

NEW

DIMENSIONS

Our May report on CAD software speculated on the probability of the QL offering 3D design capabilities. Ron Massey examines two packages fulfilling the prophecy.

Two extremely exciting products, which made their debut at the ZX Microfair, are now available to provide technical and artistic illustrators with powerful tools to add new dimensions and depth to their drawing.

Written in compiled SuperBasic, *Concept 3D* employs three basic types of model representations for drawing — free-form models, cell models and surfaces of revolution. Mixtures of the three types in any combination may be made as required.

Free-form models are drawn in 3D space by connecting points and lines manually. This technique is used for three-dimensional artistic drawing where there is no other way to model an object.

Cell models consist of a series of two-dimensional polygons wherein the QL connects the vertices. A simple example of cell modelling may be seen in a perspective or isometric representation of a cube. Cell modelling and a number of minor variations is the method most commonly used to draw.

Cell models may have constant cross-sections — such as occur in a cylinder — or variable cross-section, such as a ship hull or aircraft fuselage or wings. The third representation, surface of revolution, while managed by the QL processing in the same way as cell modelling, is created by repeating elements common to any particular shape.

An example given in the *Concept 3D* manual examines the construction of a wine-glass drawing. Lines were first drawn along the side co-ordinates. Setting-up the drawing parameters, QL processing projected co-ordinates round a pre-determined central axis.

If a cube is viewed from its front surface, the x axis occurs from the front to the rear of the cube; viewing

the cube from the side, the y axis assumes the same orientation as does the y axis when viewing the cube from its top surface.

When constructing or viewing a model on the *Concept* screen, relative x, y, z global co-ordinate positions are indicated in the lower left corner of the screen in the orientation in the drawing. Colour-coded the lines are green where the axes occur either parallel to the screen or from monitor rear to front. Red indicates an axis viewed from front to rear of the monitor.

Two methods of screen cursor movement are available; selecting one

of 1 to 9 number keys will move the cursor by the selected number of pixels. Alternatively, the cursor may be moved to a specific x, y, z position by entering the relative co-ordinates.

Models may be scaled for either drawing or viewing. The system de-



Concept 3D, user-friendly design.

faults to a value of one and the scale figure refers to pixel values. Scale values may also be established by incorporating a constant based on measurements for particular output devices.

Other powerful options include a rubber-band line for previewing a drawing element prior to committing it to the model. *Concept* will also accept inputs with mathematical operators. Elements may be "undone" or, if deleted by mistake, may be re-called, provided no new elements have been added prior to recall. Rubber-banded auto-geometry for box, circle, arc and lines have been implemented.

Up to 34 characters may be input at any time and printed on the screen at the position of the cursor defining the upper left corner of the first character.

When a model is complete, it may be viewed as a wireframe model or as a surface model. Rotation of the model in any orientation may be made by direct entry of relative x, y, z co-ordinate placement.

Other viewing options include the selection of *WINDOW*. This will effectively set the viewing distance and is the *Concept* implementation of zoom. Defaulting to a value of one, entering a five, for example, will produce a 1/5th scale model; .25 will produce a four times magnification.

File-handling includes options for *Directory*, *Load* and *Save*. Models may also be merged from a number of other model files and will occur at the current cursor position. Each model is

Comparative features of QL 3D Modelling programs

	CONCEPT 3D
Drawing method	Continuous, co-ordinate or pre-programmable.
Definition modes	4 or 8, switchable within program.
Colour range	0 to 7.
Method of selection	Menu/colour wedge.
Command access	
Menu	Yes
Icons	No
Method of entry	Keyboard
Help pages on screen	No
Aids: Border reference	Yes
Grid — on select	No
Cursor co-ord indicator	Yes
Prompt window	Yes
Image pan/scroll	Yes; at cursor position.
Element move/reposition	Yes
Image magnification	Yes; zoom function.
Auto mirror image	No
Pen direction indicator	No
Stretch/compass	No
Drawing tools:	
Pen	No
Width control	No
Brush — sizes	No
Airbrush	No
Auto Fill — on select	Yes; in surface modelling.
Erase	Yes
Drawing modes	
Pen off	n.a.
Pen on	n.a.
XOR	No
Cursor on screen	
Control	Cursor keys; direct x,y,z address.
Movement	1 to 9 pixel increments.
Turtle graphics	No
Type	*
Auto colour change (re-colour)	Yes
Auto geometrics	
Rubber-banding	Yes
Circle	Yes
Ellipse	Yes
Arc	Yes
Box	Yes
Triangle	No
Others	Expand 2D shapes into 3D; auto surface of revolution, hidden line, and surface removal, perspective. By plot.
Line: length	
Width	
Element movement	Yes; points and lines.
Element duplication	Yes; models.
Auto shadowing	No
Text	Yes
Modes	Standard QL.
Colour	Standard colours.
Sizes	5
Positioning	At any time in display mode.
File control	
Directory	Yes
Load a screen	Yes; files may be merged in a single screen.
Save a screen	Yes
Delete a file	Yes
Format media	No
Printer dump	Yes
Area printed	Full screen; area of drawing selected by pan and zoom.
Demo pics supplied	1
Principle application	Technical and artistic 3D modelling, 3D conceptual design and visualising.

saved as two separate files, one suffixed *-cd* for co-ordinate file — and the other *-md* — for models.

The first Rubicon venture into QL utilities, *Viewpoint* is written in assembler and incorporates powerful professional features required of a 3D modelling program. Conscious of efficient memory management, the Viewpoint system stores two vertices every time a line is drawn. In a completed model any stored vertex may have several lines emanating from it.

More useful in many ways than the more conventional text help pages, a demonstration mode has been included for viewing and experimenting with the effects of moving the axes and a similar demonstration for a cube.

