The VZ-200: colour graphics and sound

Dick Smith Electronics has done it again with the new VZ-200, a computer with colour graphics, sound effects and built-in Basic for around $200. Others have raved about it, but what's the new machine really like? What does it offer and how easy is it to use?

by PETER VERNON

The VZ-200 computer from Dick Smith Electronics has set a new low price for a colour computer system with Basic. Indeed we can now talk about a class of "under $200" computers, and in this category the VZ-200 is a clear leader. It is the only system for the price that offers colour, a reasonable amount of memory and a powerful built-in Basic interpreter.

With its white case and brown keyboard surround the VZ-200 is an attractive unit. Dimensions are 288 x 162 x 50mm (width by depth by height at rear) with the keyboard sloping to a height of 20mm at the front. There are 45 moving rubber keys but no space-bar as such. A double-sized key at the right side of the keyboard does duty as a space key. All the keys produce an unobtrusive beep, and most serve four different functions.

Pressing a key by itself will produce the character marked on the centre of the key top. Pressing a key in conjunction with "Shift" will produce the punctuation or graphic symbol marked in the upper corner of each key. There are 15 graphic symbols, each a combination of blocks one-quarter the size of a character space. When used with POKE or PRINT@, these symbols allow graphics with a resolution of 64 x 32 pixels in eight colours and may be freely mixed with text.

Single key entry of Basic statements is activated by the CTRL (Control) key. Pressing a key in conjunction with CTRL will produce the operation labelled on the keyboard above the keytop. Operations handled in this way include cursor movement, insertion and deletion of characters, inverse video and single key entry of about half of the Basic statements and functions. Entering the Basic statements marked below the keys requires holding down the CTRL key and pressing RETURN then the key required.

Although the single key entry of Basic keywords is an advantage, it does require learning key locations and a new typing style which some people might prefer to avoid. An advantage of the VZ-200 is that single key entry, while available, is not obligatory. Statements can also be typed in the normal way, and this may prove faster for a touch-typist. It's nice to have the choice.

All of the keys have an auto-repeat facility, and although it was not mentioned in our preliminary copy of the VZ-200 manual the Basic interpreter supports full-screen editing. Once listed, program lines can be altered by moving the cursor to the position of the alterations and re-typing. When the RETURN key is pressed the alterations will be incorporated in the program. When line numbers are changed in this way the result is a copy of the existing line with the new line number. The old line remains in memory.

The video display

The VZ-200 includes both an RF modulator (VHF Channel 1) and a direct video output, an unusual feature for a low-cost machine. The video display is produced by a Motorola 6847 Video Display Generator chip with additional circuitry to partly adapt the output to the PAL format. The VDG is designed for 60Hz NTSC operation, and the conver-

The VZ-200 computer. The keyboard has 45 moving keys with audible feedback.

sion circuitry does not fully eliminate a 10Hz ripple on the screen, even when using a direct entry video monitor.

In the text mode the characters displayed by the 6847 are stable but the sides of the text area show a distracting rippling movement. In the graphics mode the ripple shows up as sideways colour jitter and is most obvious when dots of different colours are displayed in close proximity. This display jitter prevents the VZ-200 achieving the full potential provided by its colour graphics capability.

The VZ-200 has two display formats, selected by the MODE statement. In MODE(0) uppercase text only is displayed in 16 lines of 32 characters each, with 64 x 32 block graphics available in eight colours. The normal text display is in light green on a dark green background, but a single Basic statement selects an alternative colour set, producing orange characters on a red background. An Inverse function on the keyboard allows these colours to be transposed to display dark characters on a light background in either colour set.

The statement MODE (1) activates a graphics format which allows plotting on the screen with a resolution of 128 x 64 in one of two sets of four colours each. The COLOR statement selects one of two background colours, green or buff. On a green background the colours available are green, yellow, blue and red, and on a buff background the possible colours are buff, cyan, magenta and orange. Text cannot be displayed in this mode.

