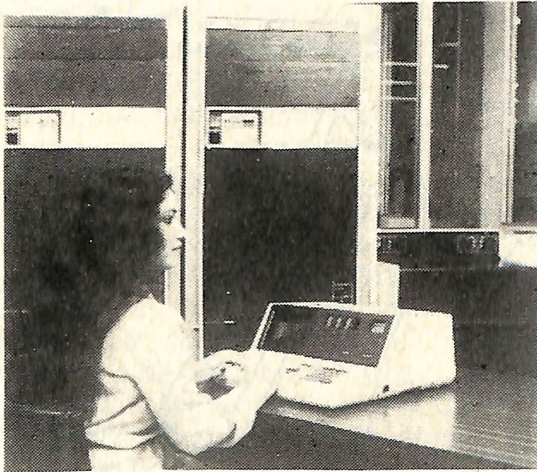
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your **SORCERER** computer

Paul Beaver

I WILL start this month by telling you of one of the most massively useful programs ever written for the Sorcerer. It's called 'System 3'. It is basically an editor, with 14 other powerful commands. These are, EDIT, AUTO, REN, MERGE, CTRL P, DEF, TRACE, HELP, FIND, CLOAD?, VAR, LIST, DEL, CLOSE, and OLD.

Starting with the EDIT function, it uses the same keys as a Sorcerer Word Processor Editor to move left or right along the current line, delete or insert characters. With the down arrow you can move to the next line of the program or even start a new line if you are already on the last line of the program. The new line number can be a specified increment on the old last line number. You can even specify which line in the program you wish to start edition on.

The AUTO command lets you enter your program without having to type a new line number at the start of each line. You can specify the first line number and the increment. All the edit functions are available while in the auto mode.

The RENumber command allows block renumbering. You can specify the first new line number, the increment, the first line to change and the last line to change. The MERGE command allows you to add a program on tape to the end of the program in memory. The program on tape must have larger line numbers than the program in memory.

The CTRL P function directs your out-

put to the centronics printer. Hitting CTRL P again will turn the output to the printer off. By the way, there are full details on how to set this function to an RS232 serial printer in the instructions, including how to save the modified System 3 to tape.

The DEF function allows you to set up a group of commands and or data and to execute them with a single key stroke; something like the monitor batch command but much, much more useful and you can have up to 10 of these functions.

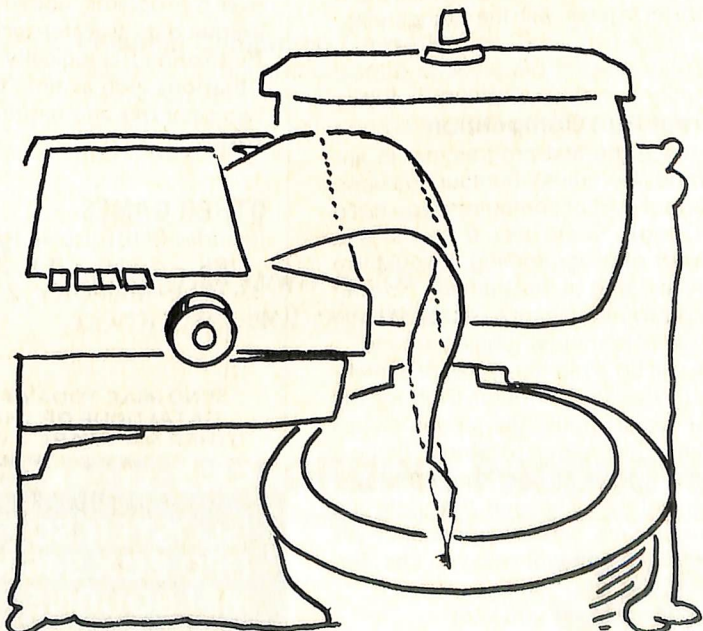
The TRACE command will print the line number of a line after it has been executed. You can also use it to print the value of variables after each line has been executed and so follow its value through the program. The HELP command will help you locate an error in a program that may not be easy to see. For example, it will locate a brackets mismatch in a mathematical equation without you having to count the brackets.

The FIND command will locate any string in your program. You can even use a wild card character to locate similar strings. CLOAD? will verify that a program has been CSAVED without risking the program in memory, while the VAR command will list the values of any numeric or string variables defined currently in BASIC.

You also have block LIST and DELETE commands.

The CLOSE command will eliminate all blanks except for those in REM or PRINT statements.

TOILET HUMOUR



ZX-81 SOFTWARE

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Finally, the OLD command will recover a basic program after CLOAD, NEW or reset.

The TAB function works in all modes and the RUB key can be used unshifted. The instructions are brief but to the point, and even include the method to make a back-up copy of the program.

If you do not have this package run, do not walk to the nearest stockist of Sorcerer software and throw money at him until he gives you a copy. I do not normally give unreserved recommendations for software, but SYSTEM 3 deserves one. It is the best program development aid that I have ever seen.

Simple Video Cursor Control

Use with PRINT CHR\$(X)

X	RESULT
1	cursor 1 space to left-no erase
8	cursor 1 space to left-erases
10	cursor down 1 line
12	clears screen, cursor home **
13	cursor to first position on current line
17	cursor home
19	cursor one space to right-no erase
23	cursor up one line
26	line feed

** CHR\$(12) also erases user defined graphics.

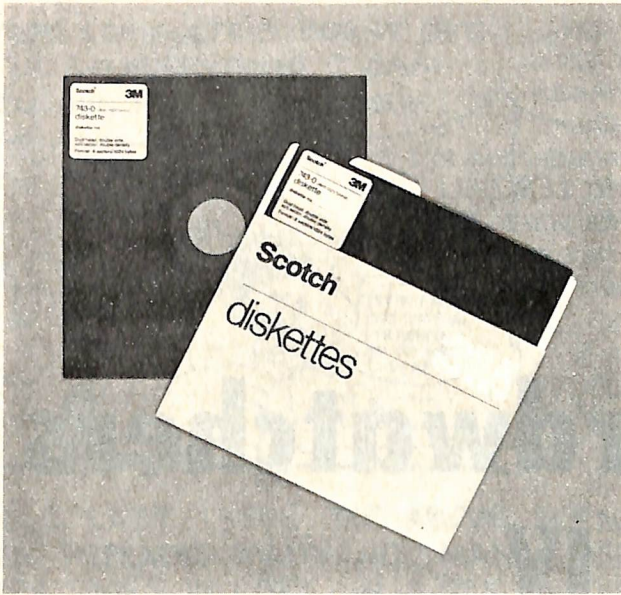
Enough of the seriousness gentries and ladiemen, let's get on with the strangeness.

The Great Pun Competition

Ever since the first programmer in ancient Rome (Romulus), humour has been an important part of computers (you need it, don't you). Some would say it is a BASIC part of programming. I would like to PEEK at some of this humour. So start POKEing around. I want to assemble the biggest file of computer giggles around.

There will be a monthly prize of a membership to the Mi-Computer Club for the best, (or worst) puns, tall stories or just plain jokes. The rules are simple. Once a month we will sit around the office and read the entries. The one that gets the most laughs wins. No correspondence will be entered into (except with you Les, Sir, Boss).

Until next time, see you later.



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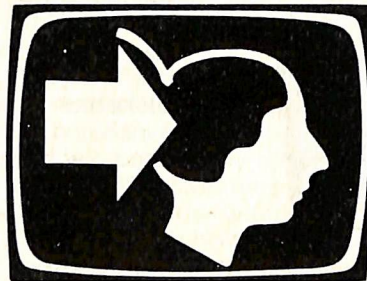
3M

In our ongoing introduction to BASIC programming LES BELL considers it's time for you to tidy up the package, so he's sub-titled this issue's installment Strings, of a Sort. Witty chap....

Basic for Birdwatchers

Part IV

Your computer



tutorial

FROM NOW on, we're going to concentrate much more on strings, because all the interesting things you can do with computers involve strings. Just think of the applications for a computer in the office: word processing, accounting, maintaining production schedules, sorting lists of names and addresses. . .

Now just a moment. Let's see if we can sort strings the same way we sorted numbers. Go back to V1.1 of our sort program and see what has to be changed. Our array, V(100), should obviously be an array of strings, called V\$(100). Apart from that, everything should be okay. Or will it?

There are a couple of things that will need changing. First, the name of the program should be changed, and the date. Next, our method of detecting the end of input should be changed. Instead of detecting a zero as the end, let's change it to an empty line (two double quotes with nothing between them). Go ahead and do that; your result should look like this:

```
100 REM   *** NAME SORT V1.0 ***
110 REM   WRITTEN IN MBASIC 4.4
120 REM   23/11/81
130 DIM V$(100)
140 PRINT "NAME SORT DEMO"
150 REM INPUT CONTENTS OF ARRAY,
    ENDING WITH A BLANK LINE
160 N=1
170 INPUT V$(N)
180 IF V$(N) = "" THEN 210
```

```
190 N=N+1
200 GOTO 170
210 N = N - 1
220 :
230 REM START SORTING
240 FOR P = 1 TO N-1
250   FOR I = 1 TO N-P
260     IF V$(I) > V$(I+1) THEN
        SWAP V$(I),V$(I+1)
270   NEXT I
280 NEXT P
300 REM PRINT RESULTS
310 FOR I=1 TO N
320   PRINT V$(I),
330 NEXT I
340 END
```

Try it out. It'll work okay, as long as you don't put in more than about 15 names. Then, all of a sudden, you'll get an 'Out of String Space in 170' or 'OS' error code. What's gone wrong?

Microsoft BASIC allocates a certain

amount of memory space to string storage. In this case, we've used it all up. To get more, we must add a CLEAR statement to our program:

```
125 CLEAR 1000
```

This will set aside 1000 bytes (or characters) of storage for our string array — enough for 100 names, at an average 10 characters each.

Notice our comparison in line 260 still works, as does the SWAP instruction (if you don't have the SWAP instruction, use a GOSUB to a modified swapping subroutine). We can expand this still further. Here's the beginnings of a mailing list program for a computer club:

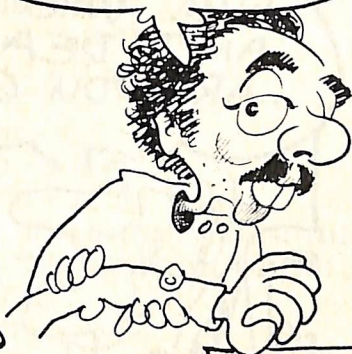
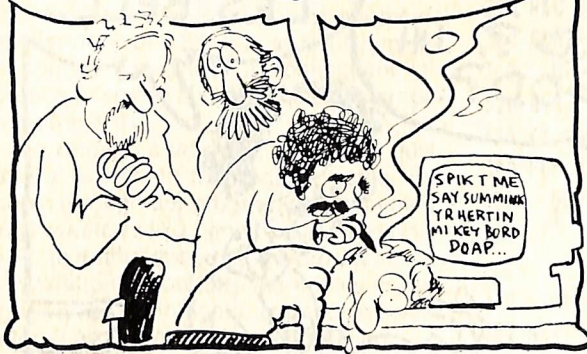
```
100 REM   *** MAIL LIST V1.0 ***
110 REM   WRITTEN IN MBASIC 4.4
120 REM   23/11/81
130 CLEAR 5000
140 DIM N$(100), A1$(100), A2$(100), PC(100)
150 PRINT "MAILING LIST"
160 REM INPUT NAMES AND ADDRESSES,
    ENDING WITH A BLANK LINE
170 N=1
180 INPUT "NAME      ":";N$(N)
190 IF N$(N) = "" THEN 260
200 INPUT "ADDR1     ":";A1$(N)
210 INPUT "ADDR2     ":";A2$(N)
220 INPUT "POSTCODE ":";PC(N)
230 PRINT
240 N=N+1
```


...YEP... COMPLETELY BURNT OUT...
 ...I'LL DO EVERYTHING I CAN...
 ...TELL HIS KIN NOT TO WORRY...

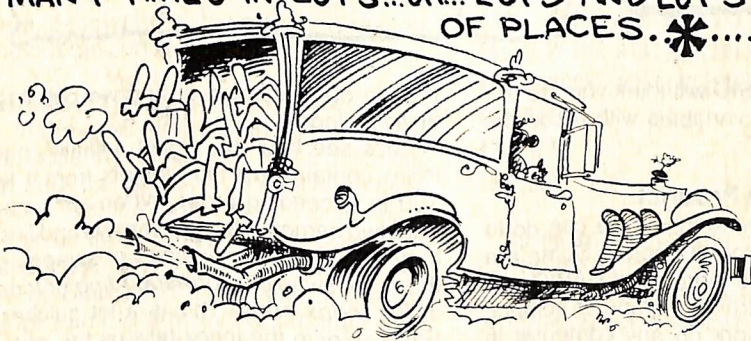
...HELP ME GET HIM INTO THE BACK OF MY HEARS... PANEL VAN...

GOSH! LES BELL HAS BROAD SHOULDERS...

YEAH... A REAL SCOUT...
 INDEED A MAN TO BE ADMIRER...



SINCE LAST ISSUE, THE ABOVE SCENE HAS BEEN REPEATED MANY...NO... MANY, MANY, MANY TIMES IN LOTS...UH... LOTS AND LOTS OF PLACES. ✱.....



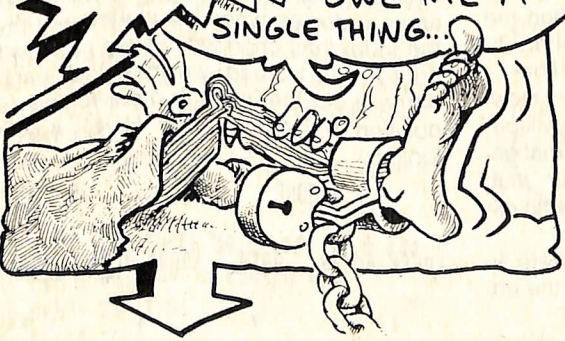
ANYWAY...

WHA... WHE... !!?
 AM I DEAD?...UH...
 ...ARE YOU GOD?...

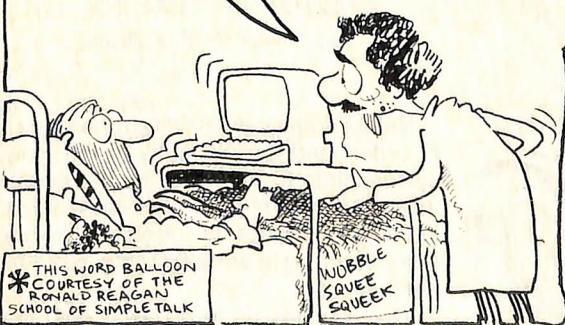
I'M LES BELL...



...I'VE JUST SAVED YOUR LIFE.
 ...OH... I OWE Y... YOU DON'T
 ...OWE ME A SINGLE THING...

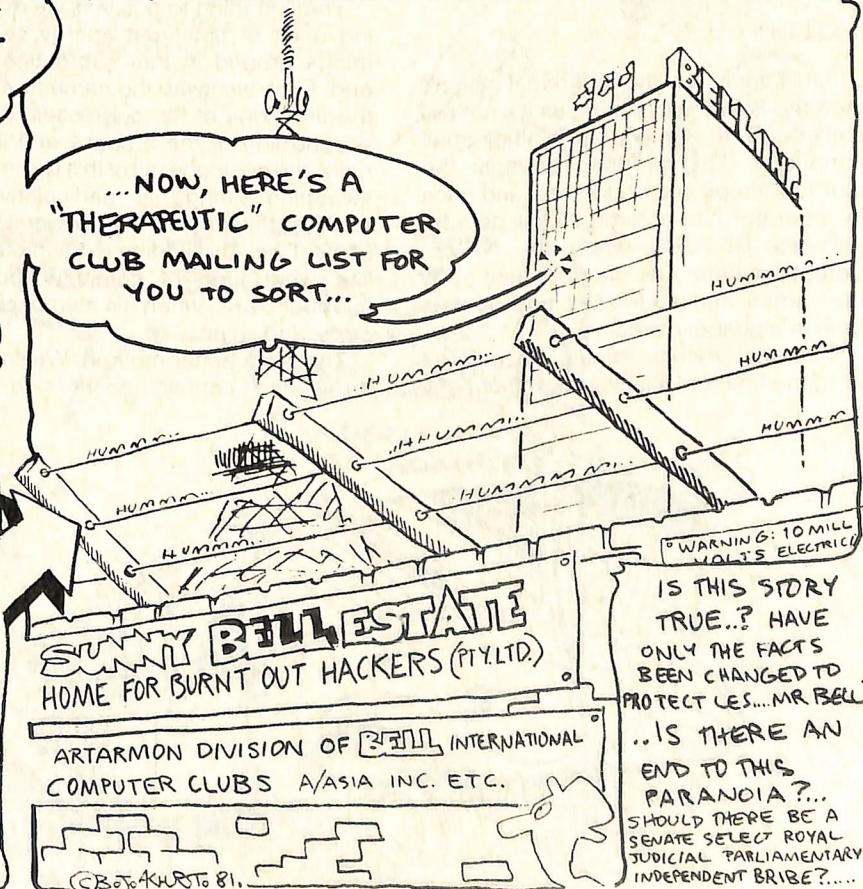


MY REWARD IS SEEING YOU EVENTUALLY RECOVER...



✱ THIS WORD BALLOON COURTESY OF THE RONALD REAGAN SCHOOL OF SIMPLE TALK

...NOW, HERE'S A "THERAPEUTIC" COMPUTER CLUB MAILING LIST FOR YOU TO SORT...



IS THIS STORY TRUE...? HAVE ONLY THE FACTS BEEN CHANGED TO PROTECT LES...MR BELL?
 ..IS THERE AN END TO THIS PARANOIA?...
 SHOULD THERE BE A SEWATE SELECT ROYAL JUDICIAL PARLIAMENTARY INDEPENDENT BRIBE?....


```

250 GOTO 180
260 N = N - 1
270 :
280 REM START SORTING
290 FOR P = 1 TO N-1
300   FOR I = 1 TO N-P
310     IF N$(I) > N$(I+1) THEN GOSUB 440
320   NEXT I
330 NEXT P
340 REM PRINT RESULTS
350 FOR I=1 TO N
360   PRINT N$(I)
370   PRINT A1$(I)
380   PRINT A2$(I);PC(I)
390 PRINT
400 NEXT I
410 END
420 :
430 REM SWAP SUBROUTINE
440 T$ = N$(I)
450 N$(I) = N$(I+1)
460 N$(I+1) = T$
470 T$ = A1$(I)
480 A1$(I) = A1$(I+1)
490 A1$(I+1) = T$
500 T$ = A2$(I)
510 A2$(I) = A2$(I+1)
520 A2$(I+1) = T$
530 T = PC(I)
540 PC(I) = PC(I+1)
550 PC(I+1) = T
560 RETURN

```

In this version of the program, I haven't used the SWAP statement, as it's not available on TRS-80s and some other small computers. This program prompts the user for names and addresses, and once the operator has entered all the data he just hits RETURN when the NAME: prompt appears. The program then sorts the names and addresses and outputs them in alphabetic order.

