Vector Reality Version 1.2 Help (rev 1.0)

Introduction

Operation Reference

New Version Information

Version 1.2 includes many significant improvements. The following list notes many of the changes made. Owners of Version 1.1 will be sent upgrades at no charge.

Version Changes

Join Layers Command Added
Invert Selection Command Added
Array Function Command Added
Backface Culling for Camera Views Option Added
Dynamic View Dragging Addded
Changed from Win 16 to Win 32 with Win32s auto-degrade capacity
Multithreded Rendering under Win95/NT Added
1.5x-2.0x faster rendering
Win95 Enabled Look
Long Filename Support
Persistent Window Placement
Persistent Toolbar Placement
Toolbars Made Detachable
Tool Tips Added
Startup Window size listened to
All Dialogs Re-Designed for clarity
Tab Property Dialogs now used where appropriate
Clipboard now resides in memory
TIFF,TGA,PCX,PCD,BMP Read Support Added
Fast and High Quality Image Viewer
Fixed Modified Flag
New Storage Directory Heirarchy
New New/Open routines
New Object File I/O
New View Type Menu
WSP Properties Moved To File Menu
Center/Zoom Moved To Submenu
Fixed Rotated Object Render Bug
Fixed Bounding Box/Light Clip Bug
Fixed Pointy Object Octree Bug
Fixed Add Polygon Bug

Version 1.1 included over 30 significant improvements and a new low price. The following list notes many of the changes made. In addition, High Velocity Systems improved sales and support services. All owners of version 1.0 were sent upgrades to version 1.1 at no charge.

Major Version Changes

Context sensitive object menu available via right mouse click
Hue, Saturation, and Level controls added to Color Selector
Supersampling for higher quality rendering
Cursors changes according to operating mode
Motion restriction added
New add mode
Camera Perspective can be specified
Join Forms command added
New Render Status Percent Bar
Partially transparent shadows added
Click Speed Improved in large workspaces
Zoom Box Added
Zoom Mode Added
Workspace windows now saved independent of screen resolution
Render Statistics for last render now always available.
Primitive type selection now in submenu
Root Resolve now an actual Windows menu
Views are namable
Added use of escape key to get out of modes
Arrow Keys can manipulate view panning
View System zooms in fractional units.
Improved Workspace properties access
Improved File Type Dialog
Fog now works appropriately
Internal file preview.mat now deleted after use
Fixed Win Type naming problems
Fixed Excessive Clone Updates when copying
Object Properties Listing of Masters Fixed
Camera view bugs removed
Improvements Made in OnLine Manual

Open Development Policy

We believe that in order to create the best product, we must be as open as possible to the ideas of our customers. If you have any ideas, comments, criticisms, or implementations please communicate them to us. By combining the ideas of our customers with quality software engineering, we know we will be able to create the most useful, understandable, and creative 3D modeling and rendering package possible.

Directory Structure

All files required to operate Vector Reality are located in the vecrel directory created on installation. Within the vecrel directory, other sub directories are created. When loading or saving a file it is recommended that you place it in the most appropriate directory. As long as this is consistently kept up, your working files may be moved to other computers (as long as all required files are copied) and you may move the vecrel directory around your computer. Following this convention also helps to keep things in order. The directores structure created and the files they should hold are as follows.

(ROOTDIR) VECREL - Hold program and help files

(SUBDIR) OBJSTORE - Hold All Objects used to create a rendering

(SUBDIR) RENDERED - Hold All Rendered Images

Copyright Information

All Versions

Demonstration Version

Objects and Files

This section discusses objects and files in general and then overviews the specific objects used in Vector Reality.

Objects

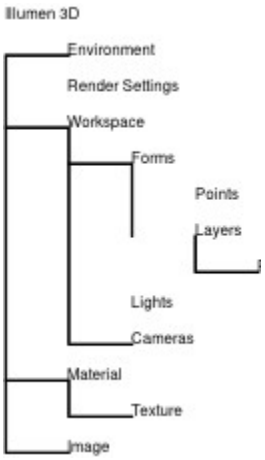
In Vector Reality generic things are referred to as objects. Some objects span the entire scope of the program, while some objects exist only within others. The relationships between these objects and their scope is described in general in Object Relationships. Each object is discussed in detail in their own appropriate section of the manual.

Files

When an object is placed on disk, it is then called a file. In Vector Reality a file can hold up to 32,000 other objects within it. For instance, a form file can hold roughly 32,000 points, layers, and polygons on disk.

Object Relationships

Objects in Vector Reality often have relationships to other objects. Object relationships may be classified by type. Many times an object is a composition of other objects. When an object is loaded, all composed objects are loaded with it. In most object compositions, the object is made up of other objects only existing within that one particular object. The important exception is the form object which exists externally and can be in multiple workspace objects, it acts as a hybrid link/composed object. The following graph shows the object composition relationships of major objects.



Other times, objects are selected, or linked, into other objects. A link allows more than one object to use another object simultaneously. It is important to note that creating some object is not always enough, it is often necessary to select, or link that object into some other object. For instance, a material does no good on its own, it must be selected into some form objects layer to be of any use. When an object with links is loaded, the respective linked objects are not immediately loaded, although they may be requested to load by operations in the workspace, such as rendering. The following graph shows these types of relationships for major objects which have link relationships.

Illumen 3D

Workspace

Forms

Points

Layers

Texture

Polygons

Lights

Cameras

What Vector Reality Does

Vector Reality is a three-dimensional Modeler and Renderer.

The role of the modeler is to allow the user to enter a three-dimensional description of an objects surface in the most logical way possible. The problem is that computer input and display technology is primarily focused on only two-dimensions. Vector Reality allows three-dimensional editing by having three parallel projection views which are two-dimensional, the top, right, and front views. The combination of these views allow the user the full range of three-dimensional motion. Actual 3D data is stored internally, however, only two-dimensional views into the three dimensional data is allowed due to the 2D representation of a computer monitor.

In Vector Reality the 3D surface data is stored as a collection of polygons. These polygons often form only a good approximation of an actual surface; however, by increasing the number of polygons in the approximation, the stored surface can be made to look more and more like an actual surface.

The role of the renderer is to take the 3D surface description of the modeler data and to output a photo realistic shaded two dimensional picture which appears three dimensional. To achieve this, materials are applied to surfaces which gives the surfaces desired qualities, lights are placed, and the environment is described. For example, one could take a surface description of a spaceship and apply a metallic material to it, light could be placed in the distance to light the scene, stars could be placed in the environment description, and then the renderer would be able to render a metallic spaceship in the stars.

In Vector Reality, the rendering process used is called ray-tracing. It allows a high degree of realism, including effects like translucency, reflection, refraction, and shadows. The material system allows for phong smoothing of polygons, and multiple procedural and non-procedural 2D and 3D textures.

Using The Manual

All documentation for Vector Reality is located in this Windows help file and the printed installation card. This help file may be browsed by clicking on Vector Reality Help in the program manager, by selecting Help:Index from within Vector Reality or by using the context sensitive help function which will automatically locate a particular portion of the help file which pertains to the context of the help call.

This manual is divided up into two main sections: Introduction, and Operational Reference.

Introduction

Provides and introduction to Vector Reality, including an introduction to multiple editors and a sample design cycle.

Operational Reference

The operational reference contains program operation description by overview of logical groupings and by command.

It is recommended that you read the introduction and experiment with the program to get an idea of how Vector Reality works. Try opening some of the example workspaces and images by choosing Open from the File Menu. Try clicking around (with both mouse buttons) in a workspace. When you have specific questions about functions, look into the operational reference section either by browsing the help file, by calling the context sensitive help in the area you have a question, or by using the search button. Whenever you use context sensitive help, you bring up information from the command section. Sometimes, it will be useful to go to the overview sections to get a broader idea of what's happening.

When working with the manual, you may want to select 'Help:Always on Top' from the help window so that the help window will always stay on top of the screen.

Conventions

Menu Convention: Menu selections are written in this format Menu:Submenu:Command. To access the command, first click on the Menu in the window, then select the submenu (where applicable), and finally select the command.

Mouse Button Convention: The term primary mouse button is used to define the mouse button used for selection in windows, this is normally the left mouse button. The term secondary mouse button is used to define the mouse button not normally used for selection in windows, this is normally the right mouse button.

Features

Vector Reality is a 3D modeler and renderer which incorporates polygon mesh based editing with the power of raytracing into one integrated environment. From the surreal to the real, your creativity is set free to create images from your dreams to recreation of actual scenery.

New 32bit Operating System Technology

Runs natively in Windows 95 and Windows NT with multithreaded rendering

Runs under Windows 3.1 by using Win32s

Logical and Customizable Interface

Object oriented operation creates a consistent interface for ease of use

User definable view system allows for infinite customization

Button bar and Accelerator keys allow for quick function access

Context sensitive help brings you answers when and where you need them

Powerful Object Generation

Primitive functions create simple objects automatically

Extrude and Lathe functions create symmetric objects quickly

Array function replicates objects in a pattern

Point Editing allows precise control over object generation

Curve Deformations create smooth 3d curves for organic effects

Image Generation

Reflection, translucency, refraction, and shadows create 3d effect

Texture mapping color, translucency, reflection, bumps makes objects alive

Supersampling creates high quality images

Procedural textures include wood, marble, clouds, turbulent colors, granite

Environmental effects include horizon, fog, and stars

Requirements

Operating Systems Supported:

Windows 3.1 (or better) with Win32s Installed and 8MB (or more) Ram

Windows 95 and 8MB (or more) Ram

Windows NT and 16MB (or more) Ram

Hardware

Video card running in 256 (or more) colors at (or above) 640x480

386,486, Pentium (or better) with math co-processor.

