LynX/Vega NT Version 3.5 Tutorial

June 2000

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LynX/Vega Tutorial

The purpose of this tutorial is to familiarize you with LynX, our Graphic User Interface (GUI) and Vega, our Application Program Interface (API). Each section gives you rudimentary instructions on how to create a simple simulation with a tank driving over the terrain. Detailed information for each topic is available in your Lynx User's Guide and Vega Programmer's Guide.

If you have any questions or problems regarding this tutorial please consult your local MultiGen-Paradigm Sales Representative.

Introduction

Vega ™ is a software environment for virtual reality and real-time simulation applications. By combining advanced simulation functionality with easy-to-use tools, Vega provides a means of constructing sophisticated applications quickly and easily. Vega is available on IRIX, NT, and Linux platforms.

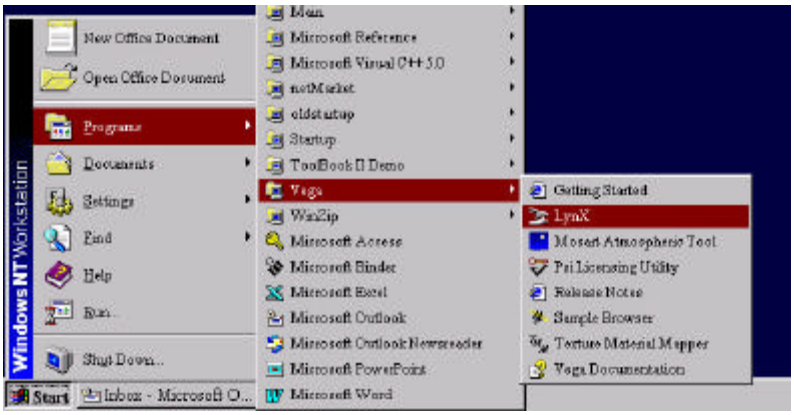
LynX ™ is the graphical user interface for defining and previewing Vega applications. These Vega applications are programs that you create using the Vega development environment or using a basic Vega executable provided with all Vega packages.

A real-time interactive visual simulation requires the specification of many values. The position of the observer, the nature and placement of players and objects in the scene, how to move around the scene, the lighting setup, the specification of the environment and environment effects, and the consideration of the target hardware platform are a few of the many parameters that must be considered. LynX helps you manage details concerning the values of these parameters through a graphically oriented point-and-click interface.

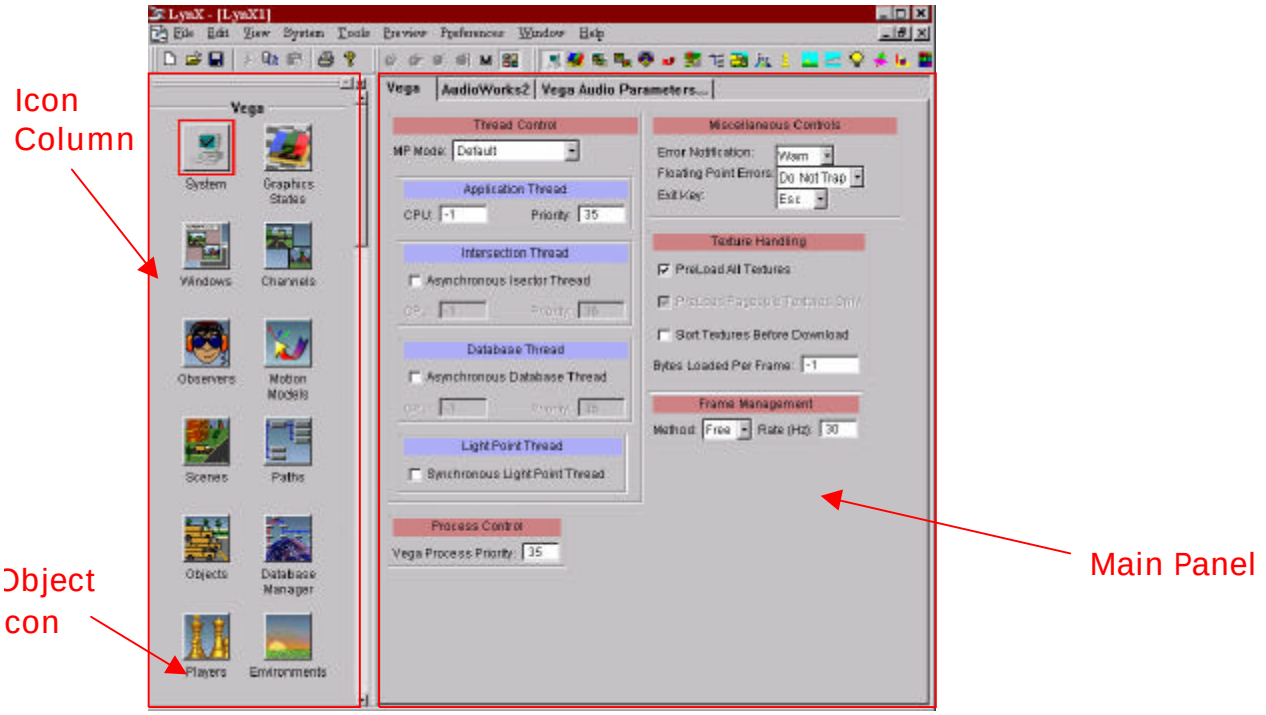
Getting Started

For NT Users:

- From the Windows NT Workstation Toolbar :
  Select **Start '➔ Programs '➔ Vega '➔ LynX '**



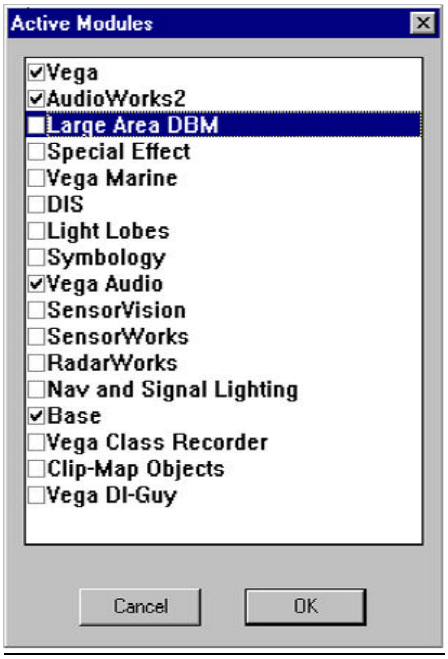
You should see the LynX System Panel on your screen.
The icon row on the left side of the screen will enable you to switch from one LynX panel to the next. The Main Panel changes based on the icon you have selected. By default you have all the necessary instances defined to preview an application: system, channel, window, environment, graphic state, observer and a motion model.



Setting up the System

Goal: Disable the unused Add-On Modules

- Go to the File Pull down menu and Select Active Modules. In this dialog box you want to deselect the following: Large Area DBM, Light Lobes, Symbology, Clip-Mapped Objects, and SensorVision.



You can activate or de-activate an Add-On Module by making your selections and pressing 'OK'

- When you are finished, press 'OK'.

Create a Vega Object

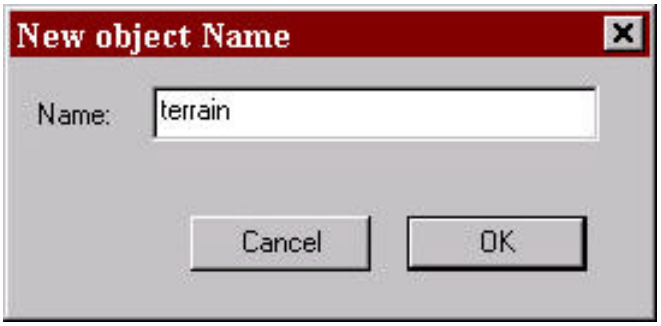
An object is a collection of geometry and attributes maintained within a single hierarchy.
For more details, see Vega LynX User's Guide Chapter 5.

Goal: Create a static Vega Object

- Go to the Objects Panel by selecting the Object Icon in the Icon Column.

- Under the Objects pull down menu select 'New'.