Note that names should be entered surname first and initials last, *without any*



commas, as BASIC will think you are trying to enter two variables with a comma between them.

Improving the Product

There are several things we can do to make our sort program better. Some are dependent on the features of BASIC and some are just straight computer science tricks that will work on any computer in any language.

The first thing to notice is we're spending a lot of time and energy swapping things around in that subroutine at the end. First, we swap the names over, then the first lines of the addresses, then the second line of the address and then, finally, the postcode. all of this takes time — swapping strings is particularly slow. And just think how much slower it will become if we start adding extra information, like what kind of computer our club member owns, when his membership expires, and so on.

There's a better method. We create an array which contains *pointers* to the en-

tries in our data arrays, and we call this array an index.

Let's see how this works. Initially, our index contains just the integers from 1 to 100 in ascending order. When we compare two names in the data arrays and find they're out of order, instead of swapping them, we swap the *corresponding entries in the index array*. This is a lot quicker. Each entry in the index tells us the *position* of the corresponding entry in the data array.

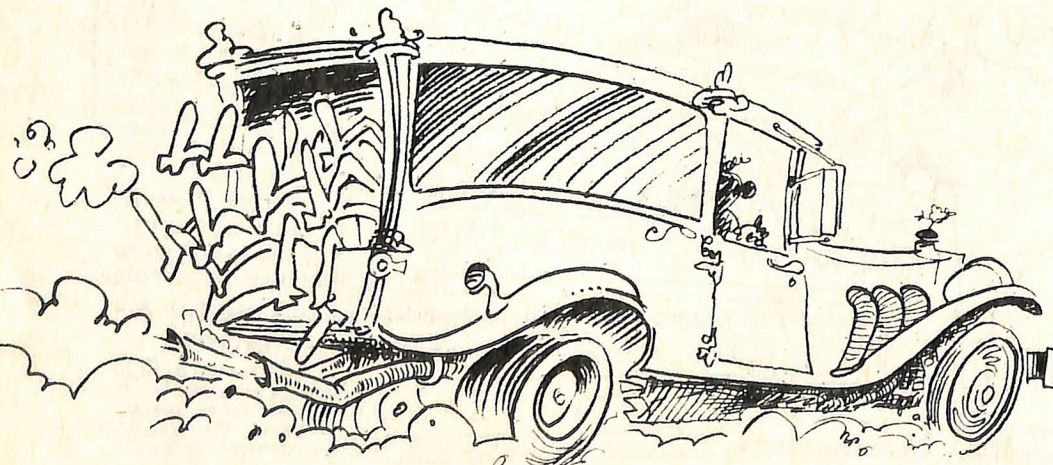
An Index, of A Sort

Of course, our data array is still in the same order as when we started — only the index has changed. So we can't just print it out. Instead, we must look each name up in the index in order to find its position in the data array. Here's how it looks:

BEFORE		AFTER	
index array	data	index array	data
1	9	4	9
2	7	3	7
3	4	2	4
4	3	1	3

Before sorting, each entry in the index is in order, and the nth entry in the index corresponds to the nth entry in the data array. After sorting, the first entry in the index corresponds to the lowest valued entry in the data array, which is probably not the first.

This enables us to do away with that



clumsy swapping subroutine from line 370 onwards, with a huge saving in time.

Second, many of the numbers we're dealing with are whole numbers; that is, they don't have any significant digits after the decimal point. Such numbers are called *integers*, and BASIC can treat them as a special case, with a consequent increase in speed and decrease in storage requirements.

To refer to a value as an integer, just add a % sign to the variable name. By going through our program and renaming loop counters like I and N to I% and N%, we can further speed up the program.

We should also note the entries in our index array are integers, so it should be an integer array, with a big space saving.

Finally, the sort algorithm (set of rules) we used is none too efficient itself. The bubble sort moves the high numbers to the right end quite quickly. But if low numbers are far out of place, it takes a long time to move them down. For this reason, the bubble sort is slow.

Shellsort Bursts the Bubble

In the next version of the program, I've replaced the bubble sort with a much faster sort: the Shellsort (D A Shell, *A high-speed sorting procedure*, Communications of the Association for Computing Machinery No 2, 1959; pp30-32).

The Shellsort is much faster. There are three parts to any sorting program (excluding the input and output subsections of course) — the comparison, the swapping method, and the algorithm itself.

In this case, we've changed the swapping method first of all (I tested an indexed version of the program with the old bubble sort first), then the algorithm. At each stage, the program still worked and could be tested. This is called *stepwise refinement*, and it is a keystone of *structured programming*.

Here's the souped-up version of the program:

```

100 REM   *** SUPER MAIL LIST V1.0 ***
110 REM   WRITTEN IN MBASIC 4.4
120 REM   26/11/81
130 CLEAR 5000
140 DIM IAZ(100), N$(100), A1$(100),
      A2$(100), PCZ(100)
150 PRINT TAB(22); "MAILING LIST":PRINT
160 REM INPUT NAMES AND ADDRESSES,
      ENDING WITH A BLANK LINE

170 NZ=1
180 IAZ(NZ)=NZ
190 INPUT "NAME      ";N$(NZ)
200 IF N$(NZ) = "" THEN 270
210 INPUT "ADDR1    ";A1$(NZ)
220 INPUT "ADDR2    ";A2$(NZ)
230 INPUT "POSTCODE:";PCZ(NZ)
240 PRINT

```

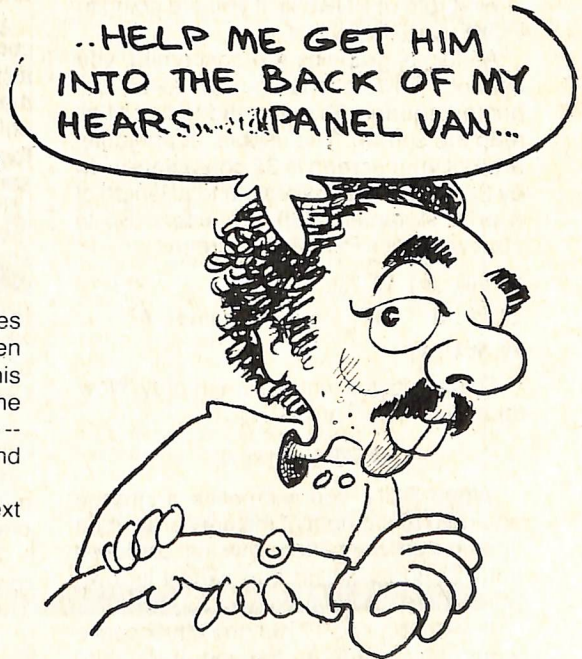
```

250 NZ=NZ+1
260 GOTO 180
270 NZ = NZ - 1
280 :
290 REM START SORTING
300 FOR IZ=1 TO NZ STEP IZ
310   MZ = 2 * IZ - 1
320 NEXT IZ
330 KZ = NZ - MZ
340 FOR JZ = 1 TO KZ
350   FOR IZ = JZ TO 1 STEP -MZ
360     IF N$(IAZ(IZ)) > N$(IAZ(IZ+1))
       THEN SWAP IAZ(IZ),IAZ(IZ+1)
370   NEXT IZ
380 NEXT JZ
390 MZ = MZ / 2
400 IF MZ <> 0 THEN 330
410 REM PRINT RESULTS
420 FOR IZ=1 TO NZ
430   PRINT N$(IAZ(IZ))
440   PRINT A1$(IAZ(IZ))
450   PRINT A2$(IAZ(IZ));PCZ(IAZ(IZ))
460 PRINT
470 NEXT IZ
480 END

```

All those arrays and integer variables can make pretty hard reading and even worse typing; but it's worth studying this program to see how it works. At the same time it's obvious what the program lacks -- the ability to save and reload name and address files on cassette tape or disk.

That will be the subject of our next development.



your ZX80 computer

John Batty

Peeking in the Poke

AFTER AN interesting week or so experimenting with PEEK and POKE, I feel a few words on the subject would not go amiss.

Possibly the only failing of the ZX80 manual is the dearth of information concerning PEEK and POKE. These facilities can be of great use, especially in games programs, allowing much more flexible graphics. But they must be used with a little caution. A POKE in the wrong place can cause all sorts of weird, often disastrous, problems. (*You're not wrong John! —Ed.*)

First rule of POKE is 'if you are going to POKE it, PRINT it first'.

As far as graphics are concerned, you cannot POKE a character on to an unprinted square. So, we need to first of all map the screen. The usable, or printable, area of your screen is 32 characters wide by 23 deep. This makes the total length of a print statement 736 characters. So to start with, let's PRINT the screen:

```
10 FOR X=1 TO 736
20 PRINT "(A)"; [(A)=shift A]
30 NEXT X
```

This prints the whole screen grey. Now for a little twist. Try this:

```
40 POKE 17164,0
```

When RUN, you will notice a strange squiggle to the right of the grey area, third line up from the bottom. We just confused your ZX80 by telling it to cancel its own built-in NEWLINE statement.

If we had used 17163, the blank space would have been on the end of the third line up. Although there are 736 printable squares on the screen, there are 758 POKE locations concerned with graphics, 22 of which are taken up by built-in NEWLINE orders. These are at the end of each line, and if you POKE into these locations it can carry over into your LIST if there is a multi-line (more than 32 characters) program line which coincides with that graphics line.

This can usually be fixed by a little EDITING, but it makes your graphics somewhat untidy and occasionally the program will crash.

The graphics locations to which you can POKE a character run from 16472 (top left corner), through to 17230 (bottom right corner), every 33rd location being a NEWLINE order. Here's a short program to move a blank square vertically upscreen:

```
10 LET T=17215
20 FOR X=1 TO 736
30 PRINT "(A)";
```

```
40 NEXT X
50 POKE T,0
60 INPUT A$
70 IF NOT A$="" THEN STOP
80 LET T=T-33
90 CLS
100 GOTO 20
```

Downscreen would make line 80 "LET T = T + 33" to the left -1 and to the right +1. Moving left or right will eventually entail crossing a NEWLINE, of course, but it will still work.

Killer Satellite

PEEK can be a useful tool too, as a control in an IF-THEN statement. It can also be used to set a variable, although in the majority of cases I have usually been able to find a more economical way to do this. Embedded in an IF-TEN statement, some interesting effects can be achieved.

Note line 280 in this month's program 'Killer Satellite'. "S" is the location on the screen of your satellite, and line 280 orders the ZX80 to check that location (PEEK at it) every move to determine what is printed there. If it finds the location of the satellite coincides with a CHR\$(155) — which is an inverse full stop — it is instructed to consider that a "starstrike".

In other words the position of S is monitored by PEEK to see if it matches one of the known positions of a "star".

This is handy if graphics are produced randomly, as the stars are in this program. The same method is used in line 300:

```
IF PEEK (S)=0 THEN PRINT , "HOME"
```

CHR\$(0) is a blank space, and if S coincides with it the ZX80 is to consider the satellite is at home, and stop the game. In this case though, since home(H) is a fixed, known location (H=16935) this line could have been: 300 IF S=H THEN PRINT "HOME", and it would have worked just as well.

Your task in the game is to steer your spacecraft (the "o") through the stars to home (the blank space). The cursor control arrows are used as directional indicators. To make a move only entails pressing an arrow, followed by NEWLINE.

The killer satellite (shown as an "X") follows you all the way, positioned randomly but sticking close to your ship, as determined by line 200. There is a 50 percent chance that even though the "X" occupies the same position as the "o", the computer will regard this as only a "close pass" instead of a "hit". This gives you a bit more of a chance, and is arranged by lines 190 and 210 to 270. If a collision

occurs, an explosion will be printed in that spot. But if you hit a star your ship will just disappear.

The starting points of your ship and the satellite can be changed by altering lines 10 and 20. But this may also change the location of home, so a little experimentation may be needed. On the first move, both ships jump to the left of their starting positions, and despite lines 130 to 140, they both leave an impression at their initial location. For each subsequent move the last position is erased.

The number of stars can be changed by altering line 50 (a lower RND number equals more stars). But this can also affect the locations of both ships and home and affect the length of your PRINT statement, a little experimenting may be needed here too. Still, 'Killer Satellite' is an entertaining game plus, I hope, a handy vehicle for getting to know more about PEEK and POKE. □

```
10 LET S = 17283
20 LET E = 17287
30 LET H = 16925
40 FOR X = 1 TO 350
50 LET Q = RND(15)
60 IF Q = 1 THEN PRINT CHR$(155);
70 PRINT CHR$(128)
80 NEXT X
90 POKE H,0
100 POKE S,180
110 POKE E,189
120 INPUT A
130 POKE S,128
140 POKE E,128
150 IF A = 5 THEN LET S = S-1
160 IF A = 6 THEN LET S = S+33
170 IF A = 7 THEN LET S = S-33
180 IF A = 8 THEN LET S = S+1
190 LET M = RND(2)
200 LET E = S+(RND(15)-7)
210 IF E = S AND M = 1 THEN
PRINT , "COLLISION"
220 IF E = S AND M = 1 THEN POKE E,9
230 IF E = S AND M = 1 THEN POKE E-32,136
240 IF E = S AND M = 1 THEN POKE E-34,8
250 IF E = S AND M = 1 THEN POKE E+32,136
260 IF E = S AND M = 1 THEN POKE E+34,8
270 IF E = S AND M = 1 THEN STOP
280 IF PEEK(S) = 155 THEN
PRINT , "STARSTRIKE"
290 IF PEEK(S) = 155 THEN STOP
300 IF PEEK(S) = 0 THEN PRINT , "HOME"
310 IF PEEK(S) = 0 THEN STOP
320 GOTO 100
```




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A&T (6 Slot)	\$3883.00
A&T (8 slot)	\$4083.00

QT Systems are designed for both businessmen and engineers in accordance with the latest IEEE standards. Among other functions, they can be used for accounting and word processing as well as a variety of scientific applications. The systems are available with MP/M or QT DOS operating systems to allow multi-user, multi-tasking operations. QT also offers a full line of business and applications software, ranging from a business package to word processing.

Technical specifications: 4 MHz Z-80 CPU • Dbl-sided, dbl-den 5 1/4" or 8" floppy disk controller (handles both drives simultaneously) • CP/M 2.2 included • 64K RAM, expandable per your requirements • Comes complete in single mainframe • RS232C serial port • Parallel port • Hard disk compatible • Monitor program & disk routines included on EPROM • Power-on/reset jump to monitor program • Documentation included • Extensive software available.

SOFTWARE +

Word processing • System utilities and diagnostics • Games • CP/M users group diskettes \$10.00 each, catalogue \$6.00 • Pascal, Fort, Tarbell Basic, Fortran and most other compilers and utilities are available • Complete range of business software • Custom programming can be arranged on a fixed price or hourly basis.

SBC2/4 Z80 S100 SINGLE BOARD COMPUTER

The QT Computer SBC2/4 Processor Board is a versatile and powerful Z80 based design which is compatible with the proposed IEEE S-100 bus standard. Although the SBC2/4 may be used as the host CPU of a large system, it has all the necessary features to be used as a stand-alone computer system.

Unlike old designs it will work reliably with dynamic RAM boards and more importantly with soft sector disk controllers, and hence standard versions of CP/M. This will give you access to the largest software base for microcomputers.

- Z80A 8 bit CPU
- 2 or 4 Mhz Switch selectable
- 1K RAM (which can be located at any 1K boundary)
- Full 64K use of RAM allowed in shadow mode
- DMA compatibility allows MWRT signal generation on CPU board or elsewhere in system under DMA logic or front panel control
- TWO programmable timers available for use by programs run with the SBC+2/4 (timer output and controls available for use on CPU board).

Shipping weight: 2lbs.

QTCBC24B	Bare Board	\$ 66.00
QTCBC24K	Kit	\$199.00
QTCBC24A	Assembled and Tested	\$269.00

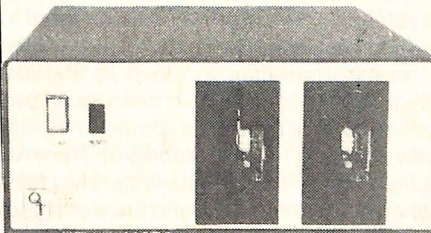
The MD+MD Mainframe offers the same quality as the MF+. It accepts two 5 1/4" disk drives with remaining space for either a 6, 8, or 12 slot Silence Plus Motherboard.

QTCMFMD	without Motherboard	\$400.00
QTCMFMD6	with 6 Slot Motherboard	\$480.00
QTCMFMD8	with 8 Slot Motherboard	\$500.00
QTCMFMD12	with 12 Slot Motherboard	\$540.00
QTCMFMDB	bare metal work	\$175.00

DISK CONTROLLER

CCS2422A features ROM bootstrap loader and monitor • CP/M 2.2 with documentation included • Accepts 5 1/4" and 8" disk drives • Double sided/single sided select • Read, write IBM 3740 or system 34 single or double density • Fast seek available for voice coil operation • Automatic disk density determination • ROM bootstrap phantom.

CCS2422A A & T Incl. CP/M 2.2	\$399.95
JADE II Bare Board	\$ 85.00
QTFDC II A&T Incl. QT DOS	\$379.00
Disk Drive cables made to order.....	P.O.A.



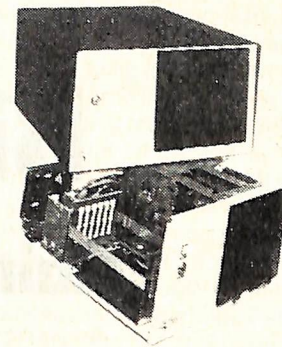
Also available without cutouts on front panel

MINI-SYSTEM + (1/2MB +)

Computer System with 5 1/4" Single Sided Drives (uses TEAC FD-50A Disk Drives) Terminal not included.

A&T (6 slot)	\$3048.00
A&T (8 slot)	\$3073.00

MAINFRAMES S-100 MAINFRAME FOR DUAL 8" DISK DRIVES



AT LAST! A desk top enclosure that will accommodate a S-100 bus system and two 8" disk drives. The MF+MD mainframe is the most versatile dual 8" mainframe on the market. It will accommodate 6, 8, or 12 slot card cages using the Silence + motherboards. Just add a CPU, memory board, disk controller and terminal and you have an inexpensive, high quality computer system.