Hard Drive with 10MB (or more) free

3.5" High Density Floppy Drive for installation

Software Extensions

Win32s for running under Windows 3.1, included with Vector Reality Release Version, available online separately for demonstration version.

Vector Reality Demo

The Vector Reality Demo is a working demonstration of the Vector Reality product. It includes all of the Vector Reality package, except save is disabled in workspaces, and it only renders at 160x120.

The Vector Reality Demo comes in the form of a zip file. To use the demo, retrieve it and place the file in its own directory and unzip it using an unzipping tool like pkunzip. For pkunzip, use pkunzip vecrel12.zip. The Vector Reality demo will decompress into that directory. Install the package by running install, which is in the directory you unzipped to, from within Windows.

Make sure your computer meets the program requirements listed above. If you're running Windows 3.1, you will need Win32s, which is available at: ftp://oak.oakland.edu/SimTel/win3/win32/pw1118.zip

The Vector Reality Demo is available from the High Velocity Systems WWW site and directly via ftp at: ftp://avalon.vislab.navy.mil/pub/demos/vecrel12.zip and ftp://ftp.povray.org/pub/mirrors/avalon/demos/vecrel12.zip

Sales, Service, and Information

Sales of Vector Reality.

Vector Reality is only available directly from High Velocity Systems. It is not available in stores or by any mail order company.

Vector Reality is US $99 + US $8 Shipping via FedEx 2nd Day where available (Nebraska Residents add US $6.44 for sales tax)

Call: (402) 423-1848 to order via Visa/Mastercard (No Surcharge) or COD (No Surcharge)

Or, See Order Form to order by mail.

Service

All questions about the Vector Reality product are handled through any of the following addresses of High Velocity Systems. Service and Technical Support is provided free of charge.

Phone Number: (402) 423-1848

Internet Mail Address: jvanabra@nyx10.cs.du.edu

Mail Address: High Velocity Systems; 6521 S. 41st Street; Lincoln, NE 68516

Information

Additional information about Vector Reality, including the Vector Reality demo, can be found on the World Wide Web at: http://nyx10.cs.du.edu:8001/~jvanabra/highvel.html

Order Form for Vector Reality V1.2 (rev 1.0)

Print out this form by selecting File:Print Topic, fill in, and mail form and payment to address below.

Information:

Price: US $99 per copy ordered

Shipping: US $8 via FedEx Second Day where available per copy ordered

Sales Tax: Nebraska Residents add US $6.44 per copy ordered.

Payment Method: Check, Money order in US Funds written out to High Velocity Systems, Visa/Mastercard (No Surcharge), or COD (No Surcharge, US Residents ONLY)

Mail Completed Form To:

High Velocity Systems
6521 S. 41st Street
Lincoln, NE 68516 USA

Fill In These Entries, Please Print:

Order Type: __ Check/Money Order, __ Visa/Mastercard, __ COD

Company Name (optional):
First Name:
Last Name:
Street Address (1):
Street Address (2) (optional):
City:
State:
Zip Code:
Country:
Telephone Number:
E-Mail Address (optional):

Quantity Ordered:
Total Payment Included:

Complete the Following 3 lines for Visa/Mastercard Orders Only
Card Name:
Card Number:
Expiration Date:

Additional Optional Information:

Where did you get this Vector Reality package from?:

Any Comments?:

Using The Editors

Using Multiple Editors

Vector Reality is divided up into five distinct editors. These editors work together to produce your 3D rendering project. They are all accessed from within the Vector Reality application main window using MDI, Window's multiple document interface. Any number of files of any type may be edited simultaneously. The job of each editor is to allow you to manipulate a specific object or set of objects.

The Design Cycle

This section covers a general design cycle used in Vector Reality. This design cycle is to give the new user an idea of what working in Vector Reality is like, and how to go about creating rendering projects.

I. Startup

1. Come up with the project idea.

   One could ask: what is the theme of the project?, what is the artistic style of the project?, what will the project be composed of?, what time will this project take to complete?

2. Find existing objects which could be used in the project.

   If a part of the project already exists, such as a render settings file, a form object, or an environment, then you should try to reuse that part in your current project. Doing this will greatly reduce project generation time.

3. Create a new Workspace.

   Select File:New to create a new workspace.

II. Create needed Form Objects and Materials

1. Create a Form Object in the Workspace

   Using the Mouse, create a new form in the workspace. Load an existing object using Object:File:Open, and/or edit the object using all the Workspace Editor tools.

2. Create Materials for the Form Object and Apply them.

   Select File:New to create a new material and/or find usable materials already created. Edit materials in the Material Editor. Apply the materials to the form object layers in the Workspace Editor using Layer Properties.

3. Place a camera and light.

   Using the Mouse, create a new camera and light and/or drag them into position. Select the camera into the camera view using View Properties on the selected camera view.

4. Setup a simple Render Settings file for test rendering.

   Select File:New to create a new Render Settings file, or use one previously created. Select that Render Settings file into the workspace using the Workspace Properties command. The render settings file should generate a small image, so that the rendering will not take much time.

5. Setup a simple Environment for test rendering.

   Select File:New to create a new Environment file, or use one previously created. Select that Environment file into the workspace using the Workspace Properties command. The environment file should not use to many environment features, so that the rendering will not take much time.

6. Test render the Form Objects.

Select the camera view and choose View:Render to render the scene.

7. Repeat until all objects are created.

III. Scene Organization

1. Think of how the Form Objects, Lights, and Camera Position should work together in the scene.
   Using the Mouse and other Workspace Editor tools, position the object for the final scene.

2. Setup an Environment file for the final scene.
   Select File:New to create a new Environment file, or use one previously created. Select that Environment file into the workspace using the Workspace Properties command. This environment file should be setup as the environment for the final image.

3. Test Render the arranged objects in the environment using the test Render Settings.
   Select the camera view and choose View:Render to render the scene. Use the test Render Settings so that the rendering does not take too long.

4. Repeat until satisfied with appearance.

IV. Generate the Final Image

1. Setup a final render settings file.
   Select File:New to create a new Render Settings file, or use one previously created. Select that Render Settings file into the workspace using the Workspace Properties command. The render settings file should generate the appropriate final image.

2. Render the final image.
   Select the camera view and choose View:Render to render the scene.

Main Application Window

All operations in Vector Reality happen in the Vector Reality Main Application Window. The following important parts will be discussed here: Title Bar, Status Bar, Menus, Accelerator Keys, and Tool and Dialog Bars.

Title Bar

The title bar states the application name and the current file.

Status Bar

The status bar informs the user on the state of current processes. See the menu command Window:Status Bar.

Menus

Most Vector Reality functions are accessed from standard Windows menus. When accessing a menu, a description of that menu's function is shown in the Status Bar. Certain operations are available in all editors, while other operations are only accessible from one type of editor.

All file manipulation is done with the File Menu. Windows may be manipulated by using the standard Windows operations, including those functions accessible from the Window Menu. These two menus, including the Help Menu are common menus available in all editors. They are described in the following links:

Common File Menu

Common Window Menu

Common Help Menu

Accelerator Keys

Certain menu functions can also be accessed via accelerator keys. If there exists an accelerator key for a menu item, then it is stated in that menu functions name. Functions with accelerator keys may be accessed by pressing and holding either the Alt or Ctrl keys and then pressing another key. The notation used to denote this, for example, is Alt+A or Ctrl+1.

Tool and Dialog Bars

Certain menu functions and operations can be accessed via the tool and dialog bars. See the Common Window Menu for a description of these items.

Common File Menu

New

Use this command to create a new document. Select the type of new document you want to create in the File Type Dialog Box.

Open

Use this command to open a new document. Select the type of document you want to open and select the name of the file to open in the File Open Dialog Box.

Close

Use this command to close the active document. Vector Reality suggests that you save changes to your document before you close it. If you close a document without saving, you lose all changes made since the last time you saved it. You may also close the document by closing all windows representing the active document.

Save

Use this command to save the active document using the current name. If a name has not yet been given, then you will be asked to choose a file name in the File Save Dialog Box.

Save As...

Use this command to save the active document under a new name. You will be asked to choose a document name in the File Save Dialog Box.

Rendering Statistics

Use this command to open the Rendering Statistics Dialog Box.

Exit

Use this command to quit Vector Reality. All active documents will be closed and Vector Reality will exit. If there are any unsaved documents you will be prompted to save them.

Most Recently Used List

Vector Reality keeps track of the four most recently used documents and displays them in the most recently used list at the end of the file menu. Selecting one of these menu items will open the corresponding document.

Common Window Menu

Standard Tool Bar, Object Tool Bar, Mode Tool Bar, View Tool Bar

Selecting these commands toggles the respective tool bar on and off. A check mark in from of the menu signifies that the tool bar is open. Certain menu functions can be accessed via the tool bars. When you browse over a tool bar button with the mouse, a description of the function is displayed in the status bar and a tool tip appears. To use a tool bar, click on the picture representation of the function you want to invoke.

