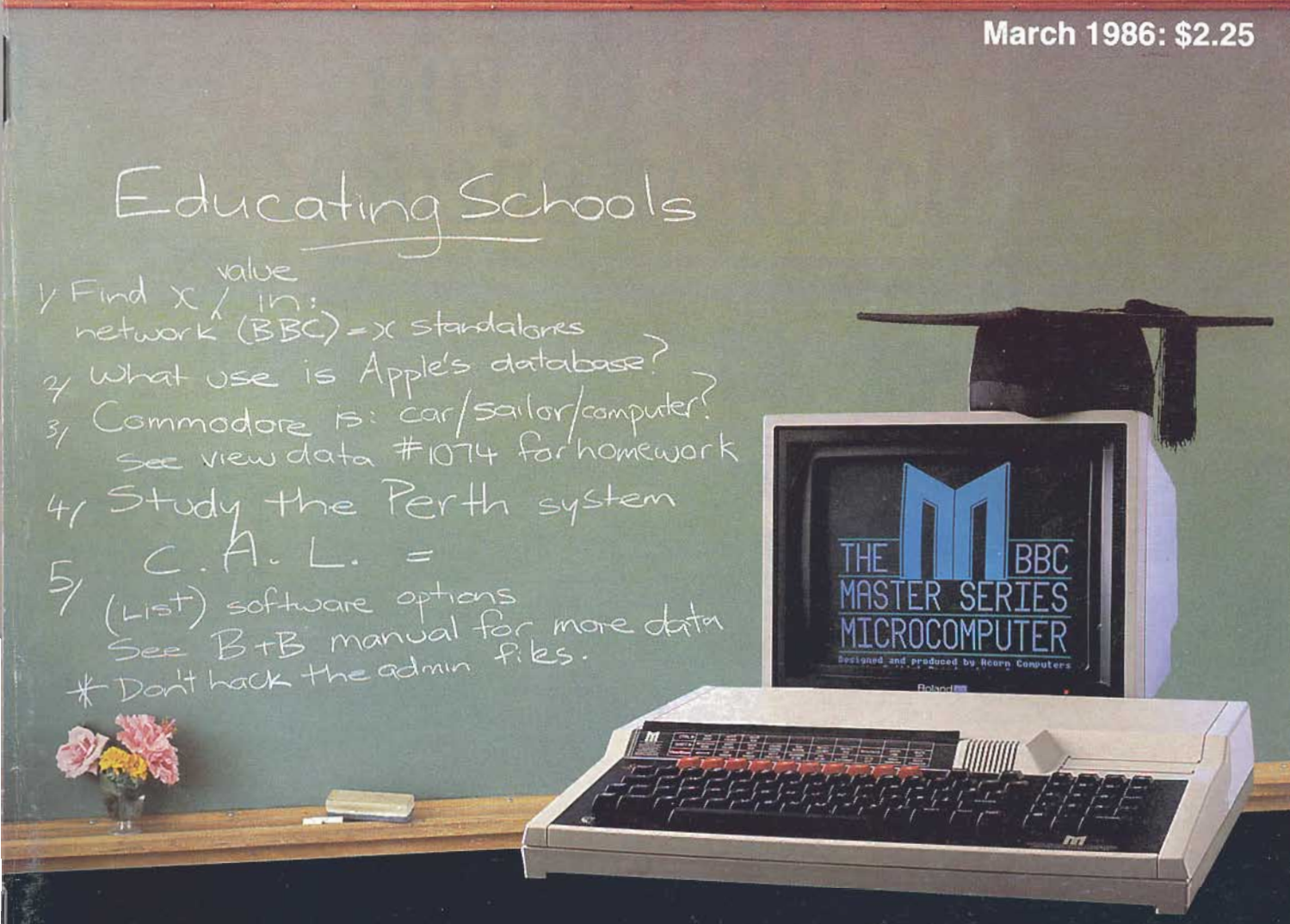
NEW ZEALAND'S LEADING COMPUTER MAGAZINE

BITS & BYTES

March 1986: $2.25



Hardware reviews

BBC Master 128

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Atari 130XE

Software

Attache

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Hardware survey continued

Multi-user systems: Part II

Computer columns plus Insider's column and Micros-at-work

NEW

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

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with Colour Monitor
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with Green Screen

Amstrad CPC 6128

with Colour Monitor or Green Screen

The Businesslike CPC6128

By including a disc drive and 128K or RAM with the CPC6128, Amstrad has elevated the budget price computer beyond being primarily a games console into the realm where serious business applications may be tackled with ease.

Digital Research's famous CP/M Plus operating system keeps your CPC6128 disc filing in order while programs like Microscript and Amsoft Business Control system (dual disc systems) keeps your business affairs in order.

The Amstrad CPC6128 is the ideal computer for the small business, and what with rates, mortgages, HP, income tax, insurance etc just about everyone can benefit from running their personal affairs with the aid of a low cost computer.

Give all your correspondence the professional touch. Plan your domestic budget, file names and addresses, organise your time more effectively. Amsoft has programmes already available to do all these tasks and many more.

The Entertaining CPC6128

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

There's shoot-outs, adventures, brain teasers, card games, 'simulations' – enough to keep the most agile and inquisitive minds busy indefinitely. As part of the CPC6128 package you will also receive CPM plus, GSX and Dr Logo, the world famous teaching and graphics language that introduces the concepts and ideas behind writing computer programs.

High Performance-Low Cost

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

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

An Expanding System

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

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

Compatibility

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

There's a full PRESTEL mode with graphics and colour.

The built in ROM BASIC for the CPC6128 is in the tradition of excellence established by the CPC464 and CPC664. Programs written using the CPC464/CPC664 BASIC will run on the CPC6128.

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As a member you will enjoy regular magazines, competitions for valuable prizes and contact with other Amstrad users.

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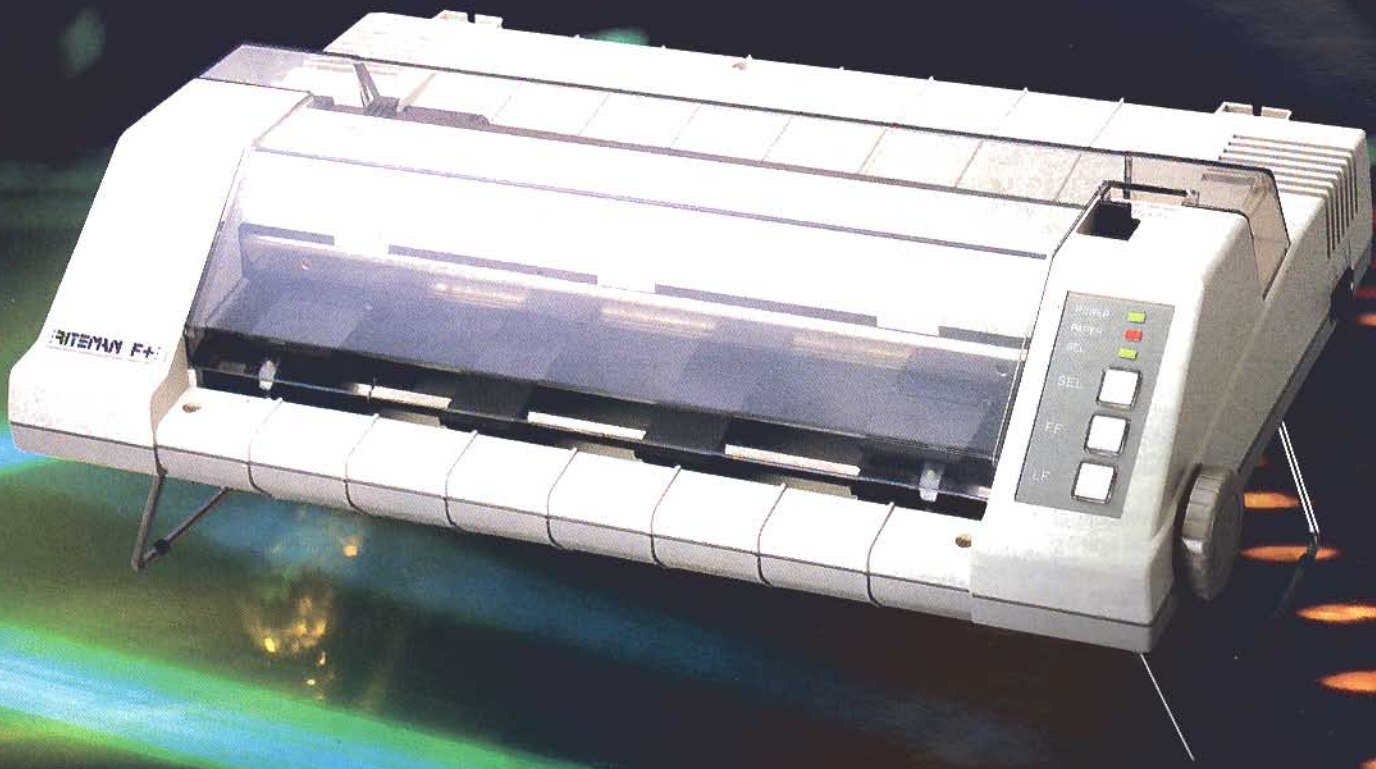

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As professional software developers, exporting to the United States and Australia, we know what it is like to lose hours of work because of a diskette failure — even the highest quality diskettes sometimes fail.

During a trip to the United States in July 1985 we found we were able to obtain **premium quality 5¼" Double Sided, Double Density diskettes** at a very reasonable rate.

We tested them for several months in-house before we began promoting them at the Christchurch Bits and Bytes show in November 1985.

To date we have sold thousands of our diskettes — mainly in the South Island. The number of people who are continuing to **re-order** is most gratifying. The number of returns to date — 1! Of course we replaced it with **no questions asked.**

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Datacom to sell Citizen

Datacom Equipment Ltd, has recently signed an agreement with Citizen Japan to market their range of dot matrix printers in New Zealand.

IT vs AT

Sperry has launched here its IT — an IBM AT clone claimed to operate 45 percent faster than the AT, have twice the memory expansion, acommodate three times the number of users, and be the first to utilise Xenix System V.

But the main selling feature, perhaps, was to be the IT micro price, of about $16,000. It was to be $3000 below the IBM AT list price — and Sperry made a commitment at the NZ launch to retain that pricing advantage. But now the AT is retailing for around $17,000, the Sperry IT price is uncertain.

Sperry also demonstated its Voice Kontroller, which does work, and enables operators/managers to by-pass the keyboard in making programmes run.

S/video moves

Computer Distributors Ltd, the Spectravideo distributor owned by Consolidated Enterprises, is shifting headquarters to the College Road building of Apple distributor CED Distributors Ltd, also owned by Consolidated.

The move is a further cost-saving measure, says CDL manager Peter de Zwart.

It meant less Auckland storage space for CDL stock and a consequent sale of discounted stock direct to consumers — the pre-MSX 318s being discounted 60 percent to $199, and a few 728s going for $395 ($595).

De Zwart says the direct sale was because dealers were not generally interested in taking the 318s and other excess stock.

CBA spreads influence

A small Auckland company, Cowan Bowman Associates, has about 100 sites for its CBA multi-user accounting software in Australia, and has 200 installed sites in New Zealand.

Woes of Wyse

Microprocessor Applications, an Australian distributor (and assembler) of Wyse terminals, has an Auckland offshoot now operating from Newmarket.

That spells serious competition for Rakon, a local supplier of Wyses which has made large corporate sales to the likes of Marac, and recently to the NZ Broadcasting Corporation.

Rakon say the latter sale was strongly pitched for by MPA and could have been used as a launch vehicle.

Complicating the market for Rakon is Wyse's own apparent infidelity amongst distributors — former Rakon sales manager Jolyon Ralston is now with Great Outdoors, the tent maker, in the role of importing network terminals...from Wyse (US).

Wyse's popularity is based on its high resolution screens, 130- column mode and page memory. But adding further to the woes of Wyse distributors is the resurgence of Televideo as an equally good terminal — the latest Televideo, the 9220, also featuring 130 column mode, high clarity and four-page memory — and a price difference of just $100 over the equivalent Wyse model.

The $5000 'man'

Factories and test labs can now install a fully programmable robot to do repetitive or dangerous tasks for as little as $5000, reports importer Vickery Electrical Ltd, of Wellington.

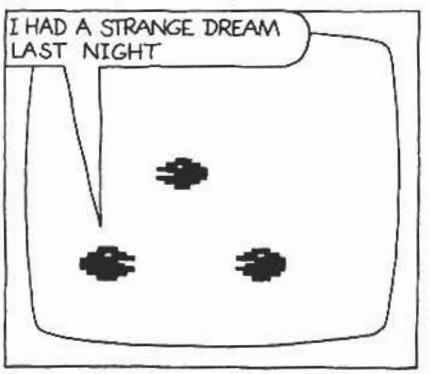
The price includes software to run it under the control of a microcomputer such as the IBM PC, Commodore 64, Apple IIe, BBC or Spectravideo.

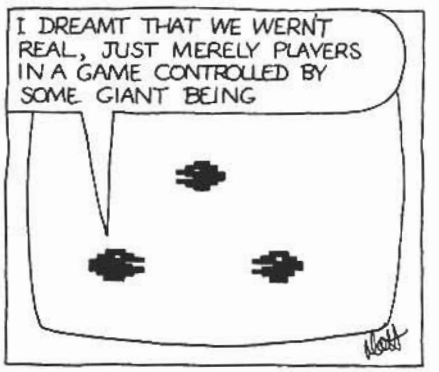
Latest robot in the range is "Serpent", which uses pneumatics and servos to pick-and-take items weighing up to 2kg — for example, on and off conveyors. It can handle and assemble items and works in four axes, under 12-bit control.

Silicon chip NZ-made

A team at the DSIR's Physics and Engineering Laboratories (PEL) has made New Zealand's first custom silicon chip using second-hand equipment bought overseas at "bargain" prices.

The $500,000 silicon facility at PEL was developed over the last three years as a learning facility, primarily intended to allow DSIR scientists and university electronics students to learn the design and manufacture of silicon custom chips.





Mac Plus

At $6595 the new Macintosh Plus computer was costing less than the current 512K Macintosh. However the 512K was discounted again, to $4995, $1740 below its previous retail.

The Mac Plus provides one megabyte of internal memory and 800 kilobytes of disk storage capacity. Further RAM expandability to four megabytes is planned.

A high-speed parallel interface transfers data up to five times faster than the standard Mac external drive port and allows up to seven peripheral devices to be connected together.

A new keyboard provides a numeric keypad and directional keys for cursor control — to complement the mouse.

Brandt joins Ergo

Brandt Electronics Ltd, a Christchurch and Auckland based electronics manufacturer, has formed a company to market in New Zealand a new range of microcomputers, terminal emulations, CAD-CAM systems and plotters.

Ergo Computers Ltd is a joint venture between Brandt and Ergo Electronics Co. Ltd, a major Hong Kong company with an annual turnover in excess of $200 million and employing 1900 people.

The general manager of the new company, Richard Green, says Ergo is not jumping on the IBM bandwagon, "but has designed and manufactured specialist computer products including photo plotting equipment, CAD-DAM and LAN systems."

The initial product range will be based on the Ergo PC-88, with the 8088 chip and five levels of configuration compatible with IBM.

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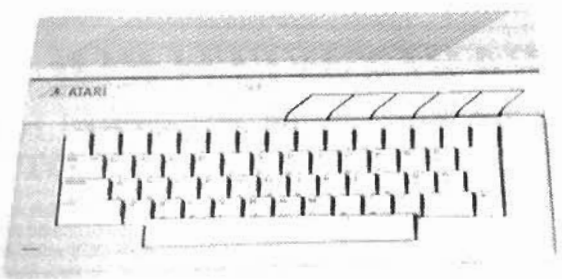

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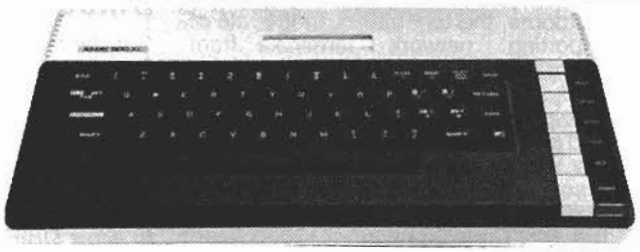

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Full marks to Gavin and Grant

Our congratulations to Gavin Fisher and Grant Collison, who both scored full marks in answering our Christmas Computer Trivia Quiz.

But, as per the rules, only one prize winner was to be chosen (by way of a lucky draw) — and Gavin's name was pulled out of the hat.

His prize was a Commodore 64 computer with 1541 disc drive, plus Star SG10C printer, plus subscriptions to Computex and Bits and Bytes for a year, plus two Bookclub books.

But Grant was not left as a passive onlooker — not while the printer distributor, Genisis Systems, was involved.

Genisis' Leon Howe donated a second printer, a Star SG10 (retail value $950) as a runner-up prize for Grant, who also received the free subscriptions and books.

Both prize-winners are Wellingtonians, and both already have Apple IIs at home — in fact, Grant is secretary of the Wellington Apple Users Group.

He is a business management student at Victoria University.

Gavin, the new Commodore owner, is a meteorologist whose own use of the Apple at home has been limited by the enthusiasm of his children to be at the keyboard. The new C64, he says, should solve the problem of queuing.

The competition attracted close to 200 entries.

Six entries scored 29 correct answers, and most of the remainder scored in the mid-20s.

Well done (we'll have to make it harder next time).

Turn to Page 12 for answers to Trivia Quiz.

The prize-giving, from left: Ralph Wilkinson (Genisis, Wgtn), Grant Collison, Gavin Fisher, Peter Sinke (Commodore Computers, Wgtn).

Computer Trivia Answers

from Gordon Findlay

Being a maths teacher doesn't usually lead to fame and attention, but for a while there I was really having to fight the fans, and their questions, off!

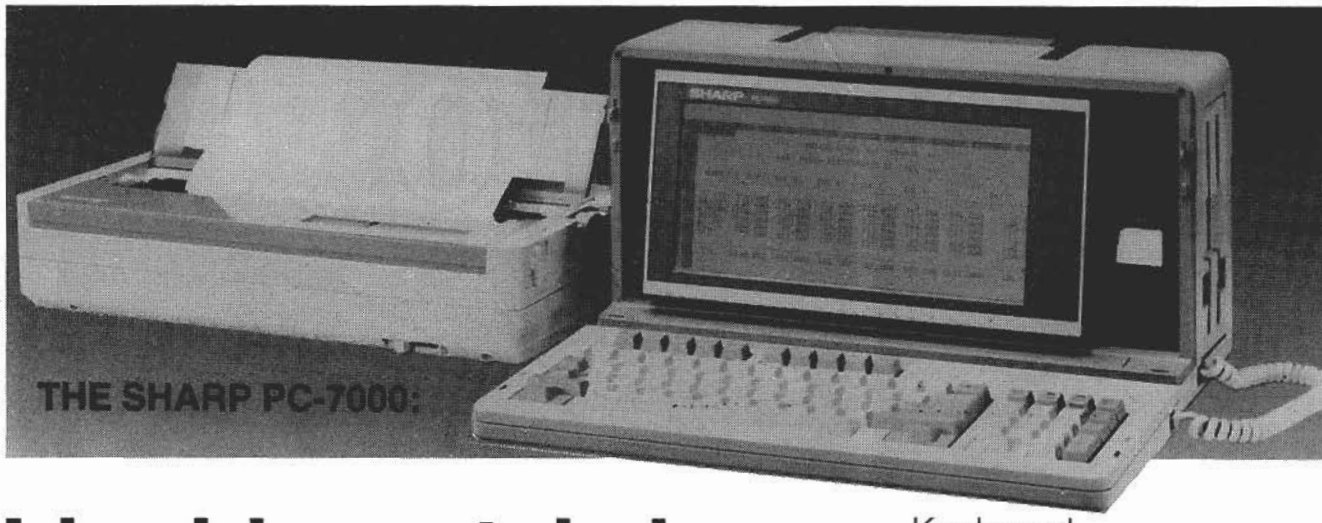
I said to Gaie Ellis when this quiz was being discussed that I would be astonished if anybody answered all these questions correctly — after all, two or three of them were intended to be totally obscure!

However, two entrants did get every question correct — a magnificent effort!

Here are the answers to the Trivia Quiz in the November and December '85 issues, with a few comments:

1. BASIC was developed at **Dartmouth College,** New Hampshire.
2. **C,** and B
3. MODEM = **MODulator-DEModulator**
4. 9870 = **268E hex**
5. The actual diameter of a "five inch" or "five and a quarter" inch floppy disk inside the jacket is **5.125 inches**, i.e. five and an eighth inches!
6. Gary Kildall wrote **CP/M**– the operating system.
7. The Commodore **Amiga** — the most interesting machine I've heard about for years. I'd love to get my hands on one. The 128 is here already (see December issue).
8. **IBM** is often called Big Blue.
9. The **Kellogg** unit
10. **65536** (numbering starts at 0, so although the highest byte is number 65535 there are actually 65536 bytes).
11. **Electronic Numerical Integrator and Calculator** (Not 'computer')
12. The **Jupiter Ace** had **Forth** as its language.
13. **Number 6**
14. By **ultraviolet light.**
15. **Scott Adams.**
16. **1000**
17. **Pascal** is named after a man, and **Ada** after a woman. (Incidentally JOVIAL is also named after a man: it means Jules' Own Version of the International Algorithmic Language!) CESIL means "Computer Education in Schools Instructional Language" or something like that.
18. **A space**. MID$ can have just two parameters in Microsoft Basic.
19. **IX,IY,I,R** or any of the alternate register set. Some other registers change their names, but they don't count!
20. Tinman was one of the **stages of development of Ada**, the official US Department of Defence language. Many ingenious guesses here. This was the question intended as a "stopper", but several got it. The stages were, from memory, Strawman, Woodenman, Tinman, Ironman and Steelman in that order.
21. **Atari**
22. The **Hewlett Packard 110** had **Lotus 1-2-3** as part of its enormous ROM. Both parts needed for a mark.
23. These are all interface chips:
ACIA: Asynchronous Communications Interface Adaptor.
PIO: Parallel (or peripheral I've seen) Input Output.
VIA: Versatile Interface Adaptor.
24. "Astronomically" was the clue to **STAR** printers.
25. Dr. Dobbs has had many titles, the first as a magazine, rather than a newsletter was **Dr. Dobbs Journal of Computer Calisthenics and Orthodontia**, or perhaps, depending on which history you read '...**Tiny Basic Calisthenics**...'. Just when the magazine started and the newsletter finished seems to be moot. Either was accepted, but you did need the subtitle "**Running light without overbyte**".
26. **System 80** (worked just like Tandy Radio Shack Model One — get it now?).
27. The first issue of Bits and Bytes was good value — it was **free**.
28. **IBM Japan**. Outside contractors don't count!
29. **Z80**.
30. **Acorn, Apple, Apricot, Macintosh, Pineapple, Pearcom and Hitachi Peach** are all in the hardware fruit salad, along with quite a few lemons.

If its news. . . ring Steven Searle, 796-775



Liquid crystal clone

by Mark James

Whenever a new microcomputer hits the market claiming to be IBM compatible, one's first reaction is "Why another?" Computer stores are bristling with dozens of IBM PC "clones" already, each shooting for a profitable share of a now unprofitable market. It is now necessary for each new machine to make its own mark. The mark of the Sharp PC-7000 is its packaging.

The PC-7000 package includes the main unit with a back-lit LCD (liquid crystal display) screen, processor and two 360K, 5¼"-inch floppy disk drives; a detachable keyboard; and a thermal printer which latches on to the side of the main unit for carrying purposes.

The entire package folds and zips into a carrying case about the size of a flight bag, with a pocket for diskettes, and weighs about 12 kg.

This puts the PC-7000 in the "luggable" class.

The display screen uses the same LCD technology that Sharp perfected in its digital watches and calculators. Unlike those instruments, however, the PC-7000 screen has LCD pixels, from which both characters and graphics are built.

The resolution, 640 by 200 pixels, matches that of a mid-resolution IBM monitor.

In character mode, it provides 25 lines of 80 characters; alphanumeric characters are exceptionally clear and readable, although special symbols are somewhat less so.

The electroluminescent back-lighting greatly alleviates the eye strain that afflicts some LCD displays, and reduces but does not eliminate the problem of viewing angle. The screen is vertically adjustable across about 15 degrees.

The back-light comes in four colours, although I only tried grey and green. I found the grey much less harsh.

Power draw

In other machines with LCD displays, one of the main considerations is the reduced power consumption. This advantage appears not to apply to the PC-7000, because of the back-lighting.

When the back-lighting is turned off, one notices that the fan runs much faster; this indicates that the back-lighting uses considerable current.

This is probably why there is no battery-power option for the PC-7000.

The computer will run with the back-lighting off, but it was clearly not designed for this, as the screen is then very hard to read.

The main unit has no expansion capability, but an optional expansion box is to be available soon. This will include a 10 megabyte hard disk and three IBM-compatible card slots. The box was not available at review time, so I cannot report as to its functionality or portability.

The main unit includes an inbuilt RS-232 serial port, a Centronics parallel port usually occupied by the thermal printer, an adaptor for a colour CRT monitor (which I did not test), and an RJ-11 port for the keyboard. The system contains an Intel 8086-2 processor with two speeds, a socket for an optional 8087-2 floating-point co-processor (for which Sharp charge a whopping $900), 320K of RAM expandable to 704K, a special set-up function in ROM, and an inbuilt time-of-year clock.

Keyboard

The keyboard is similar to that of the IBM PC/AT, except that the 10 function keys are ranged across the top of the keyboard instead of down the left side, and there is an extra key marked "Set Up".

The return key is also larger; in fact, it is enormous. It is definitely not a touch typist's keyboard, as the keys have a little firmness to them, nor are the F and J keys dished or marked.

The Set-Up key invokes the ROM set-up routine. This is a useful menu screen through which variable functions of the computer can be changed, such as setting the date and time, configuring the serial and parallel ports, adjusting the beeper level (there are four levels, from "loud" to "off"), and choosing the processor speed.

The processor runs in either "standard" mode of 8 MHz, or "slow" mode of 4.77 MHz for compatibility with the IBM PC.

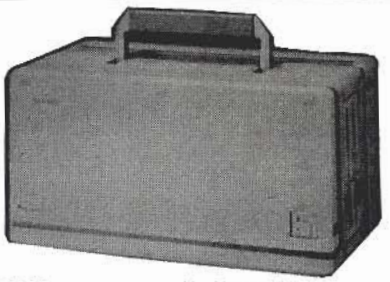
The set-up screen also allows the user to configure the PC-7000 as a terminal for a larger computer.

Those who have used computer terminals will be familiar with the principle of set-up. All set-up parameters are stored in non-volatile memory, so that they remain in effect even after the machine is switched off and on.

The thermal printer is a little marvel, producing near letter quality print with almost no noise. It uses both normal and special thermal paper; the quality of the print is better on the more expensive thermal paper.

The printer requires a special thermal ink ribbon.

The documentation that came with the demonstration machine was a preliminary version that included an owner's manual and an MS-DOS user's guide. The MS-DOS documentation was the standard Microsoft information; the Sharp owner's manual was well-presented and seemed thorough.



IBM compatibility

The PC-7000 can run two versions of the MS-DOS operating system: its own Sharp version, and IBM PC-DOS.

This means that Sharp have managed to imitate most of IBM's proprietary BIOS routines, so that all except a very few programs written for the IBM PC will run on the PC-7000.

I tested the IBM compatibiltiy of both operating systems, and found very little to complain about.

Traditionally, IBM compatibility has been tested with two programs written specifically for the IBM PC: Lotus 1-2-3 and Microsoft's Flight Simulator.

In the past couple of years, however, microcomputer manufacturers have been clever enough to build their machines to pass precisely those two tests.

On the PC-7000, both programs run perfectly; in fact, they both run even under Sharp MS-DOS.

Borland's Sidekick, which directly addresses IBM's video memory and keyboard scan codes, also ran on the PC-7000, with just one hitch. In its default set-up, the screen imitates a colour screen.

Therefore, when Sidekick thinks it is putting up information in another colour, you see nothing at all.

Going into the Set-Up routine and changing the screen to black-and-white mode resolves the problem.

Leap-frogs

To test the serial port, I ran Kermit, a public-domain file transfer program. I used the version intended for the IBM PC and not the generic MS-DOS version.

It successfully transferred files to and from an IBM PC and a DEC PDP-11, with no trouble at all.

Kermit itself configures the serial port to your specifications, and it was clearly convinced that it was dealing with an IBM serial port.

Programs that directly access the clock for timing purposes had trouble doing so under Sharp MS-DOS, but no problems when run under PC-DOS.

To test the diskette and printer routines, I ran AMPS, a multi-user operating system that does its own disk handling and takes over interrupts from the printer. I took AMPS directly from the IBM PC.

Under Sharp MS-DOS, as expected, there were occasional problems in writing sectors to disk, finding the time of day, and printing.

The first two problems cleared up completely under PC-DOS. However, I could not get the printer to work under either DOS; this turned out to be the sole unresolved compatibility problem under PC-DOS.

It is a very minor problem, as most programs do not need to take over the printer interrupts. Printing from MS-DOS or WordStar worked fine.

Conclusions

The Sharp PC-7000 is a handy machine. It is not light-weight, but is easy to carry around. Its LCD screen is a novelty that reduces the weight somewhat, and greatly reduces the amount of table space that the machine takes up.

These are its special features, the qualities that set it apart from the crowd of clones.

Its price is about average for a machine with its capabilities; those who are not enamoured of LCD screens will find cheaper machines elsewhere.

Sharp have built a reputation for quality hardware with its PC-5500 (not imported here) and MZ-5600 range.

Sales of the later 5600 machine, however, have apparently suffered due to its lack of IBM compatibility and, therefore, the shortage of software that runs under it. The PC-7000 corrects that shortcoming with style. ■

MICROCOMPUTER SUMMARY

Name:	Sharp PC-7000
Manufacturer:	Sharp Corporation, Osaka
Microprocessor:	Intel 8086-2
Clock speed:	4.77 or 8 MHz
Memory;	16K ROM, 320K RAM (plus 64K for systems operation) expandable to 704K.
Input/Output:	Dual 5¼-inch diskette drives, 360K each. RS-232C serial port, Centronics-compatible parallel port.
Keyboard:	84 full-travel keys (including 10 shiftable programmable function keys and a Set-Up key).
Display:	Back-lit liquid crystal diode display, 640 by 200 pixels or 25 by 80-character lines.
Operating system:	MS-DOS or PC-DOS
Cost:	$4935 with printer, $3950 without.
Supplied accessories:	Power cable and two manuals.
Options:	Expansion box with 10MB hard disk, $3800; colour CRT adaptor; 8087-2 mathematical co-processor; carrying bag; GW Basic, diskette and manual; font generator for thermal printer.
Reviewer's ratings (5 highest):	Ease of use 4, expansion 5, IBM compatibility 5, support 5, documentation 4, value for money 4.

Review unit supplied by Beechey and Underwood Ltd, Auckland.

Big need for training

The information technology section of chartered accountancy Arthur Young has been overwhelmed by the response to its training courses.

Course manager Ed O'Leary says many people had given up in frustration after trying to find their way around computer manuals. The courses are designed for people who have time to train themselves.

The most popular courses are 1-2 day sessions on Lotus 1-2-3 but Arthur Young also runs courses on office automation, an introduction to computers and advanced Lotus courses, and there are also courses for Symphony, Multiplan, Dataflex, CBA and dBase III

BBC Master Series

Can radical evolution work?

by Pip Forer

This is a review of the first model in the new BBC Master series, a series which offers a significant extension of the standard BBC microcomputer.

I thought quite deeply about reviewing this particular model in light of my long-standing association with the machine. Would a less exposed reviewer give a fresher perspective?

In the end two things persuaded me to take the task on.

One was the fact that this is an evolution of an existing machine which will interest existing BBC users as much as the uncommitted. Major questions with this machine are where it is taking Acorn, and how much has the growth potential of the BBC come to be realised? I decided my past experience would assist with these questions.

Anyway the second factor was very strong: an urge to see the new series for myself ... and reviewing the machine was a unique chance to do just that.

The Master series is a significant step for Acorn and comprises five models.

At its simplest, one could describe the 128 as a BBC B+ with expansion memory, all set in a new case.

However that would rather miss the point for the 128 is two things.

Firstly it is the natural rival to a variety of 8-bit machines supplying extended RAM: Atari, Amstrad, Apple and Commodore all now offer machines with banked RAM. The considerations here are how well the Master meets these in terms of facilities, software, price, support and practicality of the paging implementation.

Upgrade path

But the 128 is also the foundation for an unusually upgradeable system. Within its case it is now possible to install one of three alternative processors, each with extended RAM and addressing range.