FEATURES:

- Accommodates and 8" standard disk drive (801R, DT-8, etc.)
 - IEEE S-100 Silence + 6, 8 or 12 slot motherboard available. (See motherboard description at left.)
 - Keyed power switch.
 - Reset switch on front panel.
 - Anodized 6, 8 or 12 slot cages.
 - Quiet fan provides cool system operation featuring filtered positive air pressure. User may add two additional fans for the 12 slot if required.
 - Detachable line chord plugs directly into EMI filter for electrical noise suppression.
 - 16 DB25 cut out
 - 2 50 pin plug connector cut outs.
 - 2 DD55 cut outs.
 - Dimensions 9 5/8" x 17" x 21" (HxWxD)
 - Power supply +6V@25A/+16V @ 5A/ +5@2.5A/-5@5A/+24V@3A
 - Input Voltage 110-113VAC/220-240VAC 50-60 Hz
- | | | |
|-----------|--------------------------|----------|
| QTCMFDD | without Motherboard | \$575.00 |
| QTCMFDD6 | with 6 Slot Motherboard | \$625.00 |
| QTCMFDD8 | with 8 Slot Motherboard | \$650.00 |
| QTCMFDD12 | with 12 Slot Motherboard | \$700.00 |
| QTCB | Bare Metalwork | \$175.00 |

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What's the Big Difference?

Mainframes, Minis and Micros

RECENTLY, we had a letter from a conventional mini and mainframe computer programmer who hadn't caught up with what he called "the microcomputer revolution." What, he asked, were the essential differences between mainframe and micro computing?

He said he had been surprised to learn (by reading Your Computer) that in micro computing, there was no operating system as such. He also said the notion of command mode and execute mode were new to him.

"In particular, I am interested in the use of memory during and after the program has run," he wrote. "Are the 'working-storage' (COBOL background) areas within the program bounds, or are they in specific sections of memory? Does the program have bounds or does it grow as variables, arrays, etc. are declared? When a program has ENDED, are the 'working-storage' areas left as is? Could a subsequent RUN program access these areas?"

The author suggested a newsletter aimed at the "professional" (as distinct from the casual or hobby) programmer, so this month, LES BELL looks at microcomputers from the mainframer's point of view.

THE DIFFERENCES between mainframe computers (such as the IBM 3033 and other "big" machines) minicomputers (like DEC's PDP-11 and others) and microcomputers are wide in some areas and surprisingly narrow in others. Let's start by defining a few terms of reference.

The boundaries between micros, minis and mainframes have become less distinct in recent years, to the extent that

some micros currently entering production are as powerful as many quite large mainframes which are still in service. For example, an eight-processor configuration of Intel's forthcoming APX-432 (a 32-bit multiprocessing chip set) is estimated to provide equivalent or higher performance than an IBM 370/158 — by most standards a large mainframe.

A micro-computer, as I use the term, is a computer based on a MOS (metal oxide semiconductor) microprocessor chip or a set of up to four chips (this extension to the definition is intended to bring the DEC LSI-11 within its scope). My definition makes no statement whatsoever about performance — it can be as slow and painful or fast and powerful as you like, as long as it's based on a microprocessor. Thus a computer based on the Motorola 68000 chip would be a microcomputer, although its performance is equivalent to or exceeds a number of minicomputers. Most microcomputers are single-user systems, typically with less than 64 Kbytes of memory.

A minicomputer, to move up the scale slightly, is based on a processor comprised of discreet logic components, usually bipolar (TTL — Transistor-Transistor Logic) logic. The CPU is faster by a factor of around 10 or more, and the word length is 16 bits or more. Another distinguishing mark of the minicomputer is the level of software support offered by the manufacturer, typically several languages, a data base system and one or more operating systems. The microcomputer vendor, on the other hand, tends to rely on software designed and supported by third parties (e.g. Microsoft BASIC, CP/M). Many minicomputers have multiple users, and most mini operating systems are multi-users OS's.

The mainframe is almost always a multi-user system, with a CPU fabricated using bipolar TTL or ECL (Emitter-Coupled Logic) components. Although the instruction time is the same or slightly faster than that of minicomputers, each instruction accomplishes a lot more, as the instruction set is richer (often including floating point instructions), and operates

on words of up to 60 bits or even more.

The amount of memory on mainframes is measured in megabytes (Mbytes) rather than Kbytes more common on minis and micros. Mainframes usually have a selection of operating systems, languages, applications packages and utilities provided by the manufacturer, as well as independent vendors.

Operating Systems

Microcomputers were largely an invention of hobbyists — the DP professionals didn't believe it was possible to build a computer around those miniscule chips, and the manufacturers of the chips themselves thought the chips would find their way into vending machines and fairly 'dumb' automatic machinery.

It was only when a group of hobbyists around Hal Chamberlin built the 'Mark 8' computer around the 8008 chip that things started to happen. A big leap forward occurred a year later, in January 1975, when Popular Electronics magazine published the plans for the Altair 8800 and laid the foundations of what later became the S-100 bus. This allowed boards from different manufacturers to be connected together with a reasonable chance of their working, thus allowing larger systems (sometimes as much as 8 Kbytes of memory!!) to be built.

Early systems used cassette tape for mass storage. Programs were keyed in through switches on the front panel, and a Teletype or TV Typewriter was the dream of most hobbyists. Eventually an assembler became available, and then a BASIC interpreter, first on punched paper tape, later on cassettes.

Initially, BASIC had no provision for data files, and SAVE and LOAD commands would provide program storage on cassette or paper tape. Later BASICs have provided access to sequential and random access files.

In 1975, Gary Kildall scrounged a worn floppy disk drive from Shugart, and working with John Torode, set about constructing a disk controller. Gary also wrote a simple operating system to drive the controller, and this evolved through several commercial releases to become CP/M,

now the world's most popular operating system and winner of the Datapro Software Roll of Honor.

With commercial interest in micro-computers snowballing, other operating systems have appeared, such as OASIS, a multi-user time-sharing system which even offers user accounting.

MP/M is a multi-user version of CP/M, allowing current users to upgrade. Current interest focusses on UNIX, Bell Labs' sophisticated yet friendly OS.

All of these operating systems were written originally to run on S-100 systems with unspecified disk controllers or I/O hardware, and require some assembly language and hardware skill to install successfully. In most cases, system integrators or manufacturers supply the OS, pre-configured and installed on the system. Furthermore, CP/M was written to support assembly language development as well as BASIC and other languages.

Perils of BASIC-in-ROM

In the case of 'consumer' personal computers, the manufacturer has almost always made the assumption that the user will only program in BASIC. Most 'consumer' computers now have BASIC implemented in Read Only Memory, so the user is stuck with it. Furthermore, it takes 16K out of the already limited 64K address space, leaving even less room for alternative software systems.

However, the fact is there are many more languages and useful software packages around than BASIC. In BASICs alone, there is a choice of MBASIC, MBASIC compiler, CBASIC-2, E-BASIC, BASIC-V, BAZIC, NorthStar BASIC, and a variety of lesser-known dialects. There's a choice of Pascal Compilers, several C compilers, three or so FORTRANs, two Algols, LISP, a fulsomeness of FORTHs, COBOL, SAM76, a multitude of macro processors and a partridge in a pear tree.

Don't forget word processor packages, sort utilities, data base systems, all of which are as large as language processors. Many of these are denied to owners of BASIC-in-ROM machines.

What's more, if your operating system is CP/M, many of these languages can interchange data files, so that you can choose the best language for the job you're trying to accomplish. On my system, I run Microsoft BASIC, C, Pascal and assembler (plus a few other funnies) and they can all operate on the same data files (with a little careful design).

Generally, with BASIC 'cast into' the machine, it is simple and convenient to implement disk load and save, and file I/O statements into the BASIC and dispense with a separate operating system. One writer has described an operating system as "an attempt to correct the shortcomings of the language". But I contend that such a view is shortsighted and naive.

An operating system is the interface between the user and the machine's resources, which may include disk storage, I/O peripherals and software systems such as language processors. It also provides an interface between programs and machine resources, principally disk and console I/O.

The command mode and execute modes are a result of the language processor being an interpreter and not a compiler. On big systems, most programs are compiled to run as fast as possible — there, time is money. The interpreter offers command mode as part of its philosophy of being user-friendly and offering the user the extra debugging facility of having the source code in memory while the program is executing.

Inside BASIC

Generally, BASIC interpreters maintain the program in memory as source code; that is, English text. The lines of code are maintained as a linked list (to allow the insertion of lines) starting at the beginning of free RAM (that is above the interpreter itself) and growing upwards. When the program is run, the interpreter generally builds a symbol table after the end of the program, and usually uses this for variable storage. The subroutine return stack is maintained at the top of memory, growing down.

Editing a program will make it grow longer, overwriting part of the symbol table. It is for this reason that Microsoft BASIC will not let you CONTINUE after you have edited to fix a syntax error. The only limit to the growth of a program is the physical limits of memory. Eventually there comes a point where the symbol table, growing up, meets the stack, growing down, and in the resulting confusion, it may be difficult to sort out what happened.

Notice that BASIC does not allow the user to declare variables in the same way as compiled languages like Pascal, C and FORTRAN do. For this reason, the interpreter has sole control over the allocation of symbol table entries. However, Microsoft BASIC has a function, VARPTR(X), which will return the memory address of a variable. This can be used in various ways, most of them tricky and dirty.

When a program has ended normally, the variables it has used are still in memory. The interpreter doesn't clean up after itself, and garbage collection is almost unheard of in the micro world. However, the next program to run will start to build its own symbol table, possibly over-writing the previous version.

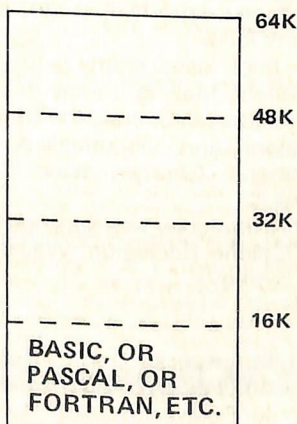
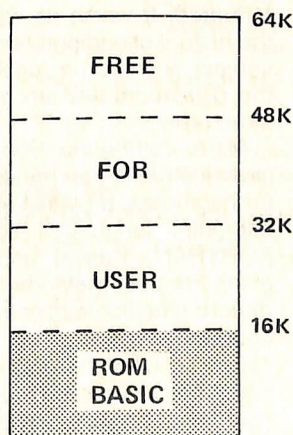
CBASIC-2 offers a way around this, by using the %COMMON statement (analogous to FORTRAN's COMMON). This declares certain variables to be shared between programs or program segments, and places them in a shared block of memory. Of course, CBASIC-2 is a compiler (with matching pseudo-code interpreter) and is better able to cope with these run-time storage allocation problems, because of its organisation.

Most compiled languages (FORTRAN, C, for example), provide some means of setting up common or external variables.

There you have it. If you're a mainframe or mini user, you may be more comfortable with a 'mainframe-style' micro, with a distinct operating system and languages. If you're a beginner just learning BASIC, then the BASIC-in-ROM style of machine may well be a better prospect.

My own feeling is that with the rising prevalence of disks, there is no need for the restriction of a language in ROM, and so future machines will be disk based with as little ROM as possible. And a damn good thing too!

On the subject of the 'microcomputer way of thinking,' there is only one way to really appreciate the limitations and opportunities of micros. That is to build and/or program your own — preferably starting with machine code, and working up through assembler, BASIC and more sophisticated languages. It's tough, and at first you wonder if you'll ever be able to do something useful. But the experience gives you a real insight into micro-thinking.



book reviews



Pascal Programming Structures; George W. Cherry, Reston Publishing Company, Reston, Virginia, 1980. \$13.95.

Here's an excellent book for the aspiring Pascal programmer who's already cut his teeth on BASIC, and perhaps read a few articles on structured programming in the mags. The rate of progress is brisk, and the early chapters could appear intimidating to the beginner who isn't already convinced of the virtues of structured languages.

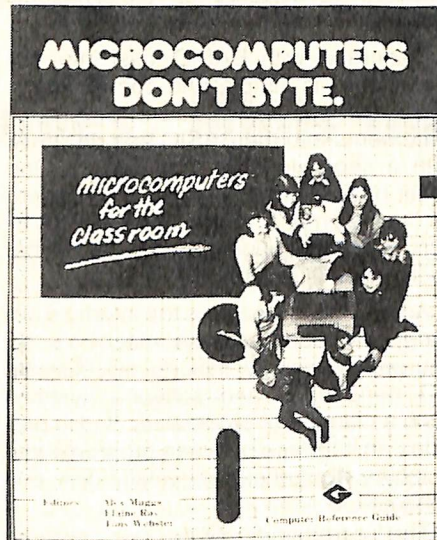
The book follows an orderly and logical progression. Some material in Chapter 1 (Intro to Programming) is redundant, as the book is really most suitable for the stage beyond complete novice. In my experience, you can't fully appreciate the advantages of Pascal unless you've suffered at the hands of a lesser creation first.

The book goes on to discuss the general structure of Pascal programs, introduces unstructured variables and input/output. It then begins to get into the real meat with the various statements for controlling program flow (begin..end, repeat..until).

Progressively more complex data and program structures are introduced in the succeeding chapters, each building on the material before it. The book is packed with interesting examples and problems.

The overall flavour of the book is very practical. The author owns and uses a micro-computer (the book was written and typeset on it), and doesn't diverge too often into academic argument.

Obviously this book cannot supplant the *Pascal User Manual and Report*



(Jensen & Wirth), but I'd recommend it as an excellent adjunct for the beginning Pascal programmer. (Our review copy came from Computer Galerie Bookshop, Walker Street, North Sydney.

* * *

Introduction to Pascal Including USCD Pascal; Rodnay Zaks, Sybex, 1980. \$23.95.

If there's one thing which makes me dubious about a computer programming textbook, it's the appearance of typeset program examples instead of examples printed straight from the computer. Especially large ones, and this book is full of them.

I didn't try any of the examples in the book, so I can't say whether they have any errors in them, but it made me suspicious.

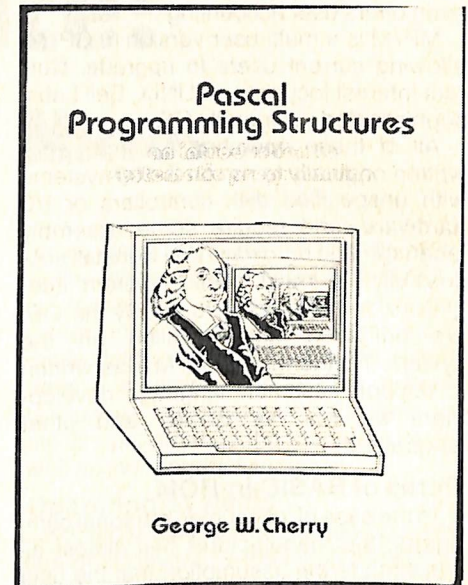
The book is intended to fulfil a similar function to George Cherry's book (above). But although it seems intended for a less experienced audience, it struck me as harder to follow.

The book uses charts and tables to good effect, making it easy to use as a reference book. Overall, the treatment is competent and workmanlike, but I'd recommend Cherry's book for most readers.

Our review copy was supplied by Computer Galerie Bookshop, Walker Street, North Sydney.

* * *

Micro-computers Don't Byte; Alex Maggs, Elaine Ray and Tony Webster, Computer Reference Guide 1981.



The problems of creating computer literacy is one of the major preoccupations of education researchers.

Dr Alex Maggs of Macquarie University has been pondering the problem for a long time, working through basic literacy and numeracy structures and trying to come up with the answer.

He is now an authority on Direct Instruction, a method used to provide students with a quick and relatively easy system of learning. With the help of computer experts like Elaine Ray and Tony Webster he has combined Direct Instruction methods with micro-computer technology. And the three have united to produce a book to outline their aims and the operational methods of the system.

The book was a direct result of a seminar on micro-computing and Direct Instruction, held at Macquarie University in September this year.

The book is an easy to use reference guide, written in basic English and well formatted. It works its way through from the history of computers to more complex subject, such as the adaption of micros for the classroom and an outline of course structures.

Micro-computers Don't Byte gives a clear instruction on hands-on experience for beginners, provides an introduction to computer languages such as BASIC, FORTRAN, Pascal and COBOL, and gives the best methods for incorporating direct instruction with computer orientated courses.

For schools thinking of upgrading to computer instruction, while also being concerned about basic literacy and num-

eracy levels of students, the book is well worth obtaining. The Computer Reference Guide is based in Sydney, and can be contacted for more information about the book or matters related to direct instruction and schools.

In an attempt to maintain an uncomplicated easy to read format, *Microcomputers Don't Byte* has a full glossary of terms to help unravel the computer jargon mysteries.

There is a chapter providing information on which micros are the best for school use. A concise directory to the needs of basic school computer use is included. Networking of micros in schools is also examined, taking into account files stations, printer stations, network hardware and software, and distributed processing.

I would recommend the book as a handy reference source for schools and education researchers.

Our review copy came from the Computer Reference Guide, 284 Victoria Avenue, Chatswood, NSW.

Australian Micro-computer Handbook; Tony Webster, Computer Reference Guide, first edition 1980.

There is a lot of information you can stack into 400 odd pages, and Tony Webster has shown that most of it can be highly fascinating.

Directories and handbooks written for experts are usually boring stuff, certainly not the type of reading you would want to settle down with at bedtime. But the Australian Computer Handbook, while certainly not lively reading, is interesting enough to keep a readers attention.

It's the kind of book necessary in these days where computer technology is becoming more of a power, both in leisure and business activities.

The handbook is generally a detailed buyers guide to the micro-computer systems and applications currently on the market.

Due to the traps awaiting a prospective computer buyer, the guide could save a lot of financial heartache. Buying the right equipment with compatible systems isn't easy, with so many choices available.

The handbook begins with an overview

of micro-computers and systems, looking at components, memory, input and output. It moves on to the peripheral devices for micros, such as mass storage and control devices.

The software section advises the prospective buyer to beware the pitfalls, and to be vigilant in checking out basic needs, whether the system is for the home, office, or research.

Like most computer books on the market at the moment, the Handbook goes through the types of language available, discussing the relative merits and demerits of each system.


And again, like most computer writers, Tony Webster attempts to be a seer, looking into his crystal ball for future micro applications.

Perhaps the most interesting section of the books is the author's run down of the various computer manufacturers, and evaluating each system.

