

The Personal Computer Your information window

An extension of your brain

An Apple Personal Computer puts you at the forefront of the technological revolution. Use it well and it will mediate the availabilities of a wealth of conceptual tools, data bases, communication channels and information processes. An Apple will help you simplify a myriad of tasks from ordinary data processing through information retrieval to economic forecasting.

Apple is versatile

Your Apple is an extremely powerful and robust problem solver backed by a comprehensive set of software programmes. Already, over 300,000 Apples are used for business, domestic, educational research and recreational purposes.

Apple as information processor

An Apple personal computer performs a full range of standard functions like statistics, word-processing, graphics, number crunching, filing, storage/retrieval and cross-referencing.

Apple as super-brain

Aside from the more pedestrian functions of retrieving and processing information, Apple performs other sophisticated functions such as econometric modelling, financial forecasting, graphics, topological modelling and trend analysis.

Apple is convenient

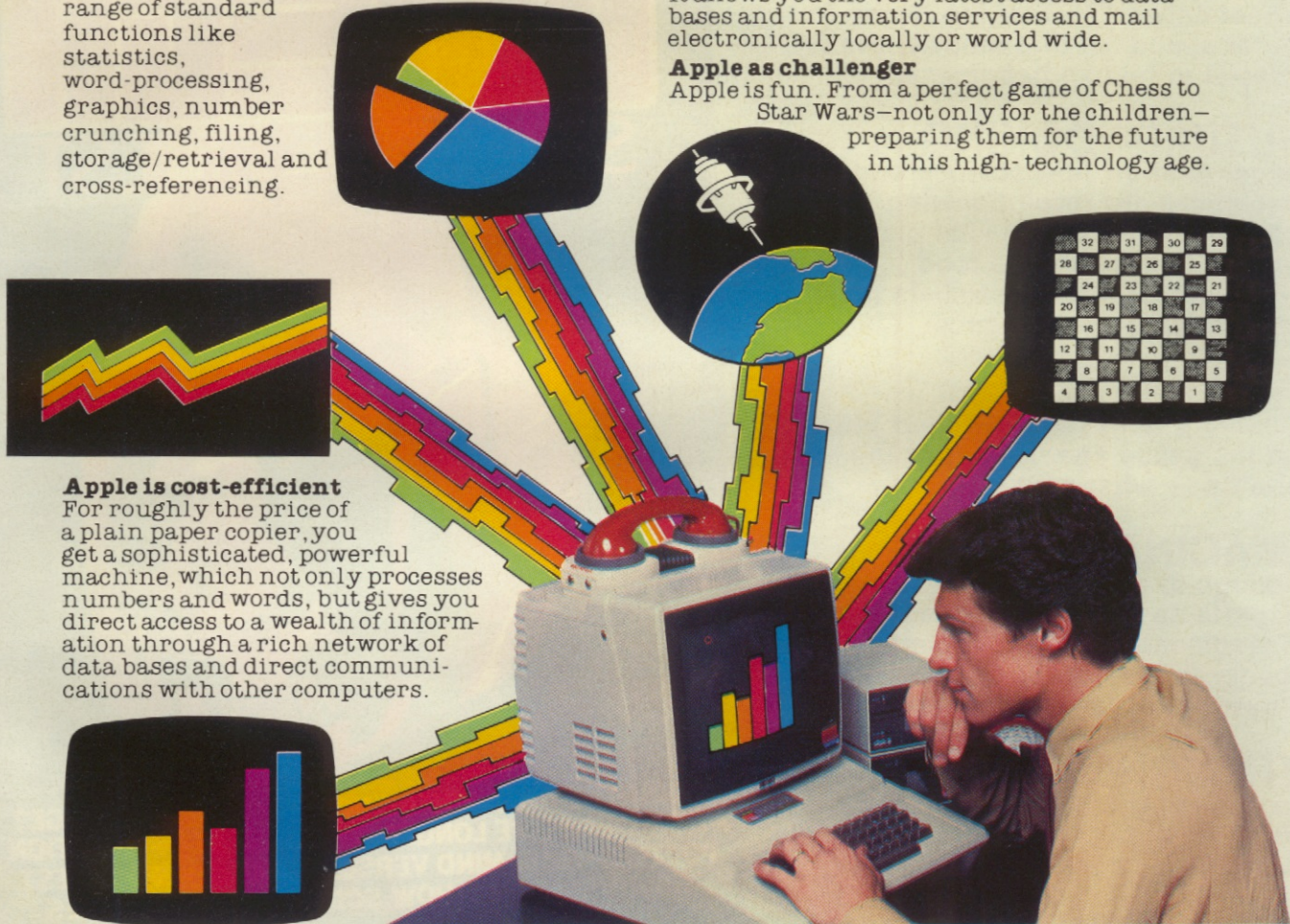
Apple is portable. It can be used at home or in the office. You can address it in ordinary English or gain full computer literacy in BASIC PASCAL, COBOL, FORTRAN or PILOT. Full step-by-step training comes with your Apple. If you can use a calculator and speak English, Apple shows you the rest.

Apple as communicator

Apple combines many of the functions of telephones, telexes, citizens' band radios and library access terminals. It allows you the very latest access to data bases and information services and mail electronically locally or world wide.

Apple as challenger

Apple is fun. From a perfect game of Chess to Star Wars—not only for the children—preparing them for the future in this high-technology age.



