CAD WITHIN YOUR GRASP

Bitstik flair is ideal use for 6502 second processor power, says Robin Mudge

THE impact computer graphics has made on art and design over the last couple of years is easy to see. We are surrounded by images produced on sophisticated computer paint boxes, special-effects generators, business graphics and computer-aided design (CAD) systems of all shapes and sizes. The trouble is that their cost – between £20,000 and £500,000 – has put them way beyond the reach of individuals and businesses itching to have a go. Now Acorn has launched the Bitstik graphics system, which puts easy-to-use, professional computer-aided design within reach of these people.

The Bitstik package itself costs £375, but it needs a dual 80-track disc drive and a 6502 second processor (reviewed on page 39) as well as the BBC model B and a colour monitor. Starting from scratch, this mounts up to about £2000.

The Bitstik is really a word processor for pictures. The user can draw pictures in a variety of line types and styles in four colours and use automatic circle, arc and curve drawing. The picture can be painted from a choice of 16 colours at a time and stored in a unique filing system. Images can be changed at will, duplicated in any orientation, distorted and moved around. For accurate diagrams, there is a range of precision aids. The user can zoom in on a drawing to reveal detail and pan all over the image. Text can be added in any size and orientation.

The Bitstik was originally designed by Robocom for the Apple II computer about two years ago. Acorn then commissioned Robocom to write a version for the BBC micro, taking into account its enhanced graphics features. The package is based around a precision three-axis joystick giving control in the x and y axis and, by rotation of the knob, the z axis. This, combined with three buttons on the body of the joystick, gives almost complete control through a series of screen-based menus with minimum use of the micro's keyboard. The software is contained in a ROM installed in one of the sideways sockets within the Beeb. The system master utilities are supplied on an 80-track disc, and a second disc acts as a drawing buffer.

The system is started by simultaneously pressing the shift and break keys (auto-booting). An initial menu appears that offers a number of utilities and starts the system running. Once loaded, a menu appears down the right-hand edge of the screen, along

with a line of items at the bottom called the 'draw palette'. The main area of the screen is the work page and shows a multiplication sign and addition sign connected by a white line, to represent the origin and dynamic cursors.

The origin cursor marks the start position of a line. Moving the Bitstik joystick in the x and y axis makes the dynamic cursor move about. The white line between the two cursors stretches and contracts like a rubber band (it's called the rubber-band cursor) and shows where a line would be drawn.

All the system's major functions are selected using the controller to position the dynamic cursor over items in the menu or palette. The selection is confirmed by pressing a combination of the three joystick buttons. The top left one is the red action button. When pressed it usually results in something happening, such as a line being drawn. The bottom left button normally confirms a selection and the bottom right button provides a release function from certain operating conditions.

The controller is slightly biased toward right-handed users. It sits comfortably in the left hand, freeing the right to control the joystick while the left makes confirmatory selections with the three buttons. This makes the system remarkably easy to use and is a real boon to people confused by computer keyboards.

The draw palette contains four groups of items: LINE SHAPE, NIB, COLOUR and LINE TYPE, each denoted by a simple symbol. In the colour block are four small rectangles, each filled with one of the four basic colours (the system runs in mode 1). These are white, red, yellow and black, but they can be reset to any of the 16 available on the BBC micro (eight if the flashing colours are ignored). The default drawing colour is white, but the dynamic cursor allows one of the others to be selected. A small white triangle appears above the selected colour accompanied by a short beep. The beep helps avoid selecting options by accident when working close to the palette or menus.

Next, there are four different line shapes, each selectable as for the line colour. By default the system draws straight lines. The dynamic cursor can be moved anywhere on the work page and when the red button is pressed a line is drawn in the position of the rubber-band cursor and in the selected colour.

The second line shape is the TANGENT ARC. This is used to draw the arc of a circle, having been given a starting direction and an end-point.

The third line shape is another arc drawing function, COMPASS ARC, which mimics the use of an ordinary pair of compasses and allows the centre-point, radius and radius length to be set at will. This line shape is difficult to get used to, but very useful.

The fourth shape, CIRCLES, allows complete circles to be drawn. When selected the cursor changes to a circle: x and y movement of the joystick positions the circle on the work page and the diameter is altered by twisting the joystick knob.

The NIB function allows the user to draw lines of variable width. It replaces the origin and dynamic cursors by two nib cursors, the area between which is filled when the action button is pressed. The system sets the nib to solid fill but by selecting the nib function with the dynamic cursor and twisting the z control, one of six different nib spacings can be set to give hatching and tone effects.