All in all the book is worth buying simply as a handy guide to what not to do in the use of computers. □

* * *


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March 7-9, Southern Cross Hotel MELBOURNE

March 23, Parmelia Hilton PERTH

March 27, The Festival Centre ADELAIDE

CASE HISTORY

Testing The Brakes Before You Have To

"When I was young . . ." writes FRED SYMES, "... I was the passenger in a beaten-up old car with no brakes." Another excerpt from the Symes' journalistic memoirs, we suspected. Well, no.

Fred reckoned he needed a break from the office, so the chance to find out about the application of microcomputers to the testing of brake components out at Girlock Limited seemed a good way to take that break. Fred found out a fair bit about brakes — which had him shaking in memory of that "beaten-up old car" — and gained some respite from the office.

WHEN I was young and had no sense, which is not to necessarily imply that I have gained some in my advanced years, I was the passenger in a beaten-up old car that had no brakes.

The 40km journey included a number of steep inclines and sharp bends on a road through the pine forests of New Zealand's central North Island. But the fact that I'm writing about it proves I survived the experience — probably the most terrifying of my life.

I also have vivid memories of an occasion about the same time when another young fellow and myself hung over the front guards of an old farm truck which had been richly decorated as a float for a New Year's Eve parade in a small town.

Hidden from view by the decorations, my friend and I each held a rope, to the

other ends of which were tied two bricks.

When the driver of the truck needed to stop, a frequent event in the somewhat shambly procession, he tooted the horn and we dropped the bricks in front of the tyres. Amazingly, it worked: though there were a few close shaves we managed to complete the procession without incident and, more importantly, without the local police twigging to the brakeless condition of the truck.

Since those far-off days I've gained a deep appreciation of the efficiency of the brakes on the various cars I've driven throughout New Zealand, Britain and Australia. So it was of special interest to me to visit the Sydney factory of Girlock Limited, makers of brakes, among other things, for a large part of the Australian motor industry.

Braking For Granted

Like most motorists, I suppose, I've always taken for granted that the brakes in my car will work, and work well. However, the people at Girlock take nothing for granted and every brake component is rigorously tested to ensure it and the assembled unit will withstand the harshest treatment likely to be meted out by drivers during the life of a vehicle.

Component testing is done on quite an array of mechanical and electronic machines, but the age of the microcomputer is now being introduced to the factory floor with the promise of even more accurate and considerably faster checking.

Test supervisor Mr Jack Fagan said from the point of view of using computers in the factory, "we were babes in the wood."

"Certainly, Girlock was using computer technology in the areas of administration

and data storage, but we had not got round to applying the new technology to production.

"We called in Applied Technology to advise us, and with its help we now have a two-station installation. If this proves as successful as initial use suggests it will be, our older test equipment will be phased out to make way for a totally computerised system," Mr Fagan said.

Though the old system showed up any and all faults and blemishes, it was slow by computer standards and provided only a yes or no answer — a component was either passed or failed.

In Strict Parameters

The new computerised system saves almost 50 percent in time. But, more importantly, it reveals the degree of fault within strict maximum and minimum parameters.

As well as being shown on VDUs, this information is produced as hard copy. This copy allows inspectors to quickly discover a developing fault trend in a production batching. This is invaluable information when a new or modified component first goes into production, and permits early corrective measures.

The program developed by Paul Wilmshurst for the brake master cylinder test rig includes the control of more than 20 input/output channels in a test sequence of about 170 distinct operations. The result of each test is shown by the display of a prominent green or red indicator to simplify the task of the operators, many of whom do not speak English as their native language.

In the event of a failed test, the cylinder

concerned is locked in place until a supervisor is called. Only a supervisor is able to unlock the cylinder. He determines the nature of the fault and takes immediate action to correct the fault in production. This reduces the incidence of faulty production runs and also maintains strict quality control.

At the end of each day all test results are tabulated and printed, providing a quick reference for production analysis.

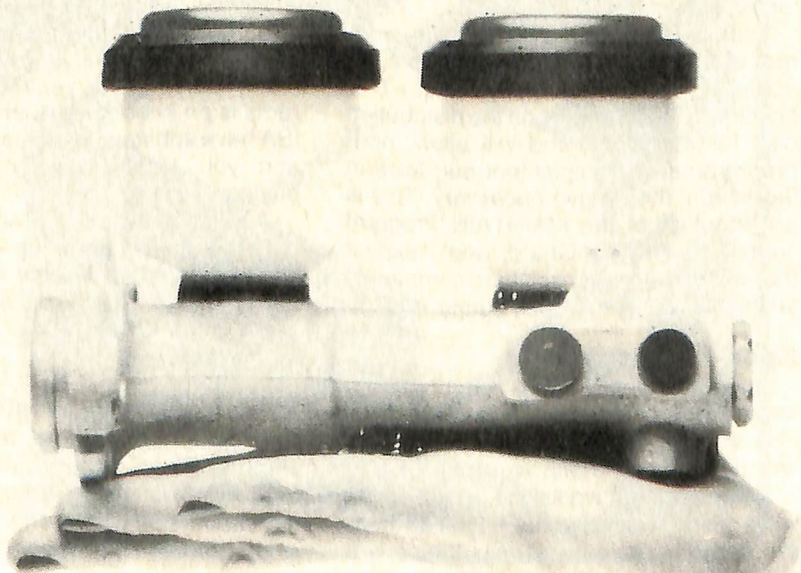
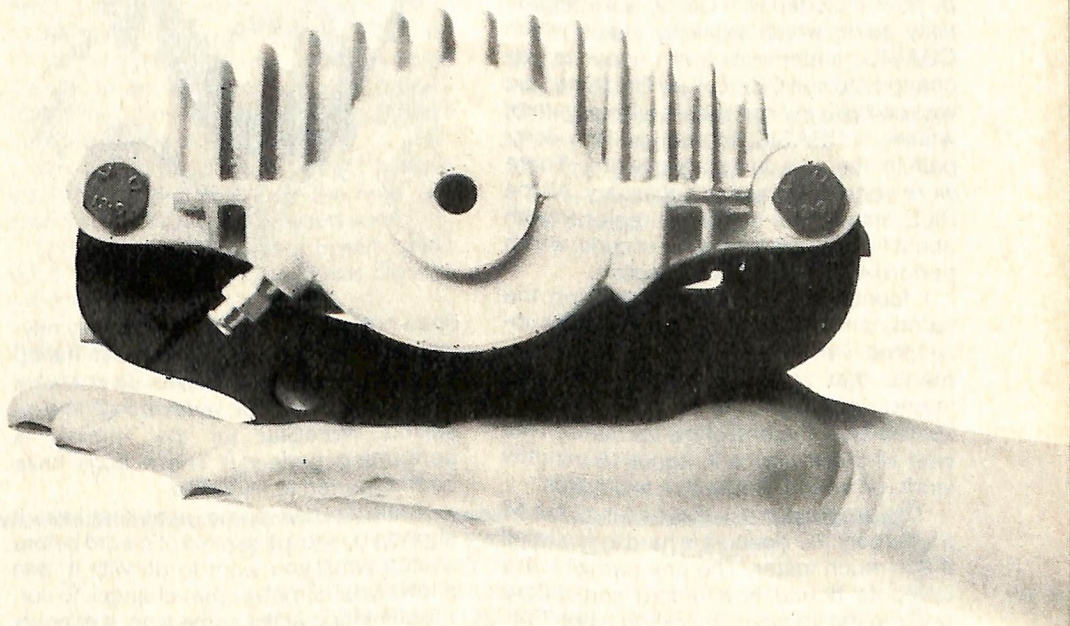
The program for the valve-testing rig is used to plot a graph of the input versus the output pressure of the valve under test. Graphs of the maximum and minimum acceptable pressure values are plotted also. If the graph for the measured values crosses either the upper or lower limit a 'fail' is generated.

The unit under test is locked in position. By examination of the graph a production supervisor can locate the cause of the fault.

Editor/Assembler Used

Both programs were written and assembled with the editor/assembler (EDASM) supplied by Applied Technology. They were written in machine language because, Paul explained, the many simple instructions required in each application would have occupied much more space had they been written in an interpreter such as BASIC, since the architecture of the Z-80 so readily supports the type of I/O instructions used.

Both programs are stored in EPROMs so they would not have to be reloaded each time the machines are switched on. This also allows the various limit values for each test to be easily changed as future needs dictate.



your CP/M computer

— Bill Bolton —

I'VE BEEN running CB-80 for several weeks now and I am very very pleased with it.

The initial release had a number of serious bugs (30 odd), but all 1.0 users should have received an automatic update to 1.1 by now. Included with CB-80 is a compatibility guide which explicitly states which CBASIC statements will need to be changed to suit CB-80. The first thing I did was compile my consultant billing system, written in CBASIC, to see just how compatible the two languages were. There were very few changes necessary. All the FILE statements had to be replaced with about five (structured) lines of code, which performed an equivalent function.

I found one occurrence of using the same name for a subscripted and unsubscripted variable and the CHAIN statements that return control to the main 'menu' module had to have ".COM" tacked on to the end of the file name. That was all there was to it, about 15 minutes work (on seven files) with a text editor.

The program ran without a hitch, but as it is largely I/O bound it is hard to really tell if it is much faster. The one part which is compute bound is a record sort before printing the invoices (quicksort type). This appeared to run about four times faster when compiled with CB-80.

Some more arbitrary speed tests (that means on special test programs rather than real production programs) showed very worthwhile speed improvements in most areas, compared to CBASIC-2. I would venture to say it will be about as fast as the Digital Research PL/1-80 compiler for many business programs.

For CB-80 DR has used a check program written by the SpellGuard people, Innovative Software Applications. This checks all the programs on the distribution disk for corruption and will allow 'non-programmers' to implement bug fixes in the field, if they prove necessary. This is an adaption of the MAINTAIN Program supplied with SpellGuard, and I expect that we will see other software companies taking the same approach during 1982.

SpelStar Evaluated

SpelStar is the latest offering from MicroPro International. It is a spelling check program, similar to SpellGuard, which is integrated with WordStar.

While SpelStar works fine, I have somewhat mixed feelings about it. First off there are some bugs in the terminal drivers; it



does not need to be installed, simply relying on WordStar to do the screen handling. Some screen functions do not work correctly in SpelStar, even though the installed WordStar for the terminal is performing perfectly! These bugs have been reported to MicroPro.

SpelStar has some neat features. It shows you the full context of a word before asking what you want to do with it, and allows you to make other changes to surrounding text at the same time. It appears to be as fast as SpellGuard 1.0 as far as a complete check/correct run goes.

Where SpelStar is weak is in dictionary manipulation. While it is easy to get words into dictionaries, it is somewhat harder to manipulate the dictionaries.

SpellGuard has a much richer set of dictionary manipulation commands. SpellGuard is now up to version 2.0, which has the dictionary files compressed to 33 percent of their former size and so has even faster dictionary searching.

The battle of the spelling check programs is on in earnest. Both MicroPro and ISA have substantial, worthwhile products and you should look at both before buying.

Just to be thorough, I should mention that there are numerous other spelling check programs available for CP/M. The November 1981 BYTE magazine had a good comparative review of several of them.

More Advantage, Another Name

A few issues back I mentioned the NorthStar Advantage computer and said it has S-100 bus capability on board. Alas, my information was wrong. The on board expansion is via a non-standard and

smaller bus structure.

I had asked Anderson Digital to send me information about the Advantage before we went to press with the Advantage item. They made all the usual promises about sending it... and I'm still waiting.

Meantime, the latest name to drop when mentioning CP/M is DEC. The venerable VT-100 terminal from DEC now has an internal add-in, which gives it a Z-80 processor and all the other support hardware necessary to make it run CP/M as a stand alone system.

I believe this was developed by an independent hardware manufacturer and then taken up by DEC for world wide distribution.

CP/M Without Tears — Postscript

CP/M Without Tears was published in the November issue of *Your Computer*. My postscript is: DON'T implement the alpha lock example program in your BIOS if you want to use programs which expect to have ALL entered characters, including control characters, passed to them. That is, almost any screen editor such as WordStar, WordMaster, Magic Wand, Vedit and so on.

BIOS character input/output code should be kept as simple as possible. If you need fancy form handling for your printer, then write a separate utility to print out files or write it into your high level program.

Printer Quickie

The Diablo 1345/1610 daisy-wheel printers sold recently by Mitsui have a neat interface board (by Micro Pro of Crows Nest, not the WordStar company), which makes the 1345 behave like a 1610 printer. There is only one major difference: there is no button to force a manual form feed on the printer. Below is a three-line assembler program you can enter with DDT to allow you to do a form feed from your system console.

```
A>DDT
DDT VERS 2.0
-F100,200,00
-A100
0100 MVI E,0C
0102 MVI C,5
0104 JMP 5
0107
-GO
A>SAVE 1 EJECT.COM
```


Now, when you type EJECT from your terminal, your printer should advance to the top of the next form. This program will work with any printer which responds to the ASCII FormFeed (OCH) character. It is also useful for insertion in SUBMIT files to force a listing, or other printout to start at the top of a new page.

CP/M 3 and MP/M 2

I have been told development of CP/M 3 has been delayed while work proceeds on other projects at DR. I think we will be lucky to see it before the middle of 1982, so don't hold your breath.

Meanwhile, MP/M 2 is out with better documentation than its predecessor (though still not adequate). It has a host of new features including a bunch of new BDOS calls which are undoubtedly pointers to what could be expected from CP/M 3.

Some of these will be very welcome, such as 'Set Multi-Sector Count' which will allow handling up to 16 'logical' records of 128 bytes in READ/WRITE operations. 'Set BDOS Error Mode' will allow user control of what happens after a BDOS error: you can avoid the automatic return to the operating system after a BDOS error. 'Chain to Program' allows passing control to another program with a command line. 'Flush Buffers' forces a flush of any deblocking buffers.

We should have an MP/M 1.1 system upgraded to Version 2 by the time you read this, so expect a full report soon.

Speaking of holding your breath, don't do it waiting for the Australian Source either!

CP/M Books

A full review will appear in the next issue of *Your Computer*, but suffice to say that

the *Osborne CP/M Users Guide* is highly recommended, as is *Interfacing to S-100/IEEE-696 Microcomputers*, also from Osborne. Both are available from the Technical Bookshop.

Feedback

Send your questions about CP/M to Bill Bolton, CP/M Column, *Your Computer*, PO Box 216, Spit Junction, NSW 2088. No guarantees that your question will get answered in the column, but I will try. Source users can contact me at TCY396 (I don't read Source mail unless there is a clear subject heading). □

Have you ever wanted to write programs that would stay in your COMMODORE permanently? Extend BASIC, write security programs, special print routines? And put them into an EPROM and plug them into your COMMODORE? (and some other popular micros)
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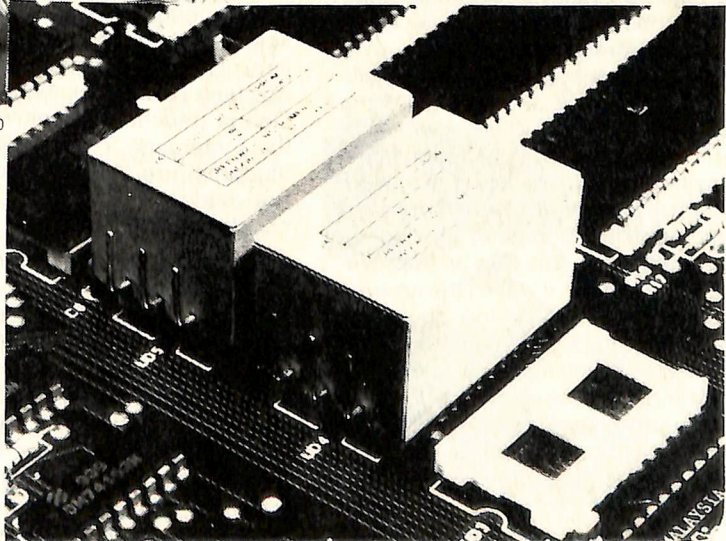


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How To Be Indispensable

By Helen Pollock

FOR THE time being at least, Stuart Laird has made himself indispensable at Rangitoto College.

How does a teacher manage to do that when rolls are falling and many teachers all over New Zealand are unable to find employment?

Well, of course, the answer lies in the computer. Persuade the headmaster to buy a TRS-80 with dual disk-drives and a printer, principally for use in timetabling, write all the software yourself, and you're in.

The beginning of each school year brings many migraines as teachers responsible for organising students into classes and courses wrestle with an enormous number of facts. There are approximately 90 teachers, 800 senior students, 60 classrooms and 30 subjects for them to shuffle into some kind of order.

Class lists for the following year are always compiled by the end of August. The senior students indicate their intentions for the following year, stating which subjects they wish to study.

In the bad old days, the confusion at the beginning of the year arising from students changing their minds, threw the senior school into chaos for three weeks. Joe Bloggs, who as a fifth former indicated that he intended to study Russian and Indonesian in the sixth form, now had to settle for repeating some of his subjects as he failed some of his end-of-year exams.

Jill Brown, who has at last persuaded her parents to let her leave school after she has gained university entrance, is unable to find a job. She decides to return to school and join the seventh form. Multiply these two by X and you'll get the picture.

The first step towards computerisation of the system was taken about five years ago, when the college rented time on a huge commercial computer owned by Hellaby's. Although this was an improvement on the old days, it wasn't the answer. It did too much. It was too rigid. The teachers operating it were unable to make alterations according to individual needs.

The names of the students and the subjects they had chosen were fed into the machine at one end, and a complete timetable for each individual appeared at the other. Just like a sausage machine.

Still, it set Stuart's brain working and he came up with a scheme which would en-

able the timetabling to be done quickly and efficiently, but would be flexible enough to allow individual changes to be made.

The scheme worked beyond Stuart's wildest expectations.

The difficulties in the past have arisen from keeping track of a vast amount of information. Such difficulties include keeping records of individual students, making note of their timetable changes making sure they go to the class to which they've been assigned, and such.

In some rooms in the past there has been standing-room only, as students have blithely ignored instructions and flocked to the classes of the most popular teachers. Students these days accept the computer's authority - the machine has spoken - and now go to meet their fate without so much as a murmur.

The computer takes one day to do what frazzled teachers once achieved in three weeks. Lists are altered so class sizes are acceptable. The machine produces an alphabetical list of students with all their subjects in options.

At senior level, the option system defines the subjects available in each area. Subjects are grouped into options. Some occur in more than one option to enable students to have as wide a choice as possible. The classes within each option are run concurrently so students cannot take more than one subject in each option.