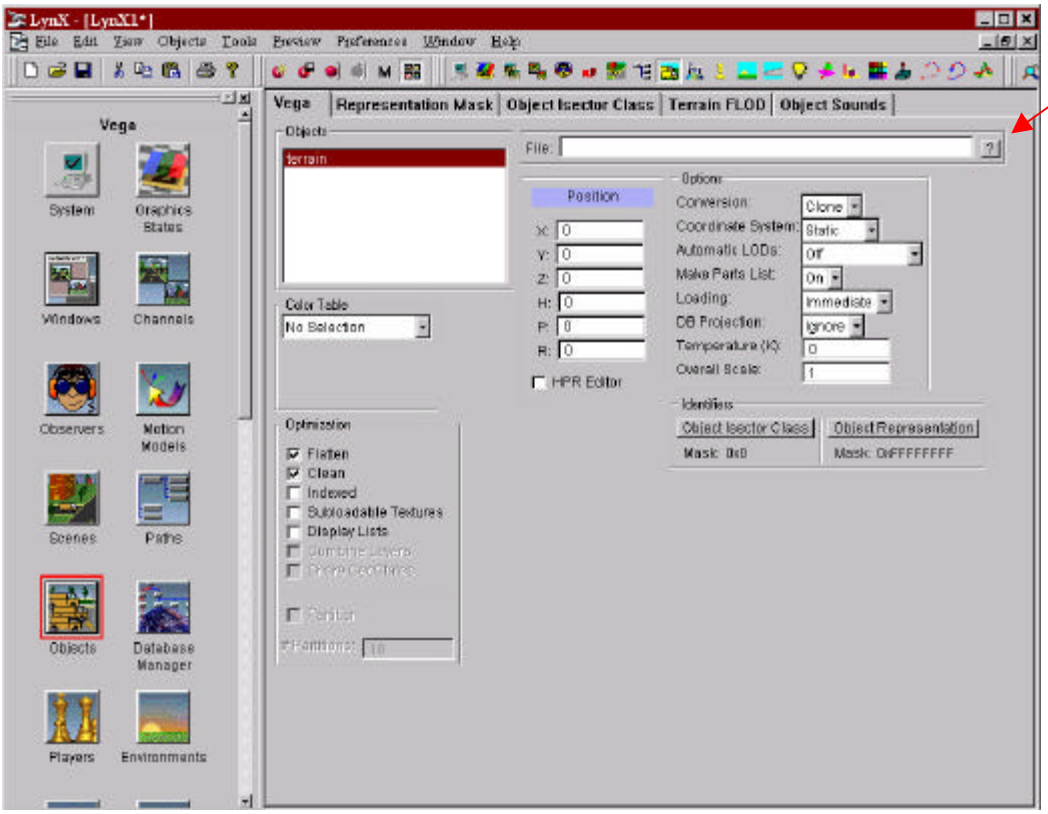
- A dialog box will appear labeled 'New Object'. In the text edit field type 'terrain' to name your object instance.



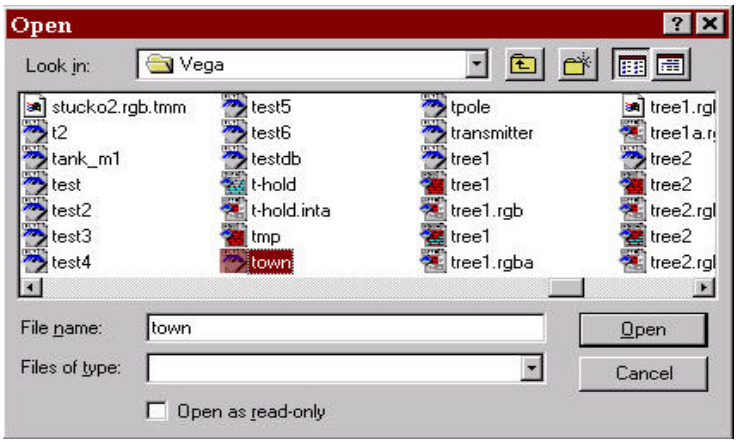
NOTE:
The name you assign is user defined! Use intuitive names to quickly identify the geometry files in use.

- Press 'OK'.

- At this time, your object panel should look like the one shown below.



- Using the File Browser (?) associate the desired geometry file with this Vega Object instance. Sample Open Flight files can be found <Installation Drive for Vega>\Vega\Sample\Data\Vega\



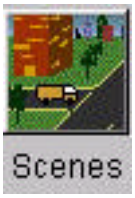
- Highlight 'town' or type 'town' in the text edit field.
- Select 'Open'.

Add the Vega Object to the Scene

The scene is a collection of objects that may be viewed. Objects may be added and removed from a scene. No restrictions are placed on the number of Scenes that are created or used. Objects, Special Effects and Marine Effects must be attached to a scene before they are visible. For more details, see :

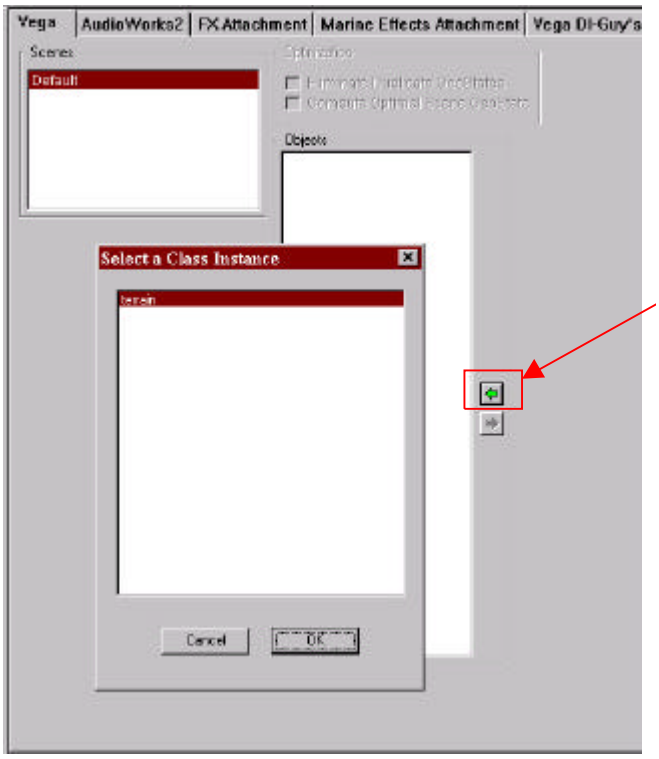
Vega LynX User's Guide Chapter 5.

Goal: Add the Vega object to the scene.



- ❑ Go to the Scene Panel by selecting the Scene Icon in the Icon Column.

- ❑ Go the Scenes Panel and press the left arrow on the Objects widget and select the 'terrain' in order to include it in the scene.



NOTE:
The left facing arrow will invoke the Select a Class Instance Dialog Box.

- ❑ Highlight terrain and press 'OK'.
- ❑ Go to the LynX Menu Bar and select 'File' ➔ Save As 'and name your 'yourname.adf'. Press 'OK'.

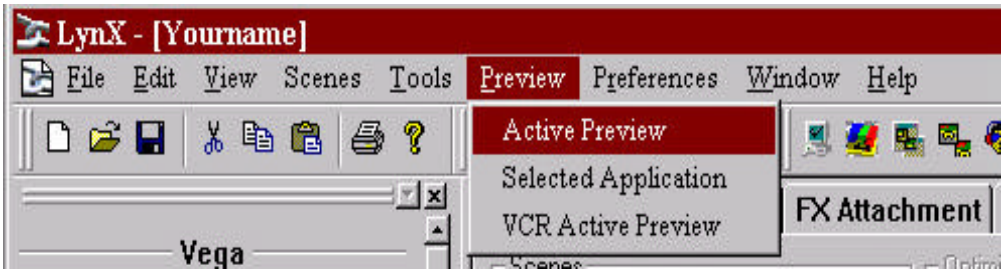
Running Active Preview

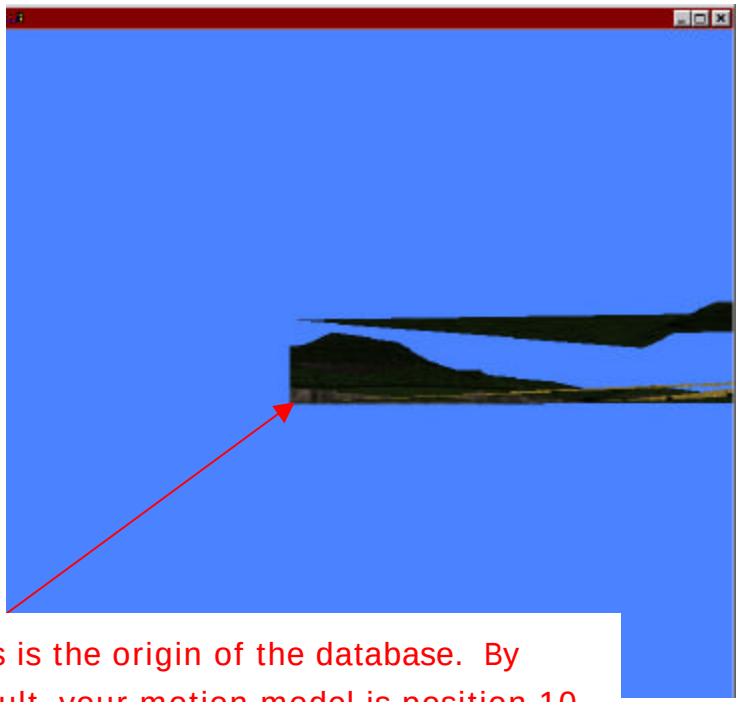
Active Preview is a basic Vega application defined by the current state of the ADF in the LynX Window. This Active Preview application is responsive to changes in parameters brought about by interaction with LynX widgets. While the Active Preview application is running, some widgets is LynX are desensitized to indicate that the user may not change the parameters associated with those widgets and expect to see corresponding changes in the application. For more details, see:

Vega LynX User's Guide Chapter 7.

Goal: View your work using the Vega Active Preview

- Go to the LynX Menu Bar and select "Preview" → "Active Preview".