Tool bars may be moved by clicking in an open area of the toolbar and dragging the mouse. Tool bars may be docked to any side of the main window by dragging them close to the edge and releasing, or they may be released in the middle of the window where they will form an independent window.

Tool Bar Function List (from left to right):

Standard Tool Bar: New, Open, Close, Save, Context Help Cursor

Object Tool Bar: Cut, Copy, Paste, Delete, Properties, Workspace Properties, Zoom Object All

Mode Tool Bar: Root Level, Point Level, Layer Leve, Polygon Level, Add Mode, Select Mode, Rotate Mode, Scale Mode, Move Mode

View Tool Bar: View Properties, Zoom View, Zoom Box View, Redraw All Views, Notify All Views, Render View

Status Bar

The status bar informs the user on the state of current processes. Selecting this command toggles the Status Bar on and off. A check mark in from of the menu signifies that the Status Bar is open.

Placement Dialog Bar, Object List Dialog Bar

Selecting these commands toggles the respective dialog bar on and off. A check mark in from of the menu signifies that the dialog bar is open. The functionality of these bars are described in Dialog Bars.

Dialog bars may be moved by clicking in an open area of the toolbar and dragging the mouse. Dialog bars may be docked to the left or right side of the main window by dragging them close to the edge and releasing, or they may be released in the middle of the window where they will form an independent window.

Arrange Icons

Selecting this command organizes all icons in to an orderly pattern at the bottom of the application window.

Window List

The window list is a list of all active windows currently open in Vector Reality. Selecting one of the windows in the list will bring that window to the top and activate it.

Common Help Menu

Contents

Opens the contents page of the Vector Reality help file.

Context Help

Opens help, moving to the page which relates to what is currently selected. You may use the F1 key to get help on selected windows, dialog boxes, and menu items.

Context Help Cursor

Starts Context Help Cursor Mode. After selecting this, the mouse cursor will change to a help pointer. You may then click upon a window, select from the toolbar, or select a menu item to get help on that particular thing.

Using Windows Help

Opens the standard windows help file on using help.

About Vector Reality

Opens the About Vector Reality Dialog Box.

About Vector Reality Dialog Box

The About Dialog Box Displays the following information:

- Copyright notice
- Version number
- Physical System Memory
- Disk space on current drive

File Type Dialog Box

Allows you to select a file type to create.

Click on the text representing the file type you want to create

- Workspace
- Render Settings
- Environment
- Material Settings

Then, Select Ok to create the file
Or, Select cancel to abort the operation.

File Open Dialog Box

The following options allow you to specify which file to open:

File Name

Type or select the filename you want to open. This box lists files with the extension you select in the List Files of Type box.

List Files of Type

Select file type to open. If possible Vector Reality presents the most logical type already selected.

Drives

Select the drive in which Vector Reality stores the file that you want to open.

Directories

Select the directory in which Vector Reality stores the file that you want to open.

Network...

Choose this button to connect to a network location, assigning it a new drive letter.

File Save Dialog Box

The following options allow you to specify which file to save:

File Name

Type or select the filename you want to save. This box lists files with the extension you select in the List Files of Type box.

List Files of Type

Select file type to save. If possible Vector Reality presents the most logical type already selected.

Drives

Select the drive in which Vector Reality will store the file that you want to save.

Directories

Select the directory in which Vector Reality will store the file that you want to save.

Network...

Choose this button to connect to a network location, assigning it a new drive letter.

Material Editor

A Material File describes the surface of Form Objects which the renderer will create. The Material Editor represents a Material File by dialog controls which allow the manipulation of the file.

The following menu is unique to the Material Editor:
Material Preview Menu

The texture system is described in:
Texture System

The following controls are used:

Name
Use this control to edit the name of the material file. This name is for descriptive purposes only, it is not the file name.

Color
Click on this color box to edit the color of the material.

Specular
Click on this color box to edit the specular color of the material. The specular color is the color of the reflective spot on the object. Set this color to white for a plasticy feel. Set this color close to the color of the material for a more 'realistic' look.

Reflect
Click on this color box to edit the reflectivity of the material. The higher the number of any color component, the more that color component is reflected on the surface. When set to white, the material is perfectly reflective.

Filter
Click on this color box to edit the filter, or translucency, of the material. The higher the number of any color component, the more that color component is transmitted through surface. When set to white, the material is perfectly translucent.

Hardness
This edit box controls the hardness of the material. Harder materials have smaller specular highlights, while softer materials have larger specular highlights.

Index of Refraction
This edit box controls the index of refraction of the material. This number only affects the material if the material has some filter defined. The area around an form is assumed to be air. The index of refraction

of some common materials are defined below:

Index of Refraction of Some Common Materials
Air: 1.00
Water: 1.33
Salt: 1.54
Quartz: 1.55
Emerald: 1.57
Glass: 1.66
Crystal: 2.00
Diamond: 2.42

The index of refraction affects how light is bent as it passes through the surface of a material. As light enters an area of a higher index of refraction, light is bent toward the surface normal. As light enters an area of lower index of refraction, the light is bent away from the surface normal.

Phong

When checked, phong smoothing is enabled. When not checked, phong smoothing is disabled. Phong smoothing has the effect of smoothing out the polygons which are connected by the exact same points. This effects the appearance of the form objects surface, and not the actual polygon data. Because of this, the silhouette of the object still appears to have sharp polygon edges, while the inner area appears smooth. Phong works across the boundaries of layers.

To use phong effectively, the workspace editor must allow the joining and separation of points so that areas where there the phong smoothing stops can be defined. To join points in the exact same location into one actual point, select the points and call Object:Join. To separate a point into two points which share the same location but are attached to different polygons, select the polygons which will form the smoothed or the non-smoothed area, then call Object:Cut and then Object:Paste.

Texture List

The texture list box lists all textures applied to the current material. Textures are described in depth in Texture System. To select the current texture, click on it. To edit the properties of the texture, you may double click on it.

(Texture List) Add

Click on this button to add a texture to the material. The Add Texture Dialog Box appears to allow you to select the texture. The property page of the texture then appears.

(Texture List) Drop

Click on this button to remove the current texture from the material.

(Texture List) Properties

Click on this button to edit the properties of the current texture.

Add Texture Dialog Box

Texture List

Select the texture you want to add to the current material by clicking on the name of the texture and clicking on OK, or by double clicking on the name of the texture.

Available Textures:

Bitmap

Checkerboard

Clouds

Color Range

Granite

Marble

Radial Wave

Roughness

Wood

Material Preview Menu

The material preview menu allows you to preview the current material in a variety of ways without setting up a form object to view it on.

Implementation

The material preview works by automatically saving the current material as preview.mat, choosing an environment (prevblk.env, prevwht.env, prevclr.env) to copy to prev.env, and then loading and rendering a workspace (prevbox.wsp, prevcpx.wsp, prevsph.wsp) which has preview.mat chosen on one of its objects, prev.env chosen as its environment and preview.rdr chosen as its render settings. You may change the preview files as long as you keep these conventions up.

Sphere

Select this command to render the current material on a sphere.

Box

Select this command to render the current material on a box.

Complex

Select this command to render the current material on a complex scene.

(Background) Black

Select this command to set the background for material preview renders to black.

(Background) White

Select this command to set the background for material preview renders to white.

(Background) Color Gradient

Select this command to set the background for material preview renders to a red-green-blue color range.

Texture System

This section describes the texture system.

Texture Definition

Texture is used to vary an attribute of a material by position within a texture domain.

Texture Modifications

Textures may vary the Color, Filter, Reflect, and Surface Normal of a surface. For example, by color modification texture can be used to define complex material patterns such as wood, or to project images upon an object. By Filter and Reflect modification, it can make the reflective and translucent spots of an ornament. By Surface Normal modification (called Bump Mapping, or Bump Normal), it can be used to simulate the bumps of a rock. Bump normal effects only modify the surface normal of the form object, and thus the edges and silhouette of the form remains the same.

The Texture Domain

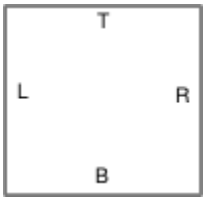
The texture domain, which is the area in which texture exists, is defined by the layer axis of the form object in which the material is selected into. The visual length of the layer axis x,y and z components is 1 unit. Positioning, Rotating, and Scaling the layer axis correspondingly affects how the texture is mapped.

Texture Domain Mappings

Texture may be defined in the texture domain either by a two or three dimensional mapping. These mappings are defined as follows:

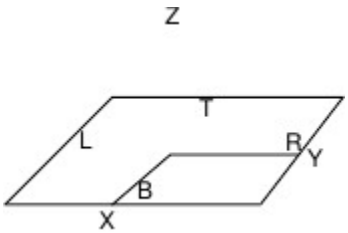
Two Dimensional Mappings

A Two Dimensional Map takes a texture which is defined in 2D and maps it to the 3D texture domain using either a plane, cylinder, or sphere mapping, such that a texture map:



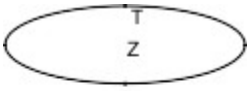
Will be mapped as follows:

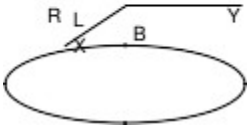
Plane



All points at (x,y) regardless of the Z component retrieve their color from x,y

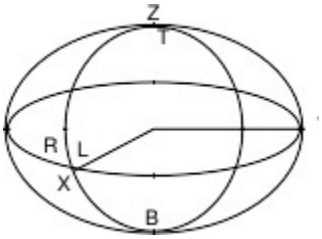
Cylinder





All points (x,y,z) retrieve their color from their angle around the Z axis and the Z component.