Interestingly these do not include the easy, but perhaps dated, CP/M-Z80 combination.

The first, in fact, is a 4 Megahertz 65C012 (double the speed of the Beeb's own processor). The next, not unexpectedly, is the NS 32016. The new arrival is the Intel 80186, an option which gives plug-in compatibility with MS-DOS type applications. This will offer a WIMPs based front-end through GEM.

All of these processors will be able to be fitted straight into the basic 128, allowing plug-in upgrades to new models.

This aspect means any review of the 128 is slightly more than a simple machine review: it is a review of a design philosophy.

The Master 128 offers the option to have a suite of teaching machines, some of which can be *internally* upgraded to allow 8086 type software to run, others for heavier computer science programming and others for expanded 6502 work.

It also seems to offer a risk-spreading strategy for educational purchasers unsure of future developments. In particular it helps solve two buyer problems: personal inertia, and the software/hardware gap.

Dollars, hawks and doves

A major, neglected factor in educational computing is the cost of retooling people to cope with new machines and the reluctance of many early users to reassess their initial choices long after they have ceased to be optimal (we might call this justifiable and unjustifiable inertia).

In addition two perspectives influence any computer buying decision. The hardware hawks want the latest hardware while the software doves want working software, even if it runs on an abacus.

Since any sort of software base on any machine takes two or three years to emerge the doves and hawks inevitably favour different solutions as to what the ideal machine is at any time.

The ideal solution is to be able to run existing software while being able to configure to emerging technologies.

And Acorn are staking quite a lot on this notion that a machine that can access both the BBC software base and the IBM-PC corner of the garden, while offering a high-powered newer chip too, will appeal.

Such an approach will not spawn great technological breakthroughs ... neither the Macintosh nor the Amiga could emerge from the restrictions such an "ideal" imposes.

However it may actually be cost-effective when the real cost of machine-obsolescence is the re-working of acquired skills by teachers or other users who have to adapt to new software. The balance depends a lot on the quality and learnability of tomorrow's software.

Hardware: not Gucci

Physically the 128 looks very much like the original BBC: no chic Italian redesign of the box. The main outward differences are that the box is more rigid (supporting a monitor) and has a raised rear section.

It also has two flap-top slots for ROMs to augment the internal slots for on-board software. Apparently these are for applications up to 256 kb in size and will also allow a 2 Mhz bus, video genlock facilities and other enhanced input-output options.

Strong communications seem somehow apt on a BBC micro. If I were gambling I would also watch out for a plug-in integrated data package. The 128 clearly has the power in screen handling to run one which would make other 8-bit packages look dead.

The keyboard is similar to the original BBC, with the addition of a numeric keypad (returning different codes to the machine than the other numeric keys so use can be customised).

BREAK is moved away from other keys a little and, more important, can be physically switched off. The cursor keys are held in a diamond shape.

Built-in software

Internally the board is transformed.

The Master 128 comes with a lot of enhanced software built in (the VIEW wordprocessor, VIEWSHEET spreadsheet, enhanced graphics, terminal emulation, text editor, two disk operating systems) and I spent a lot of time trying to find the ROMs for these. In fact they are all in a single megabit chip.

In rummaging about however I discovered a battery. This powers a real-time clock/calendar plus 50 bytes of CMOS RAM. This means date stamping of files, so you can identify most recent versions of things, and the delights of flexible start-up.

A utility with the machine allows you to set a control panel which establishes default operating system, language, printer, network printer address, econet machine number, processor and so on. You can therefore have the machine come up in any default option that you want.

On Econet it will clearly not be long before you can impose a chosen option on a whole group of machines, bringing them up automatically in the word processor for third form English or with their 32016 turned on for advanced computer studies. A very nice management option.

Like all current 8-bit machines that address more than 64k the BBC does it by paging in RAM. Thus there is 32k directly accessible and another 64k in banks of 16k that can be paged in with a slight speed loss.

It also has a 32k area used to support the screen and ROM workspace, plus 128k system software in ROM: 256k bytes at your service, in total.

Totally compatible?

Those of you reading closely will have noticed I mentioned two disk systems in that system ROM. The standard Master series contains both the standard DFS and Acorn's Advanced system.

This is a bit like the Apple II having DOS 3.3 and ProDos **simultaneously** available.

The ADFS supports hierarchical file names, has a rather neat on-line tutorial, and gives an 80-track disk, 320k per side (i.e. 640k on the standard disk).

Not only are both systems there, but you can switch and swap between them within or between programs.

The reason for the two systems is of course compatibility. DFS should be able to run all existing BBC programs, ADFS opens new doors.

How compatible is the Master series?

The answer is "very". I threw a dozen or so original BBC programs at it and it never blinked. These included ones which were legal (conformed to Acorn's published software rules), sensibly illegal (did a few bent things like address screen memory directly) and stupidly illegal.

They included machine language games, multiple-screen teletext editors and commercial software like Jacaranda's Gold Dust Island.

Clearly there will be programs that do flop. Some of these however will be picked up by a loadable 'convert' utility which catches many of the known illegal tricks (like directly poking new character definitions to RAM ... their location has moved!).

My estimate is that the final failures will be very few in number and will include few of the serious education programs.

I do not have an Econet version currently so I cannot test network response but I am confident of a good compatibility here too.

Beyond the compatible

What happens when you stop asking the 128 to behave like a BBC model B? The on-board software answers some of those questions.

View and Viewsheet support use of shadow screen memory for the screen and larger documents flawlessly.

BASIC (version IV) is enhanced to include most of the new features discussed in the December review of the 32016 BASIC (including the delightful LIST IF).

It is also faster due to use of new instructions in the 65C12. A 128k BASIC is available from disk that lets you use the full 128k of memory, including indirection or machine language assembly into paged RAMs and their execution from within BASIC.

The text editor is a superb enhancement. It is designed to allow sophisticated editing of text files and allows block moves, inserts, global search and replace and most other desirable options.

BASIC contains a new verb, EDIT, which allows BASIC programs to be handed in to the editor.

Operating system

The operating system also has enhancements, most specifically in the graphics area and in internal memory management.

For the hacker let it be said that these offer some exciting extensions.

For the non-technical they should presage some excellent software. In graphics new calls allow pattern definitions and various primitives to be defined and drawn at great speed (circles, boxes, arcs)

There is also a built-in flood fill (with unfill capabilities) and the capability to move sections of the screen around. These are all available through VDU statements in BASIC, or from other languages.

Two screen switching is also supported.

The operating system has a lot of new calls, some dealing with memory moves or control of actions within the extra memory space. Others allow configuration of the CMOS RAM.

The disk systems offer *APPEND (extend a text file from *SPOOL) and *MOVE, which will now copy material between any pair of filing systems (TAPE to DISK, ADFS to Net etcetera). There are also OS calls to instigate machine code user routines in one processor from the other, and (sadly vague) comments in the OS documentation about new calls to handle parallel processing.

Documentation

The full capabilities of many of the technical changes are hidden to the

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reviewer at present since details of many of the new calls (and of the terminal emulation) are contained in a separate technical manual put out by Acorn.

Documentation with the machine consists of a large Welcome Guide which is clearly aimed at introducing users to aspects of the machine, not providing either a full tutorial or reference guide.

Thus VIEW users could process their first document quite adequately but might need, as their skills grew, to buy the full VIEW documentation (about $12) or a supporting text from another publisher.

Likewise a BASIC novice might want to migrate to one of the excellent programming texts available.

The Welcome Guide is quite adequate as a starter. The BBC's published support work complements it for the user, but will also decrement his or her pocket.

While the reference guide was not to hand I did however receive a copy of a technical document detailing functional differences between the B/B+ and the Master 128. Between the lines it appears that the system maintains the elegance of the original BBC design and extends it in a tidy and rational manner.

There are some tantalising references in here to locations dedicated to support of sprites and a greatly enhanced Econet workspace.

Font (letter style) support is clearly extended and relocated: there is a Greek alphabet in there somewhere.

Function key definitions are also given more space, and a special command to display their current contents (*SHOW).

The network chip is Acorn's ANFS, which is alleged to offer further enhancements on Econet, likely in speed of data handling. The transmission speed of the network itself remains unchanged but the actual process of handling packets of data has been reworked.

Disappointments?

A few disappointments are there, mainly on the utilities disk. This contains some very good customising programs (font designer, pattern designer) and demonstrations. But it seems (surprisingly) to not have printer spooler or RAM disk emulation. Neither would be hard to produce and I will be surprised if these do not quickly appear on the Welcome disk or as magazine listings.

Likewise View and Viewsheet are restricted at present to use of the 64k main RAM. I feel sure new versions or patches for these will also follow.

The Utilities needed to load disk-based ROM programs into the 128's sideways RAM are in the disk ROM, but are not well documented.

The 128 is a class machine in all senses. To the guru it is also clearly a PL machine (Pre Lisa ... the great watershed in how computing gets done).

Microcomputer Summary

Name	BBC Master Series 128
Microprocessor	65C12 (inbuilt facility for expansion to 65C012, 80186, 32016. Z-80 available as external add-on)
Clock Speed	2MHz on 65C12, 4MHz on 65C012
RAM	128k plus 32k screen
ROM	128k (OS, languages, DOSs)
Input/Output	Parallel port, RS-232C port, Network port, 1MHzBus, Analogue Port, cassette port, disk port, 4 channel sound, RGB, video and UHF outlets, Tube for external second (third) processor.
Keyboard	Full 92 keys with numeric keypad. Editing and programmable function keys. All keys auto-repeat under software control. Type-ahead buffer.
Display	From 20 to 80 columns at 24 to 32 lines. Full teletext mode supported.
Operating System	BBC proprietary MOS, DOS and NOS. Other chips support these options plus alternatives on 16-bit chips.
Languages	BASIC, Mallard BASIC (MS-BASIC lookalike), Prolog, Logo, Pascal, Forth, Fortran and assembler options. Upgrade chips open way to C, LISP, etcetera.
Graphics	Full bit-mapped graphics. Trade-offs feature 2 colours by 640 by 256, through to 8 colours by 160 by 256 pixels. Text and graphics intermix freely. Pallete selection supported and OS supports variouss graphics primitives.
Sound	4 channel sound with individual control on pitch, volume, envelope etcetera.
Peripherals and Software	Compatible with virtually all existing BBC peripherals plus software.
Cost	Under $2,000 retail. Turbo upgrade under $500.
Availability	late February 128 and 128 turbo, May 512 (80186), June Scientific (32016).
Strengths	Bug-free, flexible and open system, upgrade path, compatibility with strong existing software base, strong peripheral choice, good network, elegant graphics, fast.
Question marks	Not cheap, pre Lisa technology, 8-bit BUS, cost of additional documentation.

Review Unit from Barson Computer (NZ) Ltd

However, cost and software will probably keep PL machines as educational workhorses for some time, although the Master series has a low-cost upgrade path into the GEM environment for the progressive.

Conclusions

Like the Apple IIc and 128k IIe it is not a cheap machine. It also does not have an Appleworks equivalent, just yet.

However it offers greatly enhanced graphics and far better expansion options with the real world.

It also offers a full-feature, quality, low-cost network, something Apple IIs find hard to work on.

In cost terms the Amstrad, Atari and Commodore 128 are an order less expensive. However none of these have quite the reputation for reliability of the BBC, none have the expansion options, and all have either no network or networks of variable quality.

The master series is not aimed at the casual "down-market" home user, although the 128's flexibility will attract the serious home user.

Educationally Acorn have produced a very hard machine to walk past, and one that the BBC clearly see as having the potential to carry their flag for another four years.

In small business the BBC B achieved some success in the United Kingdom. The 128's upgrades quite clearly open the power needed for more extensive small-business use.

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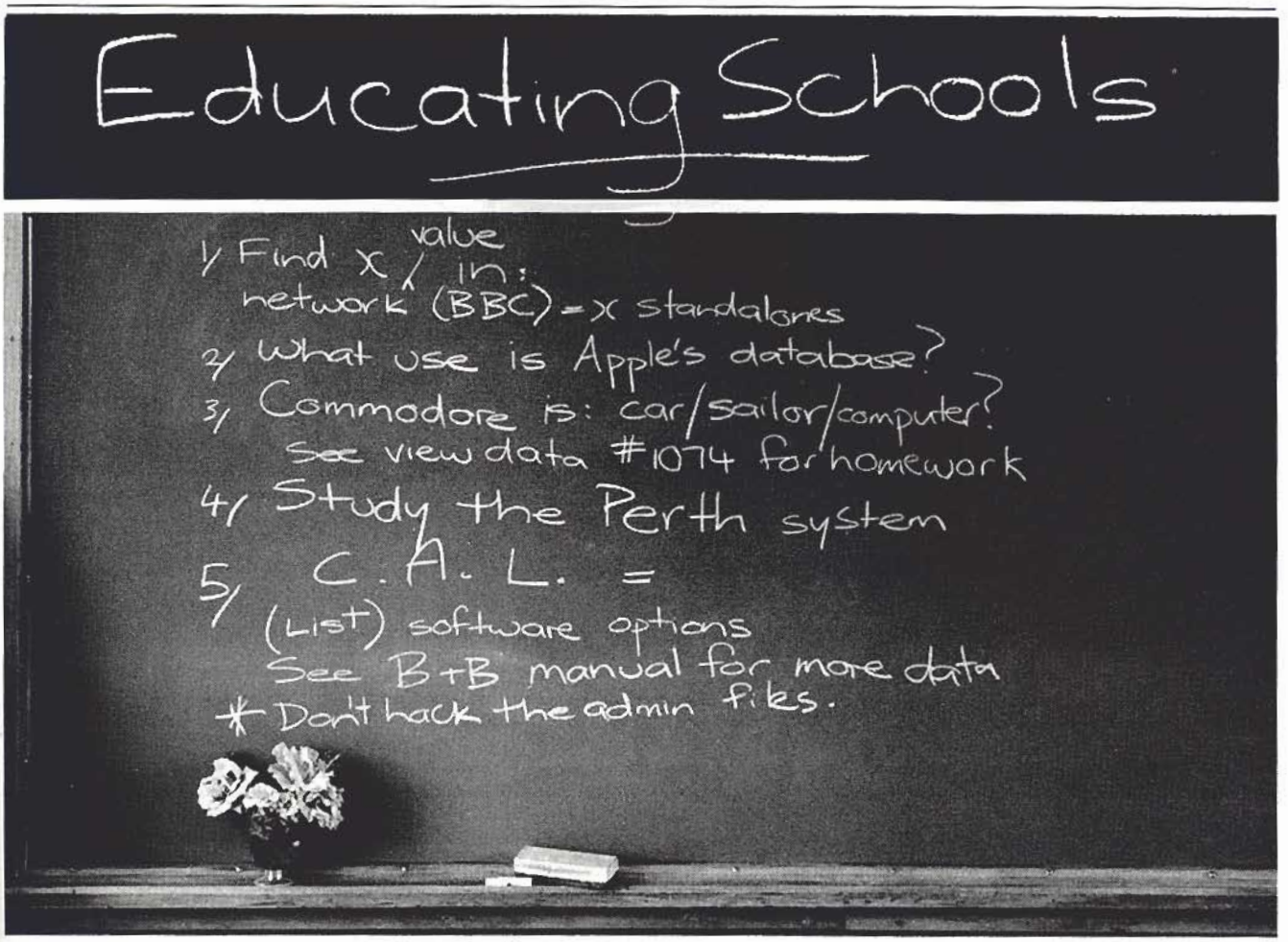

Mudpies and Swiss Army knives

by Tony Hunt **Computer studies lecturer, Auckland Secondary Teachers College.**

It is a truism that microelectronic technology is affecting in a remarkable way the lives of everybody living in New Zealand today, but the effect upon the education that most children receive at school is almost zero.

It is true that most children at secondary school will go through some kind of computer "awareness" course, and perhaps their timetable will be printed by a computer, but this technology, which allows us to store the Encyclopaedia Britannica on a video disc or retrieve information instantaneously from data in London or Los Angeles, has had negligible impact on the **quality** of their schooling.

In January I attended a conference in Sydney for teachers from a number of Australian states who are participating in a project to explore ways of using microcomputers in their teaching.

Barry Jones, Federal Minister for Science, challenged us to start addressing the educational implications of information technology: "Socially, access to information is increasingly the means to power, and exclusion implies the loss of capacity. Australia has become divided between the 'information rich' and the 'information poor'." We can still predict the life-chances of children very well from a knowledge of their race and sex and parents' occupations, or home addresses.

"If a familiarity with information technology is valuable for their future, it is frightening that, while computers are an add-on extra to the school, the white, urban middle-class, male children have most chance to use it."

Great promise

But what **is** the place of computers in our schools? Are they just expensive icing on the educational cake?

Many people believed that the computer had a great role as a teaching machine.

The promise still is that students' learning can be individualised and they can be freed from constraints of the classroom and the teacher, while teachers can be freed for more creative tasks.

There are, indeed, many (albeit relatively crude) programs around now which can give useful tutorial assistance and practice for students.

However, we are mistaken if we are looking for a batch of computer programs to replace traditional treaching.

To cover even a significant part of the New Zealand secondary school curriculum is beyond our resources and the resulting software would be out of date before it was tested.

More importantly, this approach ignores the fact that the self-same technology makes the learning of facts and skills at school even less important than it has been in the past.

When we can obtain far more information than we could ever need at the touch of a few buttons, surely an important role of the school is to enable pupils to develop the ability to select what information is important.

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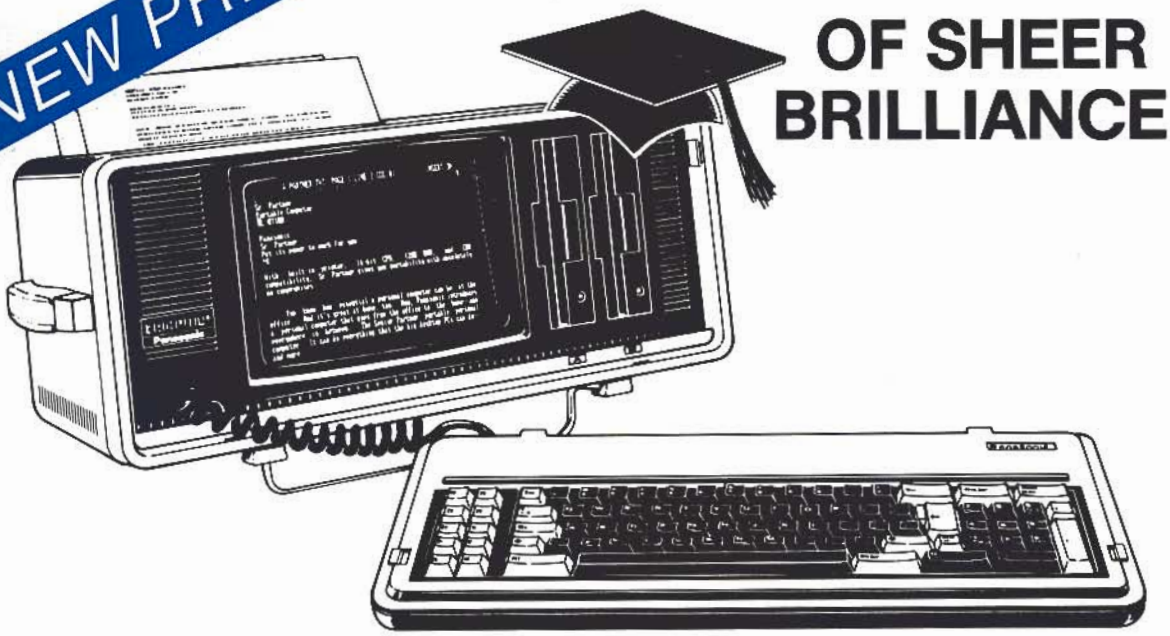

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Hard-headed employers are discovering that they prefer to train — and retrain — their employees in the particular skills which they need.

The role of the school is now to educate students for a life-time of learning.

The ability to use the computerised tools of the information revolution must be a part of that, but so should be the qualities of mind that enable them to be used imaginatively and wisely.

There are certain basic skills involved in operating computers and children pick them up rapidly if they have a reason to do so. The reason for learning them should be for the children to use the computer in a way that makes sense — as an information processing device which enables them to mainpulate data to serve their own needs.

The skill of operating any particular model of computer, operating system or piece of applications software is unlikely to be of lasting value in our fast changing world.

For this reason schools should be using the most simple and powerful software and hardware available (at the moment that probably means more than an 8-bit micro, with WIMPs — Windows, Icons, Mice and Pull-down menus).

This is the **Computer as Swiss Army Knife** — the ultimate in all purpose **tools**.

In some school classrooms, primary and secondary, you will find children using such software as word-processors, data management programs, spreadsheets and graphics programs to do things which they could not otherwise do. With word-processors they gain a new interest in their own writing because they can revise easily, check their own spelling, and print out work that other people apart from their teacher can read.

With data-management programs they can store and analyse the results of their own researches, or query files of "real" data provided for them from censuses and similar sources.

With the computer they can sift through a quantity of information which otherwise they would not have been able to handle.

The implications of this are enormous, as vast databanks across the world are available — at a price — to people with their computers linked to modems.

The cost is often a barrier for schools but in Tasmania, where every school has an on-line terminal connecting it to the Education Department, computer schools have immediate access to the same news as the large daily papers, through a direct link with the AAP news service.

Videotex services have a great potential for giving schools access to information, as well as communicating with each other.

Children in Australia and Alaska have been linked by electronic mail and regularly describe their daily lives to each other.

The practical implications alone, of such services for the Education Department in New Zealand, are very exciting; in New South Wales trials are showing the value of videotex for communicating with Correspondence School children.

Mudpies

Another way to look at the computer is what the American computer education "guru" Seymour Papert describes as the **Computer as Mudpie**.

From our very first days we learn by playing and the computer provides an environment in which children can learn by playing — often with complex ideas, for example with direction and size in mathematics. This method of learning is self-paced and self-motivating.

As Papert says, "You can make a mudpie when you want to, and play with it as your personal desires direct you. You do not practise mudpie ten minutes a day because it is mudpie time. In other words I am talking about a world in which children have free access to a computer. They can decide where to go with it, and what they want to do with it. They can play without adults standing over their shoulders. They can take possession of it, rather than be possessed by it."

Papert had in mind the use of a programming language called Logo which is becoming increasingly popular in New Zealand schools.

There are a wide range of ways in which the computer can be used as a mudpie; unfortunately the key is free access to a computer, and if a school has one computer for 300 pupils there is a large logistical problem.

Stimulus

Teachers are using programs which *are designed* for such situations. A number of excellent simulation games enable a class of children to participate in, for example, an archaelogical dig or a fantasy adventure.

The key is that the computer is used as a stimulus, and a manager of the action while the children engage in many activities away from the computer, drawing maps, writing diaries, creating pictures, researching information in the library.

At all levels of the education system the use of programs which will simulate social, economic or physical systems and allow students to play with the model have great potential for developing their understanding of the reality behind.

So what of our traditional **Computer Awareness** and **Computer Studies** courses of secondary schools?

The former served a useful purpose which will rapidly disappear: as children become familiar with computers as useful tools in their primary schools, homes, libraries or elsewhere we will have as little need for "Computer Awareness" as for "Television Awareness".

If "awareness" means studying the effect of the technology on their lives and society then it will have a place in social studies or other subject areas.

"Computer Studies" courses in our sixth forms are broadening out from learning to program (a skill which few will need) to studying the wider range of ways in which computers can be used to solve problems.

What I would like to see happening is for schools to concentrate more on the **message** and less on the **medium** — in other words to start looking at the commodity of information and the ways in which it may be obtained and how it can be manipulated.

High-touch, high-tech

It is perhaps unrealistic to get teachers, who with few exceptions are successful products of a print-based culture, to lead children into the new electronic culture.

Some predict that the innate conservatism of the education system will subvert the new technology to maintain the status-quo, but I have faith in the dedication of the skilled, far-sighted teachers that I have met.

While coming to terms with these changes themselves teachers have to accept the challenge of ensuring that children develop the counterbalancing human qualities and skills — the "High-touch" to balance the "High-tech".

For the teacher the computer offers a versatile tool which, if used imaginatively, can help stimulate children's learning; for the pupil it can be a source of free expression, a chance to create and explore, and a tool to come to terms with their contemporary world.

They have a chance to develop expertise in this area which their teachers often lack, and the wise teacher can cash in on it.

Until microcomputers become a regular tool in every classroom I believe that children will learn to cope with the information age **despite** schools and not **because** of them; some will cope successfully and others will fall further behind.

To the degree that happens, we will all suffer the loss of potential abilities.

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Hard decisions on hardware

by Joe Joyce

BBC and education manager, Barson Computers NZ Ltd

For schools intending to purchase a microcomputer in 1980/81, the choice was relatively simple, being limited to TRS80/System 80 or Apple.

By the time the government released the report of its Consultative Committee on Computers in Schools at the end of 1982, the choice had widened considerably with the release of the BBC, BMC and Poly 1 machines, to name but a few.

With advances in technology and a lot more ideas about how computers may be successfully used in the classroom, teachers today are in a real dilemma when choosing a computer for school use. This is particularly so in the case of primary schools contemplating the purchase of a machine for the first time.

At the recent course on classroom computing organised by the Teachers Refresher Course Committee, one question asked during an open forum was "What is the best computer to buy for school?"

The answer given was that schools should make their own evaluation, citing the fact that they would do just that for video tape recorders and photocopiers etc.

The answer was a little harsh because while all video tape recorders can record the same programs and all photocopiers use the same paper, all computers use software which is specific to that machine.

What choices?

Apple is probably still the most popular machine in schools though more so in secondary than in primary schools. It seems likely that the Apple IIe wil be around for some time to come with the promise of cards for 16 bit processors and up to 1 Mb of memory.

Several schools have decided that Taiwanese clones such as the Redstone, incorporating dual disc drives and detached keyboard, give the better value for money while retaining full Apple compatibility.

The BBC, in use in some 80% of British schools, is also very popular in New Zealand. Perhaps its main advantage is the range of software produced in the UK under the British Government's Micro Electronics Education Programme (MEP).

Until recently, the BBC had remained largely unchanged since it was first released in 1981.

With the release in January of the new BBC Master Series, schools will be able to follow an evolutionary path to 16 bit and 32 bit processing as their needs change, while still being able to utilize the large amount of software currently available.

The cut-down version of the BBC, the **Acorn Electron**, has proved to have only limited interest in schools, perhaps because of its modular design.

The **Sinclair Spectrum** too, has not been popular in NZ schools despite the fact that it is supported by the MEP in England and is the biggest selling home micro in the UK.

The **Commodore 64** however, is New Zealand's big seller and, because of the price, has become very attractive for primary schools buying a computer for the first time. **Commodore's 128K** successor to the 64 should prove popular if the price, relative to other machines, is low.

The **Poly** machine has continued development and the current model, the Poly 2 has a new design, and extra memory.

While the manufacturers have achieved a great deal of success with the machine in overseas markets, notably China and South East Asia, Poly has not proved to be popular with New Zealand schools, probably because of its high price tag.

This is a great pity because this excellent machine could have become 'the' New Zealand educational computer in 1982 had it been adopted by the government of the day.

A relative newcomer on the scene is the **Amstrad**. First released in March 1985 as a 64K machine, it is currently available with either 128K or 256K.

The machine is designed to take its power from the monitor and both green and colour screens are available.

It is very competitively priced and so is an attractive proposition, particularly for primary schools who wish to take the low-price option.

The Amstrad has a reputation as an excellent games machine but it remains to be seen whether more educational software will become available for it. It will certainly be competition for the Commodore 64.

16-bit/32-bit

There is a growing body of opinion which suggests that schools should no longer be buying 8-bit computers such as Apple, BBC, Commodore etc. Instead, schools should be looking to the

future and buy machines with large memory capacity and more processing power.

IBM, the industry leader in commercial computing and already very involved in education in the USA, has entered the NZ educational scene with the Japanese-made **JX**.

Although the JX uses the same processor as the IBM PC, the two machines are not totally compatible. Disc media is also different with the JX using the new 3.5" format rather than the standard 5.25" discs.

Despite its incompatibility with the rest of the IBM family, schools, particularly secondary schools, will obviously give the JX careful consideration, if for no other reason than its name.

British schools are also beginning to become involved in 16-bit technology.

Several of Britain's local education authorities, including the Inner London Authority, have standardized on the **R.M. Nimbus**, a machine recently released in New Zealand.

Unlike the IBM JX, Nimbus uses the latest processor technology and is a standard MS-DOS machine.

One further advantage will be in the fact that already, a large number of the major publishers and independent software companies in the UK are producing education software for Nimbus.

Waiting in the wings is the **Commodore Amiga**, the new machine on which Commodore seems to be hanging its hat for the future. With superb graphics and sound facilities, plenty of memory and very fast 32-bit processing, it will undoubtedly be attractive to schools. Its success in the education market, however, will depend very much on its price and the level of educational software which becomes available.

The **Philips Yes** machine is similar to the Nimbus, using both the same processor and 3.5" disc drives. Apparently the Yes already has a large educational user-base in Holland and the manufacturers are hopeful of other countries following the Dutch lead.

IBM clones, cheap versions of the IBM PC, are proving very popular in universities and technical institutes for specific tasks. Some schools too have been lured down that track despite the recent news from America that IBM is to release the **PC2**, which may not be compatible with the present PC. The PC2 itself will only be a stop-gap measure, with the **PC3** due to be released in 1988.

The future?

However, it takes more than a wordprocessor, spreadsheet and database to make a machine into an educational computer. The future direction must be governed by what we wish to do with computers in the classroom.

Do we teach about computers and their applications or do we teach using computers?

Doubtless there must be a place for both in our classrooms though the emphasis must surely be on the latter if teachers are to use these powerful and stimulating tools to best advantage.

Once we decide what we want to do with a computer in the classroom, the next step is to find the software which will be required to accomplish the task. Only with this knowledge will teachers be in a position to effectively evaluate which machine to buy.

In Australia, state government departments of education put out a tender for microcomputers at the various levels of the education system. Strict requirements, particularly of software, service and support have to be met before a machine is accepted and recommended for use in education establishments in that state.

In addition, a price is negotiated by the government and this becomes the maximum cost of the machine for education.

Supportive roles essential

by Richard Thornton

Sales manager,
Commodore Computer (NZ) Ltd

One of the most demanding jobs within today's schools is that of being in charge of computer studies.

The teacher responsible often has to spend a considerable amount of time becoming familiar with the new technology and learning the new skills necessary to communicate that subject to his/her pupils.

To acquire this confidence is essential if the teacher is to apply the necessary controls in the classroom so that the teacher dictates the direction that the learning takes.

Without this control and confidence it is all too easy for the computer-literate student to direct the computer learning experience, and perhaps to achieve undesirable goals.

Once the teacher has mastered the art of teaching the student, the person in charge of computer studies is often required to teach the teachers — and this task can often be a lot more demanding.

Students are usually enthusiastic about the new technology, but not all teachers are that keen. Some see it as a threat, others as a passing fad, and many see it as a technological overkill.

Convincing the reluctant teacher-learner can absorb many hours of the computer teacher's time as it is often necessary to earn the trust of the teacher-learner, and to create the necessary resources and be accessible as a trouble shooter in the ealy stages of the teacher's computing experience, so that they in turn gain the confidence to face a class of computer-literate students.

Other challenges

Then the computing teacher is sometimes faced with a third challenge, of computerising the school's administration system.

School administrators have quickly realised the potential value of computers in handling school roll data, accounts, class information, time planning, and timetabling. Many a computer teacher has sacrificed holiday time to produce the required statistics for school opening day.

The final 'challenge' for the person in charge of computer studies is the maintenance and operation of the equipment to make sure that all is operating smoothly and efficiently — not always easy with 30 children "attacking" the keyboards daily.

It was from this background that I joined Commodore, and with a 'been there, done that' experience I was determined to make sure that the education section at Commodore provided the resources and support necessary to make it easier for the teacher in charge of computer studies to get on with the job of teaching.

Training sessions

The first aim was to give confidence to the teacher and we have organised several training sessions to achieve this.

Secondly, to provide resources, usually free of charge, that enable the teacher to begin a programme of computer instruction immediately with very little input by themselves. *(Continued page 29)*

The new Amstrad Word processor-Typewriter appears to have upset our rivals.

Why spend huge amounts for an electric typewriter when for a third of the price, you can enjoy the unique advantages of a serious business word processor, typewriter and computer combination complete in one unit.

The sensational new Amstrad PCW8256. With 256K RAM, built-in disc drive, monitor, Locoscript word processing software, and complete CP/M Plus computer power, Amstrad will speed up the way in which the microputer takes away the drudgery of office routine. Simply, efficiently, completely.

(And the price will amaze you!)