This is the origin of the database. By default, your motion model is position 10 data base units (dbu) away from the origin. Note: Your eye point will be in motion.

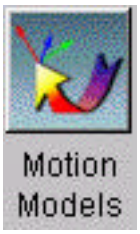
- A Vega Simulation window should appear and your observer should be "ufo"ing out around the terrain's origin. You may find the motion model a little difficult to use. The next step is to reconfigure the motion model so it becomes easier to handle.

Modify the Default Motion Model

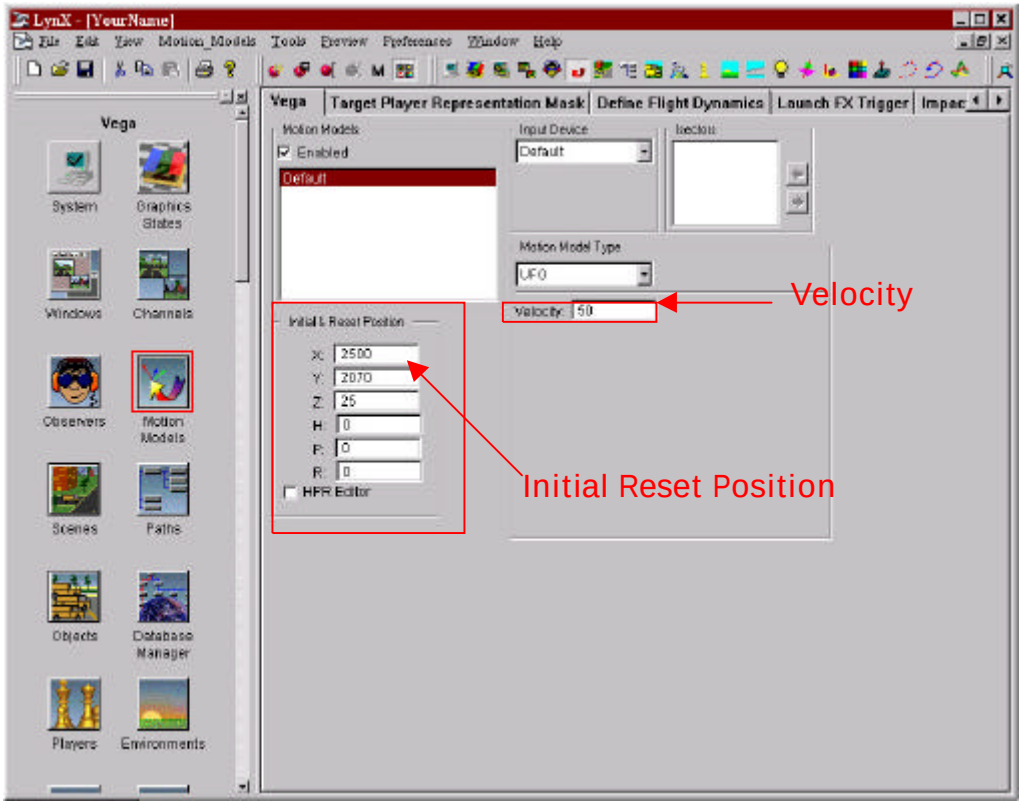
The motion models are a simplistic means of moving around in the database. They are non-physics based. This panel allows you to create and manage motion model class instances. Once created, a motion model can be attached to an observer class instance, or to a player class instance. By using an input device, each motion model type allows the user to interactively control the position and orientation of the attached observer or player. *All new Application Definition Files include a default motion model.* For more details, see:

Vega LynX User's Guide Chapter 5.

Goal: Configure the motion model.



- Go to the Motion Models panel by selecting the Motion Models Icon in the Icon Column.



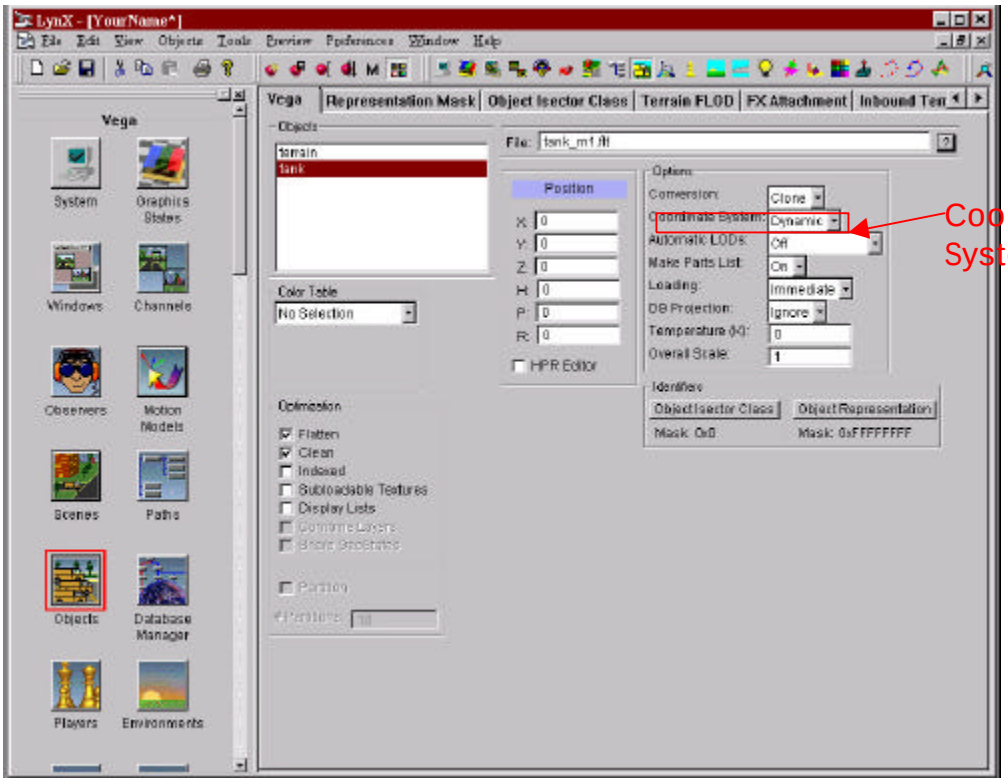
- Change the Initial Reset position to :
  - X = 2500
  - Y = 2070
  - Z = 25

- ❑ You also may want to decrease the Velocity for this UFO motion model to 50 DBU per second so that it is more maneuverable. Press the left mouse button to thrust the UFO motion model forward. Press the right mouse button to thrust backwards. To 'hover' move the mouse cursor to the middle of your simulation window. Press all three mouse buttons and your motion model will reset its position to the one indicated on the LynX panel. You should be near the center of the database.
- ❑ Exit the application by hitting the ESC key on your keyboard while your cursor is in the Active Preview window.
- ❑ Go to the LynX Menu Bar, select 'File' ➔ 'Save'.

Create a Dynamic Object

Goal: Create a tank to drive along the terrain.

- ❑ Go to the Objects panel and create a New instance of an object. You will find this feature under the Objects Pull down Menu, choose 'New'.
- ❑ Call this new object 'tank'.
- ❑ Using the file Browser (?) associate the necessary geometry with this instance, it can be found: <*Installation Drive for Vega*>*Vega**Sample**Data**Vega*\
- ❑ Highlight 'tank_m1' or type 'tank_m1' in the text edit field. Press 'Open'.
- ❑ Change the Coordinate System from 'Static' to 'Dynamic'.



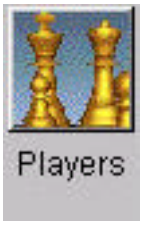
- ❑ Go to the Scenes Panel and push the left arrow on the Objects widget.
- ❑ Place the tank object in the scene by highlighting 'tank' and left clicking on the 'OK' button. You should now have both the terrain and the tank objects in your scene.
- ❑ Go to the LynX Menu Bar, select 'File' ➔ 'Save'.

Create a Player for the Dynamic Object

A player represents a dynamic entity within the simulation that may be positioned, oriented, and controlled by the user. In Vega, players are represented by either a single object or multiple objects. For more details, see:

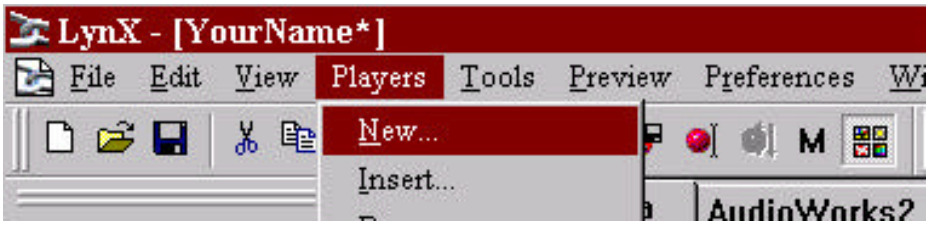
Vega Lynx User's Guide Chapter 5.