Apple is cost-efficient

For roughly the price of a plain paper copier, you get a sophisticated, powerful machine, which not only processes numbers and words, but gives you direct access to a wealth of information through a rich network of data bases and direct communications with other computers.

Mail this coupon for an "Apple Pack" brochure or talk to your local Apple authorised dealer about the specific applications for you.

If the coupon has been removed, send your name and address to:

ELECTRONIC CONCEPTS PTY LTD,
55 CLARENCE STREET,
SYDNEY, NSW 2000



apple computer

Mail to: PPCB374B
ELECTRONIC CONCEPTS PTY LTD,
55 CLARENCE STREET, SYDNEY, NSW 2000
Please send me a free "Apple Pack" brochure.

NAME _____

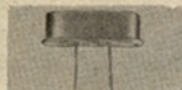
ADDRESS _____

POSTCODE _____

PROFESSION _____

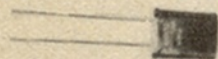
APPLE APPLE = PERSONAL COMPUTER PERSONAL COMPUTER = APPLE A

★ BRIGHT STAR CRYSTALS

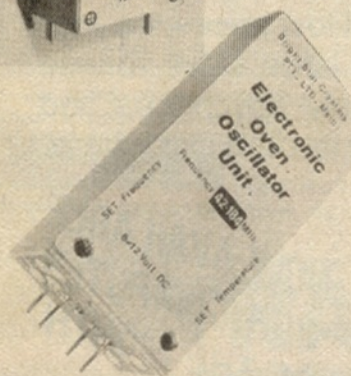


WATCH
CRYSTALS

CRYSTAL UNITS
FOR QUARTZ
CRYSTAL CLOCK



CRYSTAL
OVENS
AND OVEN
OSCILLATOR
UNITS



Specifications, Dimensions and
data sheets available on request

BULK ORDERS:

In addition to our normal range we can supply quantity orders (100 up) at very competitive prices. All we ask is 50% of cost with order balance 30 days.

DELIVERY: 5-6 weeks
from receipt of Order.
Ring for quote:
(03) 546 5076
Telex: AA 36004

BRIGHT STAR CRYSTALS

35 EILEEN RD, CLAYTON, VIC.
ALL MAIL TO: PO BOX 42 SPRINGVALE
3171

Microcomputer News & Products

Apple III now available in Australia

Following some production difficulties, the Apple III is to be finally released in Australia this month. Electronic Concepts Pty Ltd will release the new machine through its Australian dealer network.

Modifications to the original design make the Apple III a more attractive system for business and professional use. The system now features an improved operating system, more reliable hardware, expanded disk storage and can support up to 256K bytes of internal memory. In addition, seven new applications programs have been released.

Expanded storage capacity is provided by the Apple III/Profile system. Profile is a five megabyte Winchester-type hard disk which provides almost 35 times more storage space than a single floppy disk.

Usefulness of the system is increased by the release of seven new or enhanced software packages. One such program, Access III, allows the Apple III to communicate with large mainframe computers. The Apple can thus be used as a remote work station, accessing large data bases and returning completed work to the central computer.

Other new software available includes Apple Writer III for wordprocessing, Visicalc (TM) III and Business Graphics III for preparing and analysing business information, and Business Basic and Pascal III for developing applications programs. Each Apple III also comes with a set of diskettes which contain the new SOS 1.1 operating system, utilities file and Apple II emulation software. The operating system supports up to 256K bytes of memory, guards against writing data on an incorrect disk, and provides a mode which allows Apple II software to run on the Apple III, providing access to a large library of applications programs.

There have also been some price changes, in the US at least. The Apple III with 128K bytes of RAM and operating system software is priced at \$US3495. With Basic, Visicalc (TM), SOS and Monitor software, the system is \$US4190 - \$500 below last year's price.

Electronic Concepts, distributors of the Apple III, are at 55-57 Wentworth Av. Sydney, NSW, 2000.

Super-80 users group formed in Brisbane

● Users groups, in which members share programs, advice and experience are one of the strong points of the microcomputer scene, giving valuable assistance to newcomers and old-timers alike. Indeed, the popularity of a computer can often be judged by the strength of its user groups.

With almost 1000 Super-80's in use, it is high time that a user's group was established, and we are pleased to report that one group at least is under formation. The inaugural meeting of the Brisbane Super-80 users group will be held on 10th February 1982 at 7pm in room 21, first floor of the Trades Hall, Wickham Terrace, Brisbane. All are welcome to attend. For more information contact Garry Gatfield, 165 Frasers Rd, Mitchelton, Qld 4053.

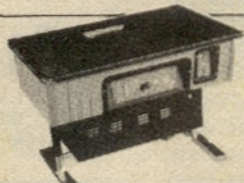
● The Blue Mountains Computer Club (NSW) meets at the Springwood Civic Centre on the first Friday of each month. Further information is available from Eric Lindsay, 6 Hill Crest Ave, Faulconbridge, NSW, 2776, ph. (047) 51 1044.

● Readers interested in joining an Atari users club in Brisbane should contact Will Visser, 74 Shailler Rd, Shailler Park, Qld. 4128, ph. (07) 209 1574.

● The ZX80 Users Club publishes a well presented newsletter, with hardware and software hints, programs and comments on the Sinclair computers. The address to write to is 24 Peel St, Collingwood, Vic 3066.

AMUSEMENT MACHINES

WE'RE THE COIN MACHINE INDUSTRY'S SERVICE CENTRE !