The 82 key keyboard is specifically designed for wordprocessing. Its special function keys allow you to refer to "pull down" menus as you work, so you don't have to memorise complicated codes.

This simply means it's easy to use. And the PCW8256 has an integrated printer, with compatible software that gives you a choice of letter quality and high speed drafting capabilities.

(All for the price of an electric typewriter!)

With the 'user friendly' software of the PCW8256, word processing need be no more complicated than an electric typewriter — although as you absorb more of the fundamentals and skills, then you can progress further to take advantage of some of the most powerful word processing software available anywhere.

And the price will amaze you – just $1,995 complete. Nothing else comes near it.

From finger to keybouard to screen to disc and printer. One simple process, one plug, one amazing price.

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PCW 8256 **$1,995**

I'd like to know more about the totally professional PCW8256 Word Processing Typewriter.

NAME: _____

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POST TO: Grandstand Computers Ltd, CPO Box 2353 Auckland.
21 Great South Road, Newmarket, Auckland. Phone: 504-033

GRANDSTAND AMSTRAD

(Continued from page 27)

Thirdly, to organise teacher-only days at the school to assist in the training of other non-specialist computer teachers.

Assistance is also provided in the area of school administration and we always sell through a local dealer so that the school has a local contact point for product support and software.

This support formula seems to work well as the Education Department statistics printed last year show Commodore to be the number one brand in the primary schools, number two in secondary schools, and number one overall. It has also been necessary to increase the education team at Commodore, with Ms Ngara Hanna now heading the educational thrust.

Making progress

Many schools are now making excellent progress and beginning to influence the direction that computer education takes. One such example was given in the Newsletter from the Computer Courseware Development Unit (CCDU, Issue 5 1985), where a report from a teacher at Papatawa School, Woodville, outlines the success of using a Commodore for 'process writing'.

An additional area of support to schools is with software development.

Commodore Computer (NZ) Ltd was approached to support research looking at what forms of feedback were the most effective in an educational program.

Two students from the Waikato University Pyschology Department wrote a simple subtraction program, and included various visual and audio effects depending on whether the subtraction problem was answered correctly or not. The program was trialled in a classroom and the results were plotted each day to determine which of these effects increased the accuracy of the children's responses.

Finally, a 'reinforcement' was introduced to the program. When four problems were correctly answered, the children were presented with a simple arcade-style game which lasted for no more than 40 seconds before the program returned to the next subtraction problem.

It was this reinforcement which increased the children's accuracy markedly, and they concentrated hard to find the correct answer so that the game could be played.

As a consequence of Geoff and Stephanie Williams' research, their subtraction program reached such a professional standard of presentation that Commodore Computer have contracted to market it, with another program on addition which follows the same criteria.

Both programs have the facility to record the children's responses to the arithmetic problems so that a teacher at the end of the day (or session) can print out the whole class or group's results for evaluation.

Another feature available is the facility to print out on a printer, worksheets which can be photocopied and presented as a 'pencil and paper' test. These programs will be marketed early this year.

Lists of software from third-party software houses is also being made available to keep teachers informed about the huge range of educational software published for the Commodore.

At the New Zealand Computers in Education Society conference held in Auckland during the 1985 August vacation, Commodore Computer held a two-day workshop for those teachers interested in, or who use, Commodore computers in their classrooms or offices. The workshop evaluated programs which claim educational value and considered their merits and use.

Computerising school administration

by Terry Perreau

Education manager, Grandstand Computers Ltd.

It is interesting to observe the interest currently being displayed not only by secondary schools but also by primary and intermediate schools in computerising school administration.

Such contemplations should give due consideration to three important factors:

1. The willingness of administration staff to learn and maintain the system(s) implemented.
2. The backup and support of suitably experienced persons to assist in the set up.
3. Don't expect classroom computers to also serve an administrative role.

In all of those areas, I had been most fortunate, while a school bursar. My principal, Tom Gerrard, and the board of governors, had encouraged the purchase of a system **for the office**.

The teacher in charge of computers, Fr John Bland, gave of his programming and computer knowledge willingly, and helped make the entry into computerisation a lot easier.

I also had expert assistance in the accounting area from a chartered accountant.

One of the problems first encountered was determining exactly what "school administration" actually meant. It was finally decided the main requirements were:—

(a) Word processing
(b) Pupil registration and roll
(c) Financial
(d) Inventory

Word processing

This enabled the first-time computer user to become familiar with the computer system as well as actually achieving something worthwhile.

Word processing catered for standard letters, references, staff manual, schemes of work, news letters, school magazine, report headings, etc.

The ability to recall and change at will the many standard documents in a school situation was of tremendous value.

Pupil registration and roll

Perhaps the most important and difficult area of all. The problems were:—

– What information to store
– How to analyse the information
– How to produce reports in a format that was understandable and readable to everyone

The information stored on each pupil included:

Surname and Christian name(s)
Phone numbers (home, business and emergency)
Parents names; addresses; occupations; nationalities
Dates of; birth; entry; leaving
Current form; class; subjects
Examination results; including TOSCA
Interests (sporting and otherwise)
Special conditions (e.g. health)
Old pupils facility

Initially we paid a computer company to customise a database for us; we had enough to do just entering the 700 odd pupils.

After making many changes to the

database, and correcting the many mistakes I made, the pupil records facility proved very versatile and catered for:
class lists
subject lists
sports/team lists
telephone/address lists
label printing by class/subject/team etc — no more typing
envelopes
old pupils register

In short, the system provided for any record or list situation that a school could require.

When a fund-raising requirement eventuated, it was a relatively simple matter to establish and maintain an accurate record of monies pledged or paid, print invoices, and even write receipts.

The key to the establishment of the general ledger was the chart of accounts.

An accountant, Gordon Deakin, made this project possible. I continued to maintain the manual accounting system complete with ledgers etc., and use this as a cross check with the general ledger.

Ultimately it was only necessary to utilise the computerised general ledger once a month for about an hour.

The ease of printing out the various reports required both by the Board of Governors, and the Department of Education was a real time saver.

Of course, when the end of the year accounts were due, one only had to select the end of year update facility, and all was done.

I remember the Department of Education being so surprised one year at receiving the end of year accounts so promptly, they even rang to congratulate us.

My advice to most schools is to utilise a general ledger in the first instance, maintaining the manual system for the cash book, cheque writing etc., as the time involved in computerising the complete accounting system can far outweigh the time saved.

There are plenty of proprietry programmes available for the storage of details regarding fixed assets. Something I intended to "get around to".

Footnote: Terry was the Bursar of Rosmini College, Takapuna, for 10 years.

C.A.L. — does it work?

by Andrew Mitchell

A crucial question but one that has only been critically looked at once, in England: how effective is computer-aided-learning.

In New Zealand Geoff and Stephanie Williams wanted to know more, because C.A.L. (computer aided learning) had been the subject of much talk, but little knowledge.

Geoff was about to start his Masters thesis, so he decided to work in this field as both he and his wife were primary school teachers. They wanted to look at the effectiveness of different types of feedback, during a learning programme.

There was a suggestion (from somewhere) that arcade style games were not necessarily bad, so it was decided to compare this type of incentive to a simple right/wrong statement. There were several combinations of feedback available and these were all tried on a Standard 2 class.

The "baseline" against which all results were compared was a compilation of 12 subtraction questions, with no feedback promptings. This was continued until a consistent level of answering was established with each pupil.

Then various types of right/wrong feedback was offered. This questioning was also continued until a consistent pattern was established.

The pupils were then returned to the baseline questioning (ie. no responses), in order to establish any effective improvement.

Having stabilised at baseline again, the game was introduced. A pupil was offered the game every time she/he had correctly answered four questions: this did not have to be four consecutive questions.

This system was dictated by Geoff's tutors at Waikato University, who were strict in the methodology of testing.

Incentive

The first obvious conclusion was that any sort of feedback was helpful, but with the addition of the game, there was more incentive to achieve more.

One pupil, who some teachers had given-up, went from an almost zero baseline to almost 100% with the game. That was the most spectacular improvement, but most pupils doubled to tripled their baseline averages.

The programme that was used for the tests is now available as a commercial product through Commodore Computer NZ Ltd.

The programme has been modified quite a bit to provide for different levels of skill, and an addition version is also available. To follow are multiplication and division versions along with one based on basic skills of maths.

Under the general title "Maths Is Fun", they can be used by teachers in a classroom situation or by a parent in the home. The level of each of the twelve questions in a session can be preset depending on the class/child using the programme.

Recording options

A teacher can prepare class lists and keep records of which questions are answered correctly, and how long it took to do so. A parent could use these recording features as well.

Having finished the problems, the results sheet can be printed for future reference.

An additional feature is being able to send to your printer, twelve questions at a present level for a child to do maths by the time-honoured method with pen and paper.

The programme has the following feedback: if a sum is correctly answered (a) a helicopter carrying the word "right" flies on and lands leaving the word; (b) a happy tune plays; (c) a thermometer is increased by one. If answered wrong then the helicopter flies on and crashes against one of the borders.

Every fourth correct answer the pupil is offered the game, which is different in each of the two present versions.

There is also a help routine which breaks down the sum into its component parts. This allows the pupil to see the mechanics of the sum.

The effectiveness of this, or any type of tutorial has not been tested but Stephanie is thinking of following this line of research for her Masters thesis.

These are superb programmes which should assist a child in the target learning group to improve performance.

It seems to me that CAL represents a large gap in the potential computer useage market that is just starting to be filled.

Thanks for the memory!

The Commodore 128 It's here . . .

. . . and it's going to make a lot of people happy. A personal computer with a 128K memory and 80-column capability that's still compatible with all the peripherals and over 3000 programs designed for the Commodore 64.

In fact, the new C128 is three computers in one. That's because it can run as a C64, a C128 and in CP/M mode. Or it can even be expanded to a full 512K memory. And that's about as "personalised" as a personal computer can get.

"The company (Commodore) has gone to great lengths to produce a new, 'State of the Art' look while preserving compatibility with 64 software and hardware: a smart move since it provides the 128 with an instant base of thousands of software packages."
Personal Computing

"The 80-column display, 2 MHZ microprocessor, 128K of memory (theoretically expandable to a megabyte), CP/M plus, and fast double-sided disk drive make the 128 a capable business machine, competitive with the much more expensive IBM and Apple computers."
Computer's Gazette

"Commodore deserves applause from all quarters of the industry for at last establishing compatibility within their range, yet producing a really exciting machine . . . It is also capable of running CP/M and well warrants the description of both home and small business computers."
Your Computer

"When you look at the C128, consider these factors: The wealth of existing software that is compatible with the C128 system in the areas of business, education and entertainment; The amount of that software taking full advantage of the sound and graphics features; The quality and extensiveness of its built-in BASIC; The cost of peripherals and hardware. Considering all it has to offer, the C128 is a personal computer that should make Apple cringe and IBM raise its eyebrows."
Run Magazine

Go to your nearest specialist Commodore dealer for information about the all new Commodore 128.

Commodore Computer (NZ) Ltd, P.O. Box 33-847, Takapuna, Auckland 9

Focus on software

by Doug Cowie

Education manager,
CED Distributors Ltd

Within New Zealand, teachers and pupils are developing software incorporating Apple features.

The Otakou Software team; Ann Frampton's Otago University Super-Pilot group; David Richardsons's climate data on Appleworks; Pat Kennan and his student writers at Katikati, Bruce Love and Carl Nugent at Hillcrest with their administration packages and Des Hunt's Physics peripherals at Rosehill College are examples of the new trend in our eductional computing.

These trends are:

- the moves away from the constraints of teaching programming and computer awareness;
- the use of professional software and hardware as the basic tools of the teaching trade;
- the "take home and teach myself" approach of teachers;
- the choice of ease-of-use software and Mouse technology;
- the moves out of the maths department into the wider curriculum.

The major difficulty the New Zealand education system faces is to satisfy the demands created by these trends. There are many cases to support the claim that practical, enthusiastic, innovative teaching staff are being hamstrung by either financial or administrative constraints — or a combination of both.

However, an increasing number of excellent teachers are now using computers in the most effective ways.

Meanwhile software publishers and distributors in New Zealand are all suffering from the same drawback — the lack of a co-ordinating software distribution system to provide educationalists with information about the software tools that can help them. This system must also give teachers the source points and some guide to the costs involved.

Apple's recently released "New Zealand Educational Software Directory" goes a long way toward meeting this need. Subsequent updates will likely attract the attention of all those little known developers whose programs have so much to offer the majority of school users already involved with Apple.

A complete solution to this problem will involve the establishment of a co-ordinating distributor to handle all education software.

Meanwhile CED has established 12 dealers as regional education specialists, to enable teachers better access to appropriate software.

How to make headlines

by Shane Doyle

The Newsroom

Judging by the booklet in this package, Springboard Software specialises in educational software, and Newsroom is their top line product.

I can see this program being enormously popular with schools, encouraging group participation by pupils to produce their own class or school newspaper, learning along the way the principles involved in producing a paper.

Once loaded, the program displays a high resolution picture of a newspaper office, divided into six sections.

An open door leading into a photographic darkroom is the default selection, a woman working at a draughting board is the banner production department, a reporter with his feet up on a desk represents the copywriting department, a man working on a layout board is the Layout area.

The Wire Service desk handles communications — local computer to computer or remote linkup via modem.

The picture of a printing press is, of course, where the final print is produced.

'Photos'

The Photo lab allows you to create your own "photos" for inclusion in your paper.

It gives access to a second disk of "clip art" pictures, and graphics tools. The supplied clip art disk holds 109 frames, each with up to 10 smaller pictures in it.

These are grouped by type: aliens, beasts, birds, frogs, men, etc. A clip art reference is in the back of the manual so you can choose the most suitable picture before accessing the disk.

Once selected, a frame of pictures is loaded on to the screen work area, and a hand is moved around the screen to touch the required picture; pressing the select key loads that picture into the work area.

A series of icons are provided for selecting picture flipping, graphics tools, zoom pixel editing, clearing the work area into the garbage can, photographing the picture, disk loading and saving, and return to the main menu.

The graphic tools option offers a selection of free drawing modes — elastic lines, boxes, circles; a choice of 10 pen styles including a spray brush; 10 area-fill patterns; 3 large and 2 small sized text fonts and the ubiquitous hand for dragging pictures around the screen.

With all these tools, the picture frame can be extensively customised. I found the pixel editing mode very good, and extremely useful for correcting the odd slip of the hand.

This whole section is very like the Apple Lisa and MacIntosh Graphics tools software, in a cut down version of course.

Camera flash

Having completed your picture frame, the next step is a real gem to watch — selecting the photo icon, the cursor is moved on to the work area and becomes an elastic box which is used to "crop" the area to be "photographed".

When the area is defined, the select key is pressed to take the photograph. The camera flash fires, and the defined area inverts colour as it is "exposed". Once the photo is taken, the picture can be saved to disk.

The banner work area is used to create the full page width section at the top of the front page, containing the publication name etc.

In the Copy Desk work area, the main copy text for the paper is written.

You work with one panel at a time, combining text with photos developed in the Photo Lab work area.

Text fonts available right through the whole program are small and large Serif, small and large Sans Serif, and large English type. Not much of a choice, but they do reproduce fairly well when printed out in bit-map graphics mode.

Production

The final production area is the Layout work area, and this is where the banners and panels are located on a page blank to form the actual content of each page of the paper.

Depending on page size and format selected, the appropriate number of blank panels is displayed on screen.

The cursor is used to move to a particular panel, and when the select key is pressed, a scrolling list of panels held on your work disk is displayed within that panel.

Again, the cursor is used to run through this list, and the select key is used to choose the appropriate title, which is then assigned to that panel.

When all panels have been assigned,

the page is saved to disk for printing.

Printing

On moving to the Printing Press, you are given the option of changing the default printer before printing either a page, panel, banner, or photo.

A very comprehensive list of printers is available, and most users would find their printer in there.

The manual tends to be a bit repetitive, but otherwise covers all functions fairly well.

The second half of the manual is devoted to "The complete guide to creating a Newspaper" — where to begin, what goes into a paper, interviewing, research, story writing, photojournalism, and layout advice.

Control variations

As the program is written for 3 groups of machines — Apple 2+/2e/2c, Commodore 64, and IBM PC/PCjr — the control keys differ markedly. I had the IBM PC version,

As the program is written, once a picture has been loaded into the photo work area, it has to be dropped by pressing the select key. A picture may be dropped any number of times, and to leave the work area it is necessary to drag the picture off the edge of the work area, triggering the "Oops" error icon.

With a large detailed picture, this is a tedious procedure, and a function key could have been used to immediately jump back to the option icons.

The only other criticism I have is the lengthy delay in accessing the clip art pictures.

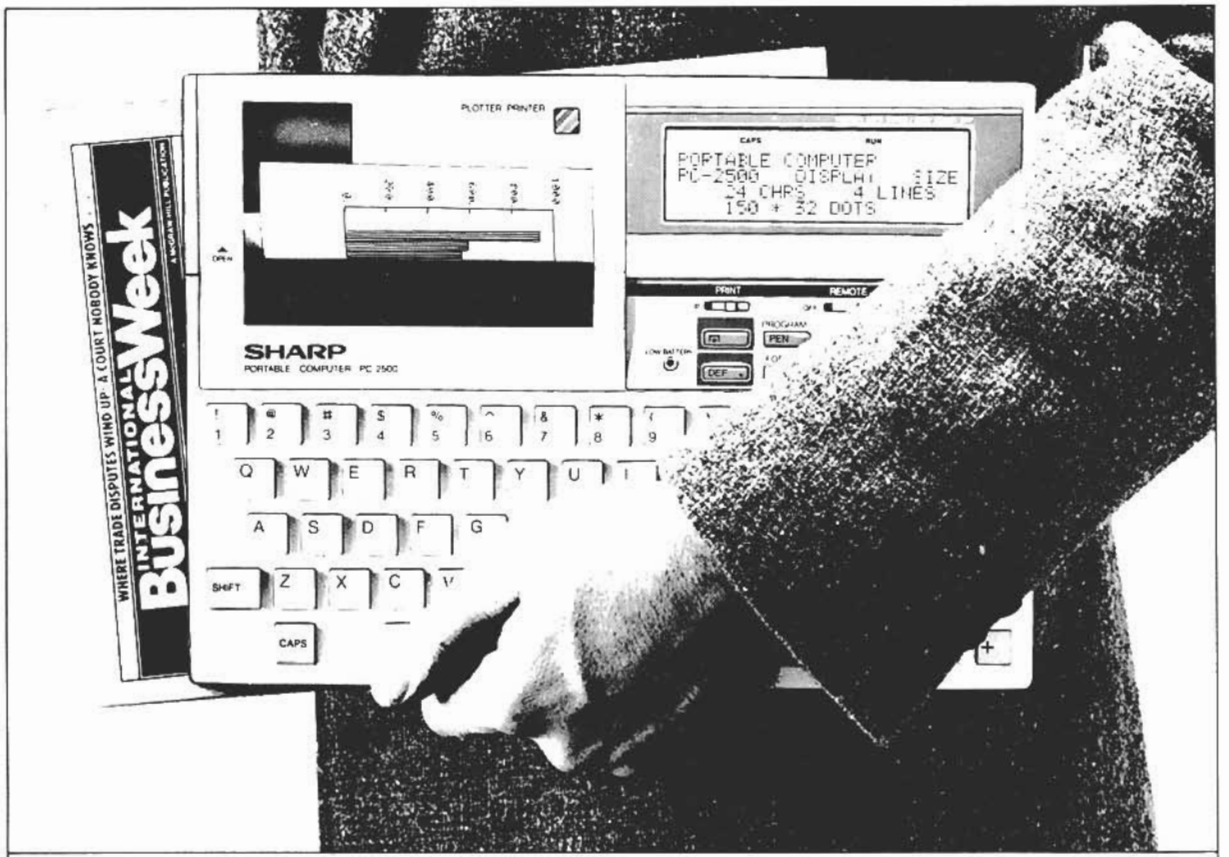
For the other machines, control & cursor keys are used, and Apples may use a mouse. Both Apple and Commodore may use joystick or koala pad as the control medium.

I had a lot of fun using this program, but you may need specific justification to outlay $225 for home use.

Having had plenty of first-hand experience at producing club newsletters and magazines under tight "just in time" conditions, I don't think I would be able to spare the time required to produce a publication of that nature using the program.

But I do see Newsroom being most applicable to the educational environment.

Newsroom was loaned, for review, by PC Power Ltd, Lower Hutt.



Portable Portfolio Partner

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The Sharp PC-2500 is the ideal business partner to take along wherever your business takes you.

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GNA 2860

Hardware survey

$4000-plus microcomputers

Apricot F2

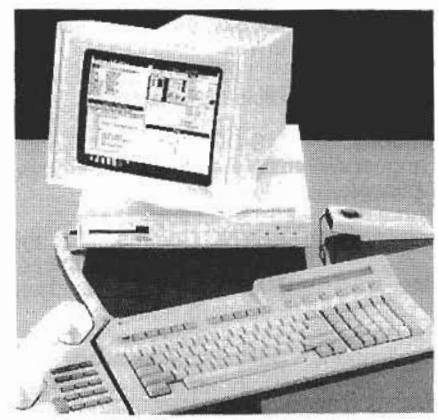
Processor:	8086, 4.77 MHz.
RAM:	512K, max. 768K.
ROM:	32K for BIOS.
Video RAM:	No.
Keyboard:	Full travel, 92 keys, numeric pad. All keys programmable, separate cursor and editing keys.
Video:	Colour, 80 x 25 lines.
Resolution:	640 x 200, 4 colours.
Interfaces:	Parallel, serial ports.
Disk drives:	2 x 3.5" x 720K f/disc drives.
Other components:	Nil.
Operating systems:	MS-DOS.
Languages:	GW Basic.
Optional:	All MS-DOS.
Bundled software:	GEM, GEM Write, GEM Draw.
Prices:	$4995 = processor, keyboard, software.
Expansions:	—
Applications:	All.

Apricot F10

Processor:	8086, 4.77 MHz.
RAM:	512K, max. 768K.
ROM:	32K for BIOS.
Video RAM:	No.
Keyboard:	Full travel 92 keys, numeric pad, all programmable, separate cursor and editing keys.
Video:	Colour, 80 x 25 lines.
Resolution:	640 x 200, 4 colours.
Interfaces:	Serial, parallel.
Disk drives:	1 x 720K floppy (3½"), 1 x 10Mb hard disc.
Other components:	Mouse.
Operating systems:	MS-DOS.
Languages:	GW Basic.
Optional:	All MS-DOS.
Bundled software:	GEM, GEM Write, GEM Paint.
Prices:	$7995 — processor, keyboard, software.
Expansions:	—
Applications:	Business, education.

Apricot XI

Processor:	8086, 8089, optional 8087, 4.77 MHz.
RAM:	512K, max. 960K.
ROM:	32K for BIOS.
Video RAM:	—
Keyboard:	Full travel, 95 keys, numeric pad, all keys programmable, 14 function keys, separate editing keys.
Video:	Mono. 80 x 25 lines.
Resolution:	800 x 400.
Interfaces:	Parallel, serial.
Disk drives:	1 x 3.5" f/disc x 720Kb, 1 x 10Mb/20Mb h/disc.
Other components:	Nil.
Operating systems:	MS-DOS.
Languages:	GW Basic.
Optional:	All MS-DOS.
Bundled software:	ASYNC, Activity, Utilities.
Prices:	$11,275 = 512K, 10Mb + software.
Expansions:	—
Applications:	Business.



Apricot XEN

Processor:	80286 (optional 20287), 7.5 MHz.
RAM:	512K, max. 5Mb.
ROM:	64K for BIOS.
Video RAM:	40K — 128K.
Keyboard:	Full travel, 102 keys, numeric pad, all programmable, 16 function keys, separate editing keys.
Video:	Mono or colour. 80 x 25 lines.
Resolution:	800 x 400 mono or 640 x 200 (4) colour or 640 x 360 (16) colour.
Interfaces:	Serial port (ASYNC, SYNC), Centronics.

(Continued on page 38

Hardware survey

(Continued from page 37)

Disk drives:	Two 3½" f/discs of 720K each.
Other components:	Optional tape, optional second hard disc (internal).
Operating systems:	MS-DOS 3, XENIX.
Languages:	GW Basic.
Optional:	All MS-DOS, XENIX languages.
Bundled software:	MS Windows, MS Write, MS Paint, VT100, IBM Emulator.
Prices:	Over $4000.
Expansions:	20Mb hard disc (internal).
Applications:	Business.

Apricot PC4

Processor:	8086, 8089, optional 8087, 4.77MHz.
RAM:	256K, max. 896K.
ROM:	32K for BIOS.
Video RAM:	No.
Keyboard:	Full travel, 95 keys, numeric pad, all keys programmable, 14 function keys, separate editing keys.
Video:	Mono, 80 x 25 lines.
Resolution:	800 x 400.
Interfaces:	Serial, parallel.
Disk drives:	2 x 3.5" x 720Kb f/disc drives.
Other components:	Nil.
Operating systems:	MS-DOS.
Languages:	GW Basic.
Optional:	All.
Bundled software:	ASYNC Comms, Utilities, IBM Emulator.
Prices:	$6800 = processor, keyboard, software.
Expansions:	—.
Applications:	Business, education.

Canon Application Computer, JX-50

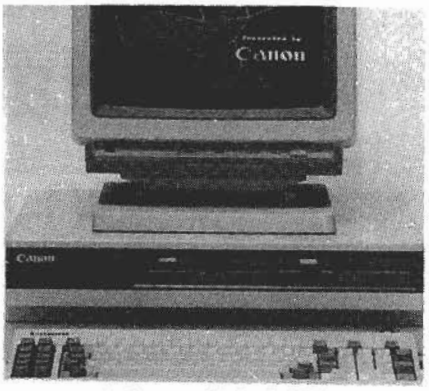
Processor:	8088, 4.77 MHz.
RAM:	128Kb, max. 256Kb.
ROM:	16Kb.
Video RAM:	No.
Keyboard:	72 keys, numeric pad, 50 programmable keys with red LEDs, additional cursor and function keys.
Video:	7 inch monochrome. 30, or 15, or 80 column x 10, or 5, or 25 lines.
Resolution:	—
Interfaces:	2 x RS-232 ports.
Disk drives:	1 x 3" x 360Kb f/disc.
Other components:	Printer integrated — 30 character dot matrix.
Operating systems:	MS-DOS V1.25.
Languages:	Canon Basic, Assembler.
Optional:	—
Bundled software:	MS-DOS, Canon Basic, Assembler.
Prices:	Around $4000.
Expansions:	—
Applications:	—

Canon Handy Terminal HT5000/P

Processor:	Canon Custom.
RAM:	16Kb, max. 32Kb.
ROM:	Mask ROM 4Kb (monitor), EPROM 16Kb (monitor & Basic interpreter.
Video RAM:	No.
Keyboard:	34 keys, 12 numeric pad keys, 16 prog. keys, 6 f/keys.
Video:	LCD, 20 x 2 lines.
Resolution:	—
Interfaces:	RS-232C port.
Disk drives:	—
Other components:	Printer Pack, Charger, Bar Code Reader.
Operating systems:	Custom.
Languages:	Basic.
Optional:	—
Bundled software:	Basic.
Prices:	From $1200.
Expansions:	—
Applications:	Business.

Canon Multifunction Computer, AS-300

Processor:	80186, 6 MHz.
RAM:	256Kb, max. 768Kb.
ROM:	16Kb for boot, BIOS, diagnostic, char. font.
Video RAM:	64 — 192Kb.
Keyboard:	93 keys, numeric pad, 12 function keys, edit keys.
Video:	Monochrome and 12" colour. 80 x 27 lines.
Resolution:	768 x 540, 1088 x 756, 27 colours.
Interfaces:	Parallel, RS-232C, SDLC, GP-IB, LAN, Mouse.
Disk drives:	1 to 3 f/disc drives, 3.5 inch/5.25 in/8.0 in floppy, 5.0 in hard disc respectively holding 720Kb, 650Kb, 1.2Mb, 10.0 or 40.0Mb.
Other components:	Canon printer range.
Operating systems:	MS-DOS V2.12C.
Languages:	Canon Basic, LII ANSI, Cobol.
Optional:	—
Bundled software:	MS-DOS.
Prices:	Dual 3.5 in mono $8300.
Expansions:	Variable.
Applications:	Business.



Canon PC Compatible A-200

Processor:	8086, 4.77 MHz.
RAM:	256Kb, max. 512Kb.
ROM:	16Kb for boot, BIOS, diagnostic, char. font.
Video RAM:	—
Keyboard:	83 keys, 10 separate numeric/cursor/control keys. 10 function keys.
Video:	Mono and colour. 80 x 25 lines.
Resolution:	600 x 200 pixels, 16 colours.
Interfaces:	Parallel (Centronics), asynchronous (RS-232C).
Disk drives:	Two 5.25 inch floppy drives x 360Kb. Optional 10 10Mb hard disc.
Other components:	Canon printer range.
Operating systems:	MS-DOS V2.
Languages:	GW Basic V2.
Optional:	A range of
Bundled software:	MS-DOS and GW Basic.
Prices:	Twin floppy system $6700; hard disk system $10,500.
Expansions:	
Applications:	Business.

Casio FP6000S

Processor:	8086, 8MHz.
RAM:	256Kb, max. 768Kb.
ROM:	8Kb for bootstrap and diagnostics.
Video RAM:	32Kb, expandible up to 96Kb.
Keyboard:	Full travel 94 keys, numeric pad, 12 f/keys, cursor, graph, screen dump.
Video:	Mono or colour, 80 x 25 lines.
Resolution:	640 x 400, 16 colours.
Interfaces:	Centronics parallel.
Disk drives:	Up to 6: 5¼" f/disc 320K, 8" f/disc option. H/disc option.
Other components:	—
Operating systems:	MS-DOS.
Languages:	C86 Basic, Assembler.

Optional:	Pascal, Cobol, Fortran, C, Forth, Modular 2.
Bundled software:	—
Prices:	$4950 for 2 x 5¼" drives, CPU and keyboard.
Expansions:	$8990 for 10 meg drive, 1 x 5¼" drive, CPU & keybd. $9990 for 20 meg drive, 1 x 5¼" drive, CPU & keybd.
Applications:	Business.

Casio FP-4000 (IBM compatible)

Processor:	8086, 4.77 Mhz.
RAM:	256K, max. 512K.
ROM:	16K for bootstrap and diagnostics.
Video RAM:	Up to 16K.
Keyboard:	Full travel, 80 keys, numeric pad, 10f/keys.
Video:	Mono or optional colour; 80 or 40 columns x 25 lines.
Resolution:	640 x 200, 16 colours.
Interfaces:	RS-232 and Centronics parallel.
Disk drives:	Two 5¼" f/disc drives of 360K or 5" h/disk drive option (10/20 Mb).
Other components:	—
Operating systems:	MS-DOS.
Languages:	Basic.
Optional:	Pascal, Cobol, Fortran, C, Forth, Assembler.
Bundled software:	Diagnostic disk.
Prices:	$4495 for 2 x 5¼", CPU and keyboard, MS-DOS licence.
Expansions:	$7495 for 1 x 5¼", 10 meg drive, CPU and keyboard and MS-DOS licence.
Applications:	Business.

Commodore PC20

Processor:	8088, 4.77 MHz.
RAM:	256K, max. 640K.
ROM:	8Kb.
Video RAM:	32Kb colour subsystem, 4Kb monochrome video board.
Keyboard:	Full size, full travel, detachable 85 keys, numeric pad. 10 f/keys.
Video:	Standard monochrome, colour optional. 80 x 25 lines.
Resolution:	640 x 200 standard. Colour board optional.
Interfaces:	Parallel, RS-232C, Monitor, RGB, 5 expansion slots.
Disk drives:	2 x 5¼" f/discs x 360Kb plus 10Mb h/disc standard.
Other components:	Printers, graphics/colour boards.
Operating systems:	MS-DOS 2.11.
Languages:	GW Basic.
Optional:	Cobol, Fortran, Pascal, Macro Assembler.
Bundled software:	PC20, Green Screen, SGIS Printer (Star) Profax Accounting System.
Prices:	$8695 incl. Debtors, Creditors, Gen Led etc.
Expansions:	256—512K expansion — $495, 512—640K expansion $249.
Applications:	Business.