Sphere



All points (x,y,z) retrieve their color from their angle around the Z and Y axes.

Three Dimensional Mapping

A Three dimensional mapping is called space filling. In a Three Dimensional map, all points in the texture domain are already defined, so no extra mapping is required.

Combining Textures

Many textures of the same modification type may be defined at the same position. When this happens, there respective attributes at that position are added.

Texture Types

Bitmap: see Bitmap Properties Dialog Box

Checkerboard: see Checkerboard Properties Dialog Box

Clouds: see Clouds Properties Dialog Box

Color Range: see Color Range Properties Dialog Box

Granite: see Granite Properties Dialog Box

Marble: see Marble Properties Dialog Box

Radial Wave: see Radial Wave Properties Dialog Box

Roughness: see Roughness Properties Dialog Box
Wood: see Wood Properties Dialog Box

Bitmap Properties Dialog Box

See Texture System for general information on texture.

Property Modification: Color, Filter, Reflectivity, Bump Normal
Mapping Type: Plane, Cylinder, Sphere

Bitmap texture defines an image file as a 2D map. This texture supports JPeg (jpg), Targa (tga), Tiff (tif), PhotoCD (pcd), PCX (pcx), and Windows Bitmap (BMP) image types. Mapped Color, Filter, and Reflectivity properties are taken directly from the bitmap. The surface normal is modified by interpreting the red value of the bitmap as the height to disturb the surface of the object at any mapping point.

(Bitmap Image) Browse
Click on this button to select the image file to map.

Horizontal Repetitions
Controls the number of times the image is tiled horizontally (y axis.)

Vertical Repetitions
Controls the number of times the image is tiled vertically (x axis)

Bump Height
Defines the bump height of the maximum red value for bump normal modifications.

Mapping
Defines a 2D->3D map as defined in Texture System.

Object Modification
Click on the modification types desired, as described in Texture System.

Checkerboard Properties Box

See Texture System for general information on texture.

Property Modification: Color, Filter, Reflect
Mapping Type: 2D

The checkerboard texture defines a pattern of alternating color squares in 2D.

First Color
Defines the color of the first set of checks.

Second Color
Defines the color of the second set of checks.

Horizontal Repetitions
Defines the number of horizontal tilling (y axis.)

Vertical Repetitions
Defines the number of vertical tilling (x axis.)

Twist Per Radial Unit
Defines how the checkerboard twists around the origin. When set to zero, no twisting occurs. When set to 90, the checkerboard twists 90 degrees at a distance of one from the origin.

Mapping
Defines a 2D->3D map as defined in Texture System.

Object Modification
Click on the modification types desired, as described in Texture System.

Clouds Properties Dialog Box

See Texture System for general information on texture.

Property Modification: Color
Mapping Type: 3D Space Filling

This texture creates a cloud-like texture in 3D.

Color Map
Click to define a color mapping.

Turbulence
Controls the turbulence of the clouds. Higher numbers produce more turbulence, while lower number produce a more calm effect.

Color Range Properties Dialog Box

See Texture System for general information on texture.

Property Modification: Color
Mapping Type: 3D

This texture creates a color range on a form object in various ways.

Color Map
Click to define a color map for the color range.

(Areas Of Equal Color) XY Planes
Click to make the planes corresponding to z=constant the areas of equal color.

(Areas Of Equal Color) Cylinders around Z
Click to make cylinders with an axis at the z axis corresponding to radius=constant the areas of equal color.

(Areas Of Equal Color) Spheres a Origin
Click to make spheres with their centers at the origin corresponding to radius=constant the areas of equal color.

(Areas Of Equal Color) Radial Planes Around Z
Click to make planes which rotate about the z axis through the yz plane the areas of equal color.

Turbulence
Controls the turbulence of the color range. Higher numbers produce more turbulence, while lower number produce a more calm effect. Set to zero to create a non-turbulent color range.

Granite Properties Dialog Box

See Texture System for general information on texture.

Property Modification: Color
Mapping Type: 3D Space Filling

This texture creates a 3D granite like effect.

Color
Click to define the color of granite.

Marble Properties Dialog Box

See Texture System for general information on texture.

Property Modification: Color
Mapping Type: 3D Space Filling

This texture creates a 3D marble effect.

Color Map
Click to define a color mapping.

Turbulence
Controls the turbulence of the color range. Higher numbers produce more turbulence, while lower number produce a more calm effect.

Radial Wave Properties Dialog Box

See Texture System for general information on texture.

Property Modification: Bump Normal
Mapping Type: 2D

This texture creates a radial wave effect, like a rock dropped in water.

Height
Defines the height of the radial wave.

Wave Length
Defines the wave length of the radial wave. The wavelength is the length of one complete wave.

Phase
Defines the phase of the wavelength. Increasing the phase pushes the wave along its path.

Radius at A/2
Defines the radius(distance) at which the amplitude (height) is one half of its original value. Set to a large value to create the effect of no decay.

Mapping
Defines a 2D->3D mapping as described in Texture System.

Roughness Properties Dialog Box

See Texture System for general information on texture.

Property Modification: Bump Normal
Mapping Type: 3D Space Filling

This texture creates a roughness or graniness.

Use Noise
Click on this to create noise base roughness.

Use Turbulence
Click on this to create turbulence based roughness.

Roughness
Defines the amount of roughness. Higher values produce more roughness. Lower values produce less roughness.

Wood Properties Dialog Box

See Texture System for general information on texture.

Property Modification: Color
Mapping Type: 3D Space Filling

This texture creates a wood effect.

Base Color
Click on this button to define the base color of the wood.

Grain Color
Click on this button to define the color of the grain of the wood.

Radial Waves
Defines the number of whole waves around one grain ring.

Length Per Twist
Defines the length at which one whole twist of the grain occurs.

Percent Base
Defines the percent of the wood effect which should be colored the Base Color.

Radial Ring Size
Defines the size of one radial ring.

Workspace Editor

Overview by group looks at some major function groups of the workspace. Reference By Function describes individual functions. Discussion in Overview By Group will often reference those things in the Reference By Function section.

Overview By Group

Reference By Function

Rendering

Rendering is started by calling View:Render.

Cloning

Cloning is a dynamic method of copying the form into another form such that changes in the master, or original form, are updated to the clone as they are made. See Form Property Page Dialog Box for more information on cloning.

Clipboard

The clipboard is a temporary storing location for objects of any type. The functions cut, copy, paste operate on the clipboard. See Workspace Object Menu for description of these operations.

Form Generation and Deformation

Primitive shapes may be generated by calling Object:Add Primitive. Lathes of polygons may be generated by calling Object:Lathe. Extrusions of polygons may be generated by calling Object:Extrude. To deform a set of points of a form, see Mode:Curved Drag.

Composition and Properties

Properties are defined for most objects in the workspace. To determine what an object is made out of, or to edit the properties of an object, select the object, and call Object:Properties.

Finding Objects

Objects may be found by looking up their name in the Object List Dialog Bar.

Object Generation

Objects are generated by using Workspace Mouse Operations.

Space Manipulation

Objects are manipulated by Workspace Mouse Operations and functions in the Workspace Object Menu and the Workspace Mode Menu.

View System

Since a scene is defined in 3D and monitors are only 2D there is a need to define a viewing system into 3D. A view into this 3-space can be of four different types, either top, front, right, or camera. There may be any number of any types of views, and they may be manipulated independently of one another. These views are enclosed by a window frame in the workspace. To Select an existing view, click on the window frame which contains the view. Views are manipulated using normal Windows window operations, those functions in the Workspace View Menu and the Workspace Window Menu, and by panning around the view using the arrow keys.

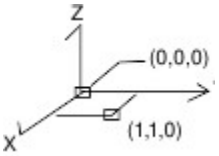
Coordinates

3D Space and Coordinates

In Vector Reality, a 3d space system is defined. All spots in this space can be addressed by an ordered triple, or coordinate. A coordinate consists of three real component values, 'x','y', and 'z' which may be written (x,y,z). These component values denote the distance in one direction in the space.

Axis

An axis is used to represent the position, rotation, and scale of space. Its origin is the origin of the space, which is the coordinate (0,0,0.) Three rays are drawn from the origin in the direction of each component part of the space to define rotation. The length of the ray is relative to the scale of the space in that direction. The axis of a form is drawn to a length of 40. The axis of a layer is drawn to a length of 1.



The Workspace and Objects

This section overview the workspace and describes the purpose of objects in the workspace.

The Workspace

The workspace is the area in which a scene is setup. The workspace defines a standard 3d coordinate space called the world space. The idea of a coordinate space is discussed in coordinates. Within the workspace many objects may exist. Objects in the workspace are manipulated through a view system. Existing objects are manipulated through their hotspot. The hotspot is a small clickable box located on or near and object which when selected is red, and when deselected is black. To affect an object, it must be selected. Discussion of selection and many manipulations is in space manipulation. Discussion of object generation is in object generation. The workspace edits cameras, lights, and forms.