FAST ELECTRONIC CIRCUIT
BOARD REPAIRS AND
REPROGRAMMING.
SAME DAY SERVICE SEND
YOUR BOARDS FROM
ANYWHERE IN AUST/NZ/PNG.

FOR SALE
ELECTRONIC PINBALLS
FROM \$299; VIDEO TABLES
FROM \$800; NEW VIDEO
TABLES FROM \$2200; HOME
PINBALLS FROM \$159.

**AUTOMATIC
RECREATION
MACHINE CO PTY LTD**

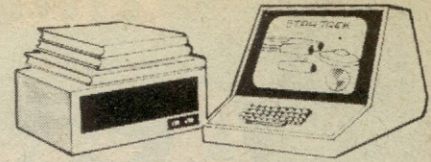
PHONE, WRITE OR CALL FOR COMPREHENSIVE
PRICE LIST



31 WATLAND ST,
SPRINGWOOD, QLD

PHONE (07) 208 8333. TELEX 44658

Microcomputer News & Products



Spectacular Applefest exhibition in Sydney

Sydney-siders recently had a unique opportunity to see some of the latest in personal computers at "Applefest", held at Sydney's Centrepoint from January 27 to 29.

Sponsored by Electronics Concepts Pty Ltd, sole Australian distributors of Apple computers, in conjunction with the Festival of Sydney, the exhibition included some of the latest in computer technology, with laser light shows, audio visual presentations, space invaders competitions, holograms and "hands-on" demonstrations of the Apple II and the new Apple III computer.

Applefest was officially opened by Ian Sinclair, Minister for Communications, who afterwards released 4000 helium balloons from the top of Centrepoint Tower. Each balloon contained a ticket which entitled the finder to enter a prize draw for an Apple computer.

According to Rudi Hoess, managing director of Electronic Concepts, Applefest was intended to cut away the mystique associated with computers.

"We wanted to give the public the opportunity to see how fascinating and friendly, personal computers can be" said Rudi.

More than 40 displays of Apple applications and related equipment from leading Australian and overseas manufacturers were on exhibit. In addition a number of organisations currently using Apple computers demonstrated some fascinating applications.

A major star of the show was the Apple III computer, officially launched at Applefest. Designed for business and professional users, the Apple III boasts an expanded memory, built-in floppy disk, new software and an extensive capacity for add-on equipment. Initial bugs and teething problems last year have been overcome, and the Apple III now appears to be a very attractive machine.

Main memory is 128K bytes, with internal expansion to 256K. In conjunction with the Profile five megabyte hard disk system and the Omninet computer networking system, one or more Apple III computers can meet the computing needs of small to medium size businesses.

The launch of the Apple III has in no way detracted from the usefulness of the Apple II, however. As many of the exhibits showed, the Apple II must be

one of the best supported personal computers currently available. A wide and rapidly growing range of software and hardware add-ons is available, from educational programs to games and sophisticated business programs.

With the advent of the Z80 software (exhibited at Applefest by City Personal Computers, 75 Castlereagh St, Sydney 2000) CP/M software is now accessible to owners of the Apple. Further news is the availability of a 6809 board for the Apple, opening up a wide range of 6809 software, including Microware's OS-9 packages, to the Apple user.

Orbital Music (503 Pittwater Road, Brookvale, NSW, 2100) demonstrated their SoundChaser Computer Music System for the Apple II. This system turns the Apple II into an advanced polyphonic synthesiser and multibank sequencer, directed by specially written music software.

Educational applications were well represented by Lothlorien Farming ("Cultivating new concepts") and the NSW Department of Education. More than 1500 Apple computers are already in use in schools around Australia.

Centre Industries (PO Box 184, Brookvale, NSW, 2100) in conjunction with the Spastic Centre of NSW exhibited their Scatt System (Scanner Apple Touch Keyboard Trolley), an integrated system which allows physically handicapped children and adults to use the Apple computer.

Books and magazines were another feature of the exhibition. Computer Gallery, of 66 Walker St, North Sydney, 2060, showed a selection from their stock of over 2000 computer book titles. Butterworths and ANZ Book Company also shared a stand to display some of the latest literature on the Apple, programming languages and microprocessors.

65 Business Advisory Pty Ltd of 39 Cheringhap St, Geelong, Vic 3220 displayed their range of business software, including packages for medical practices, insurance brokers and general business operations. Intelligence (UK) Ltd exhibited their "MicroModeller" package for the Apple II. MicroModeller is a complete financial modelling program for management use.

The NSW Institute of Technology was also on hand to display their new Apple system which will be used in some of the accounting courses offered by the Institute's Master of Business Administration faculty. The University of NSW exhibited equipment used in laboratory work for the first year Electrical Engineering course.

Many other companies and organisations exhibited at the show, a sign of the rapidly growing support for, and interest in, the Apple computer and personal computers in general.

"Applefest" was a spectacular demonstration of the many uses of computers and of the interest that they arouse. Judging by the response of many visitors to the show, Electronic Concepts well and truly met their objectives. They are to be congratulated for a very successful exhibition.

Computers Galore opens for business

A new retail computer store has opened in Neutral Bay, NSW. "Computers Galore" at 99 Military Road caters for the businessman interested in taking advantage of the power of the microcomputer for office tasks.

Manager Steve Coman is enthusiastic about the services the microcomputer can offer the businessman or manager, and after 30 years in the business world he is well qualified to advise on business requirements.