The computer also produces, for option teachers, a list of the pupils studying subjects in that option.

Each student is given a printout with his/her individual course set out. Tentative class lists are typed into the computer by the end of August. Students have selected their courses for the following year. This information is also typed in. The machine prints back the class lists so the Deans (teachers appointed to look after the interests of specific groups of students) are able to check that courses are sensible. Students are invited to check for errors.

The computer then produces a cross-table. This gives totals of all the possible combinations of subjects. The option scheme is then typed into the computer, which fits the students to it. This is balanced up, checked, re-run and altered to ensure there is the right number of teachers and that the teachers can handle the number of classes required. When this is done, having been run half a dozen times, the scheme is ready for use at the beginning of the new school year.

Once individual timetables have been worked out, a timetable grid is displayed on the screen and each teacher's timetable is entered. The machine then produces a room timetable so that the use of rooms is synchronised.

The programs consist of approximately 4000 lines. One wonders whether Rangitoto College should take out an insurance policy on Stuart Laird's life. He laughs at the suggestion. He says he'll be expendable by the end of next year, once he's initiated some of his colleagues into the mysterious rites of his master plan.

He's looking forward to the time when Rangitoto College replaces its TRS-80 with a new machine; Stuart likes a challenge. □

Footroot Flats?

MICROCOMPUTER salesmen are shedding their city suits and donning gumboots as they rush to sell their wares to farmers.

About two years ago it was thought that under the auspices of Federated Farmers, the very powerful and well organised farmers lobby, the farmers might co-operate on a large agricultural computer network.

But in typical farmer fashion, they have opted to do their own thing with their own machinery. The move toward micros has also been paralleled by the emergence of farmer/programmers, such as Wairarapa farmer Ian Campbell.

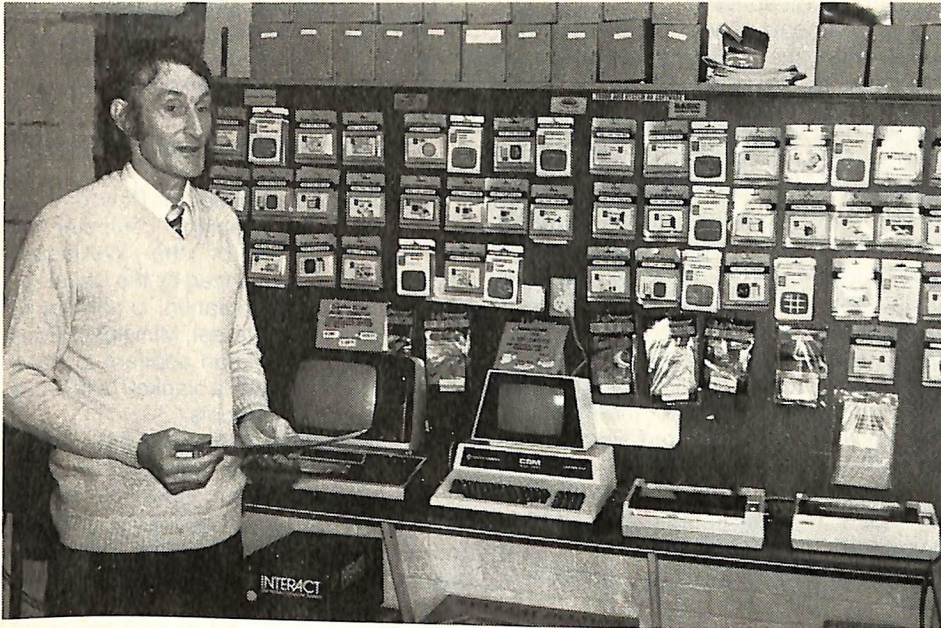
Now microcomputer supermarketeer Frank Goldingham, who is based in Palmerston North (an important rural service centre) is offering integrated software/hardware complete with feed budget management, stock and machinery records, economic modelling, and even word processing.

Goldingham's system is based on the Commodore, but he says he is adjusting the software to run on the Dick Smith System 80 and the TRS-80.

The microcomputer market has taken a sudden shift in New Zealand over the last two months, due to the sudden arrival of so many different brands on the market.

"People don't know what to choose," comments Frank Ollie, managing director of David Reid Data Processing. David Reid holds the Radio Shack agency here, and is the overwhelming market leader.

There has also been a plethora of trade exhibitions, plus sudden jumps in price performance, and this has all tended to daze the marketplace. So has the dramatic appearance in retail stores of so



Frank Goldingham takes on the rural market.

many microcomputers, not to mention the opening of half a dozen specialist micro-computing retail outlets.

So canny microcomputer salespeople are heading for the country fast. The farmers have the technological minds. They have the cash to pay outright, and thus by-pass HP and leasing deals which may yet cause the industry some problems.

The other important thing about farmers, from the point of view of the microcomputing industry, is they are not happy about letting their accountants have all the computers — generally IBM System 32's or machines in the Burroughs B80 category. They want their own, and especially they want to work on their own programming.

"It's the most important piece of machinery to come our way since the combine harvesters," notes James Stinson, a Manawatu farmer who has just acquired a TRS-80.

He wants the machine in order to get a 'much tighter' control of his herd of 489 dairy cows.

"I want to get a clean sighting on which ones are the best producers, and what time of the year they are giving their best," he notes. This, in addition to a general run down of farm accounting, plus an equipment inventory is his aim.

The other factor favouring the sale of microcomputers to farmers is the very high cost in New Zealand of leased lines,

which can suddenly jump in price without warning. This, as much as anything, seems to have precluded the networking idea which was so much in vogue 18 months ago.

Leading computing authority Denis Trotman is frankly appalled by the lack of computing resources available to the agricultural sector.

"Look at the banking and insurance industries and they are a-brim with computing power," he notes. "But look at the wealth-generator, the farming community, and you find a fraction of the computing resources of the service sector."

Meanwhile, microcomputing marketing organisations are coming under some fire from farmers, because the organisations are not familiar with agricultural procedures.

"I want to talk to a microcomputing specialist who understands my business," comments Rick Brabin, a King Country farmer. "These blokes are obviously finding it hard to come to grips with farming."

In the meantime, the micro companies are getting to grips with what seems now to be their fastest growing market. Local distributors are holding seminars in rural areas. The Wellington regional Apple distributor created a great deal of interest when it took a stand at the Carterton Agricultural and Pastoral Association. It was the busiest stand of all.

Traditionally, farmers want the market

to come to them. They have been brought up this way through the stock and station agency system. There can be no doubt that the micro industry should now take a much more mobile attitude to its rural marketing. □

Ohio Obstacles Beaten

COMPUTER Consultants Limited, the largest New Zealand-owned company in local computing, has overcome a major obstacle in its marketing of the Ohio Scientific Instruments range of microcomputers.

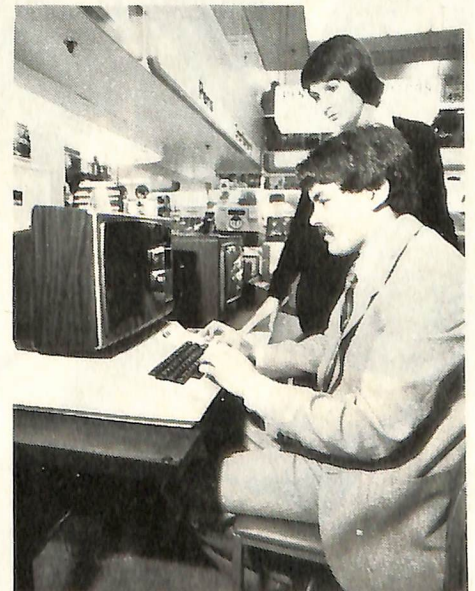
CCL struck trouble with its venture into microcomputing, first when a breakaway group of employees grabbed the Commodore agency here, then with sluggish performance on the OSI marketing front.

Now CCL has achieved a major presence with the OSI machines, through an interesting arrangement with Whitcoulls the book/stationery chain, which has shops in most cities and towns

Under this new arrangement Whitcoulls sells the OSI, then CCL looks after the servicing. Indications are the first year's total revenue will approach the \$NZ500,000 mark.

The arrangement means the OSI's stand is a conspicuous point in the bigger Whitcoulls stores. The huge Auckland store recently made a big window display out of the OSI.

CCL employs 50 people in Australia working out of offices in Sydney and Melbourne.



Derek Baker OSI consultant operates under the guidance of Cherie Barker a staff computer training officer.

It seems very likely CCL, a public company, will use its experience with the Whitcoulls arrangement to launch a similar deal in Australia, perhaps starting in Sydney.

CCL's recent acquisition of the Harris mainframe agency means it now covers the entire range of computing. The history of this fast-growth company indicates that once it enters a market, it is committed to substantial growth in it. □

Computer Plumbing

AUCKLAND systems developer Barry Sexton is introducing tradesmen to micro computing. Sexton, managing director of Computer Intelligence Applications, is demonstrating that there are profitable opportunities for micro systems in areas overlooked by the rest of the computing market.

His company has developed software specially suited to the needs of the plumbing and contracting businesses.

JADE-1, job analysis by development electronics, was produced initially for M. Cockburn and Co and Drain Unblockers Ltd, two plumbing firms. Both firms

needed micro capability to handle invoicing requirements. They had bought National Panasonic JD-840s from Fisher and Paykel subsidiary MEC.

The system needed additional refinements for the plumbing business, though. Now, invoicing is part of a process that is automated from the time a telephone order is made. Details of the job are entered into the computer, which produces the invoice and keeps track of the account until final payment is made.

The whole thing is screen rather than menu driven. The operator can add or delete a customer, make an enquiry, check on a job . . . It's all there on the screen, without complicated searches of the system's files.

For each job the computer records the man hours. His rates, materials used, and their price. The pay-off is that the system can analyse which plumbing team and which vehicle has been the most productive.

It also streamlines quoting which can be prepared using likely time and materials requirements. Then, when the job is completed, the quotation can be used against actual costs. □

Polycorp Meets Resistance

A PRODUCTION run of 100 Polycorps is now on the assembly line. Auckland's Delphi Industries will make the computer boards.

The order represents individual orders from different schools.

But the big bulk order for Polycorps, a computer aided teaching computer invented by staff of the Wellington Polytechnic and financed by the Development Finance Corporation, is still not in sight. After initial interest, Minister of Education Merv Wellington appears to have backed off the idea of a blanket, bulk order for all secondary schools.

This is the big bulk order the system needs for full scale development. But a strong lobby from Auckland micro-computing concerns against a government single-brand bulk buy seems to have curbed Mr Wellington's initial enthusiasm. □



Mr Shane Doyle Wellington Micro user.

Post Haste

A LEADING Wellington microcomputer enthusiast, Shane Doyle, is one of a growing number of buffs who are by-passing New Zealand distribution organisations altogether. He simply filled in a form in an overseas specialist microcomputing magazine, wrote in his credit card number, and in due course received an RCA 1800 CDP1802 computer through the post.

He paid the 40 percent (on wholesale price) sales tax on it. But of course the wholesale price was reduced because he did not in fact go through a New Zealand agent.

One of those lucky folk whose job is his hobby, Doyle is chief programmer for the Norwich Union group here. With fairly simple modifications, he hitched the COSMAC to his television set to present a fully fledged system with sophisticated input/output.

Doyle received a digital keyboard (at the bottom right hand corner of the keyboard) and also the instruction manual with the system. □

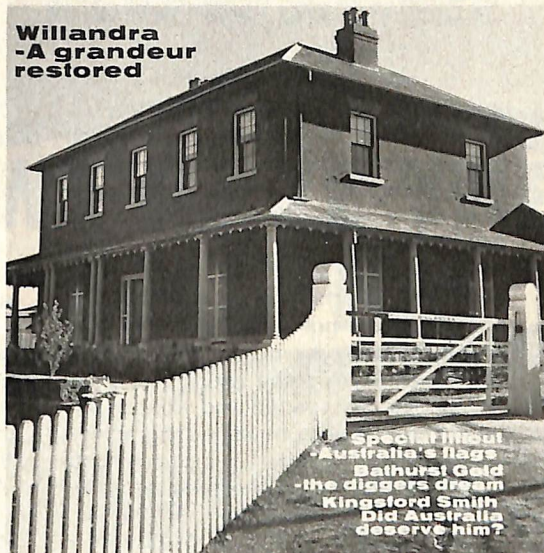


80 Barry Sexton, managing director of Computer Intelligence Applications.

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your TRS80 computer

R.G. Stevenson

'Grafix' Reviewed

WITHOUT doubt 'Grafix', by Software Specialists of California, is the easiest way of writing graphics into a BASIC program I've yet seen. And it has the speed of machine-code without the tedium of writing in Assembly.

No need to worry about the complexities of SET, CHR\$, STRING\$ or POKE: simply PRINT AS(0) and your graphics appear on the screen quicker than you could hope.

The whole success and simplicity of this program is that to set/reset any of the six pixels in the standard graphics block you use the QWASZX keys (which are in the graphics pixel positions on the keyboard). The result appears on the screen, so you can see what you're doing as you're doing it.

Having seen your desired pattern, the arrow-keys let you move it over the screen, with a choice of printing or not printing the graphics block. And having created your graphics pattern (a whole screen-full if you wish), you can then encode it (by simply pressing ENTER) as

elements in a string-array created and assigned as an extra BASIC line at the end of your program.

All that's required then is to PRINT@X, AS(0) and you'll get back your pattern, complete with graphics, spaces and characters, on the part of the screen you encoded. It's not necessary to re-load 'GRAFIX' to use a program written with it, so you can give away your masterpiece and people will marvel and wonder how you became so accomplished at graphics.

Of course, the program includes many other commands not covered here, but unfortunately it seems to be not for disk.

I find it difficult not to go overboard in recommending this program. Just think how easy it is to be able to actually see what you're doing while writing a BASIC graphics program, and you must understand my enthusiasm. If I say it's in the same class as MON-3 and PACKER is that enough?

'Grafix' is for TRS-80 Level II 16K machines. Available from Software Specialists, PO Box 845, Norco, California 91760, USA.

Instruction on the Z80

Having used Nat Wordsworth's Z80 Instruction Handbook for some time, I'm surprised it's not more widely known and used. Its cover proclaims it to be a complete reference to the Z80 instruction set, and this is truly what it is.

The book is not intended to teach assembly programming (Bill Barden's TRS-80 *Assembly Language Programming* is a good starter to do that, even if you're not using a TRS-80. It's intended as a reference to the instructions and mnemonics of the Z80.

The most valuable part of the book, I feel, is the index of the 700-plus codes available to Z80 programmers, as I find I'm unable to remember all of them. But should I suspect there's one to do the job I want, I have only to look where I imagine it will be in the alphabetical listing to find its mnemonic syntax, its octal and hexadecimal code, the number of clock cycles it will take, and the page to find a full description.

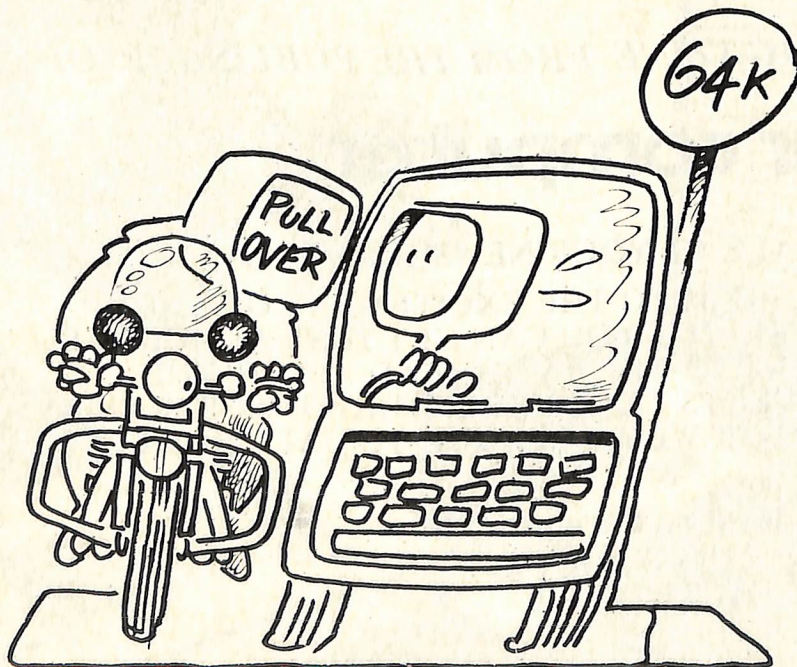
The description is indeed a full one — in English, not weird diagrams! Certainly diagrams are present where they will help the description, but never as a replacement for a proper description.

The book does contain a few pages of brief explanation of the CPU registers and flags. While it is brief, it presents all one needs to know to be able to understand and use the information contained in later pages.

So, in all, a very impressive and useful reference book for the beginning assembly programmer who is trying to do battle with a seeming jungle of mnemonics to get the most out of the very powerful Z80.

With the *Z80 Instruction Handbook* and Barden's book explaining assembly itself, all that limits the leap over the threshold of assembly programming is time, and the determination to practice sufficiently to feel at home in the way of thinking. For that's all assembly is, just another language which requires its own basic understanding.

The *Z80 Instruction Handbook* is published by Sceldi Publications. □



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Geoff Cohen

OSI AND BUSINESS

THIS MONTH we'll begin with a look at one of the bigger Ohio Scientific computers and see what it can do in the business world.

The C3 is the computer OSI designed for medium-sized business applications. It supports multi-user systems (using standard serial terminals), 200K of RAM, dual 20 cm (8-in) floppies, and a series of Winchester hard disks with capacities to 74 megabytes.

The C3 is quite innovative (or at least it was — as reported last month, it will soon be replaced with the C5). It has three processors, the standard 6502, an 8080 and a 6800; and each one can be run under software control. This enables nearly all eight-bit microcomputer software to be run on a C3, giving access to a much broader range of programs.

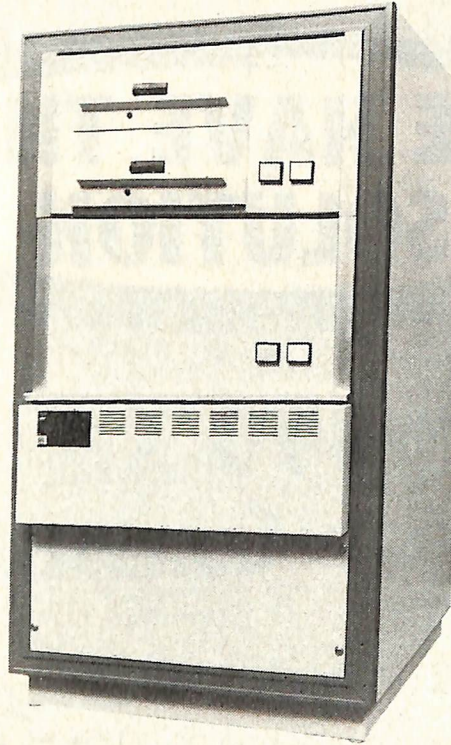
Getting back to business, there has been some mention recently about MINDER, the system used at the Australian National University to keep its (electric) heating bills down, with a 30 percent maximum reduction. I mention MINDER as it is a good example of creative microcomputer hardware/software design.