Commodore PC10

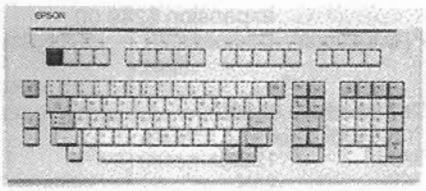
Processor:	8088, 4.77 MHz.
RAM:	256K, max. 640K.
ROM:	8Kb.
Video RAM:	32Kb Colour subsystem, 4Kb monochrome video board.
Keyboard:	Full size, full travel, detachable 85 keys, numeric pad, 10 f/keys and escape, scroll, alt.
Video:	Standard monochrome, colour optional.
Resolution:	640 x 200 standard, colour boards optional.
Interfaces:	Parallel, RS-232C, Monitor, RGB, 5 expansion slots.
Disk drives:	2 of 5.25" x 360Kb each.
Other components:	Printers, graphics/colour boards optional.
Operating systems:	MS-DOS 2.11.
Languages:	GW Basic.
Optional:	Cobol, Fortran, Pascal, Macro Assembler.
Bundled software:	PC10, Star SG10 Printer, Green Screen Monitor, Profax Accounting System.
Prices:	$5695 with above bundle. Without, $3995.
Expansions:	256—512K expansion $495. 512—640K expansion $249.00.
Applications:	Business.

Commodore 8296D

Processor:	6502, 2 MHz.
RAM:	128K.
ROM:	24K.
Video RAM:	—
Keyboard:	Full size, full travel, 73 keys, numeric pad.
Video:	Monochrome. 80 x 25 lines.
Resolution:	—
Interfaces:	IEEE-488, user port, cassette, 1/0 expansion bus.
Disk drives:	2 x 5¼" f/disc drives, 1 MGB each.
Other components:	Printers, datasette optional.
Operating systems:	Basic 4.
Languages:	—
Optional:	—
Bundled software:	—
Prices:	$5995.
Expansions:	—
Applications:	—

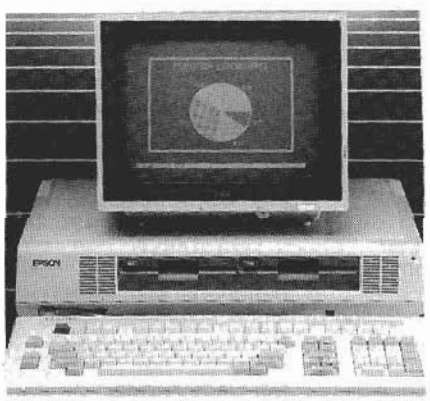
Epson PX4

Processor:	Z80, 3.75 MHz.
RAM:	64K. Max. 128K as RAM disc.
ROM:	32Kb for CP/M operating system plus 64Kb ROM cartridge.
Video RAM:	4K.
Keyboard:	Full travel, 72keys, numeric pad, 5f/keys, edit keys.
Video:	LCD. 40 x 8 lines.
Resolution:	240 x 64.
Interfaces:	Parallel (printer Centronics standard) + RS-232 or highspeed serial.
Disk drives:	Nil standard. Option of f/discs: dual 5¼" mains, or 1 x 3½" battery operation.
Other components:	Real time clock, battery-backed.
Operating systems:	CP/M.
Languages:	M Basic.
Optional:	Bar Code Reader Program, EPROM Writer Program.
Bundled software:	—
Prices:	PX-4 computer with RAM cartridge, microcassette drive, 128K RAM disc, and cartridge printer = $4651.
Expansions:	—
Applications:	—



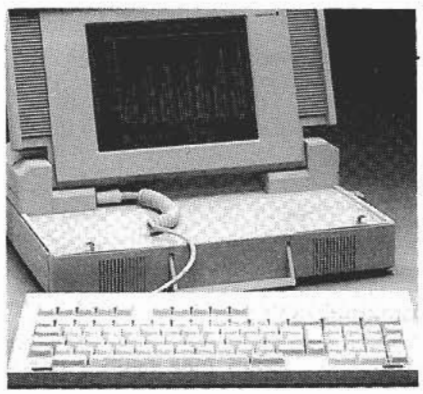
Epson QX11

Processor:	8088, 4.77 Mhz.
RAM:	256K, max. 512.
ROM:	64Kb for MS-DOS and BIOS. Plus ROM cartridge of 64Kb.
Video RAM:	48Kb plus 32K for IBM video emulation.
Keyboard:	Full travel, full size & compact k/boards (115 & 78 keys). Numeric pads and 10 F1 to F10 keys, and editing keys.
Video:	Colour or mono, 12" or 5", 80 x 25 lines.
Resolution:	640 x 400, 640 x 200. 8 colours.
Interfaces:	—
Disk drives:	Two 3½" 360Kb f/discs. Optional 10Mb h/disc.
Other components:	Battery-backed real time clock.
Operating systems:	MS-DOS 2.11.
Languages:	T.B.A.
Optional:	Concurrent CP/M.
Bundled software:	—
Prices:	$4000 (estimated).
Expansions:	—
Applications:	Business.



Epson QX16

Processor:	Dual Z80/8088; 4MHz + 5.3MHz.
RAM:	256K, max. 512K.
ROM:	64K to 128K for BIOS for MSDOS.
Video RAM:	128K plus 32K for IBM PC video emulation.
Keyboard:	Full travel, 115 keys, numeric pad, 10 f/keys & edit keys.
Video:	Colour or mono, 80 x 25 lines.
Resolution:	Max. 640 x 400; 8 colours.
Interfaces:	3 option slots.
Disk drives:	2 x 5¼" 720KB f/drives. 10MB/20MB h/disc option.
Other components:	Battery-backed real time clock.
Operating systems:	CPM 2.2 and MSDOS 2.11.
Languages:	MF Basic.
Optional:	GW Basic.
Bundled software:	—
Prices:	For above $5570 (excluding h/disc).
Expansions:	—
Applications:	Business,education.

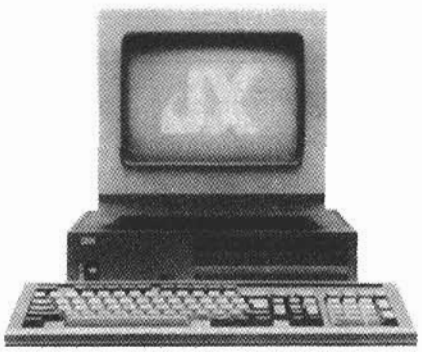


Ericsson PC

Processor:	16 Bit Intel 8088, 4.77 MHz.
RAM:	256 Kbytes, max. 640 Kbytes.
ROM:	8 Kbytes for initial program load.
Video RAM:	32 Kbytes.
Keyboard:	Full travel, 84 keys, numeric pad, 10 function keys, and other editing keys.
Video:	Monochrome and colour. 80 characters x 25 lines.
Resolution:	Monochrome 640 x 420 pixels, colour 640 x 200. 16 foreground 8 background colours.
Interfaces:	6 expansion slots, Centronics port, Async port, all standard.
Disk drives:	Up to 4 half light floppy & winchesters. F/discs 360K, h/discs 10Mb, 20Mb, external 80Mb.
Other components:	Tape with 80Mb disk.
Operating systems:	MS-DOS, PC-DOS.
Languages:	GW Basic.
Optional:	—
Bundled software:	GW Basic, MS-DOS, Diagnostic Package.
Prices:	256K, 1 x 360KFD, 1 x 10Mb HD, Mono $12,000.
Expansions:	—
Applications:	Business.

Ericsson Portable PC

Processor:	16 bit Intel 8088, 4.77 MHz.
RAM:	256 Kbytes, max. 512 Kbytes.
ROM:	15 Kbytes for initial program load.
Video RAM:	—
Keyboard:	Full travel, 84 keys, numeric pad, 10 function keys and other editing keys.
Video:	Monochrom neon/ orange, 80 characters x 25 lines.
Resolution:	640 x 400 & 640 x 200.
Interfaces:	1 expansion slot, 1 floppy disk port, 1 serial port, 1 Centronics port.
Disk drives:	1 x half height 360 Kbytes.
Other components:	Real time clock, additional f.d. drive.
Operating systems:	MS-DOS, PC-DOS.
Languages:	GW Basic.
Optional:	—
Bundled software:	MS-DOS, GW Basic, Diagnostics.
Prices:	$8500.
Expansions:	Portable PC 256K 1 FD etc.
Applications:	Business.



IBM JX-PC Model 2 (starter system)

Processor:	Intel 8088, 4.77 Mhz.
RAM:	128Kb, max. 512Kb — by installing either 128Kb or 256Kb or 384Kb options.
ROM:	96Kb — 2Kb reserved as character generator. Rest for System BIOS,

	Advanced Basic and Power-On Self Test.Plus two 96Kb ROM cartridge slots.
Video RAM:	128Kb RAM is shared for video and general, up to 64Kb for video.
Keyboard:	Full travel, all keys are Typamatic. Compact K/b/79 keys; full K/b/98 keys. Numeric pad on full K/b. 10 function keys giving 40 functions using shift, control & alt.
Video:	Colour display works in both modes. 80 chars x 25 lines.
Resolution:	640 x 200; 16 colours.
Interfaces:	Parallel (Centronics), 2 x joystick, keyboard cable and keyboard infra red, cassette, light pen, audio, 2 x ROM cartridge, RGB display, RS-232C, Cluster (Multi-User).
Disk drives:	1 x 3½" 360Kb (double sided/density).
Other components:	—
Operating systems:	DOS 2.10.
Languages:	Basic, Advanced Basic.
Optional:	Fortran, Macro ASSM, Pascal, Cobal, E2-VU.
Bundled software:	—
Prices:	Above 128K, single f/drive = $4147 (incl. DOS 2.10) + full keyboard. 64K unit $2908.
Expansions:	—
Applications:	—

ITT XTRA

Processor:	8088, 4.77MHz.
RAM:	256K, max. 640K.
ROM:	32K for BIOS.
Video RAM:	No.
Keyboard:	Full travel, 84 keys, numeric pad, 10 f/keys, editing keys.
Video:	Amber, green, colour 14". 80 x 25 lines.
Resolution:	640 x 400, 32 colours.
Interfaces:	Serial & parallel ports.
Disk drives:	1 floppy, 1 hardisk or 2 floppy.
Other components:	—
Operating systems:	ITT.DOS 2.11.
Languages:	Basic.
Optional:	All.
Bundled software:	—
Prices:	Twin floppy, 256K, mono = $5016.
Expansions:	—.
Applications:	Business.

Kaypro 2000

Processor:	8088, 4.77 Mhz.
RAM:	256K, max. 768K.
ROM:	8K for bootstrap.
Video RAM:	None.
Keyboard:	Full travel, 77 keys, numeric pad, 10 f/keys.
Video:	Built-in LCD, 80 x 25 lines.
Resolution:	640 x 200, monochrome.
Interfaces:	RS-232.
Disk drives:	1 x 3.5" 720Kb f/drive.
Other components:	—
Operating systems:	MS-DOS 2.11.
Languages:	GW Basic.
Optional:	MS-DOS languages.
Bundled software:	Wordstar, Mailmerge, Calcstar, Infostar, K-Key.
Prices:	$5895.
Expansions:	—
Applications:	Portable business machine.

Kaypro 10

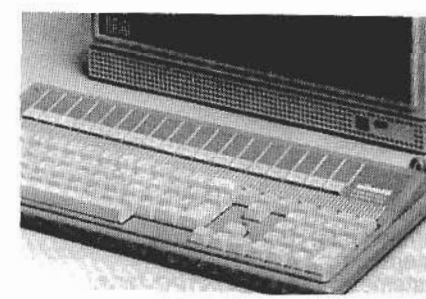
Processor:	Z80, 4.0 Mhz.
RAM:	64K.
ROM:	4K for bootstrap.
Video RAM:	No.
Keyboard:	Full travel, 72 keys, numeric pad, 18 f/keys, cursor controls.
Video:	Monochrome (green) built-in. 80 x 25 lines.
Resolution:	100 x 160.
Interfaces:	Serial.
Disk drives:	One 5¼" f/drive of 400K and 10Mb h/disc.
Other components:	—
Operating systems:	CP/M 2.2.
Languages:	MBasic.
Optional:	Most CP/M languages.
Bundled software:	Wordstar, Mailmerge, Calcstar, Infostar, MBasic.
Prices:	$6775 as above.
Expansions:	—
Applications:	Business.

Kaypro 16

Processor:	8088, 4.77 MHz.
RAM:	256K, max. 640K.
ROM:	8K for bootstrap. Max. 32K.
Video RAM:	None.
Keyboard:	Full travel, 83 keys, numeric pad, 10 f/keys.
Video:	Built-in monochrome. External RGB port. 40 or 80 columns x 25 lines.
Resolution:	320 x 200, or 640 x 200, 16 colours.
Interfaces:	Serial, parallel interfaces.
Disk drives:	One 5¼" 360K formatted f/drive and built-in 10Mb hard drive.
Other components:	—
Operating systems:	MS-DOS 2.11.
Languages:	GW Basic.
Optional:	MS-DOS languages.
Bundled software:	Wordstar, Calcstar, Infostar, Mailmerge.
Prices:	$7995 as above.
Expansions:	—
Applications:	Transportable business machine.

NEC APC-III

Processor:	8086-2, 8 MHz.
RAM:	256K, max. 640K.
ROM:	32K for BIOS.
Video RAM:	64K + 8K.
Keyboard:	Full travel, 100 keys, numeric pad, 12 function keys, usual editors.
Video:	Mono or colour, 80 x 25 lines.
Resolution:	640 x 400, 8 colours.
Interfaces:	RS-232, Centronics.
Disk drives:	Two x 5¼" x 720K. 10Mb option.
Other components:	—
Operating systems:	MS-DOS.
Languages:	Optional are GW Basic, Turbo Pascal, all Microsoft, all Digital Research.
Optional:	—
Bundled software:	—
Prices:	1 f/drive, 1 h/drive, MS-DOS, ca , screen & keyboard $8309. Dual f/drives system $6374.
Expansions:	—
Applications:	Business, architecture, pharmacy, surveying etc.



Olivetti M24

Processor:	8086, 8 MHz.
RAM:	256K, 640K max.
ROM:	16K.
Video RAM:	—
Keyboard:	Full travel, 83 keys, numeric pad, 10 function

	keys.
Video:	RGB & video, 40 or 80 x 25 lines, 64 x 16 lines.
Resolution:	640 x 400, 640 x 200, 320 x 200, 512 x 256. 16 colours.
Interfaces:	Printer, centronics, mouse, RS-232.
Disk drives:	1 or 2, 5¼" ½-height. 360K each. 10 Mgb h/drive.
Other components:	Optional.
Operating systems:	MS-DOS 2.11.
Languages:	GW Basic.
Optional:	Pascal.
Bundled software:	—
Prices:	Single-drive $6495, two-drive $6995, h/drive $10,995.
Expansions:	—
Applications:	Business.

Panasonic SR Partner (RL-H7100B)

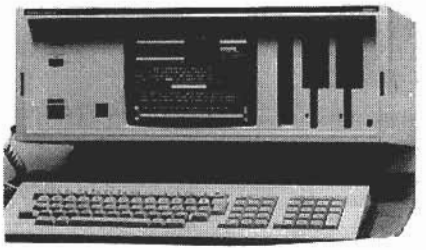
Processor:	8088, 4.77 MHz.
RAM:	256K, max. 640K.
ROM:	16K.
Video RAM:	—
Keyboard:	Full travel, 83 keys, numeric pad, 10 f/keys.
Video:	Mono. 80 x 25 lines.
Resolution:	640 x 400 pixels.
Interfaces:	Parallel Centronics/ Serial RS-232C/RGB.
Disk drives:	Two 5¼" f/d drives, 360K ea. Also 10Mb h/disc model + 1 f/d.
Other components:	Printer in-built.
Operating systems:	MS-DOS (PC-DOS).
Languages:	Basic.
Optional:	Usual IBM-PC.
Bundled software:	MS-DOS, Basic, Mterm.
Prices:	$4995 (PC + software).
Expansions:	Hard disc + f/disc model = $7995.
Applications:	Business, education, training.

Panasonic BIZ Partner (JB 3300)

Processor:	8088, 4.77 MHz.
RAM:	256K, max. 640K.
ROM:	16K.
Video RAM:	—
Keyboard:	Full travel, 84 keys, numeric pad, 10 f/keys.
Video:	Hi res plasma, 80 x 25 lines.
Resolution:	640 x 400 pixels.
Interfaces:	Parallel/serial.
Disk drives:	2 x 5¼ f/discs, 360K ea.
Other components:	—
Operating systems:	MS-DOS (PC-DOS).
Languages:	Basic.
Optional:	Usual IBM PC.
Bundled software:	—
Prices:	$5495 (PC + software).
Expansions:	XL model = 1 f/d + h/disc 10Mb. $8495.
Applications:	Business, education, training.

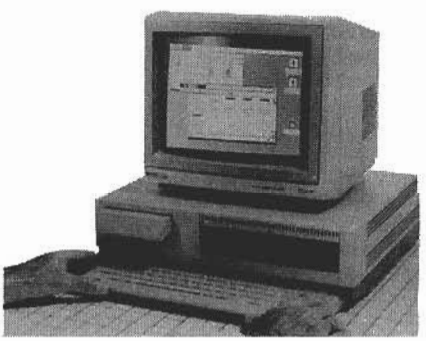
Panasonic Exec. Partner (FT 70)

Processor:	8086-2, 7.16/4.77 MHz.
RAM:	256K, max. 640K.
ROM:	32K.
Video RAM:	—
Keyboard:	Full travel, 83 keys, numeric pad, 10 f/keys.
Video:	Mono (red) plasma, 80 x 25 lines.
Resolution:	640 x 200 pixels.
Interfaces:	Parallel/serial/expansion.
Disk drives:	2 x 5¼", 360K each.
Other components:	Printer.
Operating systems:	MS-DOS (PC-DOS).
Languages:	Basic.
Optional:	Usual IBM PC.
Bundled software:	Basic, MS-DOS, Diagnostics.
Prices:	$5995 (PC + software).
Expansions:	—
Applications:	Business, education, training.



Philips P2000C Transportable PC (P2012)

Processor:	Z80 A(x2) 4 MHz.
RAM:	64K, max 608K.
ROM:	12K for IPL, video.
Video RAM:	32K.
Keyboard:	Leaf spring contact, 93 keys, numeric pad, all programmable.
Video:	Mono. 80 x 25 lines.
Resolution:	512 x 252, 256 x 252.
Interfaces:	SASI, RS-232, external video.
Disk drives:	Two 5¼", 640K f/discs. Optional 10/20Mb h/disc.
Other components:	—
Operating systems:	CP/M-80, MS-DOS 2.11.
Languages:	All standard languages.
Optional:	—
Bundled software:	Wordstar, Calcstar, Open Access-C, Grafox, TTY, MBasic.
Prices:	$5500 std h/w and above s/w.
Expansions:	256K MS-DOS + $1500; internal 20Mb + $7000.
Applications:	Business.



Philips P2000V Desk-top PC

Processor:	80186, 8 MHz.
RAM:	128K, max. 640K.
ROM:	64K for IPL and DOS PLUS. Max. 128K.
Video RAM:	No.
Keyboard:	Full travel, professional quality, 84 keys, numeric pad, 10 f/keys.
Video:	Mono and colour. 80 x 25 lines.
Resolution:	Max. 640 x 350 (mono).

	350 x 250, 16 colours.
Interfaces:	Centronics, RS-232, Composite mono, RGBI colour.
Disk drives:	Two 3½" x 720K f/discs. Optional 5¼" f/discs & 20Mb h/disc.
Other components:	—
Operating systems:	DRI DOS PLUS, MS-DOS 2.11, Concurrent DOS 4.11, CP/M-86.
Languages:	All standard languages.
Optional:	—
Bundled software:	Logistix, Open-Access with 256K and greater.
Prices:	Above with 256K dual f/drive $4900.
Expansions:	LAN board $850, Mouse, Real time clock, SASI-POA.
Applications:	Business.

Philips P3100, Desk-Top PC Compatible

Processor:	8088, 4 Mhz.
RAM:	128K, max. 640K.
ROM:	8K for IPL.
Video RAM:	No.
Keyboard:	Capacitance keyswitching, 84 keys, numeric pad, 10 f/keys.
Video:	Mono and colour. 80 x 25 lines.
Resolution:	640 x 325 max., 16 colours max.
Interfaces:	RS-232, Centronics.
Disk drives:	Two 5¼" 360K f/discs. Optional internal 10Mb h/disc.
Other components:	—
Operating systems:	MS-DOS V2.11, PC-DOS.
Languages:	All standard languages.
Optional:	—
Bundled software:	GW Basic, PC Tutor.
Prices:	Std h/ware + GW Basic, PC Tutor $6680.
Expansions:	10Mb hard disc + $3260, 128K memory + $400.
Applications:	Business, IBM compatible.

President AT

Processor:	80286, 6 MHz.
RAM:	512K, max. 3 Mb.
ROM:	32K for bootstrap, BIOS, Selftest.
Video RAM:	None.
Keyboard:	Full travel, 84 keys, numeric pad, 10 f/keys, cursor controls.
Video:	RGB colour, composite, monochrome. 40 or 80 x 25.
Resolution:	320 x 200, or 640 x 200, 16 colours.
Interfaces:	Eight expansion slots, parallel, serial.
Disk drives:	2 x 5¼" 1.2 Mb f/drives. Also 20 Mb hard drive; real time clock.
Other components:	—
Operating systems:	MS-DOS 3.1 or 2.11.
Languages:	GW Basic.
Optional:	All PC/AT languages.
Bundled software:	To be advised.
Prices:	$13,500.
Expansions:	—
Applications:	Business.

President PC 16-220

Processor:	8088, 4.77 Mhz.
RAM:	512K, max. 704K.
ROM:	8K ROM for bootstrap. 32K max.
Video RAM:	—
Keyboard:	Full travel, 83 keys, numeric pad, 10 f/keys, cursor control keys.
Video:	RGB colour, composite, monochrome. 40 or 80 columns x 25 lines.
Resolution:	320 x 200 or 640 x 200; 16 colours.
Interfaces:	8 expansion slots, parallel, serial, game I/O.
Disk drives:	Two 5¼" 360K f/drives.
Other components:	—
Operating systems:	MS-DOS 2.11.
Languages:	GW Basic.
Optional:	All MS-DOS languages.
Bundled software:	Open access.
Prices:	$7595 with 20 meg drive.
Expansions:	—
Applications:	Business and networking.

RM Nimbus PC1, PC2 (also discless network station)

Processor:	80186 plus 8051 & sep VL51 graphics. 8087 optional. 80186 at 8 MHz.
RAM:	576K, max. 1.09 Mb.
ROM:	System ROMS.
Video RAM:	No.
Keyboard:	Full travel, 83 keys detatched, numeric pad, 10 f/keys. Switchable autorepeat.
Video:	Colour standard. 80/40 x 25 lines.
Resolution:	640 x 256, 4 colours.
Interfaces:	RS-232; Piconet to 30 peripherals.
Disk drives:	1 or 2 f/d drives, 3½" x 720K each.
Other components:	—
Operating systems:	MS-DOS.
Languages:	Basic.
Optional:	All available.
Bundled software:	MS-Word, Multiplan, MS-Windows plus 11 others.
Prices:	$6500 = PC2 with MS-DOS Basic & Logo.
Expansions:	On application.
Applications:	Business, tertiary education, research.

Sanyo MBC 775

Processor:	8088/4.77 MHz (switchable).
RAM:	256 KB, max. 640K.
ROM:	8K.
Video RAM:	32K.
Keyboard:	Full travel, 81 keys, numeric pad, 10 f/keys, 5 edit keys.
Video:	Colour, 80 x 25 lines.
Resolution:	320 x 200 pixels, 8 colours.
Interfaces:	Parallel/centronics/ printer port.
Disk drives:	Two x 5¼" 360 KB f/drives. 10 Mb h/disc model (MBC 880).
Other components:	—
Operating systems:	MS-DOS.
Languages:	GW Basic.
Optional:	"Most others".
Bundled software:	Wordstar 2000/GW Basic.
Prices:	$4995 — as above. H/disc model $6595.
Expansions:	—
Applications:	Business, education.

Sharp MZ5600

Processor:	8086, 8 MHz.
RAM:	256Kb, max. 512Kb.
ROM:	16Kb for IPL.

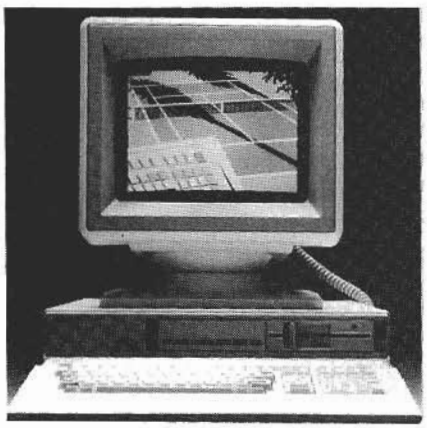
Video RAM:	96Kb, up to 192Kb.
Keyboard:	Full travel, detached 102 keys, numeric pad, 10 f/keys; also help, copy, 2 enter keys.
Video:	Mono std, colour optional. 80 x 25 lines.
Resolution:	640 x 400 pixels, 16 colours.
Interfaces:	Mouse, parallel, 2 x RS-232C, 2 x CRT, external MFD.
Disk drives:	2 x 5.25" x 640Kb f/discs.
Other components:	—
Operating systems:	MS-DOS, CP/M 86.
Languages:	Basic.
Optional:	—
Bundled software:	Business software "Financial Controller".
Prices:	$7500 as above, includes printer.
Expansions:	Up to $11,000 with hard disk.
Applications:	Business.

Sharp PC7000

Processor:	8086, 7.37 MHz, switchable to 4.77 MHz.
RAM:	320Kb, max. 704Kb.
ROM:	16Kb for IPL, BIOS, Diagnostic, Set-Up.
Video RAM:	No.
Keyboard:	Detached full travel, 3 LED's, 84 keys, IBM PC layout, nbumeric pad, 10 f/keys, set-up key.
Video:	Backlight LCD. 80 x 25 lines.
Resolution:	640 x 200 pixels. Mono.
Interfaces:	1 x parallel, 1 x RS-232C.
Disk drives:	10Mb hard disk optional. Standard are 2, 5.25" x 360Kb f/discs.
Other components:	Optional expansion unit — 3 slots.
Operating systems:	MS-DOS 2.11.
Languages:	Basic, other IBM types.
Optional:	—
Bundled software:	None.
Prices:	$4000 as above .
Expansions:	Up to $10,000 with hard disk.
Applications:	Business.

Sord M243EX

Processor:	Z80B, 6 MHz.
RAM:	192Kb, max. 1Mb.
ROM:	16K for boot, diagnostics, character gen, graphics. Max 256K (SGL language).
Video RAM:	—
Keyboard:	Full travel low profile, 104 keys, numeric pad, 16 function keys, 7 sense keys.
Video:	Green or colour. 80 x 24, + 25th status line.
Resolution:	640 x 400. 16 (8 @ time C mode) colours.
Interfaces:	4 x RS-232, 1 x Cent.
Disk drives:	2 x MFDD, 5½", 1.2Mb each. 1—4 HD drives optional, 10, 20 Mb ea.
Other components:	—
Operating systems:	Sord M (Multi-User) DOS.
Languages:	Basic Int/Comp. SGL (Sord Graphic).
Optional:	Cobol, Fortran, Pascal.
Bundled software:	MDOS, Basic, SGL.
Prices:	SGL user $9080 (green); up to $24,000 depending on # users.
Expansions:	—
Applications:	Multi-user/job business.



Sord M68MX

Processor:	Motorola 68000, 10 MHz.
RAM:	512Kb, max. 3.5 Mb.
ROM:	16Kb for boot, diagnostics, character gen. max. 32Kb.
Video RAM:	—
Keyboard:	*Full travel low profile, 109* keys, numeric pad, 21 function keys, 8 sense keys.
Video:	Amber or colour option. 80 x 25 lines.
Resolution:	640 x 500; 16 of 4096 colours at one time.
Interfaces:	Centronics port.
Disk drives:	2 f/discs, 5¼", 1.2Mb each; 20Mb h/disc option.
Other components:	Mouse.
Operating systems:	CPM-68K.
Languages:	Cobol, Basic-II, Fortran "C".
Optional:	Assembler, CAD-Brain Mini.
Bundled software:	None other than O.S. (CPM-68K + "C").
Prices:	Basic system $8500.
Expansions:	—
Applications:	CAD, commercial graphics, business.

Sord M343SX

Processor:	80286, co-processor 80287 NDP. 8MHz/ 5MHz.
RAM:	512K. 5 Megb max.
ROM:	16Kb to boot, diagnostics, multi-character set. Max. 32K.
Video RAM:	16K.
Keyboard:	Full travel, 109 keys, numeric pad, 21 function keys, 8 sense keys.
Video:	Amber and colour option. 80 x 25 lines.
Resolution:	720 x 500. 16 colours, of 4096, at one time.
Interfaces:	Centronics printer, 2 x RS-232, DMA.
Disk drives:	1 — 3 internal fds. 5¼", 1.2Mb each.
Other components:	Optional 20Mb hd. 80Mb max.
Operating systems:	Sord RM-DOS, CCP-86, MS-DOS, UCSD-P.
Languages:	M-Basic (multi-user).
Optional:	Cobol, Fortran.
Bundled software:	RM-DOS & M-Basic.
Prices:	$13,116 with 2 fds, amber screen and 512K RAM.
Expansions:	Extra memory and disc drives.
Applications:	Business, multi-user systems.

Other components:	—
Operating systems:	MS-DOS 3.1. Xenix 5.0 multi-user option.
Languages:	Basic.
Optional:	Most.
Bundled software:	—
Prices:	$14,000 for built in 20Mb h/d drive, 1 x 1.2Mb f/disc, mono screen.
Expansions:	RAM to 12Mb under Xenix. Two internal h/discs. 10 card slots including 7 AT compatible & 3 XT slots.
Applications:	Business — multi-user, multi-tasking capacity

Tandy 2000

Processor:	80186, 8 MHz.
RAM:	256K, max. 768K.
ROM:	1K for boot & diagnostics.
Video RAM:	—
Keyboard:	Full travel, 90 keys, numeric pad, 12 f/keys, arrows.
Video:	Mono or colour, 80 x 25 lines.
Resolution:	640 x 400, 16 colours.
Interfaces:	RS-232C & parallel Centronics.
Disk drives:	2 x 720K 5¼" f/d drives.
Other components:	10Mb h/d drive optional.
Operating systems:	MS-DOS.
Languages:	Basic.
Optional:	Most.
Bundled software:	Nil.
Prices:	$6485 for mono, twin floppy, 256K RAM.
Expansions:	$12,280 for hi res CLR, 10Mb Winchester, 256K.
Applications:	Business and CAD.

Wyse 1000 #3 (& #4)

Processor:	80186, 8.0 MHz.
RAM:	256, max. 768K.
ROM:	16K for self test/ bootstrap.
Video RAM:	—
Keyboard:	101 keys, numeric pad, 16 f/keys, editing keys.
Video:	80 — 132 columns x 25 lines.
Resolution:	1024 x 768. Mono.
Interfaces:	2 serial, 1 parallel port.
Disk drives:	2 x 5¼" f/disc drives x 362K each.
Other components:	—
Operating systems:	MS-DOS.
Languages:	GW Basic.
Optional:	—
Bundled software:	—
Prices:	$4617.
Expansions:	Model #4 has 1 f/disc and 10Mb h/disc, $7864.
Applications:	—

Wyse PC, Model 1 (& 2)

Processor:	8088, 4.77 MHz.
RAM:	256K, max. 512K.
ROM:	16K for self test/ bootstrap.
Video RAM:	—
Keyboard:	83 keys, numeric pad, 10 f/keys.
Video:	Mono or colour. 80 x 25 lines.
Resolution:	—
Interfaces:	2 serial, 1 parallel port.
Disk drives:	2 floppy (5¼") x 362K.
Other components:	—
Operating systems:	MS-DOS.
Languages:	GW Basic.
Optional:	—
Bundled software:	None.
Prices:	$5590. For Model 2 hard disc option, $8313.
Expansions:	—
Applications:	Business.

Zenith ZP-150

Processor:	8088/4.77 MHz.
RAM:	32Kb, max. 416Kb.
ROM:	224Kb for power-up and integrated software. Max. 288K.
Video RAM:	Yes.
Keyboard:	Full travel, 75 keys, overlaid numeric pad, 10 f/keys, graph key, phase/function key.
Video:	LCD. 80 column x 16 lines.
Resolution:	640 x 128, green.
Interfaces:	Serial RS-232, Parallel, System Bus, Bar Code Reader, Telephone (BT) Jack.
Disk drives:	NIL. Model ZFL-171 offers 80 x 25 lines, two 5¼ 360 f/drives, and MS-DOS.
Other components:	Optional. Internal modem standard.
Operating systems:	Microsoft Works.
Languages:	—
Optional:	—
Bundled software:	Microsoft Works — d/base, spreadsheet, w/p, Basic, Calendar, Telecom.
Prices:	"Individually tailored".
Expansions:	Yes.
Applications:	Business.