The final group of items in the draw palette set the line type. There are four of these, offering continuous lines and three types of dotted line. The system draws straight lines to an accuracy of 0.001mm and curves and circles to 1 minute of arc!

Menu functions are selected in a similar way to the palette, using the dynamic cursor. If a mistake is made during a drawing session an ERASE function can be used to tidy up a drawing, and the holes this seems to leave can be removed by PAGE. This clears the work page and redraws the image complete. The complete drawing can be erased using the WIPE function. When this is selected, both the left and action buttons must be pressed together for safety.

The finished picture can be coloured in with ease. When 'painting', the drawing palette is replaced by a set of 16 colours

Screen shots from Bitstik system. 1. Manipulation and distortion of any image is possible, in this case of the lettering in picture 9. Menu at bottom gives information on distortion. 2. Arty doodles at your fingertips. Base menu shows colour and drawing mode chosen. 3. Disc menu. Top right image has been chosen for copying. Note change in menu. 4, 5, 6. Zoom, zoom, zoom. Level of detail in image held is virtually unlimited.

made from mixtures of the four basic colours. Colours are chosen by touching them with the single paint cursor, again a small white triangle indicating the selected colour. When the paint cursor is in the area to be painted, pressing the action button causes the area to be filled with colour at an astonishing speed. Even the most complex irregular shapes pose no difficulty to the paint routine. Care has to be taken, though, to ensure there are no holes around the perimeter of the painted area or else the colour leeks out and fills the entire work page.

The basic colour palette can be set up with any four of the 16 BBC colours, but this is a lengthy business involving changing discs and restarting the whole system. It may seem from this that the colour range is wide – indeed it does extend the range and type of colours offered by the BBC micro – but in practice the colour range is not particularly versatile. For example, it is not possible to mix black with any of the 16 Bitstik-derived colours to aid shading – but then this is a CAD system and not a cheap replacement for computer paint boxes, so the criticism might be a little unfair.

The most remarkable facility allows detailed drawings to be made with far greater resolution than that offered by the computer itself. The user can zoom into selected parts of the drawing and add more and more detail. When this function is selected from the menu, a rectangular cursor is presented on the work page, the size of which is altered by the z control. When the piece of drawing to be enlarged is framed by the cursor, pressing the action button causes the contents of the cursor to be redrawn at the full size of the work page and at the full resolution of the system. More detail can then be drawn in and the zoom reversed or another zoom view given. The zoom range is astronomical, in fact 1 to 2^{120}.

When working on a zoom view the user can pan up, down, left and right over the image. After adding detail and returning the image to its normal size the software filters out information that is too small to show, but the information is still there and can be revealed by zooming in again. The software stores all the data needed to produce a drawing in a specially compacted way which means even the most complex drawings use very little memory. An indicator at the bottom right of the work page constantly shows how much memory remains. An audible warning is given when memory is getting low, and when this happens a procedure stores the current drawing and releases memory ready to continue.

When the drawing is finished and needs to be saved for later viewing yet another unique facility comes into action. Selecting FILE from the menu causes the work page to be temporarily stored on a buffer disc, which is replaced by a page containing either four or 16 rectangles, some of them able to contain miniature pictures. A cursor selects an empty rectangle and pressing the action button causes a miniature version of the drawing to appear in it. A label is added and the procedure is complete.

The library disc supplied is like an electronic version of Letraset, containing several predrawn images with three pages to each disc. A library picture can be repeated in any position over and over again, it can be rotated through 360 degrees, squashed and stretched. The palette gives information about the image scale, angle of rotation and degree of distortion. There is also a facility to reverse the image in the x and y planes or both, enabling instant mirror images to be created. Separate components of a complete image can be prepared, stored in the library and copied onto the master drawing using this facility.

At this point the similarity between the Bitstik and a word processor begins to emerge. Components from the library can be exchanged with existing ones on the drawing, wrongly placed ones can be found and moved or erased and pieces can be copied and duplicated in any position.

For accurate drawings a second menu is available on the drawing page. This offers facilities for creating grids with

page 98 ▶

7. View of house plan. Note use of the grid with special menu, and of standard, Letraset-style, objects such as tables, etc, which can be created and manipulated. 8, 12. Two palettes of colours. Any combination of the 16 (eight flashing) BBC micro colours can be chosen, or mixtures of them. These palettes are used for painting. 9. An image can be digitised, and manipulated or distorted, as in picture 1. 10. A full screen shot of Robocom's parrot sitting on a Corinthian column. The normal screen menus have been removed and the image enlarged.