Text screens are displayed with a black border surrounding a rectangle of the background colour. On a 34cm (diagonal) video monitor the text display is confined to a rectangle measuring approximately 26cm diagonally in the centre of the screen. MODE(1) graphics are similarly confined by a border, but since the border is in this case the same colour as the background the effect is less noticeable.

The character set of the VZ-200 is contained in the on-chip Read Only Memory of the 6847 Video Display Generator, and does not conform to the widely used ASCII code. Using the same character code with POKE and with PRINT CHR$ will display two different characters on the screen. Presumably software translates between the 6847 codes and ASCII, as statements such as LPRINT and LLIST do work correctly with standard printers.

The Tandy TRS-80 Color Computer also uses the 6847 VDG (although with more extensive modifications for use with PAL displays) and for this reason the text displays of the two machines are similar. Although the 6847 can produce graphics displays in 14 different formats, including 256 x 192 high resolution modes, these facilities are not used by the VZ-200. Most of the VDG control pins are tied to ground in the VZ-200 and there is insufficient memory to support the additional graphics — both situations which could be corrected by adventurous hobbyists.

VZ-200 Basic

Statements and functions of the Basic language of the VZ-200 are shown in Table 1. Numeric operations are accurate within the range 10^{38} to 10^{38} and with the 3.58MHz clock speed of the computer, the interpreter is quite fast. All standard Basic operations are supported, including string handling in the Microsoft format (using RIGHT$, LEFT$ and MID$). A USR statement is included for calling machine language routines from Basic but the VZ-200 does not include a machine language monitor.

In the interests of economical use of memory the VZ-200 restricts the number of subroutines and FOR . . . NEXT loops which can be nested. (A loop is said to be "nested" if it occurs inside another loop, and similarly, nested subroutines are subroutines which are called from within another subroutine.) No more than 30 levels of nesting are permitted in programs for the VZ-200, but this will be found adequate for most applications.

Graphics are handled by the statements COLOR, MODE, SET, RESET and POINT. The statement COLOR I, J will set the characters to the colour represented here by code "I" while in MODE(0) the value of J selects a background/text colour combination, for

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VZ-200 Specifications

Processor: Z80A running at 3.8MHz clock speed.
ROM: 16K.
RAM: 8K expandable to 24K with optional cartridge, less 2K for video.
Interfaces: Cassette interface, RF modulator and direct video connectors, I/O connector, expansion connector with full Z80 bus. Optional Centronics type printer interface.
Keyboard: 45 rubber moving keys, most with four functions.
Display: 32 x 16 lines text, 64 x 32 graphics in eight colours, 128 x 64 graphics in two sets of four colours. Inverse video.
Sound: Single voice with 31 frequencies, nine durations.
Software: Basic in EPROM, applications programs on cassette.
Documentation: New documentation under preparation at time of review.

either a green or an orange background. In MODE(1) the COLOR statement selects one of two possible colour sets, each of four colours, for 128 x 64 resolution graphics.

The statements SET, RESET and POINT are available only in MODE(1). SET and RESET as the names imply turn points on the screen on and off while POINT will return the colour code of a specified point. All three statements require arguments in the form of a pair of cartesian coordinates with the origin of the coordinate system at the upper left corner of the screen. There are no statements for drawing lines or other shapes or for filling areas on the screen with colour.

Sound is produced by software toggling of two bits of an output port driving a piezo-electric transducer in the keyboard unit. Thirty-one different frequencies can be specified, in one of nine durations, with the SOUND statement. The sound is not loud, there is no volume control, and the fixed durations and frequencies limit the sound effects which can be produced. As with colour graphics, however, the VZ-200 scores over its similarly priced rivals which offer no sound effect capabilities at all.