When an object consists of many different editable part types, then in order to edit all the types, different levels of the object are defined. In order to edit at different levels, one must change the editing level to the appropriate level for that part. This is done by selecting the object at the current level, and then changing the level one step closer to the one you wish to step to by using the Workspace Mode Menu. Move back to the Root Level to operate on object axes, lights, and cameras.

Forms

Forms are the objects which describe the surfaces of things in the scene, such as a ball, or a table. A form is a complex object consisting of many parts types. A form consists of an axis, points, layers, and polygons.

The axis defines a local coordinate space which is independently oriented from the world space. Everything within the form exists within this local coordinate space. The idea of coordinate spaces and axis is defined in coordinates. This axis may be rotated, scaled, moved, and dragged thereby rotating, scaling, moving, and dragging everything within it from the view of the world space.

Points define a place in 3D space. The points of a form are edited by selecting the axis of that form and then changing to the point editing level by using the Workspace Mode Menu.

Layers define a collection of polygons which share a material. The axis of the layer defines a texture domain as described in Texture System. The layers of a form are edited by selecting the axis of that form and then changing to the layer editing level by using the Workspace Mode Menu.

Polygons define a portion of the surface of a form. Polygons may consist of any number of connected points existing in a plane. Polygons are considered 'oriented' according to the direction in which the points are ordered. When creating polygons by hand, it is important that you orient all polygons clockwise when viewed from the outside surface of the polygon. Currently, only convex polygons are supported by the renderer, this means that polygons can not have segments which cave into the polygon. The polygons of a form are edited by selecting a layer of that form and then changing to the polygon editing level by using the Workspace Mode Menu.

Camera

A Camera is used to look into the scene much like a movie camera looks at a scene. A camera consists of three distinct parts: the Camera, noted by a 'C'; the target, noted by a '*'; and the up direction of the camera; noted by a 'U'. By moving these three parts, any view possible into the scene is possible.

Light

Lights are used to make the scene visible. They are moved around the scene to create different lighting effects.

Dialog Bars

Placement Dialog Bar

The placement bar displays current coordinates for accurate positioning. To open or close the placement dialog bar, use the menu command Window::Placement.

X, Y, Z

Displays the current X, Y, and Z position, rotation, or scale according to the context of the operation. When in Rotate mode, the rotation of the selected object is displayed. When in Scale mode, the scale of the selected object is displayed. When in move mode, while dragging, or while just moving the pointer in the view, the current position of the object is displayed.

Relative

When checked everything tracked by the X,Y,Z display is displayed relative to the last position. When not checked, all operations are tracked in an absolute coordinates.

Object List Dialog Bar

Displays a list of all objects in the current workspace by name. The object list is especially useful for selecting objects by name, for finding objects, and for determining which objects exist in a workspace. To open or close the object list dialog bar, use the menu command Window::Object List.

Selected objects have a darkened background, while objects which are not selected have bright backgrounds. You may select an object by clicking on it with the primary mouse button. You may select multiple objects by clicking on an object with the primary mouse button and dragging, or buy holding down the Control (Ctrl) Key and selecting multiple objects individually. To deselect an object, hold down the Control (Ctrl) Key and click on it with the primary mouse button.

Workspace Mouse Operations

This section describes mouse operations within the workspace in a view under normal circumstances. When a command alters the way the mouse functions, it is detailed within that commands description. Mouse functionality is presented by operation.

Context Menu

To view the context menu for an object, click the secondary mouse button on the object while in add or select mode. This menu will be the same as the Workspace Object Menu in the menu bar.

Object Creation

To create an object, click on the primary mouse button while in add mode. For more information, see Mode:Add.

Object Selection, Deselection, and Dragging

To select or deselect an object click on the primary mouse button on the object hotspot while in select mode. To drag and object, click and drag the object hotspot. For more information, see Mode:Select.

Zooming

To zoom a view, see information about the Workspace View Menu.

Panning

To pan a view, use the two sliders at the left and bottom of the views. To pan up and down, move the slider at the left. To pan left and right, move the slider at the bottom.

Rotating, Scaling, Moving

To rotate, scale, or move, enter into the appropriate mode and drag the mouse. These operations are described in the Workspace Mode Menu.

Handling Mouse Operations in Parallel Projections

The problem is that objects in flat projections often wind up with points in the same visual spot. This makes selection of those points difficult. The solution is that Vector Reality stores all points in a list and when the mouse is clicked, the list is searched from head to tail for the first point at the mouse location. When a point is selected, it is moved to the front of the list. When deselected, it moves to the back of the list. So, in effect, you can set the priority of points for the selection search by:

1)Selecting/deselecting points in a view where the points do not overlap to set the search priority.

2)Moving to the view where the overlap problem existed and clicking. The first point in the list that is clicked upon will be selected.

Workspace Window Menu

New

Select this command to add a new window to the current workspace. The new windows properties will be copied from the current window.

Arrange Windows: 1 Custom

Select this command to arrange the windows of the current workspace into positions stored in Custom Arrangement 1.

Arrange Windows: 2 Custom

Select this command to arrange the windows of the current workspace into positions stored in Custom Arrangement 2.

Arrange Windows: 3 Quad View

Select this command to arrange windows of the current workspace into a quad view. All top windows are placed in the upper left quadrant. All front windows are placed in the bottom left quadrant. All camera windows are placed in the upper right quadrant. All right windows are placed in the bottom right quadrant.

Arrange Windows: 4 Restore

Select this command to restore all iconized windows of the current workspace into their last positions.

Arrange Windows: 5 Minimize

Select this command to minimize all windows of the current workspace into icons.

Arrange Windows: Snapshot 1

Select this command to store the current windows position of the workspace into Custom Arrangement 1.

Arrange Windows: Snapshot 2

Select this command to store the current windows position of the workspace into Custom Arrangement 2.

Workspace View Menu

Type

Allows you to select the view type for the current view.

Parallel projections do not show perspective and allow editing.

Top: Views from the top down. Looking in the xy plane toward the negative z axis.

Front: Views from the front toward the back. Looking in the yz plane toward the negative x axis.

Right: Views from to right to the left. Looking in the xz plane toward the negative y axis.

Perspective projection types are used for displaying the workspace in 3D.

Camera: Views from a camera position defined in the Camera View Properties dialog.

Properties

Opens the Camera View Properties for camera views, or the Parallel View Properties for non-camera views to allow you to modify the properties of the view.

Zoom

Enters into zoom mode for the current view. To zoom in, primary click and drag up in the current view. To zoom out, click and drag down in the current view. To exit this mode, release the mouse button, or press Esc.

Zoom Box

Enters into zoom box mode for the current view. In this mode, you will be able to select a rectangular area of the view to be zoomed up so that it fits appropriately in the current view. To select the area, primary click at the position of the upper left corner and drag until you reach the lower left corner. When you drag the mouse beyond the window you clicked in, the view will pan in the direction of the mouse. To exit this mode, release the mouse button, or press Esc.

Redraw

Redraws the current view. Vector Reality normally keeps the views in step with the actual object data, however, sometimes the display may become corrupted. In this case, use this command to fix the view display.

Redraw All

Redraws all views. Vector Reality normally keeps the views in step with the actual object data, however, sometimes the display may become corrupted. In this case, use this command to fix the view display.

Notify All

All views store their properties individually. This allows all the views to work in completely different ways. Many times, however, you will want to synchronize the view properties. Chose Notify All to update all

views of the same projection type such that their property page data will be the same as the current view.

Render

Select this command to render the workspace from the current camera view. A rendering status dialog bar will appear once rendering is started. This dialog displays a percentage complete bar, it will display: the time spent so far, the percentage complete (estimated), and the time until completion (estimated.) The rest of rendering functions differently under Windows95/NT and Windows3.1.

Windows95/NT

You may start more than one rendering at once. While rendering, you are free to use your computer and Vector Reality for other tasks. A list of all current renderings in process are displayed in the drop list box. You may select any process from this list to view its completion status. To stop the current process, press stop. To temporarily pause the current process, press pause.

Windows3.1

You may only have one rendering at once. While rendering, you may not use the computer for other tasks. The process list box displays only the current rendering name, and all buttons are dimmed: they have no function under Windows 3.1. To stop the rendering, press Esc.

Rendering Statistics Dialog Box

The rendering statistics dialog box displays detailed information about the last rendering which took place.

Name
Displays the name of the project which last rendered.

Start Time
Displays the time at which the rendering was started.

Elapsed Time
Displays the time spent so far in the rendering process.

Primary Rays
Displays the number of primary rays shot directly from the camera into the workspace.

Reflected Rays
Displays the number of rays reflected off of a reflective surface.

Transmitted Rays
Displays the number of rays transmitted, which is the number of rays which pass through a translucent surface.

Shadow Rays
Displays the number of times a ray was shot to determine if a point is in a shadow.

Polygon I-sect Tests
Displays the number of times all rays were tested to see if they hit a polygon in the workspace.

Polygon Intersections
Displays the number of times all rays actually hit any polygon.

Octree Intersections
Display the number of times all rays have hit any octree partition.

Octree Size
Displays the number of boxes in the octree generated for this render.

Parallel View Properties

General Tab

Modify general parallel view properties.

Name:

Sets the name for the view to display in the title bar.