Goal: Create a Player for the tank object

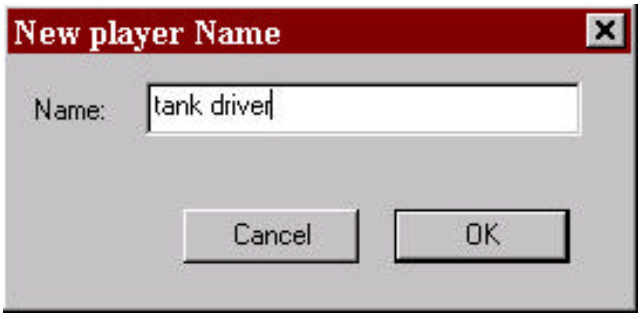


- ❑ Go to the Players panel by selecting the Players Icon in the Icon Column.

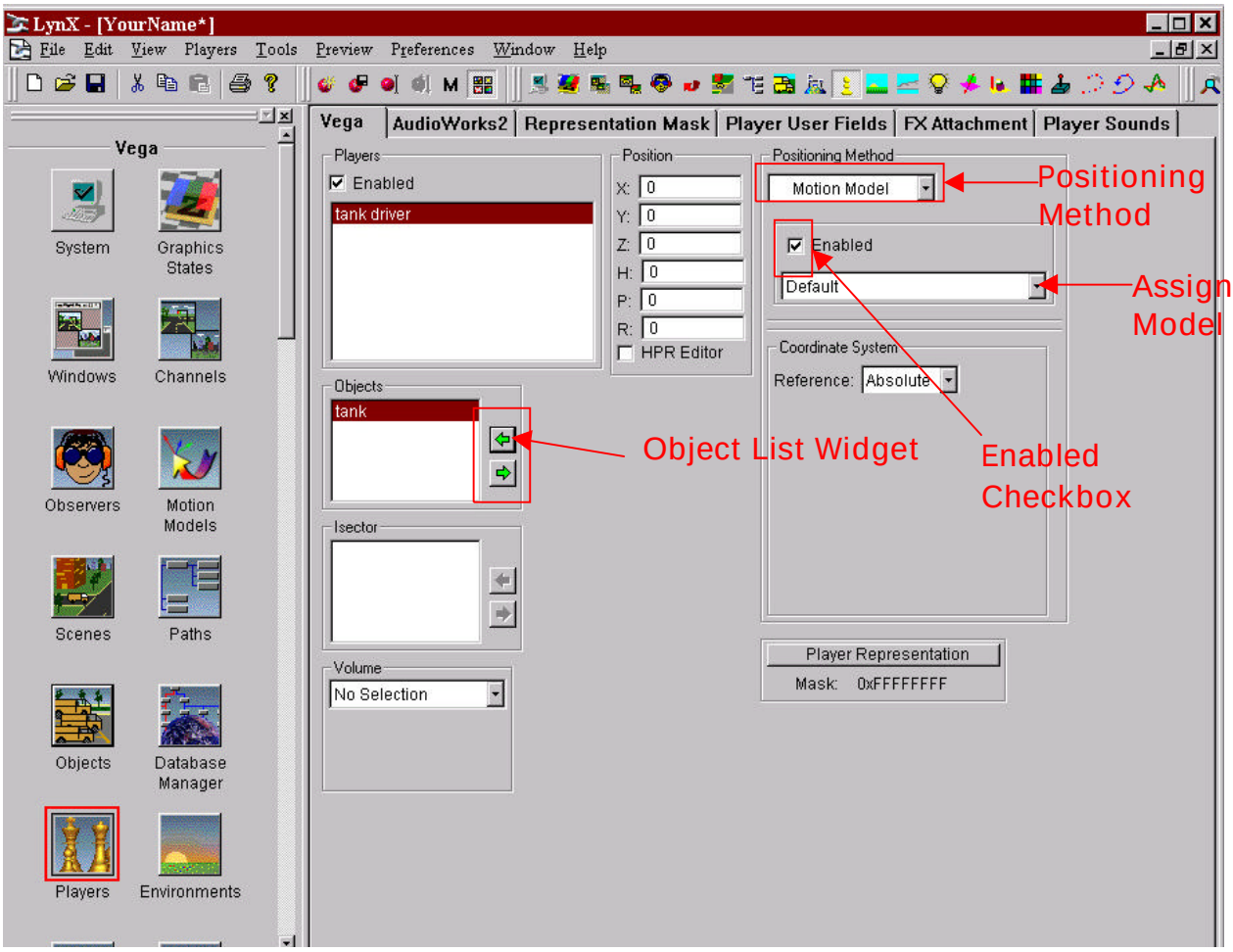
- ❑ Under the Player pull down menu select 'New'.



- ❑ To name your player, type 'tank driver' in the text entry field.



- ❑ Press 'OK'.



- ❑ On the player's panel, select the left arrow under Objects Label to display a list of available object.
- ❑ Highlight the 'tank' object and press 'ok'. This association will allow the tank player to move the tank object.
- ❑ Set your positioning method to 'Motion Model'.
- ❑ Check the box labeled 'Enable'.
- ❑ Assign the 'Default' motion model to the player by selecting from the available list of motion models.

Goal: Modify the motion model to something more suitable for a tank.

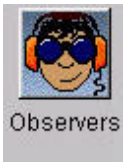
- ❑ Go to the Motion Model panel.
- ❑ Change the Motion Model type from 'UFO' to 'Drive'.
- ❑ Go to the LynX Menu Bar, select 'File' ➔ 'Save'.

Modify the Default Observer

An observer can be compared to a movie camera positioned in the database. The observer is more powerful than a real camera in the sense that it controls the load management and can be tethered to a player or be positioned by an attached motion model. An observer is required for viewing a scene. All new Application Definition Files include a default observer. For more details see:

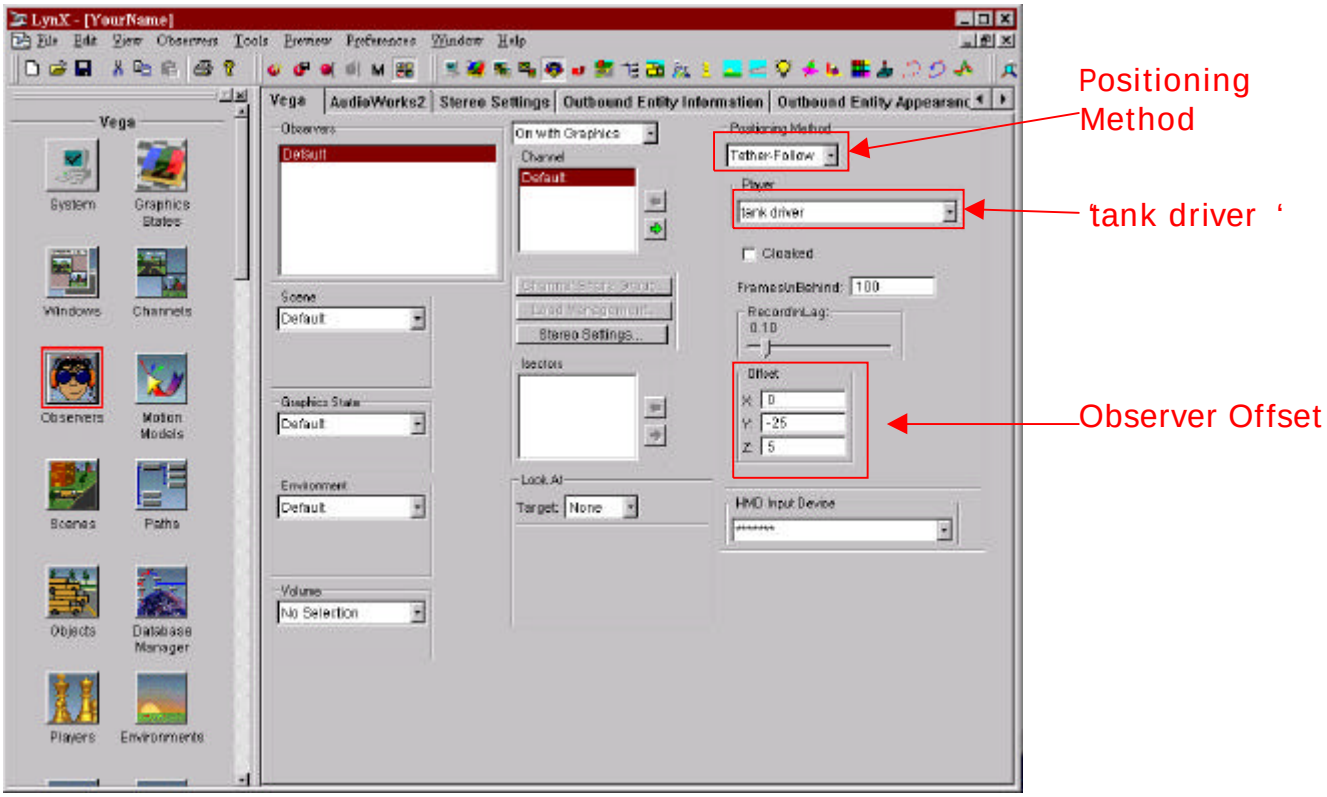
Vega Lynx User's Guide Chapter 5.