"Businesses which only a couple of years ago were relying on part time book keepers can now afford a com-

puter to give them complete invoicing, stock control and reporting on debtors, creditors and profit and loss figures on a day to day basis. Doctors and veterinarians can also have complete systems, which can be used by their receptionist or nurse".

In addition to a large range of microcomputers, Computers Galore also stocks calculators, plain paper copiers and telephone accessories, and has photocopying, instant printing and word processing services available.

Micronews cont'd ►

Bill Edge introduces Apple power near half price.

Concord II features:

- ★ 48K RAM
- ★ Auto-start ROM
- ★ Applesoft-compatible BASIC
- ★ Compatible with Apple peripherals
- ★ Inbuilt numeric keypad

\$899

MAIL CHARGE \$5.00

Concord II computer with 48K RAM

Case and power supply not included.
Please phone for details of price and
availability of these items.



But it's not an Apple computer!

The Apple has been one of the most popular personal computers on the market. And it's no wonder, with the huge range of software and hardware from over 170 different companies. The Apple's big disadvantage is its price.

Now you don't need an Apple computer to use Apple software and peripherals. Now you can have a computer that's fully hardware and software compatible with Apple - for about half the price - the Concord II.

No-frills presentation - so you save!

We can offer the Concord II at such a low price because it's an absolute base system - you don't pay for any fancy packaging, promotion or extras you don't need.

The Concord II is supplied as a complete 'Motherboard' carrying all the computer's functional parts - including a full 48K of RAM and eight Apple-compatible expansion sockets - the same number as Apple give you. The keyboard is a separate assembly mounted on a sturdy aluminium panel - and it includes a separate numeric keypad - which Apple don't give you. A connecting cable for the PC board and keyboard and a speaker for sound effects are included.

By building your own power supply and housing, you save a fortune over the price of an equivalent Apple computer - but you can use the same programs and peripherals.

Not a kit

The Concord II is completely built and tested - just connect a power supply and video monitor and it's up and running.

Numeric keypad built in

One of the real drawbacks of the Apple computer for serious users is the lack of an inbuilt numeric keypad. The Concord II solves this - a numeric keypad is built in to the keyboard assembly. It makes entering long strings of numbers as easy as on your calculator.

Seven day free trial

If you've been impressed by the Apple computer, but not by the price - you owe it to yourself to have a good look at the Concord II. Take one home and try it out feature for feature against the Apple or any other personal computer. If you're not absolutely happy, you can bring it back within a week for a full refund (as long as it's in original condition and packing.) How can you lose?

Price correct and goods expected in stock at time of going to press.

Price comparison based on Apple suggested retail of \$1680 including tax February 1982.

Bill Edge's ELECTRONIC AGENCIES

115-117 Parramatta Road Concord 2137
(Corner Parramatta Road & Lloyd George Ave)
Telephone: (02) 745 3077 (2 lines)

TRADING HOURS

Mon-Fri 8:30am-5:30pm
Thursday 8:30am-9pm
Saturday 8:30am-noon
Sunday 10am-2pm

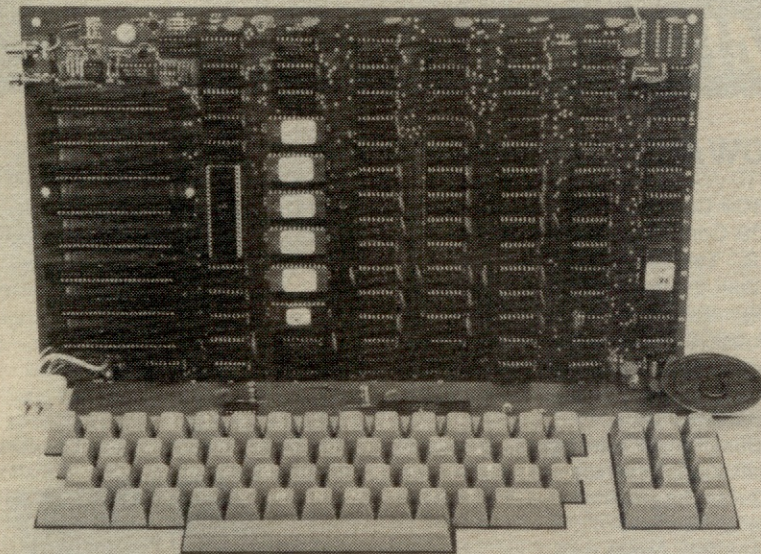
Mail Orders:
PO Box 185
Concord
2137

CITY STORE NOW OPEN!

Yes! Now there's a choice.
Electronic Agencies is now open at
123 York Street - in the heart of
Sydney's retail electronic area.
Come in and see us or phone us on
29 2098. Note that York Street opens
9am to 5.30 weekdays, to 9pm
Thursday and from 9-noon Saturday

Microcomputer News & Products

Concord II computer from Electronic Agencies



Bill Edge's Electronic Agencies has released a new computer, the Concord II, with some attractive features.

The computer comes fully assembled, but without a case or power supply. The system consists of a 370 x 217mm double-sided circuit board, plated through and fully socketed, and a separate 410 x 170mm keyboard PCB containing a full size keyboard and numeric keypad.

On the main board is a 6502A processor, 48K of dynamic RAM and a system monitor and Basic interpreter in 12K of EPROM. Also on this board is the video generation circuitry, cassette interface and the expansion interface, consisting of eight individually addressable 50-pin edge connectors which carry the 6502 bus.