It is also near to my heart, as I run an electronics section at the ANU and actually have my heating controlled by MINDER. For full details and specifications, contact M.E.S., the OSI dealer in Canberra responsible for developing the system, on (062) 49-6355.

MINDER uses load shedding to reduce current peaks, and hence the cost of heating (electricity authority charges are related to peak currents). When the current peaks above a preset level, various buildings have their heating turned off for short periods, in a round robin approach. Because the thermal capacity of buildings is high, and the individual time turned off is short, there is no noticeable change in building temperature — just a reduction in the cost of heating.

As well as handling energy management, MINDER is also a sophisticated security and alarm system with up to 6000 inputs, either analog or digital. Each input can be programmed to perform a different function at various times in the day, or week.

This is necessary for the security function — to allow a door to be an intruder detector at night or on the weekend, but not in normal working hours. However



TIFIC

Ohio Scientific C3-B business system.

events need not be time related, they can also be triggered by a changing parameter, such as a temperature or level sensor. MINDER will respond to this fault condition in a few seconds, either correcting the fault condition or sending out the appropriate alarm signal.

The hardware to implement MINDER is quite interesting, comprising two complete computer systems. The main computer is a multi-user C3 with 156K of RAM, a 74 megabyte Winchester hard disk, and several color VDU consoles, printers and so on. This computer has the main system kernel and suite of programs, handles the drawing of control points on the VDU, and generally does the high-level thinking. The other CPU, the telemetry computer, is a custom-designed 6502 system with 48K of RAM, dual 20 cm floppies and a 12 megabyte tape cartridge. This handles the housekeeping for the possible 6000 inputs and other lower-level tasks. It is quite invisible to the user of MINDER.

Two OS65D Utilities

Changing back to the smaller systems,

one of our readers, Ian Macmaster, has sent in some useful programming hints for OS65D disk users (either 13 or 20 cm).

First, if you are annoyed at having to type 'SHIFT O' for rubout, place the following in your BEXEC* and, wonder of wonders, the RUBOUT key really does rub out.

```
1 POKE 1386,128:POKE1394,127:
   POKE1419,127:POKE2820,127
```

Ian also sent in a nifty PRINT AT routine. This works for both PRINT and INPUT statements, and divides the C4 screen into 28 vertical rows and 64 horizontal columns. It should work for the small C1 screen by changing TL to 53379, V to 32 and all the 28s in lines 120 and 130 to 23s.

```
5 GOTO9000
10 C=TL+ROW*V :REM GET PAGE ADDRESS
20 HB=INT(C/W) :REM HIGH BYTE
30 LB=C+COL-HB*W :REM LOW BYTE
40 FORI=0TO6
50 POKEP(I),LB
60 POKEP(I)+1,HB :REM NORMAL ADDR
   FORMAT WE MODIFY
70 NEXTI:RETURN
99 : REM A LITTLE TEST
100 FORI=1TO32:PRINT:NEXT:POKE9770,0:
   REM CLEAR THEN STOP SCROLL
110 GOSUB10:PRINT"BOH INPUT AND
   PRINT WORK"
120 ROW =ROW+2:IFROW>28THENROW=28
130 IFROW=28THENIFCOL=0GOTO10000REM
   EXIT IF NORMAL ADDRESS
140 GOSUB10
150 INPUT"ENTER ROW,COLUMN";ROW,COL
160 GOTO110
9000 POKE9681,44: REM TURN CURSOR OFF
9010 TL=53248: REM TOP LEFT
   VIDED SCREEN
9020 V=64:W=256: REM CALC CONSTANTS
9030 DIMP(6): REM POSITION OF LOW
   BYTE VIDED ADDRESSES
9040 P(1)=9666:P(2)=9674:
   P(3)=9682:P(4)=9719
9050 P(5)=9726:P(6)=9733:P(0)=9745
9060 GOTO100 :REM START OF MAIN
   PROGRAM ABOVE SPEEDY SUBS
10000 POKE9770,64 :REM RESTORE SCROLL
10010 POKE9681 :REM CURSOR
```



```

10020 END
40000 HUMANS ONLY
40010 -----
40020 :
40030 SHORT EXAMPLE OF OS1
      PRINT-AT FEATURE
40040 :
40050 UNFORTUNATELY FOR BEST PRINT
      NEEDS CURSOR TURNED OFF
40060 :
40070 CALLED BY ROW AND COLUMN ADDRESS
      OF STARTOF PRINT
40080 :
40090 : 0 <= ROW <= 28 : 0 <= COLUMN <= 64
40100 :
40110 INPUT WORKS FROM ANYWHERE
      ON SCREEN TOO!!

```

```

40120 :
40130 AUTHOR: IAN MACMASTER
40140 :      1981
40150 REM OS 65U VERSION AVAILABLE TOO

```

To exit this demonstration program answer 28,0. The main PRINT AT subroutine is in lines 10 to 70, with the setup and exit procedures in lines 9000 to 10010. I think Ian has enough comments to make the program easy to use, the only point that must be noted is the use of a subroutine near the start of the program to speed up execution. This occurs because BASIC always looks for a subroutine by starting from the beginning of the program and checking one line at a time. The closer to the program's start the faster the subroutine will run. This principle should also be used for any variables to be used

in a routine where speed is critical, such as a video game.

Satellite Tracking

For all you budding OSCAR users, Technical Products (PO Box 2358, Boone, Nth Carolina, USA 28607) has a satellite tracking program for either cassette (\$19.95) or disk (\$24.95).

The package includes four programs for orbital predictions (time, longitude of equator crossing), antenna pointing angles (azimuth, elevation versus time) RF pass loss and design of helical antennas.

The 25-page manual includes an explanation of the equations used, a satellite frequency list and many hints on satellite tracking and antenna design. All that and it runs in 8K of RAM!

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YC 7

your PET computer

TO BEGIN the year on a profitable note, I have included a horse-race program which should be ROM independent. For those with 8032s you may need to change the poke locations, but these are only screen pokes.

The idea of the program is to stimulate ideas among PET owners for ways it can be improved. You can submit these ideas to this column, and we will print some. In this way Commodore owners can get to know their machines better and also develop more programs.

Tutor-PET Lessons

Microcomputer consultant David Bates has given me permission to print a part of his Tutor PET program on machine language.

For those interested in taking up the matter further, please contact David at 17 Prince Street, Dundas, NSW 2117.

David sells his Tutor PET programs for \$9 each, or \$45 for a year's subscription (six issues).

Bates writes:

Programming techniques are being taught through a self-study series of tutorials for Commodore PET computers. These 'Tutor-PET' cassettes teach programming through examples. They are designed for the person who wants to progress beyond the first courses in BASIC and machine language.

Tutor-PET cassettes contain:

- lessons in BASIC programming
- BASIC subroutines to use in your own programs
- lessons in machine language

Here is part of a machine language tutorial:

We will develop a machine language which scrolls downwards a small 'window' on the screen. The window will be between lines 4-9 (that is, lines 1, 2 and 3 will not be moved). The 6-line window can be thought of as 240 bytes in memory (6 x 40) — locations \$8078-\$8167 (hexadecimal). SCROLLING DOWN (in 3 easy steps):

1. The 40 bytes of the bottom line are stored temporarily.

2. The top 5 lines are moved down (that is, bytes are moved ON 40 position starting from line 8 and moving up.

3. The previous bottom line ... held in step 1 ... is now stored as the new top line.

We will set up the machine language program in 3 subroutines, pointing to these 3 steps. First there will be a mainline, or calling routine:

```
$033AI 20 44 03I JSR    $0344I jump to subr 1
$033DI 20 50 03I JSR    $0350I jump to subr 2
$0340I 20 5C 03I JSR    $035CI jump to subr 3
$0343I 60          RTS      I return to BASIC
```

1. (store bottom line in unused memory)

```
$0344I A0 28      LDYIM  40 I load Y as counter
$0346I B9 3F 81I LDAY   $813FI load line 9,Y as index
$0349I 99 79 02I STAY   $0279I store in $0279, Y as index
$034CI 88          DEY     I Y=Y-1
$034DI D0 F7      BNE     $0346I loop until Y=0
$034FI 60          RTS      I return to mainline
```

2. (move lines 4 to 8 down by 40 bytes)

```
$0350I A0 C8      LDYIM  200 I Y as counter for 200(5 lines)
$0352I B9 77 80I LDAY   $8077I load each byte ..
$0355I 99 9F 80I STAY   $809FI store in +40
$0358I 88          DEY     I Y=Y-1
$0359I D0 F7      BNE     $0352I loop until Y=0
$035BI 60          RTS      I return
```

3. (replace previous bottom line on top line)

```
$035CI A0 28      LDYIM  40 I Y as counter to 40
$035EI B9 79 02I LDAY   $0279I load from temp location
$0361I 99 77 80I STAY   $8077I .. and store at top
$0364I 88          DEY     I Y=Y-1
$0365I D0 F7      BNE     $035EI loop until Y=0
$0367I 60          RTS      I return to mainline
```

This machine language program can be incorporated in BASIC in this way:

```
58000 FOR I = 826 TO 871:READ A:POKE I,A:NEXT I
58010 DATA 32,68,3,32,80,3,32,92,3,96
58020 DATA 160,40,185,63,129,153,121,2,136,208
58030 DATA 247,96,160,208,185,119,128,153,159,128
58040 DATA 136,208,247,96,160,40,185,121,2,153
58050 DATA 119,128,136,208,247,96
58060 RETURN
```

'SYS 826' scrolls the 6-line window around by one line.

The following makes the effect quite interesting:

```
10 GOSUB 58000:REM LOAD MACHINE LANGUAGE
20 FOR I = 1 TO 6:REM SCROLL WINDOW
30 SYS 826:REM .. AROUND 6 TIMES
40 FOR J = 1 TO 20:REM DELAY BETWEEN SCROLLS
50 NEXT J,I
```

PEDISK Countered

Commodore has released a single disk drive for the PET, to counter the PEDISK. I have not yet been able to evaluate the Commodore drive, but Nigel Shepherd was kind enough to pass the information on to me.

Maybe Commodore will forgive me and let me evaluate the drive for you...


```

READY.
10 PRINT"          3COMMODORE PARK"
15 PRINT"          COPYRIGHT PETER SANDVY'S"
20 FORX=1TO2000:NEXT
30 PRINT"HI WELCOME TO COMMODORE PARK !!!"
40 PRINT"THIS IS WHERE YOU WILL BE ABLE TO "
50 PRINT"RECOVER YOUR LOSSES ON YOUR COMPUTER"
60 PRINT"YOU WILL BE ASKED TO BET ON A HORSE "
70 PRINT"AND TO INDICATE THE AMOUNT OF THAT BET"
80 HF(1)="CITY PERS"
84 HF(2)="YOUR COMP"
86 HF(3)="WHELAN FEELIN"
88 HF(4)="SANDVY'S RUN"
90 X=INT(4*RND(1)+1)
100 PRINT"OK! THE HOT TIP IS:- 3"HF(X)" "
105 T=X
115 IF="000000"
120 GETAF
130 IF114="000015"THEN150
135 IFAF=" "THEN120
140 GOTO158
150 REM
158 PRINT" "
160 PRINT" "
161 PRINT"HOONEST JOE'S "
162 FORZ=1TO4:X=INT(4*RND(1)+1)
163 OOD(Z)=X*2
166 NEXT
168 PRINT" "
169 PRINT" "
170 PRINT" "
172 PRINT"HORSE # OODS"
174 PRINT"          CITY PERS 1 "00<1>" :1"
175 PRINT"          YOUR COMP 2 "00<2>" :1"
176 PRINT"          WHELAN FEELN 3 "00<3>" :1"
177 PRINT"          SANDVY'S RUN 4 "00<4>" :1"
178 GOSUB2000
190 FORX=1TO1000:NEXT
200 REM SET UP TRACK BY POKE COMMANDS
205 IFTV=1GOTO1400
210 PRINT" "
220 M=32888:FORX=NTOM+160:POKEX,228:NEXT
250 M=33048:FORX=NTOM+40:POKEX,163:NEXT
280 M=33088:FORX=NTOM+160:POKEX,228:NEXT
310 M=33248:FORX=NTOM+40:POKEX,163:NEXT
340 M=33288:FORX=NTOM+160:POKEX,228:NEXT
365 M=33448:FORX=NTOM+39:POKEX,163:NEXT
370 REM POKE LOCATIONS FOR END & START
380 FORX=1TO4:POKE32848+(X*40),220:NEXT
390 FORX=1TO4:POKE33285+(X*40),230:NEXT
400 REM NAME OF COURSE AND HORSES PACING
410 PRINT"**** WELCOME TO COMMODORE PARK **** "
420 H1=INT(3*RND(1)+1)
430 H2=INT(3*RND(1)+1)
440 H3=INT(3*RND(1)+1)
450 H4=INT(3*RND(1)+1)
460 P1=P1+H1:IFP1=40THENT1=T1+200:P1=P1-40
470 P2=P2+H2:IFP2=40THENT2=T2+200:P2=P2-40
480 P3=P3+H3:IFP3=40THENT3=T3+200:P3=P3-40
490 P4=P4+H4:IFP4=40THENT4=T4+200:P4=P4-40
500 S1=T1+P1+32888:POKES1,222
510 S2=T2+P2+32928:POKES2,222
520 S3=T3+P3+32968:POKES3,222
530 S4=T4+P4+33008:POKES4,222
540 FORX=1TO100:NEXT
550 IFS1=33325THENW=1:GOTO3000
560 IFS2=33365THENW=2:GOTO3000
570 IFS3=33405THENW=3:GOTO3000
580 IFS4=33445THENW=4:GOTO3000
590 POKES1,228
600 POKES2,228
610 POKES3,228
620 POKES4,228
630 GOTO420
650 FORX=1TOPE
800 IFVAL(BN$(X))=NTHENGOSUB900
805 NEXT
807 IFSX=1THENGOTO840
810 PRINT"SORRY OLD CHAPS"
840 PRINT"PLAY AGAIN "
850 GETAF:IFAF=" "THEN850
860 IFAF="Y"THENGOTO1050
870 POKES9458,30:END
900 PRINT NB$(X) :
910 PRINT" YOUR WINNINGS WERE $ "VAL(BT$(X))*OOD(X)
915 FORX=1TO4000:NEXT
918 PRINT" "
919 SW=1
920 RETURN
1050 POKES1,228:POKES2,228:POKES3,228:POKES4,228
1055 FORX=1TO4:POKE33285+(X*40),230:NEXT
1060 CLR
1060 TV=1
1080 GOTO160
1400 PRINT" "
1410 PRINT" "
1415 PRINT" "

```

```

1420 PRINT" "
1425 PRINT" "
1428 PRINT" "
1430 GOTO400
2000 PRINT"HOW MANY PEOPLE WANT TO BET MAX 9"
2010 GETPE$:IFPE$=""THEN2010
2015 PE=VAL(PE$)
2020 IFPE<=0ORPE>9THEN2010
2030 PRINT" "
2050 FORX=1TOPE
2060 PRINT"ENTER NAME OF BETTOR # "X";
2070 INPUTNB$(X)
2080 PRINT" "
2090 NEXT
2110 FORX=1TOPE
2120 PRINTNB$(X)" ENTER HORSE NUMBER ";
2130 GETBH$:IFBH$<"1"ORBH$>"4"THEN2130
2134 PRINTBH$
2135 FORXX=1TO500:NEXTXX
2140 PRINT" "
2150 BN$(X)=BH$
2170 PRINT" ENTER YOUR BET BETWEEN $10-$99 ";
2184 GETBA$:IFBA$=""THEN2184
2185 GETB$:IFB$=""THEN2185
2186 BT$(X)=BA$+BX$
2187 PRINTBT$(X)
2188 FORXX=1TO500:NEXTXX
2189 PRINT" "
2190 NEXT
2200 RETURN

```

Olympia Typewriter

Olympia has released its ES100 typewriter with an IEEE 488 interface, so you can have a low cost letter quality daisy-wheel printer without having to sacrifice the quality of your letters.

The Olympia has been making a name for itself as a reliable low cost daisy-wheel printer in the Apple market. Now that same quality is available for the Commodore.

The cost should be around \$2095, including the IEEE interface. At one stage Commodore was considering marketing the typewriter here itself, I am told.

If your local Commodore dealer does not stock the ES100, you should contact Olympia to find out where you can obtain one.

Epson Printers

Your local Epson dealer can now supply an IEEE 488 interface for the Epson range of printers. While I feel it would not be worthwhile to substitute an MX-80 for the Commodore 4022 printer, it nows means those who want friction and tractor feed capabilities are able to have it.

This also means the MX-100 is available, giving a 37 cm (15 inch) carriage with friction and tractor feed. I hope to bring you more details on the Epson/Commodore situation in the next issue.

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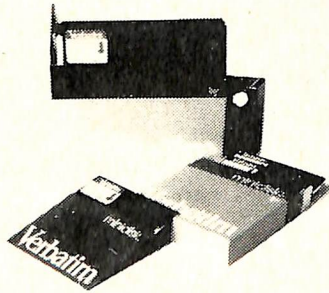
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The Secret War

WITH REFERENCE to your article in *Your Computer*, November 1981 'The Secret of Colossus', you may be interested to read a book called *The Ultra Secret*, by F.W. Winterbotham, published by Weidenfeld and Nicolson of London, 1974.

Winterbotham was chief of the Air Department of the Secret Intelligence Service from 1930 to 1954.

In the book, among many other things, Winterbotham claims that the British and Americans often had better knowledge of the progress of battles from intercepted and decoded German messages than they had from their own reports. In the battle of El Alamein, the British had exact knowledge of Rommel's plans, and they also knew he was short of fuel and other supplies.

Unfortunately, Winterbotham was not the kind of man who understood the workings of the machinery; it would be expecting the impossible if we thought he would, but apparently that was left to the 'boffins'. However, he had an unusual talent to be able to make the best use of the information.

I would like to be able to read a 'popular science' level account of how the decoding machines worked. Undoubtedly, it appears to have been the first practical use of computer technology.