Zenith Z-200 Series (IBM AT compatible)

Processor:	80286, 6MHz.
RAM:	512KB, max. 16Mb.
ROM:	64Kb. Selftest, modes, set-up. Max. 128Kb.
Video RAM:	Yes, up to 320Kb per video board option.
Keyboard:	Full travel "IBM PC" layout of 84 keys, numeric pad, 10 f/keys, sys request key.
Video:	Several options. 80 column x 25 lines (50 with video card).
Resolution:	Up to 2048 x 4096 per video card, up to 256 colours.
Interfaces:	Serial RS-232C, parallel centronics compatible.
Disk drives:	Up to six internal drives. 5¼" f/drives, 360Kb and 1.2Mb. Winchesters up to 256Mb total.
Other components:	—
Operating systems:	MS-DOS and XENIX's.
Languages:	—
Optional:	Basic, Fortran, Cobal, Pascal.
Bundled software:	—
Prices:	"Individually tailored".
Expansions:	7 IBM Bus slots.
Applications:	Business,education, science.

Zenith ZF-148 Series (IBM PC compatible)

Processor:	Intel 8088-2, 4.77 and 8 MHz.
RAM:	128Kb in single-drive unit; max. 768Kb.
ROM:	32Kb for bootstrap, diagnostics, video & scroll modes, ML access.
Video RAM:	Yes.
Keyboard:	Full travel "IBM PC" layout, 84 keys, numeric pad, 10 f/keys.
Video:	Mono and colour; 40 and 80 columns x 25 lines (50 with video card).
Resolution:	640 x 200 mono, 320 x 200 for 16 colours.
Interfaces:	Serial RS-232C, parallel centronics compatible.

Disk drives:	One or two 5¼" 360Kb f/drives. Model ZF-158 offers h/disc options.
Other components:	Optional.
Operating systems:	MS-DOS.
Languages:	—
Optional:	Basic, Fortran, Cobal, Pascal.
Bundled software:	—
Prices:	"Individually tailored".
Expansions:	Several.
Applications:	Business,education, science.

Zenith Z100 Series

Processor:	8 bit 8085, 16 bit 8088, 4.77 MHz.
RAM:	128Kb, max. 768Kb.
ROM:	32Kb to monitor ROM.
Video RAM:	128Kb.
Keyboard:	Full travel, 77 keys, numeric pad, 10 f/keys.
Video:	Mono/colour optional. 80 x 25 lines.
Resolution:	640 x 225, 16 colours.
Interfaces:	Parallel and serial ports.
Disk drives:	5¼" 360K f/drive, 10Mb h/disc.
Other components:	Optional printers, plotters, digitisers, various monitors, cards, tape streamers, winchesters etc.
Operating systems:	CPM/M-85, MS-DOS.
Languages:	GW Basic, Basic 80 interpreter, Z Basic, Bascom 86, Fortran, Fortran 86, Cobal, Pascal.
Optional:	—
Bundled software:	—
Prices:	—
Expansions:	S100 Bus System.
Applications:	Science, business, education.

Apple Macintosh

Processor:	Motorola 68000; 8 Mhz.
RAM:	512K, max. 1 Mb.
ROM:	64K.
Video RAM:	Yes.
Keyboard:	Separate, full travel type. Numeric pad. No f/keys.
Video:	Mono. Columns to 91 max.
Resolution:	—
Interfaces:	Two serial ports, mouse and external disc.
Disk drives:	1 x 3½" f/drive, 400-800K.
Other components:	Mouse, external f/drive & h/disc, Apple printers optional.
Operating systems:	Proprietary.
Languages:	—
Optional:	Basic, Pascal, Logo, and more.
Bundled software:	Yes.
Prices:	$4995 for 512K Mac with 400K f/drive.
Expansions:	H/disc, external f/d.
Applications:	Business, education.

Bondwell 36

Processor:	Intel 8088, 4.7 Mhz.
RAM:	256K.
ROM:	40K.
Video RAM:	—
Keyboard:	Separate, full travel type. Numeric pad, 10 f/keys.
Video:	Mono (or colour) 40-80 columns x 25 lines.
Resolution:	—
Interfaces:	Centronics, and RS-232 option.
Disk drives:	1 x f/drive, 360K, 5¼" discs; 1 x h/drive, 10 Mb.
Other components:	Mono screen included.
Operating systems:	MS-DOS, CP/M 86, USCDp.
Languages:	Basic and most others.
Optional:	—
Bundled software:	—
Prices:	$4995, with 10 Mb h/d.
Expansions:	20 & 40 Mb h/disc options.
Applications:	Business.

Burroughs B25

Processor:	Intel IAPX186, 8 Mhz.
RAM:	256K.
ROM:	8K.
Video RAM:	—
Keyboard:	Separate professional keyboard, numeric pad, f/keys.
Video:	80 x 29 lines, mono or colour.
Resolution:	—
Interfaces:	Parallel & RS-232.
Disk drives:	Two f/drives, 1 Mb. H/d options.
Other components:	—
Operating systems:	BTOS, CP/86 (MS-DOS option).
Languages:	Basic.
Optional:	Most.
Bundled software:	—
Prices:	$8000 for above.
Expansions:	H/disc 20 Mb, extra $8000.
Applications:	Business.

Data General/One

Processor:	80C88.
RAM:	128K, max. 512K.
ROM:	32K for Bios.
Video RAM:	Takes 48K of RAM.
Keyboard:	79 key, 10 f/keys, 18 control keys, four cursor keys.
Video:	LCD, 80 x 25 lines.
Resolution:	640 x 256 pixels.
Interfaces:	Two printer ports, RS-232C.
Disk drives:	Built-in 3½" f/drive, 720K.
Other components:	Internal auto-dial modems optional. Built-in clock/calendar. Battery pack.
Operating systems:	MS-DOS 2.11, CP/M 86.
Languages:	IBM compatible. Basic.
Optional:	Pascal, C and others.
Bundled software:	ROM-based terminal emulation, text editor, file transfer.
Prices:	$5121 with 256K RAM and two f/drives.
Expansions:	Second built-in f/drive optional, either 3½" or 5¼".
Applications:	Portable business.

HP Portable Plus

Processor:	CMOS 80C86, 5.33 Mhz.
RAM:	128K, max. 896K.
ROM:	192K.
Video RAM:	—
Keyboard:	T/writer style, 75 keys, 8 f/keys.
Video:	Flip-top LCD screen, 80 x 25 lines.
Resolution:	200 x 480.
Interfaces:	RS-232C.
Disk drives:	Electronic "RAM disc".
Other components:	Options of external f/drive (710K), Thinkjet printer.
Operating systems:	MS-DOS 2.1.
Languages:	MS-DOS related.
Optional:	—
Bundled software:	ROM-based diagnostics, security, clock, HP Link, MS-DOS, and PAM (applications manager).
Prices:	$5290, without expansion options.
Expansions:	F/drive.
Applications:	Portable business machine.

IBM PC

Processor:	8088, 4.7 MHz.
RAM:	256K, max. 640K.
ROM:	40K.
Video RAM:	—
Keyboard:	T/writer, separate.

	Numeric pad, 10 f/keys.
Video:	40 — 80 columns x 25 lines.
Resolution:	—
Interfaces:	Centronics, RS-232.
Disk drives:	One or two f/drives, 5¼", 360K.
Other components:	Extensive options.
Operating systems:	PC-DOS.
Languages:	Basic.
Optional:	Most.
Bundled software:	—
Prices:	For 256K ram, dual floppies, o/s, $6791.
Expansions:	Ram.
Applications:	Business.

IBM PCXT

Processor:	8088, 4.7MHz.
RAM:	128K (256K average).
ROM:	40K.
Video RAM:	—
Keyboard:	T/writer, 10 f/keys, numeric pad. Separate.
Video:	Mono/colour, 40 — 80 x 25 lines.
Resolution:	—
Interfaces:	Centronics, RS-232C.
Disk drives:	1 x 360K f/disc and 1 x 10Mb h/disc.
Other components:	—
Operating systems:	PC-DOS.
Languages:	Basic.
Optional:	Most
Bundled software:	—
Prices:	$9880 for above.
Expansions:	—
Applications:	Business.

Sigma XT5

Processor:	8086, 4.77 MHz.
RAM:	128K, max. 640K.
ROM:	16K.
Video RAM:	—
Keyboard:	T/writer type. 10 f/keys.
Video:	80 x 25 lines. Colour optional.
Resolution:	—
Interfaces:	RS 232, Centronics.
Disk drives:	1 x 360 f/drive & 1 x 5 Mb h/disc.
Other components:	—
Operating systems:	MS-DOS (IBM PC format).
Languages:	Basic.
Optional:	IBM compatible.
Bundled software:	
Prices:	$4290.
Expansions:	With 10 Mb h/disc $5900, 20 Mb $6990.
Applications:	—

NCR PC 4i

Processor:	8088 (8087 option), 4.77 Mhz.
RAM:	256K, max. 640K.
ROM:	8K.
Video RAM:	—
Keyboard:	T/writer style, 10 f/keys, cursor keys, numeric pad, detached.
Video:	16 colours, 80 x 25 lines.
Resolution:	640 x 400
Interfaces:	Centronics, RS-232C, serial keyboard, expansion slots.
Disk drives:	2 f/ds, 360K, 5¼".
Other components:	—
Operating systems:	MS-DOS.
Languages:	GW Basic.
Optional:	Most other (IBM compatible).
Bundled software:	O/s, tutorials, GW-Basic.
Prices:	$5,500.
Expansions:	10 Mb h/disc.
Applications:	Business.

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The best ideas are the ideas that help people. ITT

3003

Multi-user micros: Part II

Operating systems: the options

by Mark James

In this month's Bits and Bytes we consider the various operating systems as they would function on a simple, Intel 8088-based MS-DOS machine.

They are judged according to functionality, efficiency, ease of use, and the security issues outlined last month.

Each is evaluated both as an environment for writing programs and as a system for the end user who might not be very comfortable with computers. The systems are listed in order of age.

The list is by no means complete; only "portable" operating systems are included. In other words, those operating systems that are designed exclusively for one machine type are not considered.

UNIX:

Unless you buy an AT&T computer, or have US$43,000 to spend on a source licence, you cannot actually buy UNIX from AT&T; however, several UNIX variants are available for MS-DOS machines: PC/IX from IBM, Coherent from Mark williams, Xenix from Microsoft, and Idris from Whitesmiths, to name a few.

Not all, however, claim to be multi-user, although UNIX itself seems to be.

The word "seems" points up the problem with UNIX: it is not so much an operating system as a general philosophy about operating systems.

As much as AT&T has been promoting its System V as the UNIX standard, there are dozens of flavours of UNIX floating around, and it is by no means guaranteed that a program that runs under one will function under any other.

UNIX started life in the 1960s as the in-house system at AT&T's Bell Labs, and reached the real world through several channels, the most successful of which was the University of California at Berkeley. UNIX has inspired a large body of nearly religious devotees, and when they speak of UNIX, they generally mean the Berkeley (or BSD) variety.

UNIX was designed for medium to large computers and was originally intended for the engineers at Bell Labs. These are not the circumstances of the average microcomputer user, and using UNIX on a micro gives a distinct impression of being underpowered: it is slow, and a hard disk is absolutely essential in order to retain sanity.

Pipes & shells

As a system for program development using the C language, however, it is full of functionality.

Two of its features, pipes and shells, demonstrate this.

Pipes are a means whereby two programs can easily communicate with each other, as if one were the human operator running the other.

Shells are (or are supposed to be) friendly interfaces between the innocent user and the raw UNIX kernel, which is rather forbidding to anyone other than system programmers.

By varying the shell, the functionality of UNIX can be tailored to any use. These are good tools for the programmer, and set UNIX apart from the more cumbersome mainframe and minicomputer operating systems available. Each one, though, does add to the overhead of an already overburdened system.

In spite of its design as a programmer's system, UNIX long suffered from the lack of saleable programs written for it; most of its users were technical or academic people, while AT&T has been pushing UNIX as a business system.

This has finally begun to change, with accounting and other business software beginning to appear for UNIX System V. Little of this, however, is available for micros.

There are no security features in UNIX itself. The idea is that the programmer of the shell must insert such devices as record or program locking, password protection and backup utilities.

However, none of the UNIX programmes available for MS-DOS machines has implemented all of these devices.

UNIX also lacks a standard database, although several companies are marketing database systems designed for UNIX.

In summary, UNIX is an academic, programmer's system, not very well suited for microcomputers or non-computer people. If and when micros become fast enough to cover UNIX's inefficiencies, and UNIX itself becomes much more standardised and friendly, it may be worth another look.

PICK:

Modestly named after its designer, Dick Pick, the PICK operating system is nearly as old as UNIX, but appears much less so.

PICK was far ahead of its time in the 1960s, with features that today would be called a data dictionary, demand-paged virtual memory and an inbuilt database system that has some relational features.

It runs more efficiently than UNIX, although that is not saying much. PICK requires a hard disc.

Like UNIX, PICK comes in various flavours. For the IBM PC, Pick Systems sell straight PICK, while an outfit called Cosmos market Revelation, a single-user implementation of PICK.

The various versions of the PICK system available on minicomputers and mainframes are not as disparate as those of UNIX, but incompatibility among these PICK flavours has become enough of a problem that the PICK users' groups are pushing for some standardisation.

One of the less appealing features of PICK is that programs written under it must be in BASIC, as this is the only language that PICK supports.

The idea of a single language is not a bad one, since it means that the system can be custom-designed for that language; but BASIC is a poor choice.

Admittedly, PICK BASIC is a fairly good BASIC, with some structuring and unnumbered lines allowed, but it's still BASIC, and programming under PICK is therefore guaranteed to be slower than it need be.

Also, the very improvements in PICK BASIC ensure that programs written in other BASICs will require extensive rewriting in order to fit, for example, the PICK database layout.

'Missionary code'

Once programs are written, they go through a two-stage compiling process.

First, they are translated into an internal pseudo-assembly language called "missionary code", which is presumably identical no matter what machine type you are running on.

Then the missionary code is either assembled into native machine code for the particular computer, or, as in the case of the IBM PC, interpreted at a very low level.

The missionary code contains special database functions that result in database operations being quite fast. This makes PICK much more suitable than UNIX for the record-keeping functions of business, but calculations (spreadsheets, for example) are slow.

Overall, though, the system is more efficient than UNIX, due largely to a clever method of recycling little-used memory.

Although PICK is a fairly old system, it has become popular only recently, and there is therefore not as much software written for PICK as there is for other operating systems of that age.

Much of it is designed for one particular version of PICK, although that may be changing with the present push for standardisation.

In terms of ease of use, PICK suffers from being a bit different.

Those accustomed to MS-DOS or larger computer operating systems will find PICK's commands and error messages puzzling.

The documentation tends to be full but not well organised, and on-line help facilities are minimal.

PICK's own text editor is awkward and even less friendly than MS-DOS's EDLIN (other PICK implementations aparently have full-screen editors).

One of the few places where PICK shows its age is the fact that commands must be in upper case.

As a database system, however, PICK is very flexible and friendly; even major changes to the structure of the data are not difficult to implement.

It is simply a matter of getting accustomed to the PICK way of doing things.

There is also a very fine query and report-writing facility.

Security under PICK is much better than under UNIX. Each user has account information such as a password and access attributes than can be tested by programs. The system manager can allocate specific commands for use by individual users.

PICK allows record locking and easy backups, but there is no facility for a log file.

PICK has been getting a good amount of press lately, but most of it has been a silly "PICK versus UNIX" debate that ignores the fact that the two systems are not remotely comparable. UNIX is a system developer's system, while PICK is intended for the end user.

If the two could be combined (a product called Appgen tried to do so a couple of years back, with ambiguous commercial success), we might have something.

OASIS:

Unlike UNIX, PICK or AMPS, which began as minicomputer operating systems and migrated down to micros, OASIS (also called THEOS) started out as a multi-user alternative to CP/M on Z-80 machines.

That version was called OASIS-8, the IBM PC version was known at first as OASIS-86, and the Motorola 68000 version OASIS-16; all have now been rather ostentatiously renamed after THE Operating System, and its developer, Phase One Systems of California, is now Oasis Technologies, trading as Theos Software.

The overall design of THEOS contains several advanced features, such as re-entrant code; if several people are using the test editor, for example, only one copy of the editor program need be in memory.

Many other systems waste much effort and memory on multiple copies of programs.

The very fact that THEOS supports several users on an eight-bit processor demonstrates that its design is streamlined and no-nonsense.

THEOS does sacrifice some functionality for its efficiency. Sequential and random I/O benchmark tests, published in the 1985 special issue of Byte on the IBM PC, showed THEOS to be very slow at these operations.

Its filing system is rigid and a bit cryptic, especially when compared to AMPS or PICK.

Also, unlike any other multi-user operating system mentioned here, THEOS runs only on microcomputers. This means that it is not well suited to develop programs for larger computers, nor to download programs from them.

On the other hand, THEOS possesses some very useful features. It provides some degree of multi-tasking and even networking support, an inbuilt indexing method for its files, rudimentary record locking, and a full password protection scheme.

It supports two languages, BASIC and C, and its compilers and other development tools have received high marks.

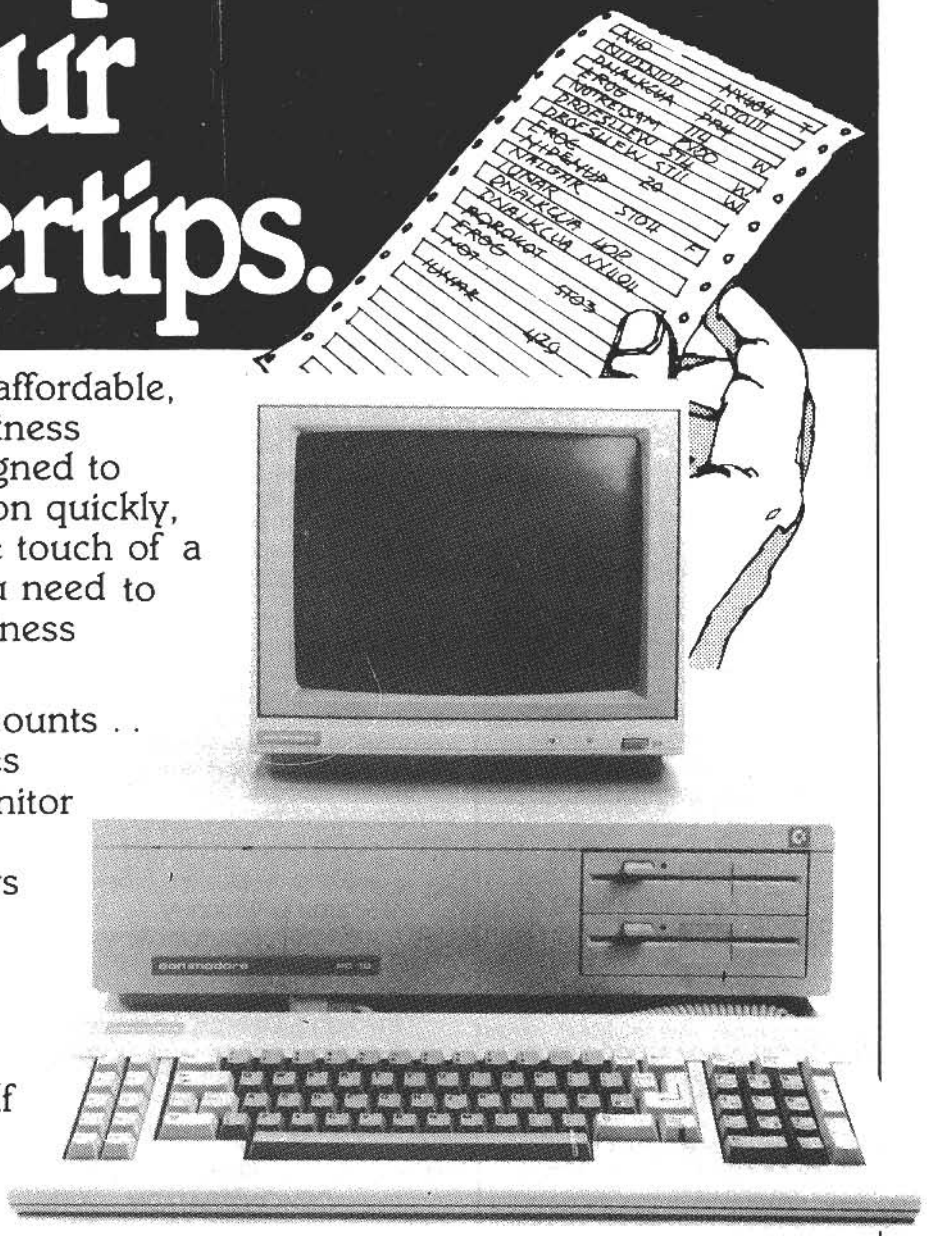
THEOS does not possess the functionality of the other operating systems mentioned here, but it also lacks the over-complexity of UNIX or the initial bizarreness of PICK.

In spite of its pretentious name, THEOS does not pretend to be more than it is: a simple, efficient system.

AMPS:

Let me be frank about my lack of objectivity here. I like AMPS because it is New Zealand's own entry into this market, and because I wrote its tutorials and much of its documentation. *(Continued on page 53)*

Commodore gives you facts at your fingertips.



Easy to use and affordable, Commodore business systems are designed to handle information quickly, giving you, at the touch of a key, the facts you need to make sound business decisions.

Keep track of accounts . . analyse your sales progress . . . monitor stock levels . . . predict cash flows and costs.

Your information under your control, instantly.

Introduce yourself to Commodore. In a very short time you'll discover your Commodore is one of the best business friends you ever had.

Commodore PC
Businessman's best friend.

Commodore Computer (NZ) Limited, 250 Forrest Hill Road, Forrest Hill, Auckland. Phone (09) 410-9182.

AMPS has many things going for it, not the least being its hardware-efficiency — where other systems may support three simultaneous users, AMPS can run five on the IBM PC/XT, and as many as 20 on the PC/AT. These limits are on the basis of users' response times being "instantaneous".

Hardware efficiency results in cost savings.

Like THEOS, AMPS uses re-entrant code, so that only one copy of a program need be in memory, no matter how many people are using it; like PICK, AMPS manages its data buffers so that the most frequently-used data blocks remain in memory and do not need to be reread from the disk. In fact, AMPS, having been created only four years ago, has been able to take advantage of a number of design tricks that were simply not known when its competitors were born, and it has added a few tricks of its own.

AMPS follows the current trend in integrating a database, editor, programming language (AMPLE), spreadsheet, office functions (message switching, task administration and the like), utilities and even games. Its developers are Advanced Management Systems in Auckland.

Before this begins to sound too much like advocacy, some of AMPS' drawbacks should be noted also.

Like PICK, its programs are compiled into a low-level code which is then interpreted; AMPS is therefore not fast at number-crunching.

Its spreadsheet has a limit of 1200 cells.

The system supports only its own programming language, AMPLE, so that existing programs must be rewritten in order to run under AMPS.

Partially as a result of this, and also of the system's newness, there are not yet many applications written for AMPS; those in existence are mainly in the insurance and accounting fields.

As a program development system, hardware efficiency means fast compiles, its language embodies such "fourth generation" characteristics as automatic validation of input and generation of error messages, file and buffer handling is managed by the system and there are a program generator, query language and report writer.

Programs written in AMPLE are portable to AMPS on any hardware; the only other system that can make that claim is the UCSD p-System, which is not multi-user. There will therefore not be a problem with "flavours" of AMPS.

The entire system is driven from menus (for the novice) or function keys, and on-line help references are extensive.

AMPS has password security and access functions (at menu level). A log file and record locking are also facilitated.

In the future most operating systems will probably have AMPS-type integration.

S1:

Lack of money is not a problem for the S1 operating system, to judge from press releases from its developers, Multi Solutions in New Jersey.

They have signed contracts with a Japanese corporation worth some US$40 million; with that kind of advertising war chest, we will be hearing a lot about S1 soon.

Let me confess here that I have never seen S1 in operation, so that I have no real proof that it works, and no clues as to its ease of use. It might not even exist yet in New Zealand.

What follows is gleaned from Multi Solutions publications and descriptions by presumably neutral observers.

S1 was created by a university professor to be the "ideal" system, one that would run on any computer and do anything. It has only been marketed for about a year, making it a bit younger than AMPS; it is not even complete yet.

Various modules are advertised with promises such as "available second quarter 1986".

S1, like UNIX, tries to be all things to all people: a commercial database system, a number-crunching scientific system, a real-time robotics system, and a software development system.

The building blocks provided look comprehensive: a variable filing system, several programming languages (including its own, called SL), multi-tasking, networking, graphics (including plotters), windowing, and even multi-processing — the ability to spread the system over different processors in the same computer.

None of the other systems can claim so much functionality.

Clearly, any system that tries to do all this on a microcomputer will run like a turtle, but the various modules of S1 are independent, and you can leave out any features of S1 whose overhead you do not wish to support.

How easy it is to do this is not so clear; nor is it certain that even a stripped-down S1 would perform efficiently.

No applications have yet been written under S1, but this is understandable, given its newness. Multi Solutions have announced agreements to develop unspecified applications with American and Swedish software houses.

Some of the S1 modules advertised with the "promised soon" label include language translators, whereby existing programs can be converted to S1.

It is sometimes not easy to see where S1 wishes to position itself. Its brochures refer to it as a microcomputer operating system, but also stress that Multi Solutions can adapt it to any computer at all; however, it has never been released on a non-micro.

If, like THEOS, it shuts itself off from larger machines, its future may be limited.

Overview:

If and when real-world applications become available under S1, it will be possible to judge whether the S1 experiment has been a success. Meanwhile the consensus, in the real-world programs of business, seems to be that things run very slowly under traditional operating systems, less slowly under UNIX, quickly under PICK, and very fast under THEOS and AMPS.

It will be most interesting to see whether S1 can continue this trend, or whether its attempts to be "the only operating system that does it all" drags its performance down.

There are, of course, other operating systems that support multiple users on a microcomputer: MP/M is a multi-user extension of CP/M; BOS (for Business Operating Software) is a British package of programs that cater to specific markets, like clothing manufacturers.

In addition, some individual programs, while not really operating systems, do allow more than one user — M L Systems in Auckland, for example, sells accounting programs of this nature that run under MS-DOS

The operating systems dealt with above share some characteristics.

All take over the machine that they run on, so that programs from other systems cannot be run.

Some cannot even read or write to floppies other than their own.

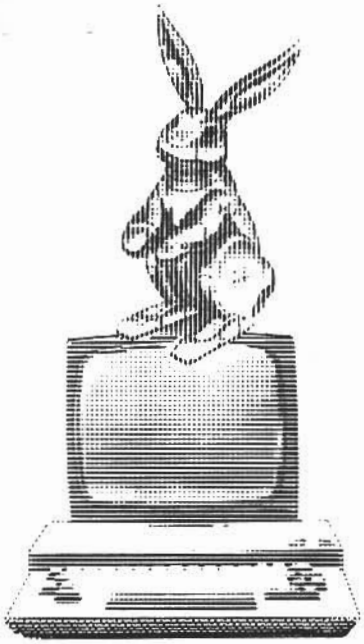
All sacrifice the colour graphics capabilities of the microcomputer's monitor, because their programs must be able to run on "dumb" terminals as well. (Most, however, have ways around this limitation.)

The prices for the systems are also roughly comparable, ranging from US$495 for a stripped-down, often single-user implementation to several thousand dollars for a fully-blown system with all the bells and whistles.

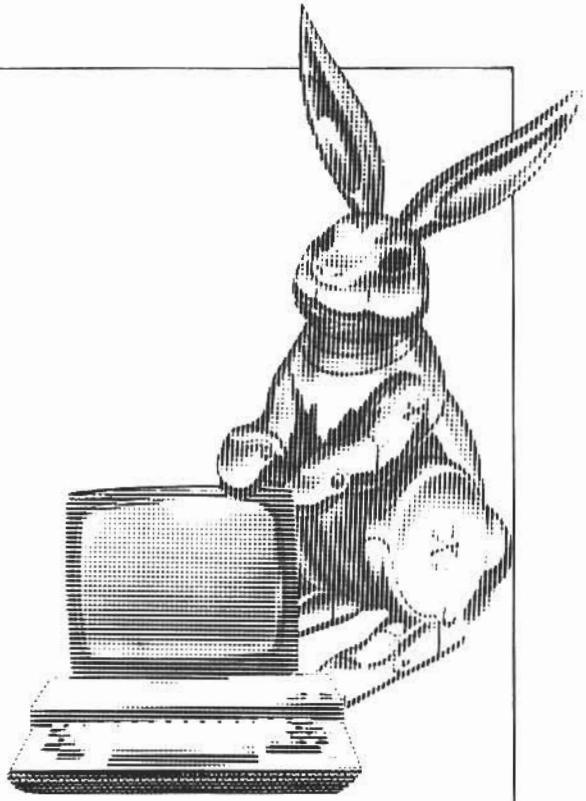
As the cost of the components, both hardware and software, continue to drop, multi-user micros will become more and more accessible to more and more computer users.

They are already a viable form of computerisation for small businesses, and we will probably see an increasing number of multi-user implementations for the home as well.

Not everyone will need more than one terminal on a computer; but computer systems that cannot support more than one will soon look a bit dated.

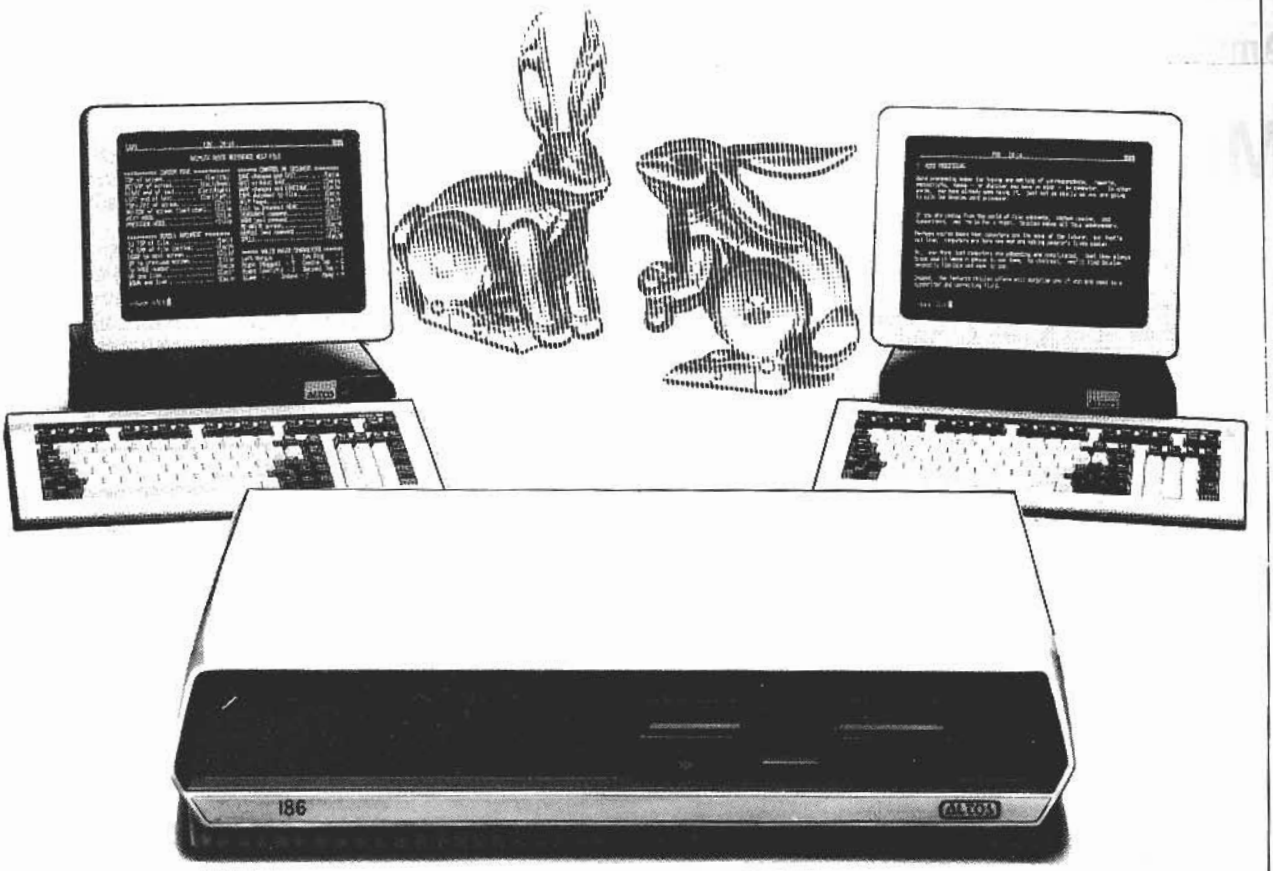


You've bought a personal business computer.