Video output is 24 rows of 40 characters each, upper case only, although a lower case adapter and an 80 column adapter board are available. With the addition of a PAL colour card,

the computer can display graphics in a 40 x 40 display in 16 colours, or in a high resolution 280 x 192 matrix in 8 colours (including black).

Also on the main board is a one-bit speaker output and a connection for an 8Ω loudspeaker, a games interface with inputs for three pushbuttons and a joystick, and a four-bit latched output port.

Power requirements are +5V at 2.5A, +12V at 1.5A -5V at 250mA and -12V at 250mA.

The Concord II computer is said to be fully compatible with Applesoft software and Apple II hardware, so programs and add-on boards will be readily available. Cost is \$899 for the basic unit.

For further information contact Bill Edge's Electronic Agencies, 115-117 Paramatta Rd, Concord, NSW. Postal enquiries should be sent to PO Box 185, Concord, NSW, 2137.

NOTE: Apple and Applesoft are registered trademarks of Apple Computer Corporation of the United States.

Microprocessor workshop at Queensland Institute

The Department of Electrical Engineering of the Queensland Institute of Technology is organising a two day workshop (14th and 15th April) dealing with hardware and software design for 6502 and 6809 microcomputer systems. The workshop will consist of a series of papers and demonstrations plus tutorials covering the practical use of the processors.

The keynote speaker will be Professor

"Lux" Luxemburg of California State University. Bob Tripp, editor of "Micro" 6502 magazine will also speak, as will Rodney Zaks.

Applications to register for the workshop should be made to Dr C. J. Chesmond, the Department of Electrical Engineering at the Institute, Box 2434, GPO Brisbane 4001 by March 31. Cost is \$50 for the two days.

Courses by radio from University of NSW

The response in 1981 to its two-part course on microprocessors was so great that the Radio University, the radio station of the University of NSW, has decided to rebroadcast the course in 1982. Part 1 is scheduled to begin early this month, with Part 2 beginning in July.

According to lecturer Dr David Mee of the University's School of Electrical Engineering and Computer Science, the course requires no more than a basic understanding of electronic circuits and simple logic networks. By the end of Part 1 of the course students will have covered simple programming and application of microprocessors. Part 2 covers further hardware and software functions used in microprocessor systems. Dr Mee will also demonstrate how to design, develop and debug a simple microprocessor project.

In October, Radio University will go further into microprocessing with a new series of lectures by Dr Mee on microprocessor peripherals and applications.

Each part of the Microprocessor Fundamentals course consists of 10 radio lectures, one television program and two evening seminars which must be attended in person. Cost is \$32.50 per part, including extensive lecture notes and facilities for students to test set programming exercises.

Radio University will also be broadcasting a two-part course covering the Pascal programming language, starting this month. The complete course will cover all elements of Pascal, starting with the principles of structured programming and the fundamentals of Pascal. Part 2 of the course will describe data structures such as arrays, lists and trees and recursive programming techniques.

A two-part course on Fortran IV programming will also be offered. The course lecturer, Professor J. M. Blatt, Professor of Applied Mathematics at the University of NSW, suggests that people engaged in research or in dealing with technical and scientific problems in industry will find the course particularly valuable.

Radio University transmits on 1750kHz (1720kHz in the Eastern Suburbs), just off the normal AM broadcast band, and can be picked up in the Sydney area by a radio adjusted to receive these frequencies. Instructions on how to modify a radio are sent out to enrolled students of each course, or they can buy a transistor radio already modified from Radio University for \$8.

Further information on this and other radio, television and tape courses can be obtained from the Division of Postgraduate Extension Studies, University of NSW, Kensington, NSW.

More micronews ►

The Concord II bare-board microcomputer

The Concord II from Bill Edge's Electronic Agencies is a "bare board" computer with some advanced features. High resolution graphics and sound effects are standard, and expansion to a colour system is easily achieved.

by PETER VERNON

The Concord II is constructed on a double sided printed circuit motherboard, with a separate 410mm x 170mm PCB carrying the keyboard and a numeric keypad, both mounted in a sturdy aluminium panel. Eight 50-pin connectors on the motherboard provide plenty of room for expansion of the basic system.

The standard computer consists of a 6502A microprocessor, running at a clock speed of 1.02MHz, with 48K of RAM provided in the form of 4116 16K dynamic RAM chips. A powerful Basic interpreter and machine language Monitor is included on the board in six 2716 EPROMs. Also on the main board is circuitry for a 1500 baud cassette interface,

sound effects, input/output and a direct connection for the NTSC composite video signal.

Input/output consists of a single-bit output for a speaker (included with the system), and a "games interface", an empty 16-pin socket which allows connection of up to four potentiometers (joysticks) and three pushbuttons. Four latched TTL outputs are also provided together with one strobed output for single bit control of other peripherals. At the left side of the board are the eight 50-pin expansion slots which provide access to the data, address and control lines of the microprocessor. A large variety of expansion boards are available.