A statement which will be unfamiliar to most is the CRUN command. CRUN, a combination of CLOAD and RUN, allows a program to be loaded from cassette tape and run automatically with a single statement. It is used extensively by the programs on the demonstration tape which accompanies all VZ-200 units.

The cassette handling statements of the VZ-200 also include the familiar CLOAD and CSAVE. Program names can be up to 16 characters long, with the name of each program displayed on the screen as it is found on the tape. The VERIFY statement can be used to compare a program in memory with a program recorded on tape as a convenient assurance of a correct CSAVE, and PRINT# and INPUT# are available for recording and reading lists of data items from tape. We have no information on cassette loading and saving speed but it appears to be around 600 baud.

A COPY statement is also included in the Basic interpreter. According to the manual this statement will copy the contents of the screen to an attached GP-100 dot matrix printer. We could not test this function without the appropriate printer.

Peripherals and expansion

The cassette connection at the rear of the keyboard unit is a stereo socket and the supplied cable terminates in two
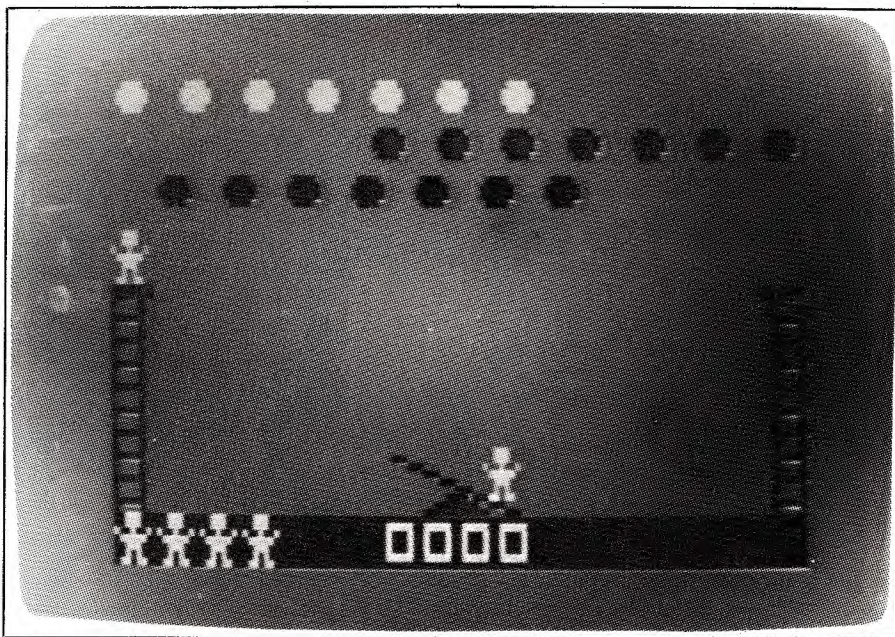
The "balloon burster" game in progress. Four colour graphics makes for eye-catching games. Over 30 programs are available on cassette for the VZ-200.

jacks, one for each for the EAR and MIC connections of a standard audio cassette recorder. There is no motor control of the cassette player.

At first we had great difficulty in using the VZ-200 with pre-recorded program tapes. Reading tapes we had recorded ourselves was only a problem until we found the correct setting of the cassette recorder volume control.

Using a more expensive National Panasonic RQ-2133 cassette recorder (Dick Smith Electronics, $82.50) however, these problems disappeared and we were able to load all program tapes.

A 16K RAM expansion pack for the VZ-200 is already on the market. This unit plugs into the expansion port at the rear of the machine to provide a total of 24K of user memory at an additional cost of $79.

A Centronics parallel printer interface adapter is also available for the VZ-200. This small unit plugs into the peripheral port at the rear of the keyboard and provides a cable terminated in a standard Centronics type connector. While the

Basic COPY statement can only be used effectively with the Seiko GP-100 printer, the LLIST and LPRINT statements will produce text output on any compatible printer.