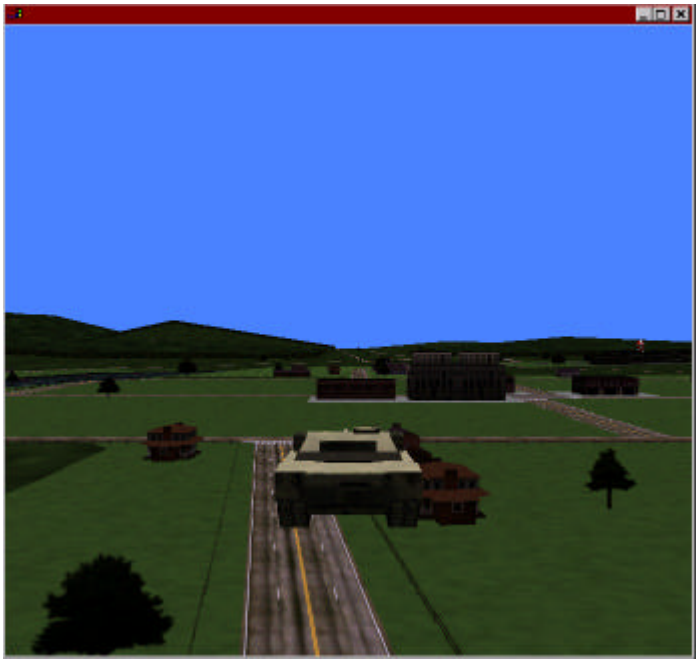
Goal: Configure the observer to follow the tank.



- ❑ Go to the Observers panel by selecting the Observers Icon in the Icon Column.

- ❑ Change your Default Observer's Positioning Method to 'Tether-Follow'.
- ❑ Set the Default observer to tether-follow the 'tank driver'.
- ❑ Change the offset of your observer as follows X=0, Y= -25, Z = 5.





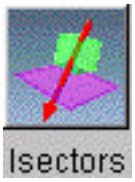
- LynX Menu Bar, select 'Preview' ➔ 'Active Preview'.
- Watch as your tank drives above the ground. There is no mechanism to keep the tank clamped to the terrain.
- Move your mouse into the simulation window and press 'ESC' on the keyboard to exit active preview.
- Go to the LynX Menu Bar, select 'File' ➔ 'Save'.

Create a Vega Isector

Goal: Create an isector to map the tank over the terrain.

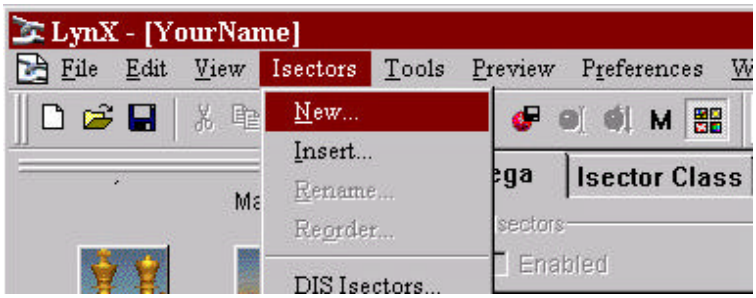
An isector is a means of implementing a collision detection. When an isector is instanciated, it requires a target, a method and a class mask. A logical and (&) between the class mask of the isector and the class mask of the target must result in a value greater than zero in order to activate collision detection. For more details see:

Vega Lynx User's Guide Chapter 5.

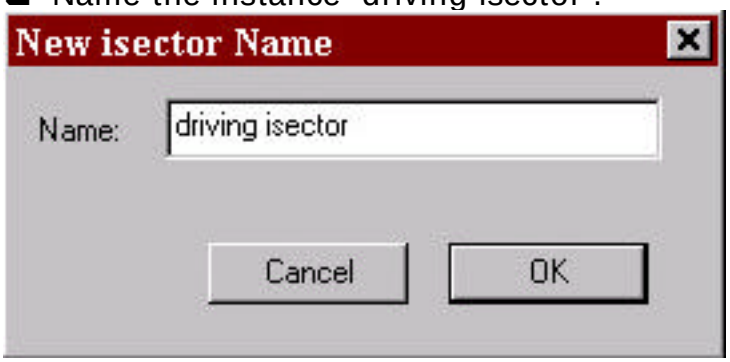


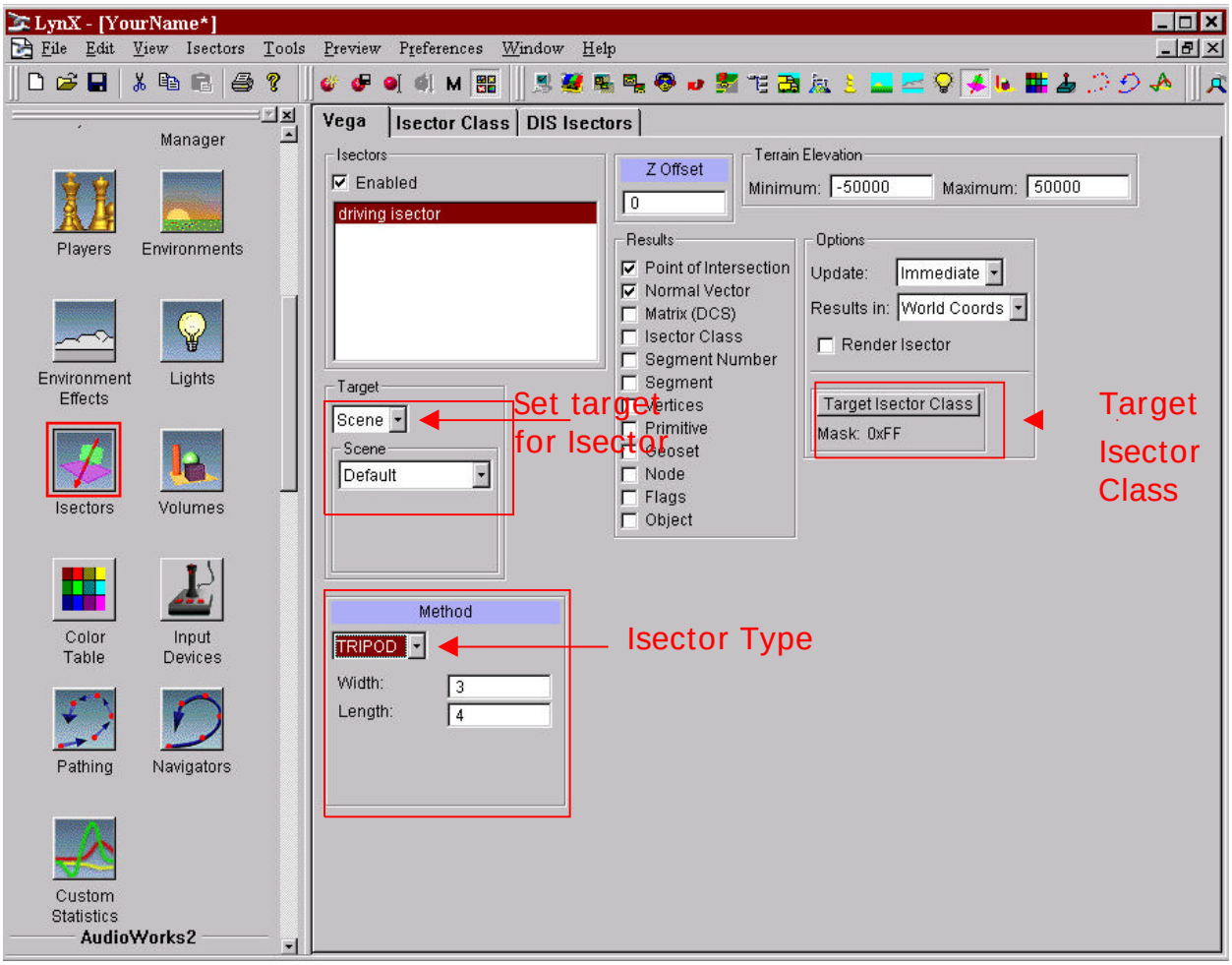
- Go to the Isector panel by selecting the Isector Icon in the Icon Column.

- Go to the Isector pulldown menu
- Select 'New' to create a new Isector instance.

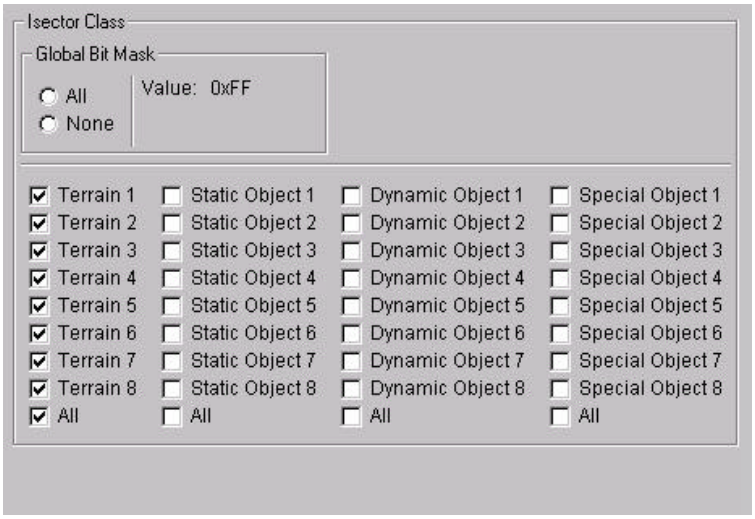


- Name the instance 'driving isector'.