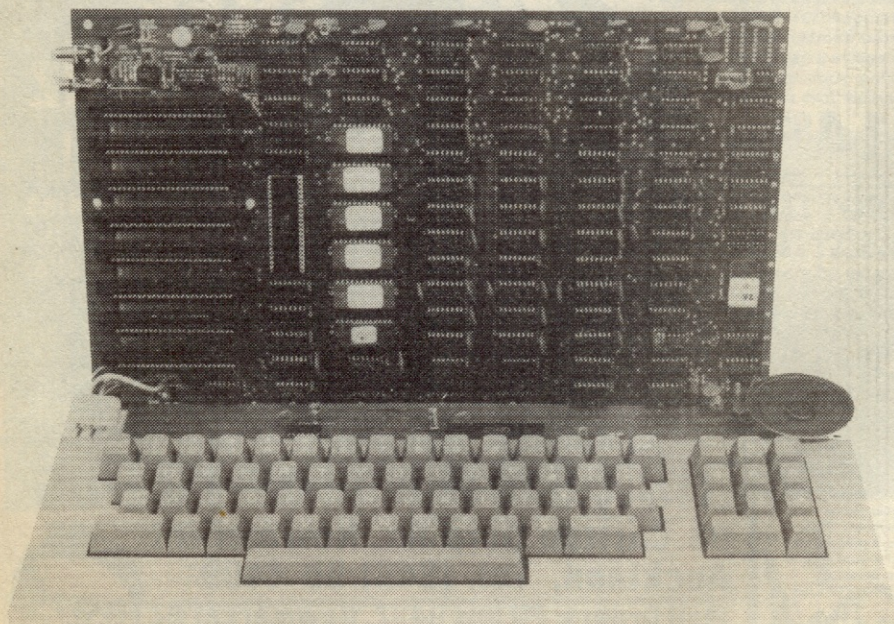
We tried out the Concord recently and found that, on the whole, it is an excellent system, with features normally only found on computers selling for twice the price. Our only criticism would be the keyboard. Although provided with sculptured keytops in a comfortable "stepped" arrangement, the keys themselves have a heavy feel but characters tend to be inadvertently entered with the slightest pressure.

Program editing is also difficult. Movement of the cursor, for instance, requires two keystrokes, "ESC" to enter the edit mode and then a letter key, such as "J" for left, "I" for up, "K" for right. Looking at the arrangement of the keyboard explains the choice of these keys, but we found them difficult to use because of what seems to be the slow keyboard scanning. While the first "ESC-I" combination moves the cursor up, the second keystroke often prints an "I". Lack of attention to detail at this stage leaves odd letters scattered through the program you are editing, if you are not careful.

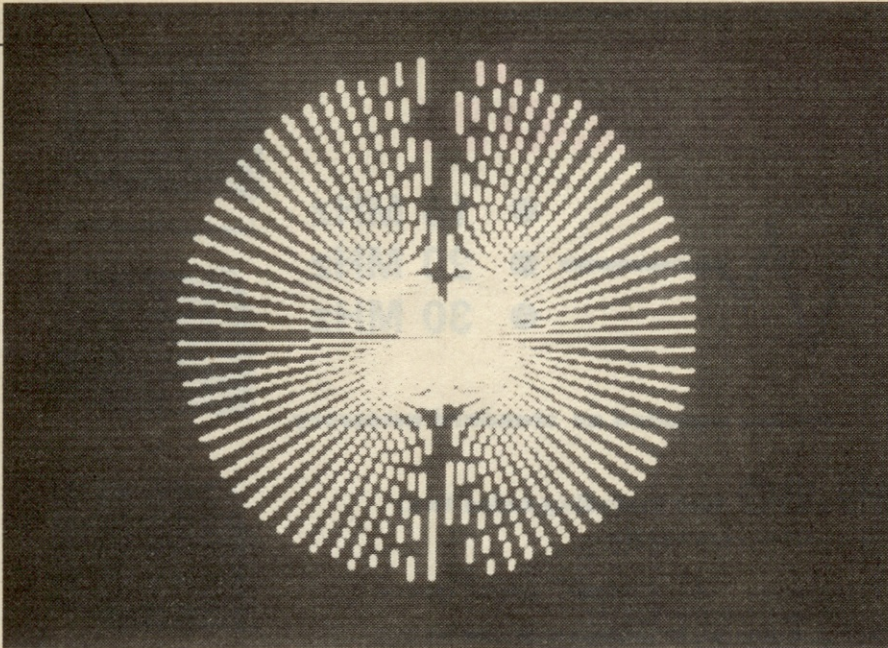
With that gripe aside, let's move on to look at the Concord II in detail.

We tested the basic unit. Getting it running was a matter of connecting a power supply, plugging in the keyboard connector (a 16-pin dual-in-line header) and attaching a video monitor. On switching on, the speaker "beeped" as the system was initialised and then the Basic prompt, a left square bracket, and the flashing block cursor appeared. Experimentally typing a few lines, we found the display to be clear and rock steady, a pleasure to use.

In the text mode in which the system comes up, the display provides 24 lines of 40 columns each, with upper case characters only. A "chunky" graphics mode, in which each character cell is



Concord II computer provides 6502A processor, 48K of RAM and 12K of Read Only Memory with robust full-size keyboard and room for eight plug-in expansion boards.



High resolution mode plots 280 x 192 points. Design is made up of line segments.

divided into four graphics points, provides 40 x 48 screen resolution for plotting graphs and charts, etc. A further high resolution graphics mode provides a resolution of 280 points horizontally by 192 points vertically for high definition graphics.

Addition of a PAL video board in one of the expansion connectors on the main board provides colour output. In the chunky graphics mode you can assign any one of 15 colours to any co-ordinate point on the screen, using the statement "COLOR=". In the high resolution graphics mode you have a choice of two groups of four colours each (including black, which of course resets a point, and white). These colours are specified with the statement "HCOLOR=".

We did not test the PAL option nor did we test the Concord using an NTSC monitor. However we did check all the colour graphics commands.