View Width:

Sets the width the current view will display. To dynamically change view width, see Workspace Mouse Operations about zooming.

World Width:

Sets the width of the world according to the current view. The sliders along side the view will only be allowed to pan inside the world width. See Workspace Mouse Operations for information on panning.

Grid Size:

Sets the size of the grid in the current view. Set Grid Size to 0 to turn the grid off.

Grid Snap:

If checked, then all drag operations in the current view will be snapped to the closest grid intersection.

Camera View Properties

General Tab

Modify general camera view properties.

Name:

Sets the name for the view to display in the title bar.

Camera:

Use this list box to select the camera from the current workspace to be the camera for the current view. Once a new camera is selected into the view, the view will redraw according to that cameras perspective.

Display Editing Objects:

When not checked, then objects such as cameras, lights, and form object axis will not be displayed in the view.

Remove Back-Facing Polygons:

When checked, only polygons which face the camera are displayed. It quickly displays only the most relevant polygons of individual objects. It does not, however, remove polygons which are obscured by other objects. This display type is useful for closed object types. Please note that when using this mode, objects which are just 'one' sided (planes, for example) will only be visible from one side.

Workspace Mode Menu

Root

Changes to the root editing mode. At this level, you may edit root objects such as form axis, cameras, and lights. This item is checked when in the root edit mode.

Point

Changes to the point editing mode of the selected form. At this level, you may edit the points of the selected form. This item is checked when in the point edit mode.

Layer

Changes to the layer editing mode of the selected form. At this level, you may edit the layer axes of the selected form. This item is checked when in the layer edit mode.

Polygon

Changes to the polygon editing mode of the selected layer. At this level, you may edit the polygons of the selected layer. This item is checked when in the layer edit mode.

Add

Changes to the add mode. This item is checked when in add mode.

To create an object, click on the primary mouse button while in add mode. An object will be created at the mouse position according to which editing level you're in. If more than one type of object can be created at a given level, then a menu will popup to allow you to choose which type of object to create.

When creating polygons, click on the primary mouse button for every point to add to the polygon. If you click on an existing point, then that point will be incorporated into the polygon. If you click in an area with no points, then a point will be created there. To finish the polygon, press Esc. See The Workspace and Objectsfor information on polygon orientation.

Select

Changes to the select and drag mode. This item is checked when in select and drag mode.

To select an object click on the primary mouse button on the object hotspot while in select mode. The hotspot is a small box which when deselected is black, and when selected is red.

Object Selection Box: To select all objects within a certain rectangular area, click and hold the primary mouse button in an area without any hotspots while in select mode; this spot will define one corner of the rectangle. Now, drag the mouse to another position to define the second corner. The selection box will be drawn as you drag the mouse. When you drag the mouse beyond the window you clicked in, the view will pan in the direction of the mouse. When you are satisfied with the area, release the primary mouse button. All the objects which have hotspots within the drawn box will be selected.

Multiple Object Selection: To select more than one object at once, hold down the control (ctrl) key and individually select the objects either by individual selection of object selection box.

Object Deselection: To deselect an object click on the primary mouse button on the object hotspot while in select mode. The hotspot is a small box which when deselected is black, and when selected is red.

Deselecting All: To deselect all objects at the current editing level, click the primary mouse button in an area with no hotspots while in select mode.

Dragging: To drag an object, click and hold the object's hotspot with the primary mouse button while in select mode. Move the mouse and the object will drag with it. To drag multiple selected objects, hold down the Control (ctrl) key, and click and hold on any of the objects hotspots with the primary mouse button. Move the mouse and all selected objects will drag with it. When you drag the mouse beyond the window you clicked in, the view will pan in the direction of the mouse. Release the mouse button when finished.

Rotate

If the selected object supports rotation, then selecting this will change into rotate mode. All normal mouse operation will be suspended. This item is checked when in rotate mode.

To rotate the object, click the primary mouse button and drag the mouse in the direction you want the object to rotate.

Dragging in the positive x direction rotates positively around the local y axis.

Dragging in the positive y direction rotates positively around the local z axis.

Dragging in the positive z direction rotates positively around the local x axis.

Scale

If the selected object supports scaling, then selecting this will change into scale mode. All normal mouse operation will be suspended. This item is checked when in scale mode.

To scale the object, click the primary mouse button and drag the mouse in the direction you want the object to scale.

Dragging in the positive x direction scales the local x axis positively.

Dragging in the positive y direction scales the local y axis positively.

Dragging in the positive z direction scales the local z axis positively.

Move

If the selected object supports moving, then selecting this will change into move mode. All normal mouse operation will be suspended. To move the object, click the primary mouse button and drag the mouse in the direction of translation. When you drag the mouse beyond the window you clicked in, the view will pan in the direction of the mouse. This item is checked when in move mode.

[Restrict Drag] No Restriction

Changes to the No Mouse Restriction mode. This item is checked when in No Mouse Restriction mode.

In this mode, when you drag the mouse, the actual position of the mouse determines the drag effect.

[Restrict Drag] Horizontal Only

Changes to the Horizontal Mouse Restriction mode. This item is checked when in Horizontal Mouse Restriction Mode. In this mode, when you drag the mouse, only the horizontal extent of the mouse drag determines the effect of the mouse drag.

[Restrict Drag] Vertical Only

Changes to the Vertical Mouse Restriction mode. This item is checked when in Vertical Mouse Restriction Mode. In this mode, when you drag the mouse, only the vertical extent of the mouse drag determines the effect of the mouse drag.

Curved Drag

Selecting this item opens the Curved Drag Dialog Box which allows you to set up curved dragging groups of points.

Curved Drag Dialog Box

This dialog sets up curved dragging of points. When the user selects a group of points and starts to drag them when curved drag is enabled, then the points are affected according to the distance of the points from the cursor point such that the point directly under the cursor is most affected while points which are further away are affected less and less according to either a linear, exponential, or bell function.

Curved drag only operates on the points of a form.

Disable
Selecting this radio button disables curved drag.

Linear

Selecting this radio button enables linear curved drag. This forms a pyramid type shape.

Exponential
Selecting this radio button enables exponential curved drag.

Exponents greater than 1 form pointy shapes.

Exponents less than 1 form steep hills.

Bell

Selecting this radio button enables bell curved drag. This forms a bell hill type shape.

Radius Of Influence
This edit box sets the maximum distance at which points will be affected in a curved drag.

Exponent
This edit box sets the exponent for exponential curved drag.

Workspace File Menu

The workspace file menu operates on the entire workspace.

Workspace Properties
Use this command to bring up the properties page of the workspace:
Workspace Property Page Dialog Box

Workspace Object Menu

Object menu functions operate on objects in views. The object menu changes according to the object currently selected. The object menu may also be viewed by clicking the secondary mouse button on an object in the view.

Cut

Use this command to copy the selection into the clipboard and to delete the selection.

Copy

Use this command to copy the selection into the clipboard.

Paste

Use this command to paste the selection from the clipboard into the current workspace. Note that the data contained in the clipboard must match the current editing level.

Delete

Use this command to delete the selection.

[File]Open...

Use this command to open a new form object from disk into the currently selected form object. When you select open, a File Open Dialog Box appears to let you select the form object file to open. The file you select will completely replace the current object.

You may only load a file into the workspace once. If you want to have multiple, separately editable, copies of an object in one workspace, then select the object and copy it using the clipboard. If you want to have multiple copies of an object which share one shape description, then create a new object and set it up as a clone of the original object.

[File]Save

Use this command to save the selected form objects to disk under their current names. Note that when you save a workspace, all forms in it are automatically saved.

[File]Save As...

Use this command to save the selected form objects to disk under new names. When you select Save As, a File Save Dialog Box will appear to allow you to select the new names. You may not give the objects file names which are already used as file names by other objects in the workspace.

Properties

Use this command to bring up the properties page of the selection. A Property page is a unique set of editable properties available for most objects. The property page format is different for every different

object type.

Property Page Dialog Box Description by Object Type:

- Form Property Page Dialog Box
- Light Property Page Dialog Box
- Camera Property Page Dialog Box
- Layer Property Page Dialog Box
- Point Property Page Dialog Box
- Polygon Property Page Dialog Box

[Find In View]Center Object

Centers the current view on the selected objects in the workspace. This function does not operate on camera views.

[Find In View]Center Object All

Centers the all non-camera views on the selected objects in the workspace.

[Find In View]Zoom Object

Centers and Zooms the current view on the selected objects in the workspace so that the objects fill the view. This function does not operate on camera views.

[Find In View]Zoom Object All

Centers and Zooms all non-camera views on the selected objects in the workspace so that the objects fill the views.

Select All

Use this command to select all hotspots at the current editing level.

Invert Selection

Use this command to deselect selected objects and to select those objects not selected.

Update Clones

Use this command to instantly update all clones. Clones are normally updated periodically by Vector Reality, however, sometimes it is necessary to update them manually.

Add Primitive

Use these commands to add a primitive layer to a selected form axis. The add primitive menu pops up to ask you for the type of primitive to create. You may select: Sphere, Cylinder, Cone, Disk, Plane, or you may cancel the operation. After determining the type of primitive to add a dialog pops up to ask you what parameters to use for primitive generation.