Other options

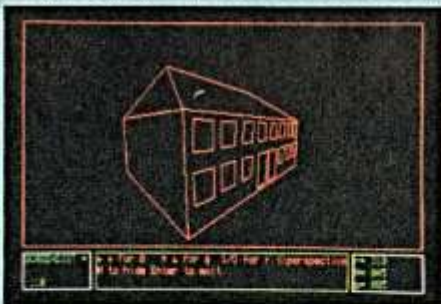
Switching between modes 4 and 8 occurs within the program. Rubber-banded auto-geometry includes options for lines — drawn between two points determined by the cursor — and a sphere — a circle, viewed in three dimensions.

Other rubber-band options include circle — may be drawn in perspective on the x-y plane; rectangle, box — drawn in 3D, to the specified height, width and depth; polygon — up to 10 sides — requires that a face be parallel to an x-y, y-z or x-z plane.

Screen aids include the option of a grid which may be superimposed on the cursor plane; image mirroring is available about the x-y, y-z or x-z planes; the screen cursor may be re-centred with a single keypress.

A SEARCH option has been implemented and will sweep a 9x9 pixel area for a vertex. The JOIN option will join two vertices, identified by number — available from the drawing data list tables.

An option for deleting the immediately previous operation is available;



Viewpoint in perspective.

once accepted into the drawing store, by pressing any key other than the <D>, the operation becomes a permanent part of the drawing.

In common with all good computer practice, users are urged to save drawings at regular intervals. Where expanded memory is available it can be

Comparative features of QL 3D Modelling programs

	VIEWPOINT RUBICON
Drawing method	Co-ordinate, plot.
Definition modes	4 and 8; switchable within program.
Colour range	0 to 7, relevant to mode.
Method of selection	Menu
Command Access	
Menu	Single command letters.
Icons	No
Method of entry	Keyboard
Help pages on screen	Yes; two active models.
Aids: Border reference	No
Grid — on select	Yes
Cursor co-ord indicator	Yes; x, y, z.
Prompt window	Yes
Image pan scroll	Yes
Element move/reposition	Yes
Image magnification	Yes; zoom option.
Auto mirror image	No
Pen direction indicator	No
Stretch/compress	No
Drawing tools	
Pen	No
Width control	No
Brush — sizes	No
Airbrush	No
Auto Fill — on select	Yes; for surface modeling
Erase	Yes
Drawing modes	
Pen off	n.a.
Pen on	n.a.
XOR	No
Cursor on screen	Yes
Control	Cursor keys.
Movement	Relevant to scale; two speed.
Turtle graphics	n.a.
Type	+
Auto colour change (re-colour)	Yes
Auto geometrics	
Rubber-banding	Yes
Circle	Yes
Sphere	Yes
Ellipse	Yes
Arc	Yes
Box	Yes
Triangle	No
Others	Continuous perspective changes.
Line: length	Yes
width	No
Element movement	Yes
Element duplication	No
Auto shadowing	No
Text	Yes
Modes	4 and 8
Colour	0 to 7; related to mode.
Sizes	Standard QL font.
Positioning	At current cursor position.
File control	
Directory	Yes
Load a screen	Yes
Save a screen	Yes; may be used in Basic programs.
Delete a file	Yes
Format media	No
Printer dump	Yes; reconfigurable.
Area printed	Whole screen; defined by zoom option.
Demo pics supplied	4
Average no. files/cart	120
Principal application	Technical and artist drawing program; 3D conceptual design and visualising.

done using RAM dis, thereby saving wear and tear on the drives.

A highly-flexible system of viewing position selection has been incorporated in the Viewpoint system. Users have the option of rotating the model in five- or 15-degree increments on any of its axes, wherein the model is re-drawn for each increment.

Alternatively, if <CTRL> is pressed and model movement keys are selected, the co-ordinates clock through successive positions. Once the required position is obtained, pressing <SPACE> will cause the model to jump directly to the new orientation. Either method will produce rotation about the relevant axis.

Both viewing position — effective distance from the model — effectively a zoom option, and perspective may be incremented as required. Extreme perspective from any viewpoint is available and is indicated numerically in a separate window next to the command line.

A number of superb demonstration files have been included with the viewpoint program and illustrate its capabilities aptly. Two-dimensional images, as viewed on-screen, may be saved in a number of consecutive files of 4K each for inclusion in separate SuperBasic programs by utilising the Viewpoint LOADER routine. Hidden lines, however, will not be represented.

LOADER adds a new function to SuperBasic, allowing the user to re-draw a model by using the CALL pic,n command, where n is the file number. The Viewpoint manual is exceptionally well-planned. A number of practical tutorial examples and tips have been included. Recommendations are made regarding use of the program and general computer usage.

Concise instructions are included for customising the Viewpoint printer dump for non-Epson-compatible dot matrix printers.

One point covered in the manual, frequently overlooked by both beginner and experienced computer user alike, is that prior to beginning a drawing session, users should plan carefully what they are attempting to accomplish on paper.

Planning

Users obsessed with speed will appreciate the fact that the entirely machine code Viewpoint is the faster of the two but, considering three-dimensional modelling requires particular care and planning if a drawing is not to dissolve into a collection of disjointed geometry, speed is of relatively little importance for any application other than re-drawing a finished model. In this respect, the compiled Concept 3D is more than adequate.

While Concept 3D is marginally more user-friendly, Viewpoint incorporates a number of professional illustrator's features. Even more unusual, both programs are supplied with superb manuals, each including a useful range of examples and detailed information. Overall, both programs will find particular applications and have individual appeal to individual methods of drawing.

Information

CONCEPT 3D

Tesseract Software Development,
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Available from most good dealers

VIEWPOINT

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