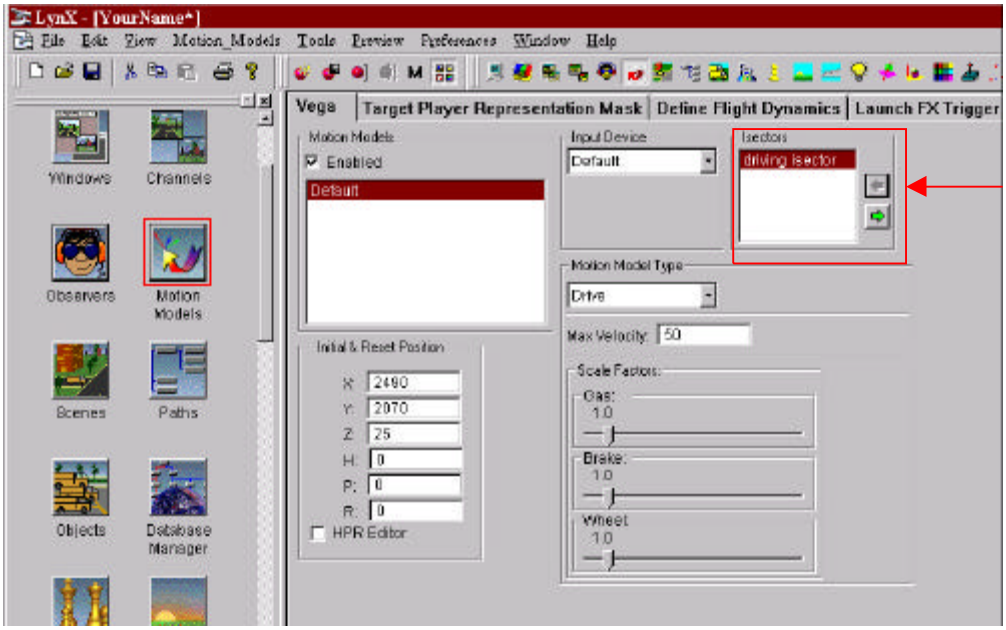


- In the Target widget set the type to be 'Scene'
- Select the Scene named 'Default'
- Set the Method of the Isector to be 'Tripod'.
- Set the Isector Class by selecting the 'Target Isector class' button within the options widget.
- Set all terrain bits on.



Note:The terrain bits may be selected by default. If so, just verify that at least one the terrain bits is checked.

- Go to the LynX Menu Bar, select 'File' ➔ 'Save'.

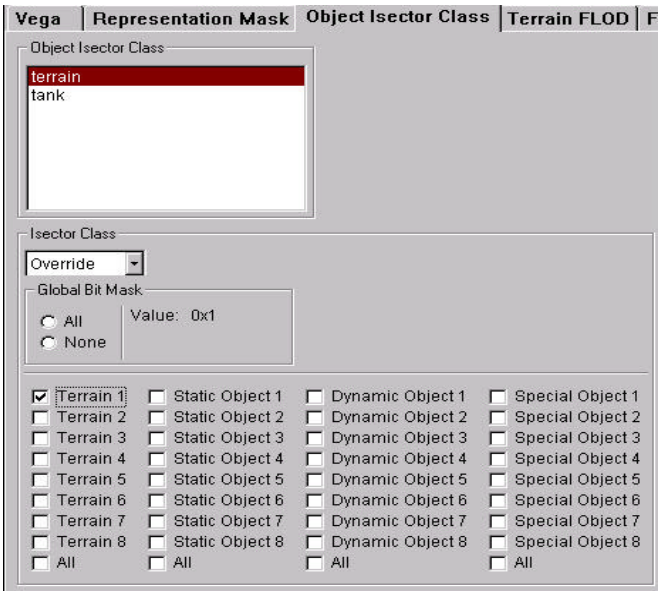


Add the Isector to the motion model

Goal: Attach the isector to the motion model.

- Go to the Motion Models panel.
- Press the left arrow of the Isectors Widget
- Select 'driving isector' from the list of available Isectors.
- Select 'OK'.
- This action attaches the Isector to the Motion Model.

Goal: Set the Class mask for the target, the terrain object.



- ❑ Go to the Objects Panel.
- ❑ Highlight the 'terrain' object
- ❑ Go to the widget labeled Object Isector Class
- ❑ Left mouse click over the button labeled 'Terrain 1'.
- ❑ Go to the LynX Menu Bar, select File' ➔ Save'.

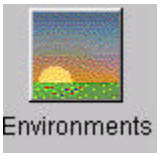
- ❑ Go to the LynX Menu Bar, select Preview' ➔ 'Active Preview'.
- ❑ Drive over the terrain. The tank should map to the contours of the terrain without sinking below or floating above.

Modify the Default Environment

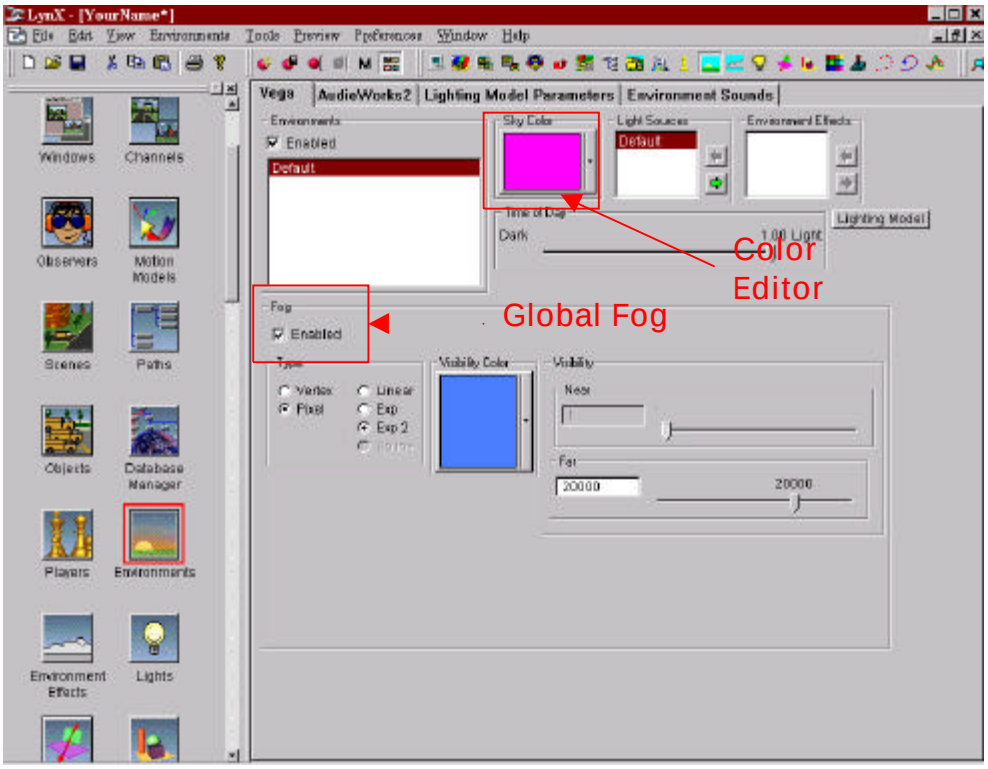
The environment contains information describing the atmospheric conditions within the scene. An environment provides a means of control for the current fog model, visibility ranges, and time of day setting. All new Application Definition Files include a default environment. For more details see:

Vega Lynx User's Guide Chapter 5.

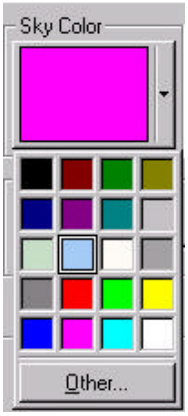
Goal: Modify the sky color.

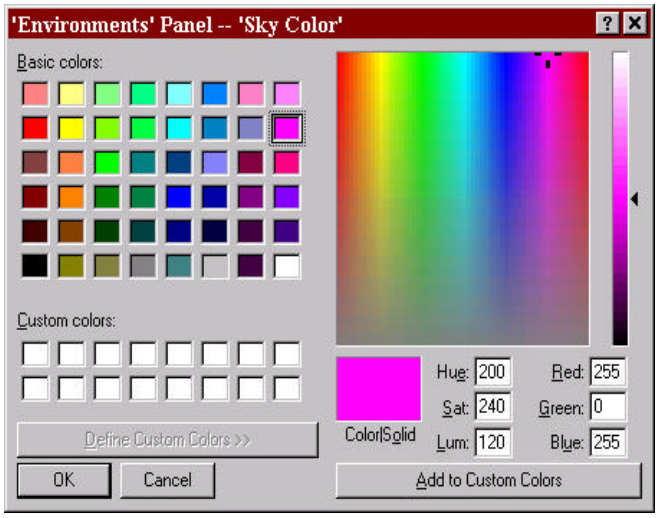


- Go to the Environments panel by selecting the Environments Icon in the Icon Column.