Concord Basic for graphics

Concord Basic shows its Microsoft heritage, with all of the familiar statements and functions. (See below). Most of the unfamiliar statements have to do with the graphics of the system, which are extensively supported.

Perhaps the best way to convey the feeling of these graphics statements is to

follow the development of a simple program:

Firstly, for plotting in low resolution, we call up the graphics screen, with the statement GR. When this statement is executed, the text screen disappears. The display goes black except for four lines at the bottom of the screen called the "text window". Above the window is a 40 x 40 graphics area. If desired, we can eliminate the text window, allowing the full 40 x 48 line area to be used for graphics, by the statement POKE-16302,0.

The next step is to choose the colour we will plot in. For simplicity, we will use one colour, say dark blue. This is specified by the statement COLOR=2. To turn on co-ordinate point we use the statement PLOT X, Y, where X is between 0 and 39 and Y and 0 and 47. We can put a border around the screen, plotting horizontal lines with HLIN and vertical lines with VLIN. For example, a vertical line at the left hand side of the screen can be specified with VLIN 0,39 AT 0 — a line from row 0 at the top of the screen to row 39 at the bottom, at column 0, the left side of the screen.

Note that in programming graphics it is necessary to specify a colour code even when using a monochrome display, as we did. The default code is black, ie no

colour, in fact, no picture. On a black and white display the various colours show up as different shades of grey, so interesting half-tone graphics effects are possible.

If required, we can verify and determine what colour is displayed at any point on the screen with the statement C=SCRN(X,Y). When this statement is executed variable C will contain the colour code of the point X,Y. This allows us to manipulate points on the basis of their colour — very useful for graphics programs.

High resolution graphics are where the Concord really shines. Resolution in this mode is, as mentioned, 280 x 192. Although fewer colours are available, much finer lines can be plotted on the screen.

Two pages are available for high resolution graphics, initialised by HGR and HGR2 respectively. First step in using this mode is to set aside an area of memory to contain the graphics page. This can be done by setting LOMEM: 24576, setting aside 16K of RAM (two graphics pages) below the Basic program area. Alternatively, it is possible to set HIMEM: 8191, giving 8K for program memory and placing the graphics area above the program in memory.

Using one page of the high resolution graphics allows the use of the high resolution graphics statements. Use of the second page for graphics allows only the use of PEEK, POKE and CALL statements for setting up the display.

The high resolution graphics mode uses eight colour codes, but four of these produce either black or white, actually giving only four different colours, green, violet, orange or blue on the screen. HCOLOR= sets the colour code to a value between 0 and 7. Note the spelling of this command — "COLOUR" will produce a syntax error.

In high resolution mode, HPLLOT X, Y will set a single point to the colour previously selected. Using HPLLOT X1, Y1 TO X2, Y2 will draw a line between two points on the screen. Further refinements are possible with HPLLOT X1, Y1 TO X2, Y2 TO X3, Y3 TO . . . which, as you might have guessed, draws lines between the points specified.

In addition to co-ordinate plotting, the Concord allows the use of "shape tables" to display and manipulate complex figures. After setting up a list of vectors (move up, down, left, right, etc) the shape can be displayed with the statement DRAW 1 AT X,Y, which will draw shape number 1 at the point X,Y. XDRAW erases the shape, without affecting the background. ROT= rotates the shape, in increments of about 3 degrees.

SCALE = provides the ability to

Concord II Basic statements

END, FOR, TO, NEXT, DATA, INPUT, DEL, DIM, READ, GR, TEXT, PR, IN, CALL PLOT, HLIN, VLIN, HGR2, HGR, HCOLOR=, HPLLOT, DRAW, XDRAW, HTAB, HOME, ROT=, SCALE=, SHLOAD, TRACE, NO TRACE, NORMAL, INVERSE, COLOUR=, POP, VTAB, HIMEM:, LOMEM:, ONERR, RESUME, RECALL, STORE, SPEED=, LET, GOTO, RUN, IF, RESTORE, GOSUB, RETURN, REM, STOP, ON, WAIT, LOAD, SAVE, DEF, POKE, PRINT, CONT, LIST, CLEAR, GET, NEW, TAB, FN, SPC, THEN, AT, NOT, STEP, AND, OR, SGN, INT, ABS, USR, FRE, SCRIN, PDL, POS, SQR, RND, LOG, EXP, COS, SIN, TAN, ATN, PEEK, LEN, STR\$, VAL, ASC, CHR\$, LEFT\$, RIGHT\$, MID\$.

Review — the Concord II computer

draw the shape to any size by specifying a multiplication factor which is applied to the shape table.

Once designed, the shape table can be saved on tape using Monitor commands, and recalled with SHLOAD. The Monitor can also be used to set up high resolution graphics screens, with routines for writing to one screen as the other is displayed, allowing animated graphics for example.

We won't go into the intricacies of shape tables. Suffice it to say that considerable planning and thought must precede any attempt to design fancy graphics using this approach, but the results are worthwhile. Numerous programs are available on cassette which demonstrate these capabilities in games and other applications.

In the text mode a number of statements are available to add interest to text output. INVERSE, for example, will display text printed out in inverse (black on white) video. NORMAL will revert to standard white on black display, while FLASH will alternate between the two modes at about 15 times a second, adding interest to any text output.