From the hobbyist's point of view a strong feature of the VZ-200 is the expansion ports provided at the rear of the keyboard. These ports consist of two sets of PCB fingers, normally covered by thin screw-down aluminium plates. One port is labelled "peripheral", and provides access to the Z80 data bus, the lower eight address lines and RD, WR and IORQ control lines, sufficient for the connection of most peripheral controllers, parallel and serial ports etc.

A second port gives access to the complete bus of the Z80 microprocessor and can be used to connect additional memory or memory-mapped peripheral devices.

Some notes on applications

Dick Smith Pty Ltd provided us with a list of around 30 applications programs currently available for the VZ-200. While some of the available games programs

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Table 1: VZ-200 Basic statements and functions

ABS, AND, ASC, ATN, CHR$, CLOAD, CLS, COLOR, CONT, COPY, COS, CRUN, CSAVE, DATA, DIM, END, EXP, FOR . . . TO . . . NEXT, GOSUB, GOTO, IF . . . THEN. IF . . . THEN . . . ELSE, INKEY$, INP, INPUT, INT, LEFT$, LEN, LET, LIST, LOG, LLIST, LPRINT, MODE, MID$, NEW, NOT, OR, OUT, PEEK, POKE, POINT, PRINT, PRINT USING, READ, RESET, RESTORE, RETURN, RND, RUN, SET, SGN, SOUND, SIN, SQR, STEP, STOP, STR$, TAB, TAN, USR

The VZ-200 computer

make excellent use of the graphics capabilities and are written in machine language for speed, many of the others can be found in any good book on Basic, without the expense of buying a cassette version.

We also question the choice of some of the programs available. For example, one cassette is a "Portfolio management" program for keeping track of sharemarket transactions. It is unlikely that anyone with sharemarket investments will skimp by buying the VZ-200 to look after them. The two statistics packages may be in the same category — if you want a computer for statistical analysis the VZ-200 is an unlikely choice. If on the other hand you get some statistics problems assigned as homework these two cassettes might be handy to have.

The programs listed in the "Basic Applications" booklet which accompanies the VZ-200 are of the familiar type; sum and average, roots of a quadratic equation, conversion between degrees Celsius and Fahrenheit etc. They serve more as demonstrations of what can be done with Basic on the VZ-200 rather than as serious suggestions for the use of a computer. As such they are a useful tutorial, although most of the programs can be found in existing textbooks. In most cases nothing need be changed to run textbook examples on the VZ-200.

Graphics statements can be added in to take advantage of this aspect of the VZ-200 without difficulty.

Additional programs are under preparation at the time of this review and we expect that independent program suppliers will get into the act as soon as the VZ-200 proves its popularity. Judging from what we have found and the comments of others who have used the computer, this shouldn't be long.

In conclusion

If you want a computer to look after your share holdings, or for word processing, look elsewhere. If, on the other hand, you want a computer for playing games, for self-education, for learning about Basic and perhaps for writing your own programs, the VZ-200 has one overwhelming advantage — the number of features for the price.

If you're handy with a soldering iron and want a computer for taking apart, adding on to and building up, the VZ-200 is also an ideal choice, for the same reason.

The VZ-200 is available from Dick Smith Electronics stores nationwide. ➌

About that keyboard

The most controversial aspect of the key VZ-200, and the one that we found least desirable, is the keyboard. We still can't decide whether it is better or worse than a flat plastic membrane keyboard.

It's not that the keyboard is bad in itself. It's small but the rubber keys move with a pleasant, positive action, and the audible feedback is a great convenience. The problem is that the keys also wobble sideways and back and forward, creating an unsettling effect and, we believe, markedly increasing the chances of typing errors.

Fortunately the single key entry of Basic keywords limits the need for accurate typing, and no one is likely to use the VZ-200 for applications requiring entry to large amounts of text.

We suspect nevertheless that one of the first "add-on" projects for the system will be a full-sized keyboard.