NOTE: A color editor is associated with each colored box you see in LynX. Pressing 'Other' will give you more options.





- ❑ Select a shade that is bright and unique and press 'OK'.
- ❑ Disable 'Fog' by deselecting the check box labeled 'Enabled'.

- ❑ You should see the new sky color in the Active Preview Simulation window.
- ❑ Adjust the color to something more appealing.

Goal: Modify the time of day.

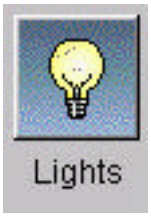
- ❑ Go to the environments panel
- ❑ Use the Time of Day slider to change the value from 1.0 to .5
- ❑ Notice the scene appears darker.
- ❑ Move the Time of Day slider to 0.0. Note the scene is completely black.
- ❑ Move the Time of Day slider to 1.0
- ❑ Move your mouse into the simulation window and press 'ESC' on the keyboard to exit active preview.
- ❑ Go to the LynX Menu Bar, select 'File' ➔ 'Save'.

Add a New Light Source

The lights panel provides a simple way of adding and editing light sources. A light source illuminates the scene in a specified way. Lights cannot be seen, they only affect what you see. All new Application Definition Files include a default light source. For more details see :

Vega Lynx User's Guide Chapter 5.

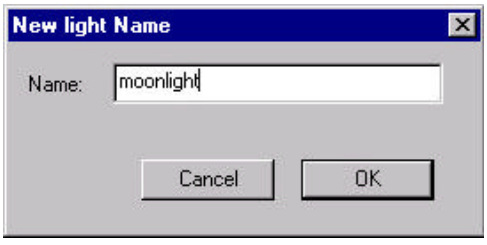
Goal Add moon light to your simulation.

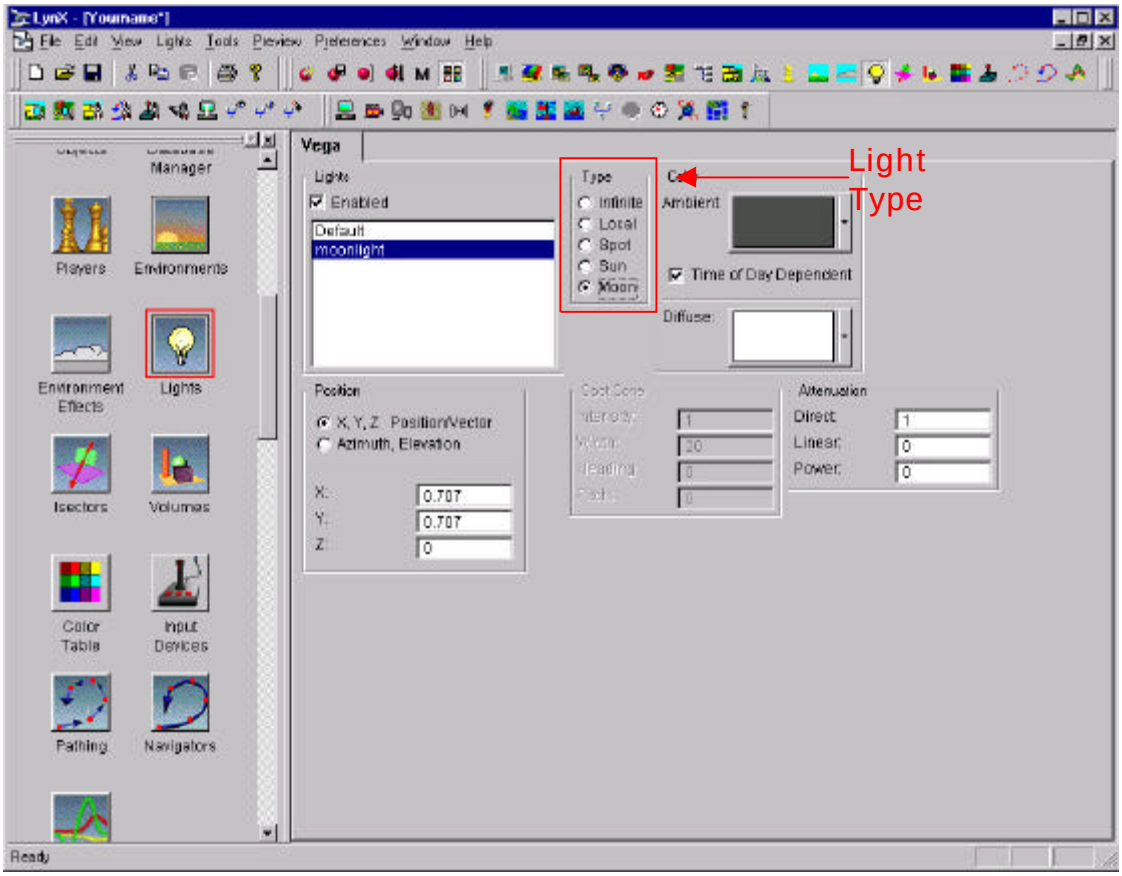


- Go to the Lights panel by selecting the Lights Icon in the Icon Column.

- Go to the 'Lights' pull down menu and select 'New'.

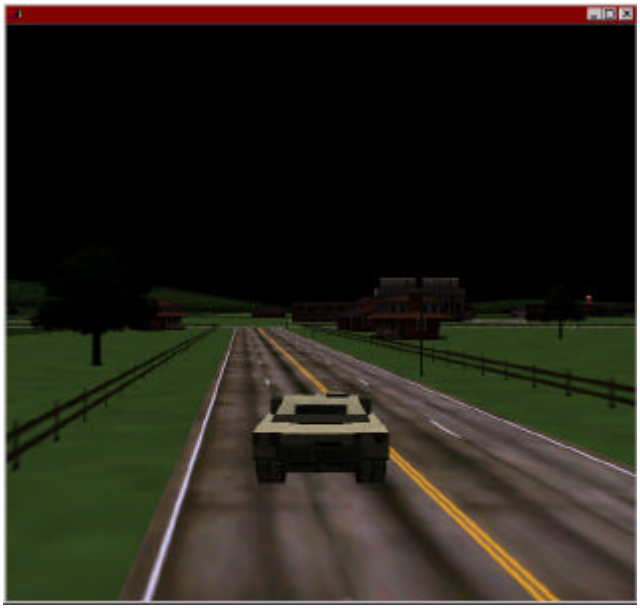
- Name the new light source 'moonlight'. Press 'OK'.





- ❑ Set the light type to 'Moon'.

- ❑ Go to the Environments Panel
- ❑ Go to the Lights Widget.
- ❑ Use the left facing arrow to add the new light source to the environment. If the light source is not included you will not see its affect in the scene.



- ❑ Go to the LynX menu bar. Select 'Preview' → 'Active Preview'.
- ❑ Go to the 'Environments Panel'.
- ❑ Move the Time of Day slider bar to '0.0'.
- ❑ The sky will darken, but the objects in the scene are illuminated by the moonlight.
- ❑ Move the Time of Day slider to '0.5'.
- ❑ Move your mouse into the simulation window and press 'ESC' on the keyboard to exit Active Preview.
- ❑ Go to the LynX Menu Bar, select 'File' → 'Save'.

Create a Vega Environment Effect

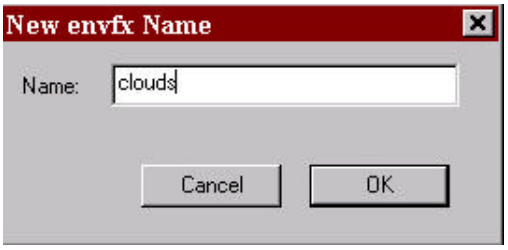
Environment effects are commonly observed atmospheric phenomenon i.e. ground fog, storms and horizon glow.