Sound effects also add interest to programs, and the Concord is equipped to provide them. A single output bit connected to an amplifier and speaker on the board allows simple sounds to be produced. The speaker is used by the Concord interpreter to signal program errors, etc, and can be accessed by printing a Control-G character. More complex effects require machine language programs to toggle the output bit on and off at a selected frequency.

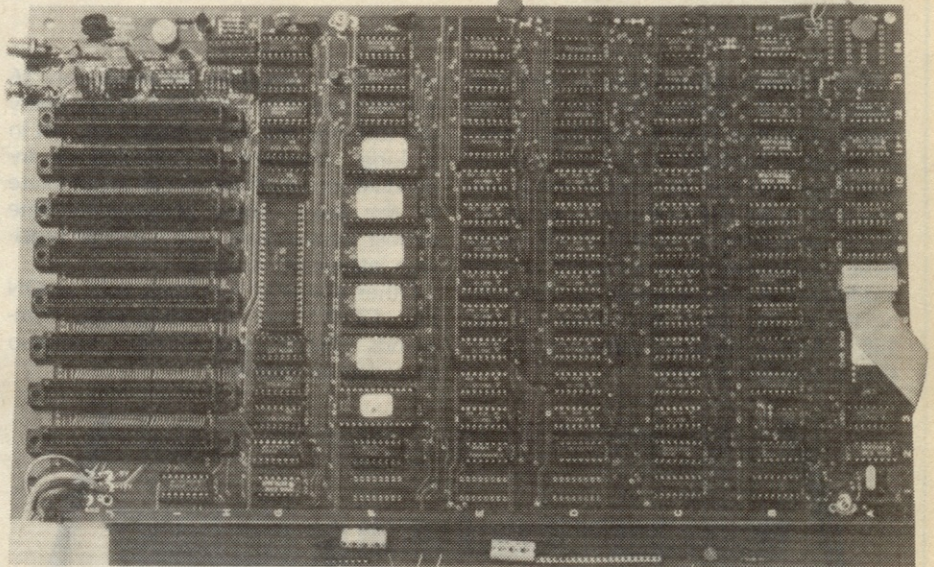
There are drawbacks to this approach of course. With the microprocessor occupied in switching of the speaker bit on and off, it can do nothing else, so sound effects cannot be co-ordinated with screen movement, for example. Further, there is no control over the volume of the sound — the speaker is either on or off. Despite this, the sound circuitry is a useful adjunct to various programs.

Also useful is the games interface. Any one of four potentiometers can be read with the PDL statement, which returns a value between 0 and 255 corresponding to the setting of the pot. Three push-buttons connected to this interface socket can be read by PEEKing the appropriate location. Four latched output bits and one strobed output can be used to drive relays, speakers or lights, etc, for peripheral control and communication with the outside world. All in all, the games interface, while simple, adds considerably to the usefulness of the Concord.

We have mentioned the machine language Monitor several times. The

Monitor program of the Concord is quite extensive, with commands for examining and changing the contents of single memory locations or blocks of memory, examining and changing the registers of the 6502 processor and saving and loading machine language data with a cassette recorder. Blocks of memory can also be moved around or compared with another block, or filled with a single character (useful for setting the background colour of the screen).

The Monitor can also be used for re-directing the input and output of the computer. If a printer interface board is in place in one of the expansion slots, a Monitor command allows output to be re-directed to the printer. Input can also be accepted from peripheral boards rather than from the keyboard, as when a modem board is used to turn the Concord into a remote terminal.



Close-up view of the processor board shows connector for keyboard at right.

Another useful feature is the ability to do hexadecimal addition and subtraction using the Monitor, simplifying the hand assembly of machine language routines. The Monitor is called from Basic with the command CALL -151 and the return to Basic by a Control -C.

What's it all cost?

The Concord II computer described here costs \$899 fully assembled. No kit versions are available. A power supply is required, supplying +5V at 2.5A, +12V at 1.5A, -5V at 250mA and -12V at 250mA. Electronic Agencies can provide a suitable power supply for \$60.

For video output a number of choices are available. For monochrome video, you can use either a black and white video monitor (around \$140) or the video signal can be fed to a VHF modulator for display on an ordinary

television set. Electronic Agencies has a suitable modulator available for \$5.50.

For colour displays you can purchase a PAL video encoder board, for around \$220, which slots into one of the expansion connectors on the main computer board. A video modulator used in conjunction with this board enables colour displays on a standard colour television set. Alternatively, an NTSC monitor can be purchased (perhaps costing as much as or more than the computer itself) — a dubious choice.

One other refinement, a suitable case, may also be required. Certainly some protection for two boards costing \$899 will be necessary. Electronic Agencies have plans to produce a case, depending on demand. Initial price estimates range from \$80 to \$100, but these are estimates only.

The Concord II is advertised as being fully compatible with Applesoft (TM) programs and hardware add-ons for the Apple II computer. Certainly if you buy a

Concord there will be no shortage of software, and a large range of expansion boards are available, ranging from disk controllers to printer interfaces and appliance controllers.

Finally, if the Concord II sounds intriguing, but you're not sure, Electronic Agencies are offering a seven day free trial period. You can try the computer out in your own home, and if not satisfied bring it back (in original condition and packaging, of course) for a full refund of the purchase price.

Interested? Further information is available from Electronic Agencies, either at 115-117 Parramatta Rd, Concord (so that's where they got that name!), NSW, or at their new store at 123 York St, Sydney. The postal address is PO Box 185, Concord, NSW, 2137, and if buying by post there is a \$5 packaging and mailing charge.