But now your business has outgrown it.

So you're thinking of adding a second personal business computer...



For less than the price of most personal business computers, the Altos 186 provides the business computer solution.

Whether you already own a personal business computer or you're about to take the plunge for the first time, there's one thing you can almost rely on - sooner or later your business is going to outgrow it. And when that happens, you've got a decision to make.

Do you buy another business computer? And if you do, how long will it be before you've outgrown that?

We would like to suggest that ***before*** *you commit yourself to any expenditure, you take time out to seriously look at what the Altos 186 has to offer. The Altos 186 is, quite simply, a powerful desktop workstation with the ability to run a second screen - enabling you to have access to a true multi-user computer system. This means that you can be using one screen to work on your accounts, while your secretary can be using the second screen for a totally different job - both at the same time.*

In fact with the Altos 186, virtually any information combinations can be sourced and worked on simultaneously. The Altos 186 is more powerful, more flexible, and less expensive than linking together two personal business computers.

Because Altos Computer systems use the industry standard for multi-user operating systems, there will always be an Altos system to grow with your business.

From the two user Altos 186 to four, five, nine and twenty user systems right up to the thirty plus user systems - all supporting a wide range of applications software.

If you are considering buying or upgrading your present business computer system it would be worth taking the time to phone Altos and find out more about the Computer system that grows with you.

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ALA 485

Amstrad PCW8256 PC Word Processor

Moves to delete typewriters

by Peter Biggs

Amstrad has produced a computer which could usher in a new computer marketing trend in that its PCW8256 model is targetted at a specific category of user — in this case the typist.

This "PC Word Processor" is directly appealing to those considering an upgrade to an electronic 'memory' style typewriter.

It is aimed at those desiring more efficient word processing rather than those wanting "a computer".

It arrived here in one well-packed large carton, comprising a green monitor with one internal disc drive, a separate keyboard, a dot matrix printer, two manuals and two 3-inch software discs.

One disc contained Locoscript ver.1.20, Mallard Basic and CP/M+, and the other CP/M+ utilities and DR Logo.

Locomotive Software (UK) wrote Locoscript (the word processing software) and Mallard BASIC.

CP/M+ is the operating system from Digital Research (USA), which also produced DR LOGO.

The 90 character x 32 line monitor can be adjusted for brightness and vertical hold but not tilt. It has room for a second internal disc drive and has an expansion port.

The keyboard is low and the height is not adjustable. It is however very versatile by making available Greek letters, mathematical symbols, fractions, arrows and other symbols and European foreign language symbols. It has an LED to indicate SHIFT LOCK.

Printer

The printer is a 7x9 dot matrix printhead supporting bold, underline, double strike, italic, pica, superscripts, subscripts and a variety of pitch sizes from 5 to 17 pitch. It has a tractor feed for continuous paper as well as provision for single sheet printing. It prints at 20 cps in NLQ mode.

Connecting it all up was easy with only one three-pin plug to the mains — a plus in an office with limited electrical outlets.

Now to the memory. Why 256K?

Although this computer uses an 8-bit Z80 processor which can address only 64K of memory, the other 192K is bank switched via CP/M+.

The word processing software configures 110K of this as a RAM disc for data storage (sometimes called an 'electronic disc' or virtual memory disc).

The RAM disc acts as another disc drive (called Drive M), although files held in it disappear when the computer is switched off.

I would also need at least another three 3-inch discs to copy the program disc and to use one as a separate data disc. They are available at around $12 each.

Software availability

This computer, although aimed directly at the office word processing market, will also run any software written under CP/M+, and of course translated to the 3-inch discs of Amstrad. This range includes spreadsheets and databases but at the time of writing, only a spreadsheet (Supercalc 2 from Sorcim) was available for this machine.

However dBaseII, a well-known major database program, is promised soon for the Amstrad 8256.

Because the main feature of the PCW8256 is its word processing ability, I will deal with that more than its BASIC and other features.

The word processing package, called Locoscript, was started by simply turning on the computer at the monitor and pushing in the Locoscript disc.

In 27 seconds, the first menu was available. This opening menu is called Disc Management.

The files on the inserted disc (Drive A) and the memory disk are shown. I can choose to Edit, Create, Print a document or use the Direct Mode.

Direct Mode allows me to type one line at a time to be printed immediately i.e. it can be used as a typewriter. As in a memory typewriter, the line can be edited before printing.

Locoscript

With Locoscript, the files can be divided by document types. For example, LETTERS, SAMPLES, CONT and TEMPLATE are the divisions provided, but you can originate up to eight types.

Creating a document gives it a default filename DOCUMENT.001. If I do not rename this, a second document will default to DOCUMENT.002, etc. It will ask you to rename these when the documents are saved. A good protection for busy typists.

Editing a document is probably better done by sending a copy to drive M (the Memory Disc or RAM disc) because file transfer is usually faster. After editing the document can be copied back to the data disc.

What is it like to write with? Well, it is almost a WYSIWYG (What You See Is What You Get) word processor.

The control codes and other non-printed codes can be optionally hidden or shown on the screen. I found this very useful.

Pop-down options

Margins, layouts, headers, footers, print emphasis, print size and many other variables can be readily organised and set up using the function keys and pop-down menus.

Cutting and pasting is convenient because of dedicated keys and screen prompts.

Locoscript has several ways in which to access a function such as text centering and I became considerably faster after using it for three days.

Layouts and form letter templates can be made and used for standard letters. Modular construction of letters and forms are possible using 'saved blocks' of text.

The printer is switched on-line as the computer is switched on. The printer can be set to off-line to change or adjust paper.

Also, when a document is being printed it is spooled to the printer so that editing the same or another document can continue. A screen dump is available.

Print quality

I found the NLQ mode quite satisfactory for correspondence but potential

buyers' ideals differ on "near-letter-quality".

Now to some of the features I especially liked.

First of all it is easy to start writing with. I only referred to the manual when the prompts on the screen were ambiguous.

Secondly, any action that could destroy text always required a confirmation. This would be essential in a busy office environment.

Another nice feature was that awkward or dangerous options always were on Shifted keys.

The keyboard was easy to use and had a good feel about it although the Shift key may be awkwardly placed for a copy typist.

The 13-inch screen was clear and easily readable.

Overall, with the program it was easy to get the printing effects I wanted as well as being user friendly.

Everything could be configured to my own style and needs — quickly and conveniently.

Slow scroll, save

However, one major concern was the speed of scrolling through text and saving to either the RAM disc or floppy disc.

It really was aggravatingly slow to edit a 10 page document. It took 2 minutes to get to the end of the document, and 1.5 minutes to go back to the beginning.

After I had finished editing it also took 2 minutes to save the document and come back to the main Disc Management menu.

This speed problem is due to the Z80 8-bit processor operating at 4 MHz. For me, this would limit the computer's truly functional use to documents of up to 5 pages.

Beyond this, I feel it's too slow.

Also a 'Software error 35' (undocumented) appeared when I tried to copy 3 pages into the 10 page document. When I tried again it worked fine. Maybe I hit a wrong key.

Easy introduction

The manual is excellent in the way it starts with 'The First Twenty Minutes'. It is clear and precise in most areas.

However, I think the section dealing with backing up and formatting discs should be extended in more detail. This is important and sometimes confusing for first-time users.

This aspect is fundamental to using any computer system and deserves a fuller treatment — note that the user cannot format a disc while in Locoscript, so data discs must be formatted beforehand.

I know that word processing is very personal and that tastes differ just as with wine and food. If you have never had experience with word processing, I guarantee once you start you're hooked for life.

I can wholeheartedly recommend the Amstrad PC8256 for anyone who is mainly writing letters and reports ... and these days that's just about everyone!

This computer/word processor is easy and convenient to use and in terms of a price/performance equation is better value than a conventional memory typewriter. It is certainly a lot better than editing documents line by line — and contains more memory for storage.

If you need affordable WP power then this hardware/software package from Amstrad is a winner at $1995 — with one proviso, that you cannot expect the same letter-quality type expected of electronic typewriters.

MICROCOMPUTER SUMMARY

Amstrad PCW8256 PC Word Processor

CPU:	Z80A processor 3.95 MHz
Operating System:	CP/M+
Internal Memory:	256K RAM
Disks:	3 inch, single sided. 170K formatted
Screen:	13 inch green screen. 90 character x 24 line. Brightness and vertical hold controls. Non-tiltable. One plug to power outlet
Keyboard:	Flat, 81 keys with a numeric keypad. 8 function keys
Printer:	Dot Matrix. 20 cps in NLQ mode, 110 cps in Draft mode
Software:	CP/M+ and Utilities, Mallard BASIC, DR LOGO, Locoscript Word Processor
Optional hardware:	Centronics Parallel & RS232C ports ($149) 1 Megabyte Internal Disc Drive ($495)
Optional software:	Pascal, FORTRAN, COBOL languages Supercalc 2 (spreadsheet) dBase II (database) due very soon DR Graph & DR Draw (for graphics)
Rating:	Ease of use 4½, support 5, documentation 4, value 5, construction 4
Retail Price:	$1995

Unit supplied by Grandstand Computers, Auckland.

Computing power

Now to Mallard BASIC. Most users will only use this computer for WP but, if you want to dabble in programming, this BASIC would be an excellent choice. It is for CP/M+ but evidently versions exist for 8080 16-bit computers that currently run Microsoft BASIC.

The second manual is entirely devoted to BASIC so there is plenty of scope for instruction. Mallard BASIC leaves 31.6K free and includes 'Jetsam' — a multi-user file record system.

This means that several PCW8256 computers could be used as terminals with one of them containing a hard disc to store records. An expansion slot exists on the monitor to service this need.

The BASIC is very complete but does not support Procedures as in BBC BASIC. It has an excellent set of file handling commands similar to CBASIC.

Although Screen handling is done through Escape codes and it has no internal timing keyword, users of Microsoft BASIC and CBASIC will recognise most of the commands.

It has no graphics or sound other than a 'beep'. On standard benchmarks it performed about as fast as my IBM PC.

Uncertain extra

DR LOGO has only a brief introduction in the first manual. I suspect it's bundled up with CP/M+ as part of the licencing agreement with Digital Research. It's there to play with if you're interested.

CP/M+ has a good introduction in the first manual, which also contains full information for converting other CP/M programs to this computer.

Overall, this package from Amstrad is superb value for money — whether it be for word processing in the office or at home ... and it can do more if you are that keen.

If you write or are in the market for a word processor in the office or home then you should try to see the PCW8256 in action.

If you need speed WP for large documents, look at this and see if it's speed in handling long documents troubles you — after all, you could always break them up into 4 to 5 page chunks.

Grandstand Computers, the NZ agent for Amstrad, also offers a WP training course in using this computer.

Attache unlocked

by Eric Vossen

Initially marketed with other IBM products, under Attache's name, this system is distributed as five stand-alone modules, or as two Packs.

("Business Pack I" has debtors, inventory, invoicing, sales analysis and "Passport" $2050; and "Business Pack II" has creditors, general ledger and "Passport" $1750; Pack III includes debtors, $2550.)

The software arrives in an attache case with a combination lock that may be opened after contacting Attache to supply user details — a clever, inoffensive ploy to reduce software piracy and to provide for later marketing follow-up.

The briefcase also contains a tutorial manual, user manuals, a test company set-up on one diskete, and preprinted forms appropriate to the subsystem(s) purchased.

Hardware requirements are: 100% IBM compatible, memory of 128K min., dual diskette drives or a hard disk (with backup).

In this review, we look at each of the subsystems making up the Attache Business Packs, at those points in each subsystem that the potential user should consider, at documentation,and at the system generally.

Debtors

The Debtors subsystem is pretty conventional, providing for both open item & balance forward customer accounts. Debtor balances, and period dollar sales are updated on-line, i.e. as debtor transactions are entered.

Central billing — charging say a head office account for any sales made to a branch account — is supported.

Debtors' makes provision for 12 sales tax codes (3 of which are reserved). Tax is calculated on the discounted price, rather than on a fixed (wholesale) price — something the Customs Dept. would not be particularly happy about if you're a wholesaler.

Customer discounts on invoices are allowed, but such discounts are not automatically credited by the system as cash is received.

If an invoice/credit note is recorded using this subsystem, rather than "invoicing", there is a limit to the number of product groups, general ledger accounts that the sale may be dissected to. A limit of nine for each may not be significant.

Inventory

The inventory subsystem records and processes stock movement information from stock issues, returns, receipts and adjustments.

Current stock levels and sales history are maintained on-line.

This subsystem may be used alone, or integrated with the debtors, invoicing and s/a (sales analysis) subsystems. Inventory g/l (general ledger) dissections may be generated automatically, or recorded and posted manually.

The 10 character inventory code is a bit longer than some — good! But a 20 character product description may not be enough.

Three selling prices may be set up for each product. The actual selling price is selected at customer level for the invoicing subsystem.

Produce cost (lowest non-zero cost is $0.01) may be held as one of average cost, standard cost or last cost. (Tax Dept won't like the last one being used to value your stock, and will usually only accept standard cost valuation if you're in agriculture/horticulture).

Provision is made for one unit-of-measure for each product line — so the stocking unit must be the same as the supplier unit and selling unit. If you buy product in lots of ten (and cost them like that), then you must be selling them in lots of ten too. Simplest would be to always operate in "each"es.

The maximum unit quantity that can be held for any product by this stock system is 999,999.99 units.

Prices may be maintained by an automatic price change procedure. Think carefully before using this one though — it may not be precisely what you want, and will do exactly what you say.

The Stockcount procedure is handy to operate. Because stock-on-hand at the time of the stocktake is stored separately, processing may continue while the physical stockcount is in progress.

Invoicing

The invoicing subsystem is used to record invoice and credit note details, and to print the corresponding customer documents. Customer balances, inventory stock-on-hand, period and year-to-date sales information is updated on-line. The necessary transactions for sales analysis are also generated if s/a is interfaced.

Invoice/credit note lines are entered five at-a-time. The five displayed lines may be amended/deleted if required. Once cleared from the screen though (to enter the next five lines), they can no longer be altered — the on-line update has happened and can't be readily undone.

A customer is set up to use, and discount, one of the three inventory prices (when inventory is interfaced). Because only one discount percentage is set up for each customer, automatic product discounting is limited in scope, although the user may override any discount/price on an invoice line.

The invoice number may be generated by the invoicing subsystem, or overridden by the operator. Because duplicate invoice numbers may be recorded, an audit trail could be confusing.

While full audit trails of transaction entered are provided, discount and price overrides do not appear in any separate exception reporting.

Will it do GST? The required amendments are a publicly announced commitment of Attache.

Sales analysis

Sales analysis reports may be produced for up to six analysis codes (customer, stock code, product group, and 3 other sales codes — user defined).

A s/a update takes transactions recorded by the debtors or invoicing sybsystems and updates the s/a file presented by the user (the s/a file should be held on a separate diskette if the computer hasn't a hard disk).

There's a catch though. Each differently sequenced report ("customer by item" is one sequence, "item by customer" is another) requires a different s/a file. So there must be as many different s/a file diskettes as there are differently ordered s/a reports — requiring a corresponding number of additional s/a updates.

The user must pre-determine the order of the required s/a reports, and initialise the diskettes necessary to contain that number of s/a files. Remember that the item by customer file will probably take lots of space!

S/a reports current period and YTD quantity, value and cost of sales, together with gross profit %. As with g/l, comparisons with other periods have to be done outside the system.

Creditors

The creditors subsystem processes transactions from supplier invoices & credit notes, payments and journal adjustments. Aged balances, and purchasing and payment history are updated on-line. Supplier invoices/credit notes may be dissected to a maximum of 15 g/l account codes for subsequent

posting to g/l if required.

This subsystem supports the recording of prepaid invoices, and part-payment of invoices. It also writes cheques.

A cheque register would have been nice, with accompanying outstanding-cheques and missing-cheques reports. The required information certainly goes in.

With this creditors subsystem, the user cannot record transactions against a subsequent or prior year's accounting period, because the g/l is only ever working on ONE accounting period at a time — the current year.

General ledger

The g/l subsystem is used to record and process accounting transactions from source documents such as bank statements, customer and supplier invoices.

When various of the Attache modules are integrated with the g/l, most of those transactions are automatically generated as journals to be posted into the g/l.

When g/l transactions have been updated, a range of accounting reports may be printed.

The g/l account code may be up to 8 digits. The user may divide the code in up to 3 ways to achieve, for example, company, division and branch reporting.

Budgets may be entered/maintained in a number of ways. Once budgets are set up for a period, a number of g/l reports comparing actual with budgeted account balances may be printed — management reporting.

Budget production — eight different ways — nice, but not a vital consideration for the small business. Accountants must have had a field day specifying this one.

To make this g/l work for you, you will need to thoroughly understand how it works before setting up your chart of accounts.

Setting out your g/l reports may require some cleverness too. Having set it up, the g/l should work well.

Note that account balances are held for one period at a time (plus Year-to-date balances and previous year totals).

You will have to use the Passport utility to produce most historical reporting — in conjunction perhaps with a spreadsheet.

Passport

To "export", "import" or report from the Master file (not the transaction files) of whatever subsystem is of interest (eg debtors).

All three basically involve the transfer of data from or to a file/printer.

The extra fields may be "constants" (either numeric or literal), or a calculation (expressed as data dictionary numbers and arithmetic symbols eg 8+9+10+11 means "sum the CURRENT, 30DAY, 60DAY and 90DAY balances" in the Creditors subsystem).

A bit obscure perhaps to start with, but potentially useful for any extra reporting — not as good as specialised report writing tools, and historical reporting could be awkward.

I wonder why this facility couldn't have been used to make the sales analysis subsystem to operate.

Documentation

"Read Me First" Manual for each subsystem is an excellent introduction to using the system. Other accounting software products could well follow the documentation standard set by Attache.

Data entry conventions are carefully explained, followed by instruction in how to format and backup your diskettes. Once you know how to take copies of your system, Attache explains how to install your subsystem and then carefully puts you through a tutorial. There is little chance for confusion.

The Tutorial in the debtors sybsystem explains, almost by keystroke, how to "Add a Customer", "Enter a transaction — journal, invoice and payment", and "Print a Report — Sales register and Aged Trial Balance".

Having gone through a "day", and the end result of any transactions recorded (in the ATB), any anxiety the user may have felt about operating the computer should have been dispelled.

The manuals explaining each subsystem are as useful. They each describe how to configure the subsystem for use, and the procedures to follow when preparing and entering opening balance data.

For each operational procedure, a user overview is followed by a step-by-step operator's guide of what to do to perform the discussed procedure. And at the end of several manuals, for the first-time user, a list of operations to be performed, in order, during the month.

I was impressed — to produce accurate, useful, consistent documentation to this level of detail requires a lot of work.

Conclusion

Attache will not customise to suit specific requirements.

As Attache pointed out, too many one-offs mean too heavy an investment in staff to respond to and maintain what would grow to be a very large number of "specials".

Most specific reporting requirements may be set up using either the Passport facility in tandem with a spreadsheet.

This is not multi-user software although it runs on common networks. Nor will this version of Attache be multi-user, in spite of assurances of later multi-user releases.

Even though there is presently no payroll subsystem, nor either of customer order processing or supplier order processing subsystems, this is a pretty complete system for the small business.

Some of the holes pointed out would initially make this system awkward, but familiarity would overcome this. ■

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On import costs:—

The Grandstand view

The computer industry's insiders — the distributors and dealers — have their say in Bits and Bytes.

Dear Sir,

Thank you for the opportunity of responding to the comments regarding direct import savings on our computers.

Set out below are the responses to the questions as outlined in your letter of 5 February 1986.

Commitments of Grandstand and Amstrad to each other:—

As the New Zealand agent for Amstrad, Grandstand is committed to extensively and vigorously promote Amstrad products and to stock quantities of the Amstrad range sufficient to meet the damand thus created.

Secondly, we are also required to service and repair any faulty or damaged goods and to carry a quantity of spare parts for each particular model.

Thirdly, we have a responsibility to the public to provide a reputable and reliable base for Amstrad.

On the other hand, Amstrad is committed to Grandstand to provide technical information, service manuals and service diagrams for all models, sales support and other data, and assistance which make up the normal terms and conditions of any agency agreement.

Commitments with dealers:—

With regard to dealers, they are expected to stock and display a representative range of both hardware and software and we of course are committed to supply them. We also provide technical support, service any hardware faults as and when they arise, and rectify any software problems.

Commitments with end-users:—

When a consumer buys an Amstrad, he automatically gets a one year guarantee for any hardware purchased, and is secure, in that after that date we continue to offer an Amstrad repair service.

We also offer the opportunity to join the Amstrad user Club which supplies a monthly magazine and newsletter; the Auckland Computer School offers beginners, intermediate and advanced lessons; technical staff are always available to answer any consumer queries on software and hardware.

Our company has a substantial investment in people, products and know-how and is strongly committed to the retail network. This will provide a secure and reliable base for many years to come.

Many dealers also offer training support to the consumer as part of the package when a machine is sold.

Disadvantages/advantages of direct importing:—

In attempting to save on local retail prices, the direct-import buyer may make a price advantage, but there are significant disadvantages.

For example, all computers imported into New Zealand must meet Post Office regulations governing power supply and radiation. It is important to note that the New Zealand Post Office specifications are particularly stringent.

Secondly, we offer our consumer a one year guarantee. Obviously if machines came to us from any other source other than ourselves, faults and repairs would have to be charged for (both parts and labour).

A further disadvantage is that, in all cases, the overseas seller of the computer will require payment before despatching the goods. This is not without its risks.

Lastly, the direct-import buyer has all the inherent problems of arranging the importation, dealing with Customs, arranging bank drafts etc. This of course, whilst not direct, is a cost.

Our company has invested heavily in learning the most efficient ways of handling documentation and freight methods as well as keeping up-to-date with the frequent changes in import regulations, taxation and duty, in order to keep ahead price wise.

Stable prices are offered on our products because day to day exchange risks are calculated and taken by the company. An individual sending money from New Zealand may well experience long delays in completing the purchase because there is a shortfall in the money forwarded, owing to currency changes.

No doubt, if a similar exercise on direct importing of any product from overseas were done, it may be found to be cheaper than buying locally (for example, motor cars). However, the initial report contained some errors, eg:

— Customs assess sales tax at a different level if an individual purchases from overseas, levied on the total cost, plus freight and insurance, plus 25%;

— For any items imported with a value of over $200, an import entry is required which means that there will be a charge from a qualified customs agent;

— The understating of the cost of packaging and freight by some £35.

When these additional facts are taken into consideration, I would say that the cost of importing direct and buying locally would be approximately the same (taking into consideration that the price of a CPC 6128 is $1,295).

Yours sincerely

W.R. Fenton
Managing Director
Grandstand Computers Limited

Editor's note: *This discussion on importation (which began in the February Amstrad column) applies, of course, to all imported brands of microcomputers, and does not relate singularly to Amstrad.*

Little advantage

by Craig Beaumont

Last month we looked at the quoted cost to import a Green screen 6128.

I know the actual cost of this — I'm still getting used to the new keyboard of the 6128 sent from Britain direct.

Unfortunately Micro-X underquoted the freight costs by £35. This increases the total cost by $100 using 0.3500 as the exchange rate. The breakdown is now as follows:—

CPC 6128 (green)	$700.00
Sales Tax (10%)	$70.00
Post, Packing & Insurance	$242.86
Cost of Bankers Draft	$2.55
Total	$1015.41

Given recent trends in prices (e.g. the 128 for $1295) there may soon be little advantage in importing.

The Way of the Exploding Fist is a game with a big reputation. It's been No. 1 in Britain, where sports and martial arts programs are all the rage. I actually prefer the real thing — sports anyway.

Starting as a novice you develop your skills through a series of clashes with either computer or human as your opponent. Eventually you may climb to the rank of 10th Dan — on the way being dazzled by the variety of moves available.

Initially finding the right key for the desired move, before being attacked, is a little tricky. You can block any attack with the one move. Moves can be combined. After crouching to avoid a flying kick you can let loose a low punch into the knees — devastating.

Flying limbs

The graphics in mode 0 display the flying limbs rather like a cartoon — although they are a little chunky. In the background there is a temple like building and a little judge who raises his hand for the winner — who takes a dignified bow. The sound is a mixture of crunches and grunts. It has lost some effectiveness in translation from the CBM-64.

A friend has discovered a simple set of moves that allowed him to reach 10th Dan. From an appropriate range unleash a flying kick which your computer opponent will block. Follow this with a low sweeping kick to between the knee and ankle. While doing this repeatedly will with practice get you to 10th Dan, it subtracts from the enjoyment of what is overall an impressive game.

Even the loading screen is impressive. This is pictured with help from Tascopy by Tasman Software.

Tascopy gives different shades on the printer for the different colours on the screen. All you have to do is put your printer in the right mode, load the screen and issue the RSX command :COPY.

At the moment I'm involved in the setting up of an Amstrad Users Group in Wellington. The functions of the group, we envisage so far, include building a library of public domain software, books and magazines. Members are expected to contribute programs as well as take them out. Some of those collected so far I found rivalled the early Amsoft products.

Also the group may arrange bulk buying discounts on disks and tapes.

The group's main purpose will be to allow members to exchange information — beginners especially should benefit as we appear to have some "experts" in various areas.

Our first newsletter if out — we would like to exchange with other groups.

If you are interested you can contact us at PO Box 2575 Wellington.

The Atari 130XE is...

by Allan Clark

The Atari 130XE is a direct descendant of the Atari 400/800, first released in 1980.

The 130XE is upward compatible, which means that programs written six years ago for the 400, which keep to the vector rules set by Atari, will run on the 130XE.

What's more, books and articles written for the Atari are relevant to the 130XE. Hence when you buy a 130XE you are not buying the unproven theory of what it will do.

Over the past six years over 60 books and countless magazine articles have been written on the use of the Atari computer.

A large base of software, public domain and copyrighted, is also available to support new computer owners.

In addition new software has been developed for the 130XE which makes use of the extra memory.

For those who wish to write their own programs the extra memory is easily accessed from any language — the extra memory made available by changing a single memory location.

The extra 64K of memory is available in four banks of 16K each. The Antic and 6502 chips may access each of the banks independently.

If you think of each of the 16K banks as a card then each time you change memory location 54017 a different card is brought to the top and used by the Antic or 6502 chip. A little experimentation is all that is needed to get to grips with the simple rules.

The manual gives full details and there have been several tutorials in Atari-related magazines.

Ram disk

If you do not wish to programme the extra memory yourself, several programmes are available that do the bank switching for you. Basic XE is an advanced basic compatible with Atari Basic which allows easy access to the extra memory.

Dos 2.5, Spata Dos Construction Set, Dosxl and Mydos all allow you to create a ram disk in the extra memory. This is a disk drive which functions the same as an external disk drive except if you turn the computer off you lose the stored data.

Sparta Dos and Mydos allow any number up to 8 disk drives to be used while Dos 2.5 limits you to disk 8.

The ram disk cannot be used by programmes such as the Peachtree Back to Basics accounting series which require two disk drives.

Syncalc and Synfile have been upgraded to allow larger spreadsheets and databases to be held in memory.

I have created a spreadsheet that looks up the category cost and selling price of over 450 stock items in a simple invoicing program using Syncalc.

Synfile for the 130XE dramatically increases the number of records that may be held in memory.

Typesetter is a graphics designer dump programme which allows you to make full use of the resolution of your printer up to 768 pixels wide by 672 high (greater than the Macintosh).

Sculptured

The Atari 130XE is housed in a smart silver and grey case which is smaller than the old 400/800 or 800XL. The most striking feature is the new sculptured full stroke keyboard.

The five console keys have been moved from the right hand side to a row along the top. The only problem is the positioning of the Reset key which while out of the way can be easily pressed to cause a warm start and the loss of your program.

The Help key only provides help if programmed to do so. I know of no commercial programme which uses it.

Start Select and Option are all common to the older computers and are used by most programmes.

The joystick ports are reduced to two (the 400/800 had four) and have been moved to the left hand side of the computer. The space between them is smaller and they have been recessed further, meaning some connectors are impossible to use without modification.

The light pen plug is a tight fit.

Along the back of the computer are power input, monitor and tv output (a tv cable is provided), serial input-output connector.

Recessed on the back are the cartridge and an expansion slot. The cartridge slot will run most cartridges from the 400/800 range while the expansion slot is provided for future development (rumours of hard disks prevail).

Pinouts for each of the ports and slots are provided in the manual.

The 130XE manual is spiral bound, of 132 pages providing sufficient information to get started. For more advanced use you will have to purchase further books or magazines. Full details on how to programme the extra memory are provided.

Brand specific

The serial input-output is used to connect storage devices, modems, and printers.

You will need to purchase an Atari cassette recorder or disk drive to load or save programmes (unless they are on a cartridge, in which case they load directly).

Without special interfaces you can only use the Atari cassette recorder, disk drive or printer.

Interfaces for printers are readily available in New Zealand as are a small number of third party disk drives with interfaces built in. With a Printer Interface you can attach any centronics printer. If you want to make the best use of software available you should make sure it is Epson compatible.

The 1050 disk drive now comes with the Atari DOS 2.5 operating system. This is completely compatible with DOS 2 except it allows you to format in enhanced density on the 1050 disk drive, allows the creation of a ram disk on the 130XE, and is resident in memory on the 130XE and 800XL.

For those wanting a fully fledged menu driven DOS, the Sparta Dos Constrtuction Set provides many of the features found on bigger computers. When combined with US Doubler, Sparta Dos provides read and writes up to 5 times faster and true double density.

When used with the 130XE you can create a ram disk of the number of your choice.

The Atari 130XE has five chips: the 6502C, Antic, GTIA and Pokey chips have been joined by the Freddy chip, which is used for memory management.

The Pokey chip is used to generate up to four voices at any one time: advanced programmers can utilise true 16-bit sound capabilities whilst the beginner can use software such as The Music Construction Set Bank Street Music Writer, or Atari Music 1 and 2 to create their own music. SAM is a software-based speech synthesiser which uses this chip to advantage.

Graphics

The GTIA chip is used to generate the Atari's 16 graphic displays and 256 colours.

The Antic chip is used for screen input and output and may be programmed to design your own graphics screen combining the 16 graphics modes in one screen.

The Atari light pen and touch table provide ways of creating your own artwork. If you prefer, you can use the joystick with programs such as Paint.

The 6502C chip is the kernal of the 130XE, as it is for the Commodore 64 and Apple IIe. This is driven by a 10K operating system.

Disk and cassettes programmes are booted automatically on power up if these devices are connected.

The Atari 130XE has the standard Atari screen editing features. In 1980 these were raved about, but you don't hear much about them today — although they continue to make the Atari one of the friendliest and easiest computers to learn on.

Most of these features are incorporated into the many word processors available for the Atari.

New versions of Atariwriter and Paper clip take advantage of the extra memory and Ram Disk capabilities of the 130XE. An 80-column word processor is only available with a hardware modification.

The Atari comes with Atari Basic, which is similar to most basics but is different in the way it handles strings.

Most of the features of Microsoft can be simulated in Atari Basic or you can purchase Microsoft Basic for the Atari.

In addition the following languages are available: 6502 machine language (in several formats), Forth, C, Pascal, Lisp, Logo, Pilot and Action.

Action is the only language specifically designed to run on the 8-bit computers and hence takes full advantage of features.

The Atari 130XE provides the computer enthusiasts and initiates with a proven computer supported by a large amount of software, written word and satisfied owners.

The problems of price and memory constraint have been removed to provide the home computer enthusiasts with a strong base for learning, entertainment and development.

The extra memory could lead to further upgrades of software like Syncalc and other novel uses for this home computer. ■

WHAT PRICE IBM SOFTWARE COMPATIBILITY?

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Monitor shown not included in price.

System 2 pictured

Specifications:

CPU: 8088 16 bit (internal) processor running at 4.77MHz

RAM: 128K for System 1, 256K for System 2 & 512K for System 3.

ROM: 8K for Bios and diagnostics. Socket for optional 32K (27256) user expandable.

CLOCK: Fully integrated crystal locked real time clock with battery back-up.

DISK DRIVES:
1 slimline 360K disk drive — System 1
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What the manual doesn't say

by Noel Weeks

Welcome to 1986.

This month we are looking at a few omissions in the Sanyo manuals.

The main omissions occurred in the early manuals, approx pre- January 85.

Function keys in Basic

In Basic, there are 20 user definable function keys available at all times. For Functions 11-20, press a number key while holding down the CTRL key (CTRL-1) for function 11, CTRL-2 for function 12, ending with CTRL-0 for function 20).