Keep up the good work of your magazine.

B.N.A.
Mackay, Qld

Z80 I miss you

I HAVE eagerly followed your magazine from its very beginning, and being the proud owner of a ZX80 have enjoyed greatly the articles written on it. In the August issue there was even a special section for it at the back of the magazine.

Therefore I find your September/October issue slightly disappointing as there is not any mention of the mighty mite in the entire magazine. Will the special YOUR ZX80 COMPUTER page return to *Your computer* in the near future?

C. SAMPSON
Maldon, Vic.

Read this issue and your wish will be granted. Ed.

your computer pocket programs

Health Insurance Forecaster

JUST ABOUT everyone is confused about health insurance, especially with the changes introduced on September 1. This program for the System 80/TRS-80 submitted by John Richardson of Gooseberry Hill, Western Australia, gives you the opportunity to forecast your levels of medical, hospital and extras expenditure, then indicates which insurance tables will be most economical for you.

In addition, a list of available tables in each of the three categories is printed, showing the net cost after all tax benefits are allowed for, of various levels of expenditure.

If this all sounds confusing, run the program and all will be revealed.

Note, however, the program is based on the rates charged by HBF in Western Australia. It would be quite simple to modify this for other funds, other states, and the program indicates how to do this. Note too that HBF's benefit tables are based on 85 percent or 100 percent medical refund, and \$85 or \$110 per day hospital costs.

The program, which is written for the Dick Smith System 80, gives the user the option of hardcopy results, and could be reduced in length by around 40 percent, if LPRINT options were deleted.

The program can be used by single people or families, and takes into account all tax benefits.

HEALTH BENEFITS CALCULATOR

FAMILY TABLE
32c IN \$1 TAX REFUND ON HEALTH EXPENSES

MEDICAL BENEFIT OPTIONS

EXPENSES	NIL INS.	85% INS.	100% INS.
50	34	146	203
100	68	151	203
150	102	156	203
200	136	161	203
250	170	166	203
300	204	172	203
350	238	177	203
400	272	182	203
450	306	187	203
500	340	192	203
550	374	197	203
600	408	202	203
650	442	207	203
700	476	212	203
750	510	217	203
800	544	223	203
850	578	228	203
900	612	233	203
950	646	238	203
1000	680	243	203

HOSPITAL BENEFIT OPTIONS

DAYS	\$85/DAY BED RATE				\$110/DAY BED RATE			
	NIL	\$85 INS	\$110 INS	*	NIL	\$85 INS	\$110 INS	*
1	57	212	264	*	74	229	264	
2	115	212	264	*	149	246	264	
3	173	212	264	*	224	263	264	
4	231	212	264	*	299	280	264	
5	289	212	264	*	374	297	264	
6	346	212	264	*	448	314	264	
7	404	212	264	*	523	331	264	
8	462	212	264	*	598	348	264	

9	520	212	264	*	673	365	264
10	578	212	264	*	748	382	264
11	635	212	264	*	822	399	264
12	693	212	264	*	897	416	264
13	751	212	264	*	972	433	264
14	809	212	264	*	1047	450	264
15	867	212	264	*	1122	467	264
16	924	212	264	*	1196	484	264
17	982	212	264	*	1271	501	264
18	1040	212	264	*	1346	518	264
19	1098	212	264	*	1421	535	264
20	1156	212	264	*	1496	552	264
21	1213	212	264	*	1570	569	264
22	1271	212	264	*	1645	586	264
23	1329	212	264	*	1720	603	264
24	1387	212	264	*	1795	620	264
25	1445	212	264	*	1870	637	264
26	1502	212	264	*	1944	654	264
27	1560	212	264	*	2019	671	264
28	1618	212	264	*	2094	688	264
29	1676	212	264	*	2169	705	264
30	1734	212	264	*	2244	722	264
31	1791	212	264	*	2318	739	264
32	1849	212	264	*	2393	756	264
33	1907	212	264	*	2468	773	264
34	1965	212	264	*	2543	790	264
35	2023	212	264	*	2618	807	264
36	2080	212	264	*	2692	824	264
37	2138	212	264	*	2767	841	264
38	2196	212	264	*	2842	858	264
39	2254	212	264	*	2917	875	264
40	2312	212	264	*	2992	892	264

ANCILLARY BENEFIT OPTIONS

EXPENSES NO ANCILLARY BENEFIT ANCILLARY BENEFIT

25	17	86.5
50	34	95
75	51	103.5
100	68	112
125	85	120.5
150	102	129
175	119	137.5
200	136	146
225	153	154.5
250	170	163
275	187	171.5
300	204	180
325	221	188.5
350	238	197
375	255	205.5
400	272	214
425	289	222.5
450	306	231
475	323	239.5
500	340	248

SAMPLE EXPENSE/BENEFIT - ALL TABLES

GROSS MEDICAL COSTS \$ 400
GROSS HOSPITAL COSTS \$ 990 (\$ 110 * 9)
GROSS ANCILLARY COSTS \$ 240

TOTAL HEALTH COSTS \$ 1710

BENEFIT TABLE GROSS EXPENSES NET EXPENSES

\$110H+85%M+ANC	1710	614
\$110H+85%M	1710	617
\$110H+100%M+ANC	1710	627
\$110H+100%M	1710	631
\$85H+85%M+ANC	1710	715
\$85H+85%M	1710	718
\$85H+100%M+ANC	1710	728
\$85H+100%M	1710	732
\$110H+ANC	1710	750
\$110H	1710	753
\$85H+ANC	1710	851
\$85H	1710	854
NO INSURANCE	1710	1162


```

3 CLEAR200
4 GOTO10
5 INPUT"PRESS 'NEW LINE' TO CONTINUE";N0:RETURN
6 PRINTSTRING(62,"-"):RETURN
7 LPRINTSTRING(62,"-"):RETURN
10 CLS:PRINTTAB(10)"HEALTH BENEFIT CALCULATOR"
11 PRINT"PRINT"COMPARES BENEFIT TABLES AVAILABLE AND CALCULATES FINAL NET COST OF
A RANGE OF HEALTH EXPENSES, TO ASSIST SELECTION OF INSURANCE TABLE MOST APPROP
RIATE TO USER'S NEEDS."
12 PRINT"PRINT"RESPONSIBILITY IS DISCLAIMED FOR ANY LOSS RESULTING FROM USE OF T
HIS PROGRAMME."
13 PRINT"PRINT"DATA IS VALID FOR WEEKLY CONTRIBUTIONS TO HBF (WA). EDIT LINES 3
0 TO 70 FOR OTHER FUND CONTRIBUTION RATES. TAX REBATE ON QNT- RIBUTIONS HAS BEE
N ALLOWED FOR."
14 GOSUB5
20 DIMN(13),K(13),EE(13)
30 M1=4*52*.60:REM #4/WEEK MEDICAL TABLE (85%)
40 M2=M1+1.2*52:REM #5.20/WEEK MEDICAL TABLE (100%)
50 M1=6*52*.60:REM #6/WEEK HOSPITAL TABLE (#65)
60 M2=M1+52:REM #7/WEEK HOSPITAL TABLE (#110)
70 A1=1.5*52:REM #1.50/WEEK ANCILLARY TABLE
80 FORX=1TO13:READN(X):NEXT
90 DATA"85%","#85H+85%M","#85H+ANC","#85H+85%M+ANC","#85H+100%M","#85H+100%M+AN
C","#110H","#110H+ANC","#110H+85%M","#110H+85%M+ANC","#110H+100%M","#110H+100%M+
ANC","NO INSURANCE"
100 CLS:PRINT"INPUT"HARD COPY PRINTER REPORT REQUIRED (Y/N)";P#
110 PRINT"INPUT"FAMILY OR SINGLE BENEFITS TABLE (F/S)";F#
120 IFF#="Y"THENLPRINT"HEALTH BENEFITS CALCULATOR":GOSUB7
130 IFF#="Y"ANDF#="F"THENLPRINT"FAMILY TABLE"
150 IFF#="Y"ANDF#="S"THENLPRINT"SINGLE TABLE"
160 IFF#="Y"ANDF#="F"THEN170ELSE100
170 M1=M1/2:M2=M2/2:H1=H1/2:H2=H2/2:A1=A1/2
180 GLS:PRINT"ARE YOU ELIGIBLE FOR A TAX REFUND ON YOUR HEALTH COSTS? AVAIL- AB
LE IF YOUR 'CONGRESSIONAL EXPENDITURE' (LIFE INSURANCE, SUPER- ANNUATION), EDUCATI
ON, RATES, HEALTH COSTS) EXCEEDS $1590."
185 INPUT"ENTER Y/N";I#
190 TX=1:IFT#="Y"THENTX=.60
200 IFF#="Y"ANDT#="Y"THENLPRINT"32% IN #1 TAX REFUND ON HEALTH EXPENSES"
210 IFF#="Y"ANDT#="N"THENLPRINT"NO TAX REFUND ON HEALTH EXPENSES"
300 CLS:PRINTTAB(25)*** MENU ***
305 GOSUB6
310 PRINT"1. REVIEW MEDICAL BENEFIT OPTIONS"
320 PRINT"2. REVIEW HOSPITAL BENEFIT OPTIONS"
330 PRINT"3. REVIEW ANCILLARY BENEFIT OPTIONS"
340 PRINT"4. ENTER SAMPLE HEALTH COSTS. COMPARE BENEFIT TABLES"
350 PRINT"INPUT"ENTER SELECTION (1-4)";S
360 IFS<1ORS>4THEN300
370 ONSGOTO400,600,800,1000
400 CLS:PRINT"MEDICAL BENEFITS":GOSUB6
410 PRINT"PRINT"FOR A RANGE OF ANNUAL MEDICAL EXPENSES, DISPLAYS THE AFTER TAX
COSTS, AFTER PAYMENTS FROM INSURANCE FUNDS WHERE APPLICABLE."
420 PRINT"PRINT" 'COST' = TOTAL EXPENSE BEFORE ANY TAX OR FUND REBATE/PAYMENT"
430 PRINT" 'NIL' = NO HEALTH INSURANCE"
435 PRINT" '85%' = NET COST AFTER REFUNDS, PLUS FUND CONTRIBUTIONS, AT 85%
REFUND LEVEL"
440 PRINT" '100%' = AS ABOVE, BUT AT 100% REFUND LEVEL"
450 PRINT"PRINT"PROGRAMME PROVIDES FOR COSTS TO $1000. FOR HIGHER COSTS, EDIT
LINES 400/520." GOSUB5
455 IFF#="Y"GOTO510
460 GOSUB1510
470 FORGM=50TO1000STEP50
480 PRINTGMTAB(15)INT(GM*TX)TAB(30)INT(GM*.15*TX+M1)TAB(45)INT(M2)
490 IFGM/500<>INT(GM/500)THEN500
495 GOSUB5 GOSUB1510
500 NEXTGM GOTO300
510 LPRINT"PRINT"MEDICAL BENEFIT OPTIONS":LPRINT
512 LPRINT"EXPENSES"TAB(15)"NIL INS."TAB(30)"85% INS."TAB(45)"100% INS." GOSUB7
515 FORGM=50TO1000STEP50
520 LPRINTGMTAB(15)INT(GM*TX)TAB(30)INT(GM*.15*TX+M1)TAB(45)INT(M2)
530 NEXTGM GOTO300
600 CLS:PRINT"HOSPITAL BENEFITS":GOSUB6
605 PRINT"PRINT"DISPLAYS NET COST OF UP TO 40 DAYS IN HOSPITAL PER ANNUM, AT
#85 AND #110 BED RATES. OPTIONS ARE NIL INSURANCE, #85/DAY INSURANCE TABLE,
#110/DAY INSURANCE TABLE." GOSUB 5
610 IFF#="Y"THEN700
615 GOSUB620 GOTO660
620 CLS:PRINTTAB(10)"85/DAY BED RATE"TAB(32)"*TAB(40)"#110/DAY BED RATE"
640 PRINT"PRINT"DAYS"TAB(7)"NIL"TAB(13)"#85 INS"TAB(22)"#110 INS"TAB(32)"*TAB(36)
6)"NIL"TAB(43)"#85 INS"TAB(53)"#110 INS"
650 GOSUB6 RETURN
660 FORHD=1TO40
670 PRINTHDHTAB(7)INT(HD*85*TX)TAB(13)INT(H1)TAB(22)INT(H2)TAB(32)"*TAB(36)INT(H
D*110*TX)TAB(43)INT(HD*25*TX+H1)TAB(53)INT(H2)
680 IFHD/10<>INT(HD/10)THEN690

```

```

685 GOSUB5:GOSUB620
690 NEXTHD:GOTO300
700 LPRINT"PRINT"HOSPITAL BENEFIT OPTIONS":LPRINT
710 LPRINTTAB(10)"#85/DAY BED RATE"TAB(40)"#110/DAY BED RATE"
720 LPRINT"DAYS"TAB(7)"NIL"TAB(13)"#85 INS"TAB(22)"#110 INS"TAB(32)"*TAB(36)"NI
L"TAB(43)"#85 INS"TAB(53)"#110 INS"
730 GOSUB7
740 FORHD=1TO40
750 LPRINTHDHTAB(7)INT(HD*85*TX)TAB(13)INT(H1)TAB(22)INT(H2)TAB(32)"*TAB(36)INT(
HD*110*TX)TAB(43)INT(HD*25*TX+H1)TAB(53)INT(H2)
760 NEXTHD:GOTO300
800 CLS:PRINT"ANCILLARY BENEFITS":GOSUB6
810 PRINT"ANCILLARY BENEFITS COVER DENTAL, OPTICAL AND OTHER MISCELLANEOUSEXPENS
ES. TYPICALLY, REFUND IS 50% OF EXPENSE. THE TABLE COMP-ARES NET AFTER-TAX COS
T FOR A RANGE OF ANNUAL ANCILLARY ITEM EXPENSES." GOSUB5
820 IFF#="Y"GOTO900
830 GOSUB1500
850 FORAC=25TO500STEP25
860 PRINTACTTAB(20)AC*TXTAB(45)AC/2*TX+A1
870 IFAC/250<>INT(AC/250)THEN880
875 GOSUB5:GOSUB1500
880 NEXTAC:GOTO300
900 LPRINT"PRINT"ANCILLARY BENEFIT OPTIONS"
910 LPRINT"EXPENSES"TAB(15)"NO ANCILLARY BENEFIT"TAB(40)"ANCILLARY BENEFIT"
920 GOSUB7
930 FOR AC=25TO500STEP25
940 LPRINTACTTAB(20)AC*TXTAB(45)AC/2*TX+A1
950 NEXTAC:GOTO300
1000 CLS:PRINT"SAMPLE EXPENSE BENEFIT CALCULATOR":GOSUB6
1010 PRINT"PROVIDES NET COST, AFTER TAX, OF SAMPLE (FORECAST) HOSPITAL, MEDIC
AL AND ANCILLARY EXPENSES ENTERED BY THE USER."
1020 PRINT"DATA IS FOR ALL AVAILABLE BENEFIT TABLES AND INCLUDES AFTER-TAX CONTR
IBUTION COSTS."
1025 PRINT"INPUT"ENTER YOUR GROSS ANNUAL MEDICAL COSTS";GM
1030 INPUT"ENTER NUMBER OF DAYS IN HOSPITAL PER YEAR";DA
1035 INPUT"ENTER HOSPITAL BED RATE (#85 OR #110)";RA
1040 IFRA<>85ANDRA<>110THEN1035
1050 INPUT"ENTER GROSS ANNUAL ANCILLARY ITEM COST";GA
1060 GC=GM+RA*DA+GA
1070 RB=RA-85
1080 RC=RA-110:IFRC<0THENRC=0
1085 B1=GM*TX:B2=B1*.15:B3=RB*DA*TX:B4=RC*DA*TX:B5=GA*TX
1100 K1)=B1+B3+B5+H1
1110 K2)=B2+B3+B5+H1+M1
1120 K3)=B1+B3+B5/2+H1+A1
1130 K4)=B2+B3+B5/2+H1+M1+A1
1140 K5)=B3+B5+H1+M2
1150 K6)=B3+B5/2+H1+M2+A1
1160 K7)=B1+B4+B5+H2
1170 K8)=B1+B4+B5/2+H2+A1
1180 K9)=B2+B4+B5+H2+M1
1190 K10)=B2+B4+B5/2+H2+M1+A1
1200 K11)=B4+B5+H2+M2
1210 K12)=B4+B5/2+H2+M2+A1
1220 K13)=GC*TX
1230 GOSUB1600
1250 IFF#="Y"GOTO1400
1260 PRINT"PRINT" BENEFIT TABLE"TAB(20)"GROSS EXPENSES"TAB(40)"NET COST"
1270 GOSUB6
1280 FORX=1TO13
1290 PRINTS#(EE(X))TAB(23)GCTAB(43)INT(N(EE(X)))
1300 NEXTX:GOSUB5:GOTO300
1400 LPRINT"PRINT"SAMPLE EXPENSE/BENEFIT - ALL TABLES":GOSUB7
1410 LPRINT"GROSS MEDICAL COSTS $"GM
1415 LPRINT"GROSS HOSPITAL COSTS $"RA*DA ("#RA*"DA")
1420 LPRINT"GROSS ANCILLARY COSTS $"GA
1430 LPRINT"PRINT"TOTAL HEALTH COSTS $"GC
1440 LPRINT"PRINT" BENEFIT TABLE"TAB(20)"GROSS EXPENSES"TAB(40)"NET EXPENSES"
1450 GOSUB7
1460 FORX=1TO13
1470 LPRINTS#(EE(X))TAB(23)GCTAB(43)INT(N(EE(X)))
1480 NEXTX:GOTO300
1500 CLS:PRINT"EXPENSES"TAB(15)"NO ANCILLARY BENEFITS"TAB(40)"ANCILLARY BENEFIT"
GOSUB6:RETURN
1510 CLS:PRINT"EXPENSE"TAB(15)"NIL"TAB(30)"85%"TAB(45)"100%":GOSUB6:RETURN
1600 FOR AR=1TO13
1610 PP=1
1620 FORBB=1TO13
1630 IFN(AR)<>N(BB)THENPP=PP+1
1640 IFN(AR)=N(BB)ANDAR<BBTHENPP=PP+1
1650 NEXTBB
1660 EE(PP)=AR
1670 NEXTAR:RETURN
15100 CLS:PRINT"EXPENSE"TAB(15)"NIL"TAB(30)"85%"TAB(45)"100%":GOSUB6:RETURN

```


ZX80 8K ROM Function Plotter

READER and ZX80 user James C. Canning, of Frankston, Victoria, noticed the September/October issue of *Your Computer* lacked his two favourite departments — Your ZX80 Computer, and Pocket Programs.