Primitive Parameter Dialogs:

- Sphere Definition Dialog Box
- Cylinder Definition Dialog Box
- Cone Definition Dialog Box
- Disk Definition Dialog Box
- Plane Definition Dialog Box

Array

Use this command to create a two or three dimensional array of the currently selected form objects. When you select this command, the Array Dialog Box appears to allow you to specify the type of array.

Join

When editing points, use this command to join all selected points which share the exact same position into one point. When in root mode, use this command to join a group of selected form objects under the last selected axis. When in layer mode, use this command to join a group of selected layers under the last selected layer.

Select All Components

Use this command to select all component parts of the selection. This currently works only on polygons to select the points within the selected polygons.

Extrude

Use this command on selected polygons to extrude them. This creates a 3D effect from planar objects like pushing dough through a form. The Extrude Dialog Box pops up for you to enter the extrude parameters.

Lathe

Use this command on selected polygons to lathe them. This creates a 3D effect from a planar set of polygons by spinning them around their forms' z-axis. The Lathe Dialog Box pops up for you o enter the lathe parameters.

Array Dialog Box

The array dialog box allows you to specify the creation of an array of a form object. There are two main types of arrays: positional and rotational. The type is selectable at the top of the dialog box.

Notes: It is a good idea to keep the the number values small since the number of elements generated is equal to (number in x)*(number in y)*(number in z).

Positional Array

Number:

Specifies the number of items in each direction of position. Specifiying one dimension creates a line. Specifiying two dimensions creates a plane. Specifying three dimensions creates a cube.

Spacing:

Specifies the space(in world units) between each item in each direcion

Pos Jit:

Specifies the maximum amount of positional jitter(in world units) for an element in the array in each direction

Rot Jit:

Specifies the maximum amount of rotational jitter (in degrees) for an element in the array in each direction

Rotational Array

Number:

Specifies the number of items in each direction of rotation. Specifying one dimension creates a circle segment. Specifying two dimensions creates a spherical segment. Specifying three dimensions creates a mess.

Spacing:

Specifies the space(in degrees) between each item in each direcion

Pos Jit:

Specifies the maximum amount of positional jitter(in world units) for an element in the array in each direction

Rot Jit:

Specifies the maximum amount of rotational jitter (in degrees) for an element in the array in each direction

Point Property Page Dialog Box

About Tab

Displays information on the contents of the point.
Layers In: Number of layers which have polygons which reference the point.
Polygons In: Number of polygons which reference the point.

Polygon Property Page Dialog Box

About Tab

Displays information on the contents of the point.

Points: Number of points in the polygon.

Workspace Property Page Dialog Box

General Tab

Controls general editable properties of a workspace.

Name:

Edit box which is used to name the workspace. This name is not the filename, it is used only for description purposes.

Description:

Edit box which is used to store a description of the workspace.

Render Settings File Name:

Displays the file name of the current render settings to be used for rendering the workspace.

(Render Settings File Name) Browse:

Clicking on this button brings up a browse file requester so that you may search for a render settings file to be used for rendering the workspace.

(Render Settings File Name) Edit:

Clicking on this button opens the render settings file defined in Render Settings File Name for editing.

Environment Settings File Name:

Displays the file name current environment settings to be used for rendering the environment of the workspace.

(Environment Settings File Name) Browse:

Clicking on this button brings up a browse file requester so that you may search for a environment settings file to be used for rendering the environment of the workspace.

(Environment Settings File Name) Edit:

Clicking on this button opens the environment settings file defined in Environment Settings File Name for editing.

About Tab

Displays information on the contents of the workspace.

Cameras: Number of cameras in the workspace.

Forms: Number of forms in the workspace.

Layers: Sum of the number of layers of each form.

Lights: Number of lights in the workspace.

Objects: Number of root objects in the workspace (cameras+forms+lights)

Points: Sum of the number of points in each form.

Polygons: Sum of the number of polygons in each form.

Form Property Page Dialog Box

General Tab

Controls general editable properties of a form.

Name:

Edit box which is used to name the form. This name is not the filename, it is used only for description purposes within the workspace. Whenever this form object is referenced by name in the workspace, it will be referenced by this name. This name is independent of the external form name.

Is Clone Of:

If checked then the form looses its own definition and becomes a clone of another form. A clone of a form gets it's points, layers, and polygons from it's master; however, it's root level is still unique, which means that it may be positioned, rotated, and scaled independent of its master. A clone exists only within a workspace, it has no external file characteristics; because of this, there are no External or About tabs. A clone is dynamically updated from its master as needed. To select the clone master, choose from the listbox. Only valid form possibilities are listed. Any form which is already a clone may not also be a master.

Quick Draw:

If checked, then the form is drawn only as it's bounding box; the underlying form remains intact. Use this feature if your video card is slow, and/or the form is very large to speed up drawing time.

External Tab

Controls external editable properties of a form

Name:

Edit box which is used to name the form. This name is not the filename, it is used only for description purposes within the form file. When a new form is loaded this name is copied into the workspaces form name. This name is independent of the workspaces form name.

Description:

Edit box used to describe the form. This is stored externally in the form file.

About Tab

Displays information on the contents of the form.

Is Cloned: If 'Yes,' then the form is cloned. If 'No,' then the form is not cloned.

File Name: This is the name of the file in which the forms points, polygons, and layers are stored. The axis of the form is stored in the workspace. This storage method allows the same form to be used in different workspaces in different places. The form is stored on disk in this file whenever the workspace file is saved.

Layers: Number of layers in the form.

Points: Number of points in the form.

Polygons: Number of polygons in the form.

Light Property Page Dialog Box

General Tab

Controls general editable properties of a light.

Name:

Edit box which is used to name the light. This name is not a filename, it is used only for description purposes within the workspace. Whenever this light object is referenced by name in the workspace, it will be referenced by this name.

Color:

Defines the color of the light for use in rendering.

Layer Property Page Dialog Box

General Tab

Controls general editable properties of a layer.

Name:

Edit box which is used to name the layer. This name is not a filename, it is used only for description purposes within the workspace. Whenever this layer object is referenced by name in the workspace, it will be referenced by this name.

Material File Name:

This is the file name of the material to be applied to the layers polygons during rendering.

(Material File Name) Browse:

Click on this button to open a browse file requester to select the file name of the material to apply to this layer. The file must be a valid material.

(Material File Name) Edit:

Click on this button to open the material file named in Material File Name for editing.

About Tab

Displays information on the contents of the layer.

Polygons: Number of polygons in the layer.

Camera Property Page Dialog Box

General Tab

Controls general editable properties of a camera.

Name:

Edit box which is used to name the camera. This name is not a filename, it is used only for description purposes within the workspace. Whenever this camera object is referenced by name in the workspace, it will be referenced by this name.

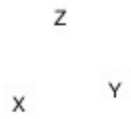
View Plane Width:

The view plane width determines the width in world units which will be displayed in the camera at the view plane distance. Increasing this number relative to the view plane distance results in a wider field of view. Decreasing this number relative to the view plane distance results in a narrower field of view.

View Plane Distance:

The view plane distance determines the minimum distance from the camera point which will appear in the camera. Increasing this number relative to the view plane width results in a narrower field of view. Decreasing the number relative to the view plane width results in a wider field of view.

Sphere Definition Dialog Box



Defines a procedurally created sphere with center at the origin.

Radius

Defines the radius of the sphere, that is, the distance from the center to any point on the sphere.

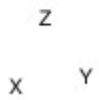
Horizontal Divisions

Defines the number of polygon divisions to divide the sphere up in to in the horizontal direction (around the z axis). Higher numbers produce a more realistic, better curved sphere, but require more memory and time to operate upon.

Vertical Divisions

Defines the number of polygon divisions to divide the sphere up in to in the vertical direction. Higher numbers produce a more realistic, better curved sphere, but require more memory and time to operate upon.

Cylinder Definition Dialog Box



Defines a procedurally created cylinder with bottom in the plane z=0 and center at the z axis.

Top Radius

Defines the radius at the top of the cylinder, that is, the distance from the center to any point on the cylinder at the top.

Bottom Radius

Defines the radius at the bottom of the cylinder, that is, the distance from the center to any point on the cylinder at the bottom.

Height

Defines the distance from the top to the bottom of the cylinder.

Number Of Divisions

Defines the number of polygon divisions around the center of the cylinder. Higher numbers produce a more realistic, better curved cylinder, but require more memory and time to operate upon.

Close Top

If checked, the cylinder will have a closed top.

Close Bottom

If checked, the cylinder will have a closed bottom.

Cone Definition Dialog Box

Defines a procedurally created cone with base at z=0, and center along the z-axis.

Radius

Defines the radius at the bottom of the cone, that is, the distance from the center of the cone to any point at the bottom of the cone.

Height

Defines the height of the cone, that is the distance from the base to the tip.

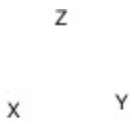
Number Of Divisions

Defines the number of polygon divisions around the center of the cone. Higher numbers produce a more realistic, better curved cone, but require more memory and time to operate upon.

Close Bottom

If checked, the bottom of the cone is closed.

Plane Definition Dialog Box



Defines a procedurally created plane located in the plane z=0 with center at the origin.

Width
Defines the width of the plane, that is the distance from left to right along the y axis.

Height
Defines the height of the plane, that is the distance from the top to the bottom along the x axis.

Horizontal Divisions
Defines the number of polygon divisions along the y axis.