Note:— Don't confuse "a number key" with the "PF keys". The number keys are the ones found on the top of the keyboard or on the right hand side. A simple mistake but extremely frustrating if you do get them muddled.

Screen editing error

There is a bug that you must be very careful of when you edit in Basic.

The editor in Sanyo Basic is a "Screen Editor" which is very much different to other editors found in other versions of Basic.

The main difference lies in that a Screen Editor generally only edits what is on the screen.

If you are in the habit of inserting heaps of text in the middle of a program, you may run across a very nasty problem.

When editing the bottom line on the screen, do not insert any characters that will cause the line to extend past the end of the screen, otherwise the keyboard will lock up and you will lose your entire current program. (Ouch!)

Errors in saving programs

If you try to save a program from Basic to a disk that doesn't have enough room, the DISK FULL error occurs. But even after you insert a disk with enough space, you get the same error.

When this occurs, type RESET (do NOT use the Reset button!) and then you can save the file.

Also, if you try to save a file without an extension, it automatically adds .BAS to the filename.

Another sneaky little problem you may get is a DISK FULL error message from Basic when you use an invalid file name. This is the wrong error code and you should re-save the program using a proper file name.

Basic disk files

There are two types of data files available in Sanyo Basic:— sequential files and random files.

To write the data into a file or to read the data out of a file, you must first open the corresponding file with the OPEN statement and close it with the CLOSE statement after it's been used.

Note that when DELETE, END, LOAD, MERGE, RESET or SYSTEM instructions are executed, all the open files are closed automatically.

Writing sequential files

In a sequential file, the reading and writing of data starts in order from the beginning of a file. Sequential files can be written in the following manner:

1. Open the file in "O" mode:

OPEN "O",#X,"filename"
(X=File number, usually 1 (one) if it's the first file you're opening)
2. Write the data to the file:
PRINT#X, (string type variable/s) or
PRINT#X USING, (string type variable/s) or
WRITE#X, (string type variable/s)
3. Close the file:
CLOSE#X (closes file number "X") or
CLOSE (closes all files)

When you need to add more data to a sequential file without reading the original file, open the file in the "A" (Append) mode (OPEN "A",#X,"FILENAME") so that the added data can be put at the END of the original file.

Reading sequential files

1. Open the file in "I" mode:
OPEN "I",#X,"FILENAME"
2. Read data from file:
INPUT#X, (variables to store data) or
LINE INPUTR#X, (variables)
3. Close the file (as above)

EXAMPLE SEQUENTIAL FILE

```
10 OPEN "O", #1, "TESTFILE"
20 INPUT "PRODUCT NAME"; PDNAME$
30 IF PDNAME$="XXXX" THEN 90
40 INPUT "QUANTITY"; QTY%
50 INPUT "AMOUNT"; AMOUNT
60 WRITE#1, PDNAME$, QTY%, AMOUNT
70 PRINT
80 GOTO 20
90 CLOSE#1
95 REM Reading of data written starts here ****
100 OPEN "I", #2, "TESTFILE"
110 IF EOF(2) THEN 150
120 INPUT #2, READNAME$, READQTY%, READAMT
130 PRINT READNAME$, tab(10); READQTY%;
    TAB(30); READAMT
140 GOTO 110
150 CLOSE #2
```

Writing random access files

In a random access file you can read or write data from the disk in any order. This is necessary when dealing with data of no particular order.

The random file can be created in the following manner:

1. Open the file in "R" mode:
OPEN "R", #X, "FILENAME", (length)
Record length must be specified. If omitted, a default value of 128 bytes is assigned for each record.
2. Define the random buffer fields:
FIELD#1, 8 AS A$,32 AS B$
8 & 32 correspond to the size in bytes.
3. Enter the data into the random buffer area by the LSET/RSET statement:
LSET A$=MKD$(D#):LSET B$=X$
Numeric data must be converted to string data in advance
4. Write the data from the buffer to the disk file with the PUT statement:
PUT#X, (record number)

Reading random access files:

1. Read the data from the disk file to the buffer with the GET statement:
GET# (record number)
Numeric data must be converted from string data to the numeric data.
2. Close the file (as above)

NOTE: Up to 32,767 records can be written in a random file. If a record that has not been written is read from the disk, the contents of the record are unpredictable.

EXAMPLE RANDOM ACCESS

```
10 OPEN "R", #2, "RANDFILE", 50
20 FIELD #2, 2 AS EMPNUM$, 18 AS NAME$, 30 AS OCC$
30 INPUT "EMP NUMBER"; CX
40 IF CX = 0 THEN 500
50 INPUT "NAME"; NA$
60 INPUT "OCCUPATION";OA$
70 RSET EMPNUM$=MKI$ (CX)
80 LSET NAME$=NA$
90 LSET OCC$=OA$
100 PUT#2, CX
110 GOTO 30
500 INPUT "EMP NUMBER";NX:IF NX=9999 THEN 700
530 GET #2, NX
540 PRINT TAB(10);CVI(EMPNUM$);TAB(20);
    NAME$;TAB(50);OCC$
550 PRINT
560 GOTO 500
700 CLOSE #2
```

When the EOF mark is put at the end of a random file, CHR$(&H1A) must be added to the beginning of the file next to the records which are used by the user (in the case of SORT, etc.) ■

Micro clues for ZX

by Gary Parker

There are so many books about the Spectrum around these days that it is unusual to find a new approach to the subject.

But the Collins Gem Micro Facts ZX Spectrum book manages to be different — it arranges material in alphabetical order.

In effect you have a little Spectrum encyclopaedia.

I don't know whether I have a natural aversion to encyclopaedias, but when I first saw this book I immediately suspected that it was going to be simply a rearranged Spectrum manual. But how wrong I was.

Spectrum Micro Facts is a mine of information. Practically every word associated with the Spectrum (which you could possibly think of) has an entry, including related subjects such as Z-80a machine code and Spectrum peripherals.

Of course, with a book such as this you have to know the right word to start with, and that can sometimes be difficult. But it is cross-referenced and could lead you to the advice being sought.

Some references

To give an idea of what sort of information is offered let's pick out a few entries:

Accuracy: Under this heading rounding errors and suchlike are discussed. It points out that the loss of accuracy in any single calculation is equivalent to one cent in fifty million dollars (actually it uses pence and pounds), and gives a program example to show how these errors can accumulate.

Block Transfer: This machine code operation is briefly explained, and the reader is referred to sixteen machine code mnemonic entries (such as LDDR).

Dec: This machine code instruction is explained and a table given of its effects on flags and suchlike.

Input: This Sinclair Basic statement is explained and a program example given.

Machine code loader: The way machine code is stored in memory is explained, and a loader program is listed.

Printer: The types of printer available and the interfaces required are briefly discussed.

Rasp: This system variable, which control the length of the warning buzz given for over-long lines, is explained.

Trigonometry: Basic trigonometry and the use of radians is explained — useful if you've forgotten your school maths!

Zero page addressing: The RST machine code instructions are explained.

As you can see, Spectrum Micro Facts covers a wide range of material, is concise but clear, often referring to diagrams.

Personally, I find it well worth while for the excellent machine code entries alone. But everything else is covered equally well, and at the very reasonable price of $6.95.

I believe this is a book no Spectrum owner should be without.

Drum printer

I bought an LTR-1 letter quality printer a few months ago and have had several enquiries about it from out-of-town Spectrum owners.

The LTR-1 is a small Japanese-made printer with a drum head.

The drum works in a similar way to a daisy wheel except that the letters are on rings which spin until the correct letter is in place, when a plate behind the paper presses it against the paper. A set of five rings form the drum. Drum heads can be seen on some large business printers.

The LTR-1 is unusual in having no ribbon. Instead, a rubber roller holds ink, and transfers the ink to the drum as it spins against the roller.

I was a bit dubious about this feature when I bought the printer, but I have found it to be very satisfactory.

A roller, once inked with ordinary stamp pad ink, will print perhaps ten pages darkly, and perhaps twenty more with reasonable clarity. It is not possible to get really black lettering such as produced by some correctable ribbons, but the darkness is perfectly adequate.

It is indistinguishable from the average electric typewriter.

Ribbons can work out to be a very expensive item on some letter-quality printers, so the inking system of the LTR-1 is quite a money saver.

When I first used the LTR-1, the letters had a very slight up-and-down appearance. The vertical alignment was not quite perfect. But with use this has improved, and now alignment is excellent.

The LTR-1 can only print 12 characters to the inch, unlike some more expensive printers which allow the user to set the spacing to 10,12 or 15 characters per inch. But this should not be a problem in most cases.

Also printers set to 10 or 15 cpi often produce untidy overlapping or overspaced printing,unless special fonts are used.

Software controlled

The LTR-1 is quite a simple printer, and has less switches and control characters than most printers. For example there is no paper-out indicator.

But most of these things can be controlled by software — for example my word processor pauses at the end of pages. I have found no real limitations.

I have been impressed by the LTR-1. It is an ideal low-cost printer for word processing applications. I can also vouch for its reliability — I have been working it hard printing many draughts of a 60-page thesis without any problems.

I can't give you an exact price since I have seen it advertised from $300 to $900, but if you can get an LTR-1 for anything in the lower region of that range, I suggest you jump at the chance.

Using a bit of control

by Joe Colquitt

If you're lazy like me, you hate typing programs in, and get a bit frustrated when they won't type in fast enough.

Many programs contain a lot of repetitive POKES or DATA statements which can be entered much more easily using the small ML routine I've devised to allocate words to keys.

Only 11 common keywords have been allocated, just to keep it simple, but there's no reason why the list couldn't be expanded.

If you do, it means you'll have more keys to remember.

The method is reasonably simple, although the ML looks a bit convoluted. To enter a keyword, press CTRL and an allocated key, eg. CTRL/F1 produces POKE (in its abbreviated form).

The SYS calls the routine that makes the machine scan the key input. Entry into the main routine is at $C00D, 60 times a second. Because of this, a 'toggle' has to be enforced, so that CTRL/F1 doesn't print POKE 60 times a second.

A keyword will not repeat until 'RETURN' or ':' a new keyword is selected before the original is selected again.

The 11 keywords are:

POKE	CTRL/F1
PEEK(	CTRL/F3
FOR	CTRL/F5
NEXT	CTRL/F7
DATA	CTRL/D
INPUT	CTRL/I
LEFT$	CTRL/L
CHR$(	CTRL/C
RIGHT$(	CTRL/G
GOTO	CTRL/O
GOSUB	CTRL/U

The choices for the last 3 are not arbitrary, but arise because the CTRL keyboard produces effects like 'HOME' 'RVSON' with certain keys.

A new CTRL keyboard could be written, but it didn't seem worth it.

If you wish to add more words (up to 10 letters each), enter them at 8 byte intervals in the fashion of $C070-$C0C3.

The key to allocate is found by POKE198,0:WAIT198,1:PRINTPEEK(197)
then pressing it.

Put it in the list at $C063, in the same relative position as its word in the word list.

Don't forget to increase $C022.

Below are the BASIC loader and the disassembly of the machine- code.

```
10 READD:IFD<>-1THEN30
20 POKE49152+I,D:I=I+1:GOTO10
30 SYS49152:END
100 DATA 120,169,13,141,20,3,169,192,141,21
110 DATA 3,88,96,165,197,201,1,240,14,201
120 DATA 45,240,10,173,141,2,41,4,240,8
130 DATA 76,41,192,169,12,141,209,192,76,49
140 DATA 234,165,187,162,0,221,89,192,240,8
150 DATA 232,224,12,208,246,76,49,234,138,205
160 DATA 209,192,240,247,142,209,192,10,10,10
170 DATA 170,168,185,112,192,141,208,192,133,198
180 DATA 162,0,185,113,192,157,119,2,200,232
190 DATA 138,205,208,192,208,242,76,49,234,4
200 DATA 5,6,3,10,26,42,33,20,38,36
210 DATA 0,0,2,90,111,0,0,0,0,0
220 DATA 3,88,101,40,0,0,0,0,2,76
230 DATA 111,0,0,0,0,0,2,78,101,0
240 DATA 0,0,0,0,2,68,97,0,0,0
250 DATA 0,0,4,82,73,100,40,0,0,0
260 DATA 4,76,69,102,40,0,0,0,3,73
270 DATA 78,80,85,84,0,0,0,3,67,104,40
280 DATA 0,0,0,0,2,71,111,0,0,0
290 DATA 0,0,3,71,79,115,-1
```

```
C000 SEI        ;set interrupt to $C00D
C001 LDA#$0D    ;
C003 STA$0314   ;
C006 LDA#$C0    ;
C008 STA$0315   ;
C00B CLI        ;
C00C RTS        ;
C00D LDA$C5     ;IF PEEK(197)
C00F CMP#$01    ;="return"
C011 BEQ$C021   ;
C013 CMP#$2D    ;or "-"
C015 BEQ$C081   ;then reset toggle
C017 LDA$028D   ;if CTRL not pressed
C01A AND#$04    ;then exit
C01C BEQ$C028   ;
C01E JMP$C029   ;else process other key
C021 LDA#$0B    ;set toggle to unknown
C023 STA$C601   ;word number
C026 JMP$EA31   ;exit
C029 LDA$C5     ;find other key's index
C02B LDX#$00    ;
C02D CMP$C063,X;
C030 BEQ$C03A   ;if found get word
C032 INX        ;
C033 CPX#$0C    ;
C035 BNE$C02D   ;
C037 JMP$EA31   ;if not  exit
C03A TXA        ;compare index to toggle
C03B CMP$C601   ;
C03E BEQ$C037   ;if = to last word, exit
C040 STX$C601   ;else store new value
C043 ASL        ;X=X*8
C044 ASL        ;
C045 ASL        ;
C046 TAX        ;X/Y=word position
C047 TAY        ;
C048 LDA$C670,Y;get LEN(word)
C04B STA$C0D0   ;store as reference and
C04E STA$C6     ;# of keypresses
C050 LDX#$00    ;
C052 LDA$C671,Y;put word letters
C055 STA$0277,X;into keyboard buffer
C058 INY        ;
2259 INX        ;
C05A TXA        ;compare loop to
C05B CMP$C0D0   ;LEN(word)
C05E BNE$C052   ;
C060 JMP$EA31   ;exit
C063 04 05 06 03 12 1A 2A 21 14 26 1E
C070 02 50 6F 00 00 00 00 00 poke
C078 03 50 65 28 00 00 00 00 peek(
C080 02 46 6F 00 00 00 00 00 for
C088 02 4E 65 00 00 00 00 00 next
C090 02 44 61 00 00 00 00 00 data
C098 04 52 49 67 28 00 00 00 right$(
C0A0 04 4C 45 66 28 00 00 00 left$(
C0A8 05 49 4E 50 55 54 00 00 inout
C0B0 03 43 68 28 00 00 00 00 chr$(
C0B8 02 47 6F 00 00 00 00 00 goto
C0C0 03 47 4F 73 00 00 00 00 gosub
```

Basic access to interrupts

by Don Stanley

In this article I will explore the remaining ON <condition> GOSUB statements available in SVI/MSX BASIC. These are all the ones which are driven by Basic's Interrupt facility.

ON STRIG	GOSUB
ON INTERVAL=n	GOSUB
ON KEY	GOSUB
ON SPRITE	GOSUB
ON STOP	GOSUB

Before starting to explore these commands I will point out that all of them require a second command before BASIC will look for an interrupt. This is the <condition ON> statement. The ON <condition> GOSUB tells BASIC where to branch to, the <condition> ON statement actually starts BASIC checking for the interrupt.

For all of these statements, the following comments apply.

When an interrupt is detected and BASIC finds the two required statements have been set up, control passes to the instruction given in the GOSUB, but only after the current instruction is completed.

When BASIC is executing any one of the above interrupts, that particular interrupt CANNOT be regenerated, since, upon entering an interrupt subroutine, BASIC issues a <condition> STOP statement. This statement causes BASIC to stop going to the interrupt routine (which it is already on), however BASIC remembers that the interrupt has occurred and will re-enter the interrupt routine upon leaving it.

How detected?

How are these interrupts detected?

The VDP hardware interrupt, which occurs 50 times a second, checks all the possible interrupt conditions. If the joystick trigger is being pressed it sets a flag in high memory to indicate this, and the same thing happens if there has been a sprite collision, function key pressed, interval counted down, or the control stop key pressed.

At the end of every statement executed in BASIC, the BASIC roms check these flags, and do the associated GOSUB if the flag is set.

<condition> STOP and <condition> OFF are two statements which, along with <condition> ON give you complete control over the interrupt system. <condition> STOP causes BASIC to STOP executing the GOSUB associated with the ON <condition> GOSUB statement, even if the interrupt occurs.

For all the interrupts BASIC will still set the flag if the interrupt is detected, but will not carry out the interrupt until a <condition> ON statement is detected.

<condition> OFF means exactly that. No interrupt flags are set and BASIC will neither go to the interrupt routine nor remember that an interrupt occurred.

Various interrupts

Remember that when entering an interrupt routine, BASIC issues its own <condition> STOP statement.

You could also issue a <condition> OFF statement if you wanted BASIC to ignore interrupts occurring while in the interrupt routine. But this is applicable only to the <condition> that the current interrupt applies to.

It is possible to be in an interrupt routine and have that routine interrupted by another sort of interrupt.

When you have a program that allows this sort of interrupting, you must be very careful to ensure that all the routines are properly returned from.

There are two reasons for this.

One is concerned with the way BASIC remembers things. An area of memory known as the stack is used by BASIC to remember where to RETURN to after a GOSUB. Not returning from a GOSUB'ed routine properly can cause an OUT OF MEMORY ERROR if it occurs often enough.

(For a large program this could occur very quickly if only a small amount of memory is available for stack space).

Secondly, until BASIC finds a RETURN from the subroutine, it thinks it is still in that subroutine. Interrupts are not re-enabled for the subroutine unless you have a <condition> ON in the program under this circumstance.

For these reasons it is good programming practice to ensure that in a big program you develop subroutines without GOTO's wherever possible, and to ensure that every subroutine (whether it was entered by an interrupt trap or not) is exited by a RETURN.

Trapping

Interrupt trapping can get very complicated. For instance you can cause the interrupt to reoccur even in the interrupt routine by issuing a <condition> ON statement at the start. Here is an example:

```
 10 ON STOP GOSUB 1000
 20 STOP ON
 30 GOTO 30
1000 STOP ON
1010 BEEP:BEEP:BEEP
1020 FOR I=1 TO 5000
1025 LOCATE 20,20 : PRINT I
1030 NEXT
1040 RETURN
```

The STOP ON at line 100 allows :STOP interrupts to be trapped while in the interrupt routine itself. This means that BASIC may have got part way through the loop at 1020/1030, detect a :STOP interrupt and then GOSUB to line 1000. Try this little program, you should see the value of I change suddenly when you :STOP after the message.

Such interrupts, while perfectly legitimate, can cause all sorts of headaches in practice. The above is called a re-entrant interrupt, it allows the interrupt routine to re-enter itself.

Be careful that you ensure that every entry to the routine has a corresponding RETURN, this is the sort of code where stack overflows causing OUT OF MEMORY errors can occur.

(Every entry to the subroutine causes 32 bytes of memory to be used as stack space in the above example. If any entry did not get properly returned from, that 32 bytes would be unavailable to your program.)

A further extension beyond the obvious with the interrupt system is to cause a different piece of code to be executed with the same interrupt trap. This involves redefining the interrupt from within the interrupt routine.

The following code demonstrates this:

```
 10 ON STOP GOSUB 1000
 20 STOP ON
 30 GOTO 30
1000 ON STOP GOSUB 2000
1020 STOP ON
1020 PRINT "EXECUTING ROUTINE
     AT 1000"
1030 FOR I=1 TO 1000
1040 NEXT
1050 RETURN10
2000 PRINT "EXECUTING ROUTINE
     AT 2000"
2010 RETURN
```

The first interrupt by a :STOP will go to line 1000 where the :interrupt is redifined to go to line 2000.

If a :STOP was detected between lines 1000 and 1040 then control would pass to line 2000. Note the RETURN10 in line 1050 ensures that the interrupts are defined back to what they were originally.

The routine at line 2000 cannot be :STOP interrupted as BASIC would have issued a STOP STOP statement, and if :STOP were pressed during that routine it would be re-entered at its finish.

Five conditions

The above comments apply to all 5 interrupt conditions, here are comments relevant to individual conditions.

(1) ON STRIG GOSUB

AN ON STRIG GOSUB command sets up interrupt routines to branch to when BASIC detects a press of the joystick trigger button. The command can specify 3 lines to jump to, so that ON STRIG GOSUB 1000,2000,3000 could be used to specify all 3 triggers. (The space bar is considered a trigger button).

The STRIG ON/STOP/OFF command takes the following format...

STRING(nn) ON/STOP/OFF

where nn is 0,1 or 2. nn=0 refers to the space bar, 1 to the trigger on joystick 1 and 2 to the trigger on joystick 2.

Note that the command is actually STRIG(, there must be no space between the word STRIG and the first bracket.

When an interrupt routine is entered for one of the buttons, the interrupts for the other buttons are not STOPped by BASIC. The ON STRIG GOSUB command can take the form ON STRIG GOSUB ,,2000 which would apply to trigger 2, or ON STRIG GOSUB ,2000 to apply only to trigger 1.

(2) ON INTERVAL=nn GOSUB

This command is somewhat different from the other interrupts in that it involves time.

When this interrupt is switched on with the INTERVAL ON statement, BASIC generates this interrupt every nn/50 second. Thus ON INTERVAL=3000 GOSUB would see the interrupt carried out every 3000/50=60 seconds.

Internally all that happens here is that BASIC's VDP interrupt routine decreases the interval by 1 every 50th second until it reaches zero when it sets the flag to tell BASIC to branch to the interrupt routine at the end of the current instruction.

At the end of the interrupt routine the interval countdown begins again.

ON INTERVAL=nn GOSUB will NEVER be quite exact when using graphics programs, as the rom routines for graphics all switch off the VDP interrupt at some stage, thus no countdown can take place.

Have you ever noticed how sprites appear a little jerky as they move across the screen? This is because the VDP interrupt routine occurs during sprite movement, just stopping movement for a fraction of a second.

Smooth moving sprites can be obtained by only moving them in between 2 VDP interrupts, and this can be set up using ON INTERVAL=1 GOSUB...as follows:

```
10 SCREEN 1 : X = 128 : Y=96
20 SPRITES$(1)                    =
   STRING$(8,GHR$(255) )
30 ON INTERVAL = 1 GOSUB 100
40 INTERVAL ON
50 GOTO 50
100 PUT SPRITE 1,(X,Y),7,1
110 X = X + 1 : Y + Y+1
120 RETURN
```

Compare the movement of the sprite with the movement of the next program which does not synchronise with the VDP interrupt.

```
10 SCREEN 1 : X = 128 : Y=96
20 SPRITE$(1)                     =
   STRING$(8,CHR$(255) )
30 PUT SPRITE 1,(X,Y),7,1
40 X = X + 1 : Y = Y + 1
50 GOTO 30
```

You can synchronise with the interrupts like this provided that the code in the INTERVAL routine does not take more than about 18ms to perform, as this is about the time that the VDP interrupt leaves between interrupts.

You will find synchronising with the interrupts a difficult thing to do in BASIC due to its slowness interpreting code, but in assembler or any CPM's compiler languages it is much simpler.

(3) ON SPRITE GOSUB

ON SPRITE GOSUB give a location to branch to when BASIC detects that 2 sprites are overlapping. Detection is done by the VDP chip which sets bit 5 of its read only status register to a 1 if any sprites overlap. The statement is of the

form
ON SPRITE GOSUB xxxx
and gives no information about which sprites collided.

As usual a SPRITE ON/STOP/OFF statement is required to activate the interrupt. As usual the collision is detected during BASIC's VDP interrupt routine, the acutal branch to the SPRITE collision interrupt routines occurs when the current instruction is finished.

(4) ON KEY GOSUB

This command causes an interrupt when the function key switched on in the KEY(nn) ON statement is pressed.

You can specify up to 10 locations to branch to (1 per function key). To trap just one key and none before it use commas like this...
ON KEY GOSUB ,,,,100
with the associated KEY ON command being KEY(5) ON. Note again that the first bracket is part of the instruction name and must not be preceded by a space.

It is often necessary to employ the function keys contents first so that you do not get the characters assigned to the key placed in the input buffer. To do this you have 2 choices...
1 — destroy the contents not keeping them elsewhere
2 — destroy the contents keeping a copy.

The first choice is accomplished simply by using a loop like this...
```
FOR I=&HFA1E TO &HFA1E + 159
  POKE I,0
NEXT
```
which replaces the 160 characters assigned to the function keys by nulls. When you wish to restore the keys at the end of the program, use
DEF USR=&H59 : A=USR (0)
(NOTE...MSX replace &HFA1E by &HF87F and &H59 by &H3E)

The second choice adds the statement
FK$ = FK$ + CHR$ (PEEK(I))
immediately BEFORE the POKE I,0 instruction, so that you have a copy of the function keys kept in the variable FK$. At the end of the program, don't use the DEF USR, but instead use the following...
```
FOR I=&HFA1E TO &HFA1E+159
  POKE I,ASC(MID$(FK$,I-
&HFA1E+1,1) )
```
The second way is of use when you have defined the keys differently in the default way, which is what the first DEF USR restores.

Note that for MSX users there is a variation on the KEY ON/OFF command. By not specifying a number in brackets the function key display at the bottom of the screen is switched ON/OFF.

(5) ON STOP GOSUB

This is designed to do two things. One is to branch somewhere to ensure an orderly exit from a program rather than just the BREAK IN nn which you usually get.

When a program meets a :STOP you might send it to a routine which CLOSE's files, maybe restores the function keys and so on.

The other use is to prevent a program ever being stopped. This is accomplished by branching to a line which does nothing more than RETURN like this...
```
10 ON STOP GOSUB 40
20 STOP ON
30 GOTO 30] 40 RETURN
```
This innocent looking little program requires the computer to be switched off to stop it.

Of course there is no reason why :STOP interrupts should have to do one of these two things, but that was the intention behind the command.

That sums up the interrupt system and the various ways of accessing it from BASIC.

To finish off this month here's something completely unrelated.

Mastering of strings

by Dick Williams

This month is part two on strings for the Sega computer.

Strings are a necessary part of general purpose computing using the Basic computer language. Even though the subject can be a bit dry and uninteresting, the mastering of strings and string handling is absolutely essential to make any kind of progress with your computer.

Most of the learners that I meet always seem to have a problem with strings and more particularly with the various hidden problems that crop up immediately or worse, later on in a program because of faulty string handling at an earlier stage of the program.

Last month I gave an introduction to strings.

This month I have followed the same format by presenting more small, self-contained programs to illustrate a particular use of string handling.

Some of these show how, by a very small change to the program, a markedly different end result is obtained.

Keep record

When you type these programs in and get them working it's a very good idea to cut them out and keep an exercise book with your own comments on how you think the program works, the results you got and where you might be able to use it.

This part is very important because if you do this, and put some hard practice in, you will be starting to teach yourself.

After a few weeks of effort, things start to fall into place and you will find that information you couldn't make any sense of suddenly becomes useful and you can create programs yourself.

Once you have a program running, it's a lot of fun to add a little bit more for some extra functions, colour, sound and so on. This extra dressing up of a program is usually done last, after the main part has been coded and tested. It's the main part that should be solid, reliable code.

Once you get some coding experience and start to create longer programs, you will find it a considerable advantage to put a Rem line with a brief description of the purpose of the code at the start of each code section.

It's surprising how much help it is to look at your own Rem line telling you what you're ging to do next, when you don't even know how to do it.

I resort to lots of cunning schemes to try and solve a problem that's got me stumped.

First, I have a quick go at getting the code right and try it out.

Nine times out of ten that doesn't work and next I try to remember a similar problem that I might have worked out.

If it's brand new and I haven't done anything like it before, I always start form basic principles and sort out a little bit at a time, test it out and then do a bit more.

Another useful way is to put time delays (for P=1 to 500:next) in to slow down the computer and give me a chance to see each part in action.

I get the computer to print information on screen after each bit of code that I want to check, and make the computer "stop" at critical places to allow me to study the screen and consider the next step.

For those of you who have slaved away at strings, here is a little problem:—

Take a 37 character string and make it scroll continuously from right to left as though there were several strings on a drum.

The string I used was "—Merry Christmas and a Happy New Year".

Next month's article is an introduction to rotating graphic images about the X, Y axis.

```
10 REM prog 11      reverse a string
20 A$="THE CAT SAT ON THE WALL
30 L=LEN (A$)
```

(Continued on page 74

```
40 D$=MID$ (A$,L,1)
45 IF L=0 THEN 80
50 L=L-1
60 P$=P$+D$
70 GOTO 40
80 PRINT A$:PRINT P$
90 REM this scans A$ and creates a new
string (P$) made up from the righthand
character of A$,working back to the
left hand character. When L (LENGTH OF
 A$) has dropped to zero it prints
the original string,A$,and the reverse
string P$.
```

```
10 REMprog 12 reverse/change a string
20 A$="THE CAT SAT ON THE WALL"
30 L=LEN (A$):A=0
40 D$=MID$ (A$,L,1)
45 IF L=0 THEN 80
50 L=L-1
60 P$=P$+ CHR$ (ASC (D$) +A)
70 GOTO 40
80 PRINT A$:PRINT P$
90 REM same as 11 except characters
increased by variable A.IF you alter A
in line 30 to A=1,the letter A becomes
B,B becomes C etc.Alter variable A in
line 30 to any number between 0(normal
reverse) and 100 to see result.
```

```
10 REMprog 13 reverse/change a string
20 A$="THE CAT SAT ON THE WALL"
30 L=LEN (A$)
40 D$=MID$ (A$,L,1)
45 IF L=0 THEN 80
50 L=L-1
60 P$ = P$ + CHR$ (ASC (D$) +L)
70 GOTO 40
80 PRINT A$:PRINT P$
90 REM this program is the same as 12
except the variable A has been replace
d by a continually changing number
which in this case is L (line 60).
L starts out as the length of A$ and
is reduced by 1 each time the computer
passes line  50
```

```
10 REM prog 14  numbers into strings
15 CLS
20 INPUT "NUMBER PLEASE ";A
30 PRINT A
40 PRINT
50 A$=STR$(A)
60 PRINT A$,"LENGTH OF A$= ";LEN(A$)
70 PRINT"----------------------------
80 GOTO 20
90 REM this takes a number from the
keyboard,places it in the variable A,
prints A,changes A into A$,prints A$
and the length of A$. The space on the
left is for a minus sign.Try inputting
these 45W,45T,45X6,E32
91 REM Spaces and a decimal point are
accepted by the computer.Try 12.45
67.98 and one with a space 34 56.
Spaces are not usual in numbers and
the computer will squeeze the number
up to remove any gaps between.
```

```
10 REM prog 16 keyboard into strings
15 CLS
20 M$="ITEM CODE "
25 Z$="CASH SALE"
30 INPUT "ITEM CODE ";A$:BEEP
35 IF A$="" THEN 20
40 IF RIGHT$(A$,1)="C"THEN A$=LEFT$(A$
,LEN(A$)-1):Z$="CHARGE TO CUSTOMER"
45 FOR P=1 TO LEN(A$)
50 D$=MID$(A$,P,1)
55 IF D$ < "0" OR D$ > "9"THEN PRINT
A$,"INCORRECT NUMBER":BEEP 2: GOTO 30
60 NEXT P
65 PRINT M$;A$,Z$
70 PRINT"----------------------------
75 GOTO 25
80 REM same as prog 15 but also checks
the last character.If this is C the
message"CHARGE TO CUSTOMER" is printed
 The C is removed by making A$ equal
to all of A$ except the last character
and it then goes through the number
checking at lines 45-60.
```

```
10 REM prog 15 keyboard into strings
15 CLS
20 INPUT "NUMBER PLEASE ";A$
25 IF A$="" THEN 55
30 FOR P=1 TO LEN(A$)
35 D$=MID$(A$,P,1)
40 IF D$ < "0" OR D$ > "9"THEN PRINT
A$,"INCORRECT NUMBER":BEEP 2 :GOTO 20
45 NEXT
50 PRINT A$;VAL(A$),"NUMBER OK":BEEP
55 PRINT"----------------------------
60 GOTO 20
65 REM This prog accepts characters
from the keyboard,scans them from left
to right and if any are not numbers an
error message is printed. Line 25 is a
bypass if A$ is null string ie if only
CR key pressed.Compared with prog 14-
66 REM This program traps errors put
in by the operator and as such is more
friendly.There is more code required
of a friendly program.In this one you
accept input into a string,test each
character of the string to  see if acc
eptable and-
67 REM if it is,reconvert the string
back to a proper number for use by
using this code A=VAL(A$).Line 40
checks each character in the string to
see if it is less than 0 or greater
than 9. There is no provision for a
number with a decimal point
```

Database kit for the classroom

by Paul Left

One of the more important uses of a computer in the classroom is using a database program to store and manipulate information.