Canning wrote to us: "As a ZX80 user, I must ask what has happened to the life-lines of we underfinanced computer boffins? I can only assume the reason for this unfortunate omission is lack of reader input, thus I submit my ZX80 8K ROM Function Plotter, to share with fellow users."

And he enclosed this program.

The program has been designed for the ZX80 8K user who would like to see the functions of the 8K ROM put to use. It provides a graphical representation of almost any relation, whether it be a simple linear or complex trigonometric.

The listing itself has been economised, to provide a maximum amount of display file in the ZX80's little 1K memory. In using the program, the first step is to enter the initial parameters, namely the equation by which the graph is defined, and the extreme points to be plotted.

Equations are entered as strings and must be given in terms of the variable 'X'. For example: $2 \cdot X^2 - 3 \cdot X + 2$, or $\text{SIN } X$, where 'SIN' is a single-worded ZX80 function.

This format is required for the VAL A\$ function in line 30 to operate without errors.

Secondly, the X and Y maximum and minimum values must be entered. The object of these parameters is to control the portion of the graph seen by dimensioning the screen to suit. It should also be noted that the larger the graph on the screen, the more likely it is to cause a 'memory full' error, considering a large display file has developed.

The operation of the plotter itself begins at line 26, with a single loop whose function is to adjust the equation's solutions to ones which can be plotted on the computer's 64 by 44 pixel grid.

Note in line 36 that if the Y value exceeds the limits of the screen, then that point is omitted and the program continues. It is also often useful to use 'GOTO' instead of 'RUN' when the same graph is required with different dimensions.

The modifications available for this program could be endless, particularly if you're the proud owner of a 16K RAM pack. X and Y axes, scales and more graph information such as intercepts, gradients and maximum and minimum points, could all be added. The extent of these additions are limited only by your own ingenuity (and memory space!).

```

ZZZZZ X   X   888   1
      Z X   X   8   8   11
        Z X X   8   8   1
          Z X X   888   1
            Z X X   8   8   1
              Z X X   8   8   1
                Z X X   8   8   1
ZZZZZ X   X   888   11111
  
```

```

PPPP L   000. TTTT TTTT EEEEE RRRR
P   P L L 0 0 T T E E R R
P   P L L 0 0 T T E E R R
PPPP L L 0 0 T T E E RRRR
P   P L L 0 0 T T E E R R
P   P L L 0 0 T T E E R R
      LLLL 000 T T EEEEE R R
  
```

```

2 PRINT "EQUATION:";
4 INPUT A$
6 PRINT A$
8 PRINT "XMIN:";
10 INPUT A
12 PRINT A;" XMAX:";
14 INPUT B
16 PRINT B;" YMIN:";
18 INPUT C
20 PRINT C;" YMAX:";
22 INPUT D
24 PRINT D
26 FOR N=A TO B STEP -(A-B)/50
28 LET X=N
30 LET Y= VAL A$
32 LET X=5+50*(X-A)/ ABS (A-B)
34 LET Y=36*(Y-C)/ ABS (C-D)
36 IF Y>36 OR Y<0 THEN NEXT N
38 PLOT X,Y
40 NEXT N
  
```


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your computer club news

THE INAUGURAL meeting of the Brisbane Super 80 users group will be held on Wednesday February 10 at 7 pm in room 21, first floor, Trades Hall, Wickham Terrace, City. All welcome.

Contact Garry Gatfield, on (07) 225 8663 in business hours.

* * *

AUSTRALIAN CAPITAL TERRITORY
Australian ZX80 Users' Group (AZUG); David Brudenall, 19 Godfrey St, Campbell, ACT 2601.

MICSIG; Registrar, PO Box 446, Canberra 2601

OMEGA (Ohio Scientific Microcomputer Enthusiasts Group Australia); Geoff Cohen, 72 Spofforth St. Holt, ACT 2165.

Sorcerer Computer Users of Australia (ACT Branch); Mr G.T. Dick, 31 Creswell St, Campbell, ACT 2601.

NEW SOUTH WALES

Australasian ZX 80 Users Newsletter; 87 Murphys Avenue, Keiraville, NSW 2500

Commodore Users Group; John Guidice, GPO Box 4721, Sydney 2001.

Compucolor Users Group; Andrew MacIntosh, 91 Regent St. Chippendale, Sydney 2008.

80-AT; The Australian 8080-Z80 Users Group; PO Box 165, Lakemba 2195.

Macarthur Computer Users Association; R.G. Friend, C/- 109 Campbellfield Ave, Campbelltown, 2560. Phone (046) 25 2752 (A.H.) or (046) 76 0541 extn 325 (Work).

MEGS; (Microcomputer Enthusiasts Group); John Whitlock, PO Box 3, St. Leonards 2065.

Newcastle Microcomputer Club; Gordon Johnson, Electron Microscope Unit, University of Newcastle. Phone (049) 68 5045 (Work).

NSW Apple Users Group; John Smith, 1a Wallaroy Road, Double Bay 2028, Phone (02) 36 5696.

NSW 6800 User Group; 27 Georgina Avenue, Keiraville, NSW 2500.

Sorcerers Users Group; PO Box E162, St. James 2001. Ian King, 15 Forest Avenue, Wahroonga 2076. Phone (02) 48 6072.

TI-99/4 Home Computer Users' Group of Sydney; S. Andersen, PO Box 101, Kings Cross, 2011. Phone (02) 358 6662.

NORTHERN TERRITORY

The MicroComputer Association of the Northern Territory; Andy Smith, Darwin Community College, Casuarina, NT.

QUEENSLAND

Brisbane Youth Computer Group; A. Harrison, PO Box 396, Sunnybank 4109.

Commodore Computer Users Group of Queensland; Mrs D.D. Dillon, PO Box 127, Stones Corner, 4120.

Iree Microcomputer Interest Group; N. Wilson, PO Box 811, Albion 4010.

Superboard Users Group, Ed Richardson, 146 York Street, Nundah, 4012.

SOUTH AUSTRALIA

Adelaide Micro User Group (TRS-80 and System 80 Users); R.G. Stevenson, 36 Sturt St, Adelaide 5000.

South Australian Microprocessor Group Inc (SAMG); The Secretary, PO Box 113, Plymton, 5038. Phone (08) 278 7288.

TASMANIA

TAS-Micro; Peter Deckert, Unit 1/456 West Tamar Rd, Riverside, Launceston, 7250.

Tasmanian OSI Users Group; David Tasker, 111 Bass Highway, Westbury, 7303

VICTORIA

Apple Users Society of Melbourne; G. Halprin, Phone (03) 859 5835.

BUG 80; Burwood Users Group, PO Box 46, Blackburn South 3130.

Compucolor Users Group; L. Ferguson, 12 Morphett Avenue, Ascot, Melbourne 3342.

Geelong Computer Club; Peter McKeon, PO Box 93, Geelong 3220.

KAOS (Ohio Scientific); David Anear, 49 Millewa Crescent, Dallas, 3047.

National ZX80 Users Club; 24 Peel St. Colliingwood, 3066

Northern and Western Suburbs Computer Users' Group; contact CP/M Data Systems, 284 Union Rd, Moonee Ponds, 3039. Phone John King (Secretary) (03) 338 9304

SMUG; SCORD M100 users, Robin Miller, 60 Winmalee Drive, Glen Waverley 3150.

Sorcerer Computer Users (Australia); Secretary, PO Box 144, Doncaster 3108.

WESTERN AUSTRALIA

Sorcerer Computer Users of Australia; The Secretary, 90 King George St, South Perth 6151. Phone (09) 367 6351

CU WEST (WA Compucolour/Intecolor User Group); John Newman, 8 Hillcrest Drive, Darlington, 6070.

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Wellington Microcomputer Society Inc; Lindsay Williams, 2 Pope Street, Plimmerton, New Zealand

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NOW AVAILABLE: For those who missed out, we have obtained limited stocks of *Your Computer* issue numbers 1, 2 and 3. Available from White House Publishing, 706 Military Road, Spit Junction for \$2 per copy or write to White House Publishing Group, PO Box 216, Spit Junction, NSW., 2088 for mailed copies at \$2 50 per copy.

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, in which arithmetic and logical functions are performed. Some computers have several registers which can function as accumulators; in others some registers can perform a subset of the full set of operations.
- Address:** A memory location which can contain data or an instruction.
- Algol:** Algorithmic Language, an early computer programming language for mathematical applications. Widely used in Europe, embodied early structured programming concepts and was a precursor of Pascal.
- Algorithm:** A set of instructions which define a method of obtaining some result (usually mathematical). A cooking recipe is an algorithm, as is a knitting pattern.
- Alphanumeric:** Composed of either letters or numbers or both.
- Analogue (Analog):** Representation of a value by a voltage or some other measurable datum, rather than a binary or other representation based on counting.
- Apple:** The Apple 11 computer is a computer based on the 6502 microprocessor with an integrated keyboard. Noted for its colour graphics capabilities, which make it popular with schools.
- Application:** What you do with your computer.
- Array:** A set of values under a common variable name, which are accessed through a subscript. For example A[1] is the first item in array A, A[2] is the second, etc. A[N] is the Nth item.
- ASM:** Assembler. also a suffix added to assembly language file names to distinguish them from other files with the same name.
- Assembler:** A program which converts assembly language into its corresponding machine (or object) code, which can be executed by the computer.
- Assembly Language:** A language in which each machine code instruction is represented by a short mnemonic which is much more comprehensible to the programmer. For example, the 8080 machine code
[10010110]
in binary, is
[SUB L]
(subtract L from accumulator) in assembly language. Each line of assembly language becomes one machine instruction.
- Assign:** To make one thing equal to another, e.g: [A = B] assigns the value of B to A.
- 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. Invented in 1970 at Dartmouth College By Kemeny and Kurtz as a teaching language, it has since been enhanced in its more exotic forms into one of the most sophisticated yet easy-to-use languages available on personal computers. Its major rival is Pascal, which has the added virtue of stressing structured program design.
- 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.
- Binary Tree:** A form of data structure in which entries are tagged on at the end of the appropriate branches.
- BIOS:** Basic Input/Output System. The part of the CP/M operating system which is different for each machine and provides any special I/O routines for disks, terminal, printer, etc.
- 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.
- Branch Instruction:** A program instruction which causes the computer to jump to another instruction, usually fairly close by.
- 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. Makes programmers itch.
- 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, which is particularly convenient for writing system utility programs.
- Case Statement:** An instruction found in some high level languages which allows control to pass to one of several subroutines depending on the value of a variable. For example, the BASIC statement
ON X GOSUB 100, 200, 300
will jump to line 100 if X = 1, 200 if X = 2, 300 if X = 3.
- 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. Doesn't use line numbers on every line, and is compiled, rather than interpreted like Microsoft BASIC.
- 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:**
Absolute: Machine instructions which are intended to be loaded and executed in a particular area of memory.
Object: Machine instructions, as distinct from the source code from which it was generated.
Reentrant: Code which can be used by several users at once, keeping separate variables for each.
Relocatable: Code which can be loaded and run anywhere in the computer's memory.
Source code: A program written in assembler, or a high level language such as BASIC, which must then be assembled or compiled to produce the object code which can actually be executed.
- Cold Boot:** To start up a system from scratch, loading the operating system from disk or tape.
- Cold Start:** See Cold Boot.
- COM file:** In CP/M parlance a command file, that is, a machine code program that can actually be run.
- Command:** An instruction from the console for the system to do something.
- Comment:** A note added into a program to help the reader (or programmer) to understand its operation. Does not affect the program's execution in any way.
- 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.
- Computer:** Are you serious?
- Concatenate:** To join two strings together, one after the other.
- Conditional:** A test; for example, is X greater than Y: IF X is greater than Y
THEN GOSUB 500 (BASIC)

or, if the carry flag is set, jump to location NEXDIG:
JC NEXDIG (Assembler)
Conditionals are one of the most powerful features of any computer language.

Console: The keyboard and screen from which the operator controls the computer.

Control characters: Codes which perform functions like acknowledging correct receipt of a message or requesting retransmission of an erroneous message. Control characters are defined as part of the ASCII and similar codes.

Copy: To duplicate, usually for backup safety.

CP/M: A disk operating system for 8080 and Z80 based microcomputers. Allows the user to store information and programs in named files, as well as managing disk storage and input/output functions. Other disk operating systems include TRSDOS (on TRS-80) and DOS 3.3 (for Apple).

CRT: Cathode Ray Tube. Usually refers to the screen of a video terminal or the terminal itself.

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.

Decimal: Based on ten.

Delete: To erase.

Device: A piece of equipment such as a printer or tape drive which the computer uses.

Directory: A list of the programs on a disk (or occasionally tape) together with necessary information, such as length and location.

Disc: A flat, circular magnetic surface on which the computer can store and retrieve data and programs. Is fast compared with tape, particularly when access is not one item after another.

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; sometimes the computer can draw on the display.

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.

Erase: See delete.

Error Message: Tells you something went

wrong, and sometimes what.

Execute: To run a program; to follow its instructions.

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. Usually limited to small values, and restricted in accuracy, giving rise to ridiculous answers such as $9/5 = 1$.

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. There are two varieties; eight inch and 5¼ inch. These can typically store somewhere between 140,000 and 3 million bytes (characters).

Focal: Formula Calculator. A simple language, rather like a small BASIC, found on some mini and microcomputers.

FORTRAN: Formula Translation. One of the first computer languages, and beginning to show it.

Function: A sub-program that processes variables in some well-defined way.

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. See local.

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.

Hard Copy: Printout.

Hardware: The bits of a computer you can kick, as opposed to the programs you can only swear at.

Hashing: A method of reducing the size of a table which otherwise would have mostly empty entries.

Hexadecimal: The method of counting to the base sixteen. Or the method of splitting binary digits into groups of four, which is the same thing. In hex, you count: 0 1 2 3 4 5 6 7 8 9 A B C D E F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F 20 21 22 . . .

Identifier: A label, or the name of a variable.

Iff: If and only if.

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. Compare with compiler.

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.

Jump Instruction: Normally, control proceeds from one instruction to the next, one after the other. A jump instruction passes control, not to the following instruction, but to some other. Jumps can be conditional.

Kilo-: Prefix meaning one thousand.

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.

Language: The set of instructions, and rules for stringing them together, which you use to instruct the computer what to do.

Library: A set of programs, or sub-programs.

Line Number: A number at the beginning of a line, which identifies it in a similar way to a label.

Line Printer: A high-speed printer for computer output.

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.

List: A sequence of consecutive data items.

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: what the computer regards as the "list device" may be one of several "physical devices", such as a line printer or teletype.

Loop: To repeatedly execute a sequence of instructions; part of a computer program that is so executed.

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.

Microcomputer: A small computer based on a microprocessor.

glossary

- 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.
- NAD:** A name and address file maintenance program.
- 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.
- all work. See Disk Operating System.
- Operator:** An arithmetic function or some other function which alters variables.
- Optimization:** Making a program work better (or faster, or using less memory).
- 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 of you before allowing you access to certain (or all) programs or data.
- Patch:** A temporary (ha,ha) fix on a bug.
- Peripheral:** A piece of equipment the computer uses, like a printer, disk drive, or modem.
- Peripheral Driver:** A program which outputs data to a peripheral and controls it.
- Physical Device:** See Logical Device.
- PIP:** Peripheral Interchange Program. A CP/M utility for copying files between devices.
- PL.1:** Programming Language /1. A good general purpose commercial language.
- 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.
- Poll:** To ask a peripheral if it requires service.
- Postfix Notation:** Also known as Reverse Polish Notation, this is similar to Polish; 4 5 means 4 + 5.
- Preprocessor:** A program which does part of a job to make life easier for the program which follows; e.g. a macro processor before an assembler.
- Printer:** Gets computer output down onto paper.
- Priority:** The resolution of which interrupt is serviced first if two should arrive at the same time.
- Process:** A program.
- 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.
- Reader:** Paper tape input device.
- 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 (particularly BASIC).
- Schedule:** To decide at what stage a process should run (of an operating system).
- Screen:** See CRT.
- 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, e.g. BASIC, Assembler, C.
- Sort:** To arrange items of data in order.
- Spool:** To output a file to a peripheral, usually either a printer or tape.
- Stack:** A list in which both entries and removals are made at the same end. A microprocessor usually has a hardware stack which is used to save subroutine return addresses, temporary storage of data, and to pass variables between subroutines.
- 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. Often, the only program that is not a transient is the operating system.
- 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, but can be two on recent processors.
- 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.
- Z80:** A popular 8-bit microprocessor.

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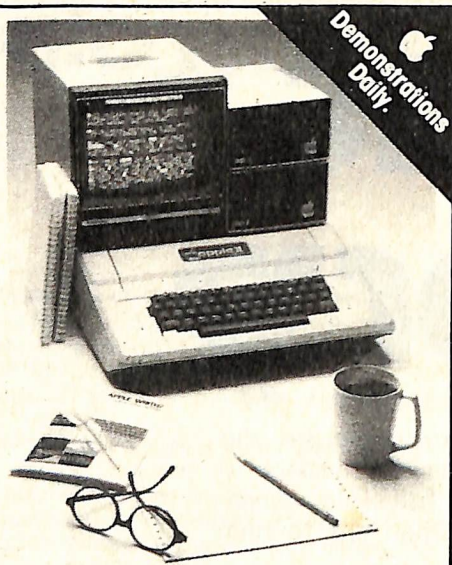
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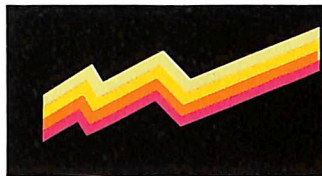
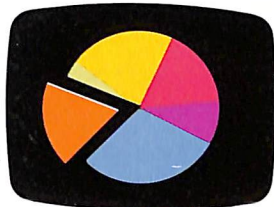
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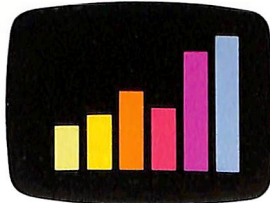
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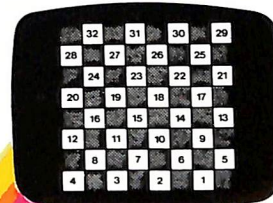
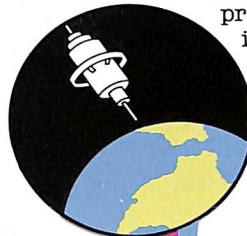
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