Vertical Divisions
Defines the number of polygon divisions along the x axis.

Disk Definition Dialog Box

Defines a procedurally created disk in the plane z=0 with center at the origin.

Radius
Defines the radius of the disk, that is the distance from the center to any point on the disk.

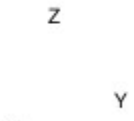
Number Of Divisions
Defines the number of segment divisions around the center of the disk.

Make Center Point
If checked, the disk will have a center point connected radially to all other points on the disk.

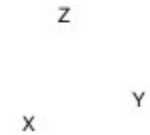
Extrude Dialog Box

Defines how selected polygons should be extruded. An extrusion forms a 3D object out of a 2D one. For example, a box is an extrusion of a square polygon.

Example:



Starting Form



Extruded Form

Number Of Divisions
Defines the number of polygon layer divisions along the extrusion.

Translation
Defines the ending position of the extrusion relative to the starting position.

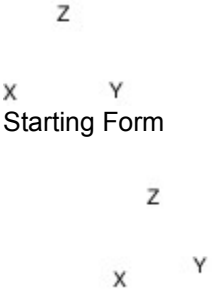
Scale
Defines how the scale of the polygons at the end of the extrusion relative to their starting size.

Rotation
Defines how to polygons are rotated at the end of the extrusion relative to their starting rotation.

Lathe Dialog Box

Defines how selected polygons should be lathed. A lathe spins a 2D polygon to form a 3D object. For example, a lathe of a circle positioned away from the axis is a donut shape called a torus.

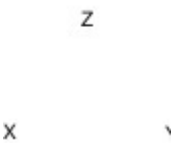
Example Lathe no Sealed Center:



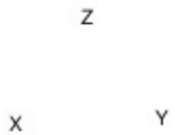
Starting Form

Lathed Form

Example Lathe with Sealed Center:



Starting Form



Lathed Form

Number of Divisions

Defines the number of polygon divisions of the lathe around the z axis.

Sealed Center

If checked the lathe is sealed off. This means that the top and bottom points are unique and the last polygon segment is removed. If sealed center is not checked, then the all parts of the polygon are used and the top and bottom points of the lathe will not be unique.

Render Settings Editor

A Render Settings file describes the image file which renderer will create and some parameters of how the rendering should be done. The Render Settings Editor represents a Render Settings File by dialog controls which allow the manipulation of the file. The following controls are used:

Name

Use this control to edit the name of the render settings file. This name is for descriptive purposes only, it is not the file name.

Width

Use this control to edit the width of the image, in pixels, to be output by the renderer.

Height

Use this control to edit the height of the image, in pixels, to be output by the renderer.

Pixel Ratio

Use this control to edit the pixel ratio of the image to be output by the renderer. The pixel ratio is the ratio of the width of a pixel over its height. For instance, if a pixel on the output device is twice is wide as tall, then enter 2 here to create an image with the correct aspect for display. Most display devices use square pixels, so the pixel ratio should be 1.

JPeg Quality

Use this control to edit the quality of the JPeg file created by the renderer. The quality range is 25 to 100, where 100 produces the best images but the worst compression, and 25 produces the worst quality images but the highest compression.

Octree Limit

An octree is a device used to speed up rendering. A large octree limit uses more memory and takes longer to build, but, on average, the overall render will take less time. A small octree limit will use little memory and take less time to build, but, on average, the overall render will take longer. The default, 6, will work well most of the time. However, if you are low on memory, you may want to try 4 or 5. If you have a lot of memory (>8Mb), are working on a fast machine, and are working on large workspaces, then you may want to raise this number to 7 or 8.

Depth Limit

The rendering process used in Vector Reality is ray tracing. In ray tracing, light rays are reflected and transmitted. Every time a new reflection or transmission occurs, a new ray is created, and the depth limit for that ray increases by one. If you don't want any reflections or transmissions to occur, then set he depth limit to one. To enable reflections and transmissions to occur, set this number greater than one. In highly reflective scenes, you will get better results by rasing this number, however, as you increase this number, the rendering may take longer.

Auto Display Render

If Checked, then once a rendering is complete, the resulting image will be loaded into the Image Viewer.

Supersampling

You may select no, low, medium, or high supersampling. Supersampling results in higher quality images at the expense of rendering time. Use no supersampling when rendering test images. For the final image, it may be appropriate to select anything from low to high supersampling. Please note that supersampling increases rendering time dramatically: if you take the time for rendering an image at no supersampling to be 1x, then the rendering time for each of the supersampling levels is as follows low: 4x, medium: 9x, high 25x.

Image Viewer

The image viewer is used to display images created by Vector Reality and other programs. The image viewer supports JPeg (jpg), Targa (tga), Tiff (tif), PhotoCD (pcd), PCX (pcx), and Windows Bitmap (BMP) image types. Only image viewing is supported, therefore, you may only open images, not save them. These images are displayed in a window. It's recommended that you be in a graphics mode that can produce 256 or more simultaneous colors.

For users of 256 color graphics modes, an optimal palette will be computed for display. The displayed image will not perfectly represent the actual picture due to the lack of display colors. In these palette based modes, only one image can be displayed an optimal palette, therefore, when more than one image is opened only the image with the active display will be displayed optimally.

For users of true color graphics modes (16, or 24 bit) no palette is computed. Pictures displayed on true color graphics mode will more accurately represent the actual image than those produced on 256 color displays. Since there is no palette, many pictures may be opened simultaneously, all with optimal displays.

Color System

Whenever there is an editable color it is represented by a color button. This color button is roughly square and displays the current color inside the button. To edit the color, click on the color button. The Select Color Dialog Box then pops up for editing.

Sometimes, it is necessary to define a range of colors. Whenever there is an editable color range, it is represented by a color map button. This color map button is much longer than it is tall and it displays the current color map inside the button. To edit the color map, click on the color map button. The Color Map Dialog Box then pops up for editing.

Select Color Dialog Box

The select color dialog box edits a color. In Vector Reality colors are defined by three components, Red, Green, and Blue. The three color components are mixed together to form any possible color. Each component ranges in value from 0 to 255 where 0 corresponds to none of that component, and 255 corresponds to the maximal amount of that component.

The current color composed in the Select Color Dialog Box is displayed top and center.

Red,Green,Blue

The red, green, and blue components are edited either by typing in the value in the corresponding edit box, or by moving the corresponding slider up or down.

Hue,Sat,Level

You may also edit the color by modifying hue, saturation, and level values. Hue selects the type of color, saturation selects the grayness or depth of color, and level selects the brightness of the color.

Color Map Dialog Box

The Color Map Dialog Box edits a color map. A color map is a range of colors. The range of colors is specified by setting the color of any of 21 distinct color boxes located evenly throughout the map and by specifying how that particular color box affects the color map.

Color Boxes

The color boxes start in the top left corner of the dialog and continue to the right. To set the current color box, click on it. The properties of the color box are displayed at the bottom of the dialog box. The color of it is displayed in a color button, and one of the radio buttons are selected to show its type.

Color Button

Click on this button to edit the color of the current color box.

Color Box Types

Click on a color box type to edit the type of the current color box. A Color Box may be either Solid, Linear, or Empty. A Color Box defined as empty does not affect the color map. A Color Box defined as Solid colors the portion of the color map from the last defined color box to the current Color Box the color defined in the color button. A Color Box defined as Linear colors the portion of the color map from the last defined color box to the current a range of colors varying linearly from the previously defined color to the color of the current color box.

Environment Editor

The environment editor is used to setup the background effects of a rendering. The Environment Editor represents a Environment File by dialog controls which allow the manipulation of the file. The following controls are used:

Name

Use this control to edit the name of the environment file. This name is for descriptive purposes only, it is not the file name.

Horizon

Click on this color box to edit the background color at the horizon (the color at the xy plane).

Enable Poles

Check this box to have the background color change as the camera is pointed from the Positive Pole to the Horizon to he Negative Pole. If not checked, then the entire background color is the horizon color.

Pole Tension

This edit box controls the Pole Tension. The pole tension is a number greater than zero. As the number goes from one toward zero more and more of the pole colors are pushed toward the horizon. As the number goes from one up, more and more of the horizon color is pushed away from toward the poles.

Positive Pole

Click on this color box to edit the background color at the positive pole (the color at the +z axis).

Negative Pole

Click on this color box to edit the background color at the negative pole(the color at the -z axis).

Shell Size

This edit box controls the radius of the background environment shell. The background environment shell is a large sphere centered at the world origin in which all background environmental effects are projected upon. The default value is normally sufficient. However, this value should always be large enough to encompass all objects within the workspace the environment is used in.

Stars

When greater than 0, stars are placed on the environment shell in front of the background color. The higher the number, the more stars are placed on the shell. A number of 0.1 produces just a few stars.

Fog Occluded/Unit

When set greater than 0, fog is placed in the environment. This value determines the percent of

'haziness' per world unit of distance from the view position. To set up for your scene, determine the maximum distance you want to be able to see from the camera, and set this value equal to 100/(Max Distance).

Fog Color

Click on this color box to edit the color of the fog.

Ambient Light

Click on this color to edit the color of ambient light in the environment. Ambient light comes from every direction onto every object in the scene. A value of 40,40,40 is normally a good value. When set much higher, the scene becomes washed-out.

Shadows

If checked, then shadows will be rendered in the environment.