It is a means of allowing children to gain new insights into areas of knowledge and to achieve greater mastery of information and research skills.

There are many database programs available, especially for Apple II computers, but much of this software is too complex and difficult to use for classroom applications.

One program however, which lacks flexibility and power for many business applications, eminently suits the role of a classroom database.

PFS:file is extremely easy and logical to use, and children as young as 8 or 9 can build and search databases.

If you are going to use it in your classroom, however, you need to be familiar with its use yourself.

You need to plan how it can be used in a worthwhile way, and you need to prepare reference materials (eg 'activity cards') so that children can work on their own or in small groups at the keyboard independently of the rest of the class.

Data kits

PFS:file allows you to design a 'form' in which to store information — one item to each form.

The program is flexible enough to let you have up to 32 pages of free-form text for each item, and you can search on any field without previously defining it as a key-field.

It's relatively easy to design and use a database using PFS:file, but teachers often shy away from using such software in their classes because of the difficulty in planning a sound learning sequence around it.

However, Ashton Scholastic, who also market PFS:file, have produced kits on various curriculum topics containing ready-made data-files and the planned activities to make use of them.

Each kit includes the data files on disk, teacher's planning, and student instructions, all packaged in one large ring-binder.

The kits do not include PFS:file, which must be purchased separately.

Life science databases

One of the kits now available is "Life Science Databases for PFS:file", which includes three units which use the databases provided, and two units which involve the creation of new databases from the pupil's research.

The written material is a thorough planning description of each unit, along with reference material to help the teacher and children.

The first unit is "Migrate", which contains data on 230 migrating birds which visit one area in Michigan, USA. The 10 activities are designed to develop research and database skills as well as stimulate interest and understanding of the topic.

The other two databases provided are "Animals" and "Animal Biological Systems". The first contains information on the physical attributes of 130 animals, the second on the physiological systems (eg skeletal, nervous, circulatory) of 90 animals. The activities for these two units are almost identical to those of the first unit.

(Continued on page 76

Apple

The last two units each involve the creation of a database ("Wild Flowers" and "Drugs") and the skills involved, while similar, are at a more advanced level than the first 3 units.

As an example, here is a brief rundown of Activity 8 in the 'Animals' unit:

8. *Choose a project and determine 'information needs' to complete it.
   *Design and carry out a search ot provide answers to questions.
   *Plan, print, and interpret a written report.

Notice that open-ended activities are provided for, and that printed copy of information is called for in many of the activities.

That means that if you are going to make full use of this package, you'll need an Apple IIe or IIc and a printer.

If you want to use all the features of PFS:file, or prepare reports with PFS:report, you'll need a second disk drive.

One of the faults of this package is the repetition of activities from one unit to the next, which means that you would probably not use all five of the units with one group of children.

In fact, I would be inclined to use only two units: one from the first three and one from the last two.

You could certainly use more if you felt the pupils would benefit from reinforcement in these skills.

The "Bird Migration" unit has little relevance to New Zealand wildlife, but could be useful as a thorough description of the bird-life of one area, albeit remote.

Structured

One aspect of the package which could be an advantage or a disadvantage, depending on the teacher, is the highly structured nature of the units.

A whole course is clearly set out with a well-planned progression of skills.

If you have little experience of using a database in the classroom, these units should provide you with the confidence to give it a go.

If you have some experience, you might find the units overly prescriptive.

If you are careful to keep to a logical progression, however, you could easily pick and choose from the activities described and design a course for your own needs.

If you already have PFS:file and teach children at intermediate level or above, then you could make good use of this package as part of your science programme or to develop information and research skills.

If you are not using a database in your classroom, then purchasing this package along with PFS:file could be considered.

At around $200, plus the cost of PFS:file itself, it's not a cheap option, but could be an excellent way to get started with databases in your school. ■

Coping with GST

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

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

The concern with all users running computer systems is 'will the software be able to handle GST?' Those without systems will be asking themselves 'will I be needing a computer?'

In the first case, we have been advised by all major software houses that their software developer's hands are poised awaiting final details on GST, so that the relevant amendments can be made. In fact some claim to have already introduced it, which is an intriguing thought when we currently know little about the mechanics of it.

A complication will arise if the Government introduces GST on certain products without totally phasing out the existing sales tax. This could mean two forms of tax on the same item.

Our discussions with the Inland Revenue Department have identified that any software product must be capable of handling:—

— Supplies from non-registered trades below $24,000;
— Private apportionment eg: power, rent etc and private purchases from the business;
— Cash discounts;
— Automatic payments;
— Assets purchased on hire purchase.

[Where the $ value of the invoices and the tax (where appropriate) are accumulated for the IRD return.]

Without doubt, for those in business who have not computerised and are fence sitting or procrastinating, GST will send an electric current through the fence (and knock them on to the right side). The accumulation of GST transactions supporting the periodic payment or collection of GST lends itself to being computerised, apart from the automatic calculation on invoices etc... Be prepared.

Multi-user/Multi-tasking/ Networking

Terminology designed to confuse. If you are operating a single screen micro and can see it having ample capacity and flexibility as such for the next few years then you probably haven't given these terms much thought.

Those that have given them some thought probably wish they hadn't. When we refer to a computer system comprising more than one screen we are introducing one of the above options:

Multi-user

Multiple screen entry into software where more than 1 person can perform the same job at the same time without noticeable delays eg: 2 operators entering customers' orders. Only one central processor shared between all screens.

Multi-Tasking

Multiple screen entry into software where more than 1 person has access to the system at the same time but not in an area of operation already accessed by another operator, eg: 2 operators, 1 entering customers' orders, 1 entering general ledger journals. Again only one central processor shared between all screens.

Networking

Just to complicate matters Networks can be both multi-user and multi-tasking. It involves the linking together of often intelligent screens (using personal computers) where storage of data is shared between screens usually on a central hard disk and allowing operators multiple access to the information.

In a network each screen usually has its own processor or brain thereby allowing tasks to be run separately on screens eg: spreadsheets, as well as sharing information on the central hard disk.

So where does this lead you?

If you were buying your first computer system and it was agreed more than one screen was essential, then you would typically plump for either a multi-user or multi-tasking system sharing the same processor: a. because these systems typically are cheaper and b. they are proven in the market place.

However if you had a single screen computer system and wanted to add flexibility by adding a second screen then you may go the network way (naturally there are software considerations too).

Networks are developing a high degree of acceptance, having survived their initiation in the NZ market place some 9 to 12 months ago.

Be aware that these definitions are not universally accepted. Whereas you may have defined true multi-user access as essential, your supplier may be talking multi-tasking!

New PC products

One of our KMG people has just returned from a trip to the US and Europe and he managed to fit in a **week** at COMDEX — the big Microcomputer show at Vegas. Here are just some of the key new software products you can expect:—

Q & A

Question & Answer is an intelligent database and word processor that has been selling like hotcakes, reaching number 6 on the softwell hot list after only 4 weeks!!

Q & A is the first significant new product to use AI, Artificial Intelligence.

You type in instructions to the computer in every day language and the program can understand.

Q & A's been receiving rave reviews so expect first copies in NZ soon.

Q & A will accept data from Lotus, PFS, D Base II and III, Wordstar and Multimate amongst others, so you could upgrade to this "smart" software easily.

Lightening

Turbo Lightening is Borland's latest effort, and it promises to be as influential as the price/performance barrier busting Turbo Pascal and Sidekick.

Like Sidekick, Lightening is memory resident, it sits in your computer's RAM, alongside the program you're running and checks your spelling, as you type.

Make a mistake and Lightening will alert you and list correct options.

Press a couple of keys and you'll get a list of synonyms. (Throw away your dictionary and Thesaurus).

Pricing activity

The strengthening of the NZ dollar in October fuelled by the ever increasing range of cheap, imported IBC PC compatible micros led to a very unsettled pricing situation in the last quarter of 1985. Prices generally fell, with some major hardware suppliers announcing two price reviews in two months.

Fortunately the non-corporate business section has recognised the importance of ongoing supplier support, particularly in the software area, and therefore have generally steered clear of the very cheap machines (which are generally sold without software and with minimum support).

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Sinclair

The Sinclair QL Companion **Boris Allan**

Covers Sinclair SuperBASIC, principles of structured programming, use of sound and graphics, and hardware facilities. For machine code programmes, there are sections on programming the QL's Motorola 68008 microprocessor and an overview of the Intel 8049 support chip used to handle peripheral devices such as the keyboard. Intended for comparison between techniques for programming the QL and other popular models.

Pitman **Our price $18.14. Save $1.05**

Using Graphics on the Sinclair QL **Garry Marshall**

Introduces beginners and experienced programmers to ways of creating graphics, presents graphics programs and explains how they work. Covers creation of business graphics with QL Easel and writing programs in SuperBASIC for games, simulations and general presentations of information.

Hutchinson **Our price $27.75. Save $2.20**

Machine Code Programming in the Sinclair QL **Martin Gandoff**

Offers an insight into machine code instructions which activate the Motorola 68008. Shows how to write programs and subroutines using QDOS and how, through knowledge of QL machine code and how to make QDOS save program writing time, you can improve existing programs and fully use the QL's processing power.

Hutchinson **Our price $27.75. Save $2.20**

Making the Most of the Sinclair QL: SuperBASIC & its Applications **Dick Meadows**

Practical guide to programming for the newcomer and experienced user. More than 100 programs for direct use and modification. Reviews essential QL commands and SuperBASIC constructs used for writing programs. Practical programs then cover wide variety of topics.

Hutchinson **Our price $27.75. Save $2.20**

BASIC Basics for the Timex Sinclair 1500/1000 **Michael P. & Simon J. Barnett**

Family introduction to BASIC filled with information for managing household finances, using the machine as an electronic message board, as a calculator to solve complicated mathmatical functions and many other applications

Reston **Our price $21.95. Save $1.75**

Database Management of the Sinclair QL **Mike O'Reilly**

Introduction to Archive, the database management program provided with the QL. Explains basic concepts and technology, and guides beginners through all stages to create and maintain database. Emphasis on pratical applications with particular stress on design of user-friendly systems.

Hutchinson **Our price $27.75. Save $2.20**

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Software

The Complete Guide to Software Testing
William Hetzel

Explains how software can be tested and how testing should be managed within a project or organisation. Aimed mainly at the software practitioner, it covers concepts of testing, testing techniques, methodologies, and management perspectives. Each chapter contains examples and checklists to help the reader understand and adapt material to personal needs. Case studies based on the author's experience.

Collins **Our price $65.60. Save $5.35**

Whole Earth Software Catalog
Stewart Brand

A comparative guide and recommendations on software, hardware, magazines, books, and accessories, suppliers and online services for personal computers. Lots of tips on buying and shopping around, and warnings on what to beware of.

Corgi **Our price $27.70. Save $2.25**

pfs Software Made Easy — Carl Townsend

Step-by-step tutorial to the pfs series — pfs Write, pfs File, pfs Report, pfs Access and pfs Graph. Programs will work on the IBM PC and XT, Apple IIe IIc and III, and the TI Professional — and you will need at least one disk drive, preferably two, or a hard disk system. Book includes tips for intergrating programs and working with advanced applications.

Osborne/McGraw-Hill **Our price $41.60. Save $3.35**

MSX

The Complete MSX Programmer's Guide
Toshiyuki Sato, Paul Mapstone & Isabella Muriel

Claims to be the definitive handbook for the MSX standard computer. Set out in four parts: a comprehensive, self-paced guide which takes the mystery out of learning to program; advanced programming techniques to sharpen the experienced programmer's skills, with information on sound and graphics facilities; detailed explanations of BASIC and machine language and programming guide to the operating system.

Melbourne House **Our price $75.95**

Getting More From MSX — With Spectravideo & All MSX Computers
Brian Boyde-Shaw

Deals with editing and debugging of programs, then moves on to how to write programs for education or entertainment, writing text, graphics, sprites and sound. Each new idea is presented as a problem to be solved. The program which solves the problem is explained in detail but you can write your own program for comparison.

Sigma **Our price $28.45**

Behind the Screens of the MSX — Mike Shaw

Takes an in-depth look at the MSX computer's powerful graphics screen displays, revealing many secrets and unveiling a mine of information. As well as providing the beginner with an insight into what's happening behind the MSX screens, it also provides reference information for the experienced programmer.

Kuma ***Our price $28.45***

MSX Exposed — Joe Pritchard

Comprehensive guide and encyclopaedia of solutions. Begins with BASIC programming and works through to machine language. Step-by-step format concentrates on providing understanding on how your MSX works. Each feature and program statement carefully explained with the aid of demonstration programs, tables of vital memory locations and system variables.

Melbourne House **Our price $37.95**

Starting Machine Code on the MSX Microcomputer — G.P. Ridley

Shows how Z80 instructions are used and demonstrates these fundamental routines in a straightforward way. Explains and demonstrates accessing of machine code routines from BASIC to use of an assembler, movement of sprites and playing music in machine code.

Kuma **Our price $28.45**

Starting With The MSX — Tony Marriott

Written especially for the first-time user, explaining some of the "computer jargon" and introducing the MSX keyboard to the user. Step-by-step guide to elementary Microsoft BASIC — includes plenty of examples. Finishes with some games programs and graphics demonstrations.

Kuma **Our price $18.95**

MSX Games Book — Andrew Lacy

Easily-entered listings for games to test reflexes, nerve, logic, strategy and intelligence — educational, simulation and adventure games. Games make full use of MSX features, including its sprite capabilities and sound. Screen shots preview each program, program structures outlined and key variables given to allow modification.

Melbourne House **Our price $37.95**

IBM

IBM PC Programming
Richard Heskell & Glenn A. Jackson

Hands-on step-by-step approach for beginners and advanced programmers. Uses actual photographs taken from the computer screen in graphic examples to develop many fundamental programming concepts. Includes information on string variables and functions, IBM PC DOS: numerical variables and arithmetic; expressions; sound effects; medium resolution graphics; loops and subroutines; bar graphs; animated graphics.

Prentice-Hall **Our price $27.10. Save $2.20**

The IBM Connection — James W. Coffron

From the author of the popular Apple Connection, VIC-20 Connection and Z80 Applications, this book shows how easy it is to use your computer with common household devices. Explains techniques for setting up your IBM to control a home security system, home temperature and control system, voice synthesizer to make your computer talk, as well as other home appliances.

Sybex **Our price $55.45. Save $4.50**

Data File Programming on your IBM PC
Alan Simpson

Presents the techniques for writing BASIC programs for mailing list systems, grade books, library referencing system, graphic displays. Covers adding files, searching, sorting, editing and printing formatted reports.

Sybex **Our price $55.45. Save $4.50**

Your IBM Made Easy — Jonathan Sachs

Covers the fundamentals and details major features of the system, including coverage of DOS 2.0 and the PC XT. Step-by-step operating instructions, and a guide to resources — what you need to know about dealers, software, services and accessories. Reference guide to operations and troubleshooting for common problems.

Osborne/McGraw-Hill **Our price $29.55. Save $2.40**

Computer Graphics for the IBM Personal Computer — Donald Hearn & M. Pauline Baker

Discusses basic concepts and techniques of graphics and explores IBM PC's capabilities for these applications. Examines methods for creating two and three-dimensional pictures and graphs, and shows how to manipulate and animate displays. Also analyses make-up of PC and its graphic features.

Prentice-Hall **Our price $41.70. Save $3.40**

Your IBM PC Made Easy (includes IBM PC (DOS 2.0) and PC XT) — Jonathan Sachs

Covers the fundamentals and details the major features. Step-by-step operating instructions and a guide to resources telling you what you need to know about dealers, hardware, software, services and accessories. There's also a reference guide for operations and troubleshooting common problems.

McGraw-Hill **Our price $29.55. Save $2.40**

Animation, Games and Sound for the IBM PC — Tony Fabbri

Learn by having fun through brief discussions and programs at first, and ready-to-use examples to help you create new games and practical explanations. You learn programming skills in the process.

Prentice-Hall **Our price $54.10. Save $4.40**

Software Construction Set for the IBM PC & PC Jr — Eric Anderson

Complete package of software tools to help in designing programs. Contains techniques, advice and individual routines to help you build custom-made programs. References for information storage and retrieval, data searches, sorts, window building, using disk files, display charts and graphs.

Hayden **Our price $51.75. Save $4.20**

WordStar on the IBM PC — Richard Curtis

Complete guidebook written in clearly understood style. Assumes no prior knowledge of WordStar or the IBM-PC. Includes all enchancements the IBM-PC brings to WordStar along with add-ons such as MailMerge, Spellstar, StarIndex and CorrectStar.

McGraw-Hill **Our price $30.50. Save $2.45**

Handbook for Your IBM PC (includes XT version)
Louis E. Frenzel & Louis E. Frenzel, Jr.

Experienced users will find it a handy reference, with a concise summary of key operational information and as a source book of information about non-IBM accessories. Beginners will find it step-by-guide to using the computer and a source for "what to do and how to do it".

Sams **Our price $35.15. save $2.85**

Here Come the Clones: The Complete Guide to IBM PC Compatible Computers.
Melody Newrock

Explains which compatibles run what and which are hardware compatible, where the differences in design are critical, how the clones compare in overall performance, why some are and some are not real bargains, and where their hidden costs lie.

Osborne/McGraw-Hill **Our price $48.95. Save $4.00**

Atari

Assembly Language Programming for the Atari Computers — Mark Chasin

Routines follow the rules established for assembly language programmers and will work with any Atari computer. Examples given in both assembly language and, where possible, BASIC incorporating assembly language routines to perform tasks in BASIC.

Osborne/McGraw-Hill **Our price $41.60. Save $3.35**

How to Excel on Your Atari 600XL & 800XL
Timothy O. Knight

Chapters on programming, graphics , sound and music in straightforward terms. All key terms defined, and many accompanied by illustrations. Suggests many uses for business and fun.

Osborne&McGraw-Hill **Our price $25.85. Save $1.90**

BBC

The BBC Micro Gamemaster
Kay Ewbank, Mike James & S.M. Gee

Shows you how to devleop your own games as you learn the techniques of the professional games programmers. You also pick up the skill of solving programming problems as they arise. Programs are structured so that each procedure, or module, performs a distinct task allowing variations on the "core" program to be written by substituting new modules. Also advice on how to customise your programs.

Granada **Our price $20.30. Save $1.65**

Cracking the Code of the BBC Micro
Benni Notarianni

Practical guide to machine code programming introduces you to the 6502 hardware and instruction set, then teaches you to combine the separate elements of machine code into the fast code of commercial programs. You learn creation, manipulation and the animation techniques for arcade graphics, there is a set of arithmetic routines for calculation within machine code programs, and appendices on the instruction set, BASIC 1 differences and fixes, and OSWORD calls.

Pan **Our price $24.95. save $2.00**

Exploring Music With the BBC Micro & Electron — Kevin Jones

Explores creative ways of using the computers to make music. Shows how to generate sounds, and to combine sound characteristics and rhythms. Covers wide range of styles — pop, folk, classical and modern. Examines many musical ideas and techniques.

Pitman **Our price $36.00. Save $2.95**

Getting the Most From Your BBC Micro
Clive Williamson

Introduction intended to complement the User Guide supplied with the machine. Contains many hints and tips on programming and general use. Explores many possible uses and the computer's potential for expansion to suit individual needs. Some features and accessories, undocumented in the User Guide, are investigated, with specific advice on connecting printers, TV monitors and disk drives.

Penguin **Our price $13.80. Save $1.15**

Business

Multiplan Home & Office Companion
Elna Tymes & Peter Antoniak

Collection of models covering a broad Spectrum of business and personal applications, personal finance, household management Ready-to-use model described and accompanied by the listing needed to create the model and sample data with your own. As you become familiar with Multiplan, the modelling techniques help you to create customised models.

Osborne/McGraw-Hill **Our price $36.95. Save $3.00**

Lotus 1-2-3 Simplified — David Bolcan

Designed for all levels, it starts with installing and using Lotus 1-2-3, then moves through designing and using spreadsheets; formatting spreadsheets and making them aesthetically pleasing; generating printouts; working with oversized spreadsheets; graphics functions, data management; advanced spreadsheet applications and programming with macros. Attractive presentation includes many diagrams and graphs.

TAB: **Our price $31.70. Save $2.55**

Guide to using Lotus 1-2-3 — Edward M. Baras

Detailed comprehensive guide to help you make full sense of Lotus 1-2-3's integration of spreadsheet, database and graphic functions. Includes step-by-step instruction on implementing practical application models for financial forecasting consolidating business statements, simulating dynamic processes, electronic forms management. Equally useful to beginners and experienced users.

Osborne/McGraw-Hill **Our price $38.80. Save $3.15**

Business Program Portfolio for your Apple IIe: An Integrated Office System
George H. Hildebrand

Collection of 61 BASIC programs covering such office tasks as interest calculation, financial analysis, depreciation, property management and real estate, cash receipts and disbursements, job cost, payroll. All programs documented for implementation and modification. There is also a guide to printing out business forms, creating a menu system, and securing business records with password programs.

Hayden **Our price $51.75. Save $4.20**

On-Line Computing for Small Businesses - Silver's Wall — Maurice A. Silver, John Jeacocke & Ray Welland

Sets out to provide managers of small businesses with a clear, concise but non-technical instruction in the use of on-line computing based on the pratical experience of the authors. No prior knowledge of computing assumed and only essential technical definitions are included.

Pitman **Our price $9.70. Save 70 cents**

The ABCs of 1-2-3
Chris Gilbert & Laurie Williams

Hands-on approach using detailed step-by-step instructions. Lessons involve tackling projects such as building a worksheet, displaying the worksheet as a graph, building a database, simplifying several operations using micros, performing calculations and printing graphs and reports. Remains a handy reference once you are familiar with 1-2-3.

Sybex **Our price $37.85. Save $3.05**

Taking care of Business with your Commodore 64 — David P. Dautenhahn

More than 100 brief BASIC and financial programs, each documented with a short explanation of what the computer will do and a BASIC listing. A real-life scenario follows, with a sample run and more instructions on how to combine two or more applications. Programs include: interest, depreciation, retailing, real estate, loan analysis, savings, lease analysis, time value for money, stocks and bonds analysis, sinking fund analysis, forecasting inventory needs, payroll, insurance, metric conversion.

Hayden **Our price $35.60. Save $2.90**

1-2-3 Run: 41 ready-to-use Ltous 1-2-3 Models — Robert & Lauren Flast

Collection of models that run on Lotus 1-2-3. Each model presented with a step-by-step description, complete listing, an illustration with sample data (you simply replace this with your own), and where applicable, instructions to produce bar and line charts. Designed to simply work, the models include applications for sales, accounting, real estate and the classroom.

Osborne/McGraw-Hill **Our price $38.80. Save $3.15**

Database for Fun and Profit — Nigel Freestone

For users wanting to do their own programming. Provides straight forward introduction to data processing, with explanations of routines in BASIC. Examples of system designs for home and business, which can combine and expand. Systems for names and addresses, catalogue index; diary; stock control; bank account/budgeting; debtors list/sale/purchase ledger; payroll.

Granada **Our price $18.45. Save $1.50**

Electron

Getting the Most From Your Acorn Electron
Clive Williamson

Comprehensive introduction to the Electron, exploring its potential and possibilities to suit each owner's needs. Intended to complement the user guide, and contains many tips on programming, software and the general use of the computer. Some features and accessories not documented in the user guide are investigated.

Penguin **Our price $14.75. Save $1.20**

The Electron Gamemaster
Kay Ewbank, Mike James & S.M. Gee

Programs structured so that each procedure, or module, performs a distinct task, allowing variations on the "core" program to be substituted. You also learn how to customise your own programs, improving your programming skills along the way.

Granada **Our price $20.30. Save $1.65**

Adventure Games for the Electron
A.J. Bradbury

Numerous examples and ready-to-run program modules in a book which lets you in on the secrets of professional games programming. Takes you through the whole process of writing an adventure, with a chapter on the type of instructions you are most likely to need. All programs in MODE 6 unless otherwise stated.

Granada **Our price $25.85. Save $2.10**

Apple

Getting Started With ProDos
B.M. Peake & D. Rorke

Aimed at Apple II and IIe users, this is needed for someone familiar with the existing Apple DOS 3 3 systems. Comprehensive guide to ProDos, with exercises for practice. Reference section goes over commands and comments on their use, and there is a discussion on the advantages and disadvantages of the system. A list for further references is included.

Bluewater Press **Our price $6.45. Save 50 cents**

Applesoft BASIC: A Teach-Yourself Introduction — B.M. Peake

Second edition revised to cover the Apple II Plus and IIe. A manual for New Zealanders to learn BASIC with the Apple, instead of picking information from two or three sources includes model answers. Enquiries for class sets welcome.

McIndoe **Our price $12.90. Save $1.05**

Fun, Games & Graphics for the Apple II, IIe & IIc. — Paul Garrison

Collection of more than 75 ready-to-run programs which you can use, study, modify, combine and experiment with. Complete listings written in standard Applesoft BASIC and CP M-Supported BASIC-80, and explanations. More than 20 financial and record keeping programs, and a wealth of graphics and education programs, a word processing organ and some small-scale database programs.

TAB **Our price $39.75. Save $3.20**

Ken Uston's Illustrated Guide to the Apple IIe

No-nonsense illustrations which allow the reader to master any application without reading the whole book. Self defined chapters deal with buying a computer, which Apple IIe components to buy, how to create a database, word process and perform spreadsheet calculations, how to tap into electronic information services, how to do fundamental BASIC programming, video games.

Prentice-Hall **Our price $35.95. Save $2.95**

Applied Apple Graphics — Pip Forer

Step-by-step introduction to graphics and their applications using BASIC. Suitable for Apple II, IIe and II-Plus. Covers hardware and software enhancements as solutions to graphic problems, in particular, reviewing the software utilities that can make BASIC programming pointless in some cases. Special disk, with 30 programs and 24 other files, is needed to understand many parts of the book.

Prentice-hall **Our price $66.75 (includes disk) Save $5.40**

The Apple House — John Blankenship

Explains how to compose your Apple to control your house security, lights, heat, telephone etc. This system allows the house to accept verbal commands and respond with its own voice. Shows how to build some items from scratch, and how to use some of the equipment you already own.

Prentice-Hall **Our price $41.50. Save $3.35**

Commodore 64

Cracking the Code on the Commodore 64
John P. Gibbons

Introduction to 6510 instruction set and how to combine the elements of machine code into commercial-style speed. Full machine code monitor with 14 commands gives you the tools to interface with the 64's architecture. Learn good programming practice and trade tricks while using the sprite, sound and hi-res graphics, and get to grips with the interrupt handling for multiple sprites and smooth screen scrolls.

Pan **Our price $24.95. Save $2.00**

Getting the Most From Your Commodore 64
Simon Potter

Uses diagrams, colour photographs, programs and examples to introduce you to the machine. Moves from starting through writing programs to graphics and sound, printers, disks, and extras and troubleshooting.

Penguin **Our price $12.90. Save$1.05**

First Steps in Machine Code on Your C64
Ross Symons

Clear concise explanation of machine code — introduction to the disassembler and its use; instructions for the 6510 chip with the aid of a demonstration program; discussion of the kernal operating system and its applications such as printing, input/output devices and scanning the keyboard. Two complete machine code games show you how to create your own high speed, animated arcade-like games.

Corgi **Our price $12.00. Save 95 cents**

Data handling on the Commodore 64 Made easy
James Gatenby

Data processing — sorting raw facts to produce useful information — can be just as rewarding as playing games. Explains how to use the Commodore 64 to process information for the home and small business. Uses straightforward examples to demonstrate storage of large quantities of data, attractive and readable on-screen display, and searching and print-outs.

Granada **Our price $20.30. Save $1.65**

Commodore 64: Basic Programs in Minutes
Stanley R. Trost

Collection of versatile, ready-to-enter programs for more than 65 home and business tasks on the Commodore 64. Programs for home finances, business calculations, real estate, data analysis record keeping and education. No knowledge of BASIC programming needed to use programs which can be entered and ready to run in less than 10 minutes.

Sybex **Our price $37.30. Save $3.05**

The Commodore 64 Experience
Mike Dean Klein

The many and varied uses of a home computer .. programs for the home (recipes, shopping, phone books, kitchen metrics, budgeting); education programs (maths, geography, spelling, languages, graphics); entertainment programs, business programs (appointments, cash flow, interest, cheque books, inventory); utility programs (sprite creation, charater design, memory loader, saver and clear, disk menu ideas). All programs can be modified.

Reston **Our price $31.80. Save $2.60**

The BASIC Explorer for the Commodore 64
Lee Berman & Ken Leonard

Combination of suspense novel and instructional text, it teaches introductory programming in BASIC. Elements of Commodore 64 BASIC and the thought processes that go into designing a computer program to solve a problem are introduced through the adventures of three modern-day explorers.

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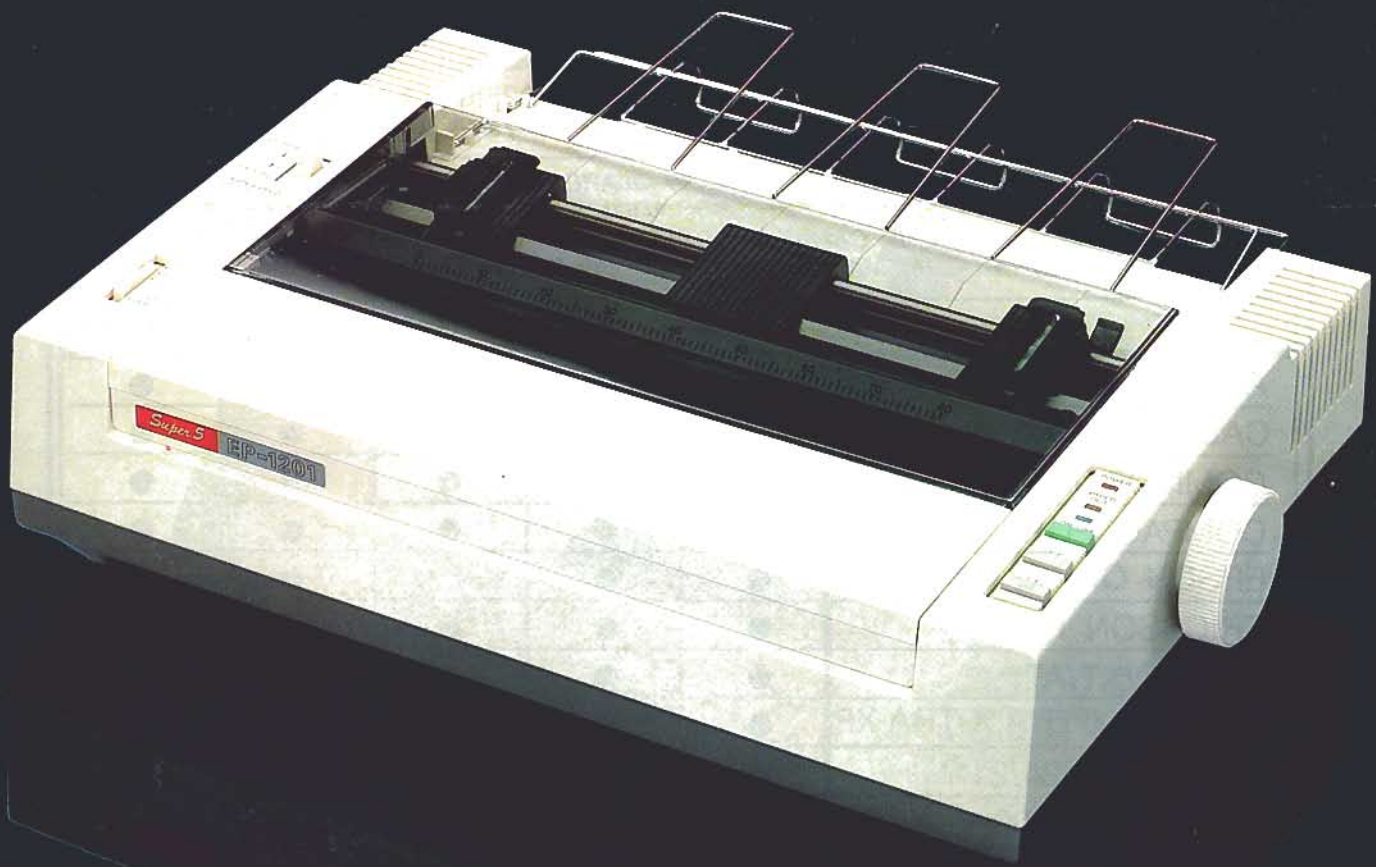

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