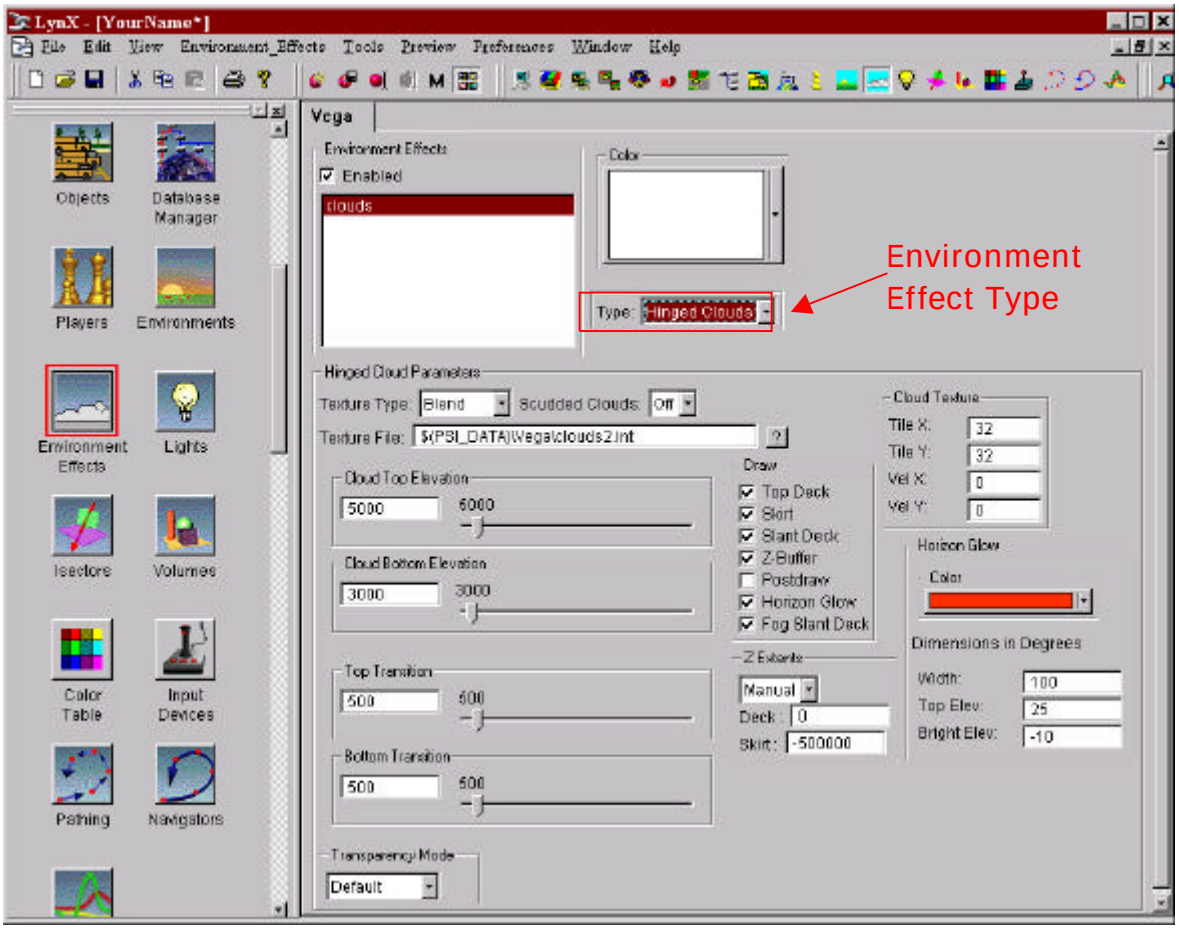
Goal: Add clouds to the environment.

Go to the Environment Effect panel by selecting the Environment Effects Icon in the Icon Column.

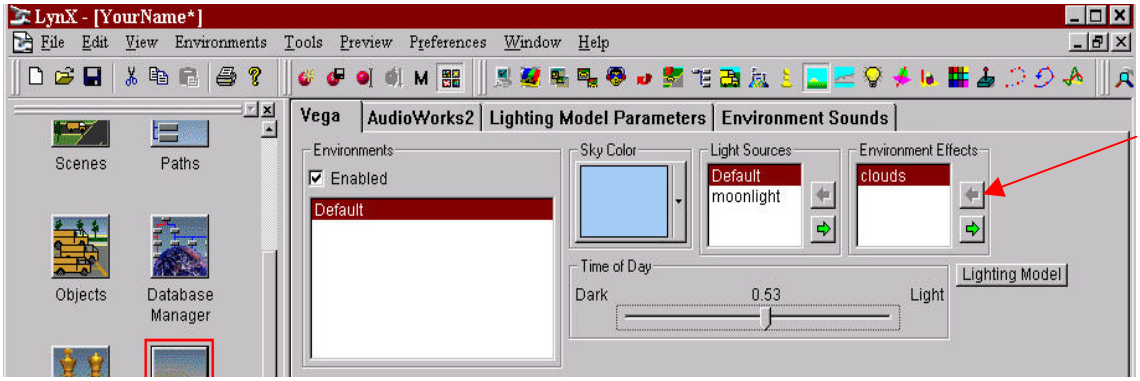
- Go to the Environment Effect pull down menu. Select 'New'.

- Name the new environment effect 'clouds'.





- Set the environment effect 'type' to 'Hinge Clouds'.
- Go to the Environment Panel.



Add new environment effect by selecting the left facing arrow

- Add the 'clouds' environment effect by selecting the left facing arrow of the Environment effect list widget.
- Left mouse click on the environment effect listed as 'clouds'
- Press 'OK'.

- ❑ Go to the LynX menu bar. Select Preview ➔ 'Active Preview'.
- ❑ You should see clouds rendered in the sky.
- ❑ On the Environments Panel, move the Time of Day slider to .3
- ❑ Steer to the right and you should see an orange glow. The horizon glow is an added bonus for using hinged clouds.
- ❑ Move your mouse into the simulation window and press 'ESC' on the keyboard to exit Active Preview.

Create a Vega Path and Navigator

Goal Create a Path instance to store the waypoint data.

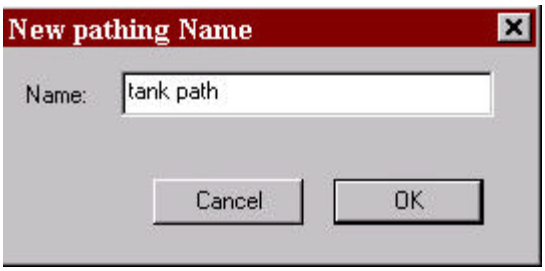
A path is a collection of waypoints. Users can create waypoints for a predetermined path and then control motion automatically by traversing the path with players, observers, or objects (via a player) using a navigator. For more details see:

Vega Lynx User's Guide Chapter 5.

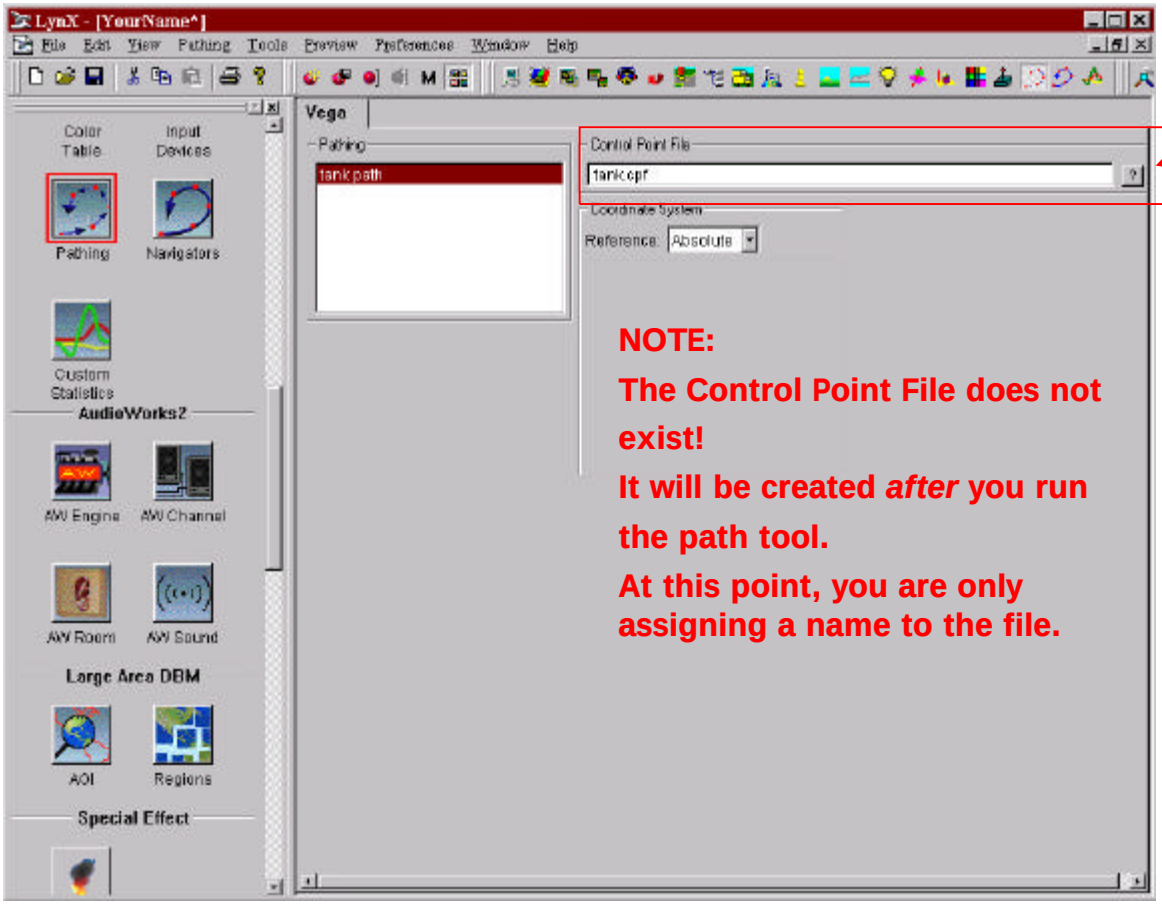
- ❑ Go to the Pathing Panel by selecting the Pathing Icon in the Icon Column.

- ❑ Go to the LynX Menu Bar. Select Pathing ➔ 'New'.

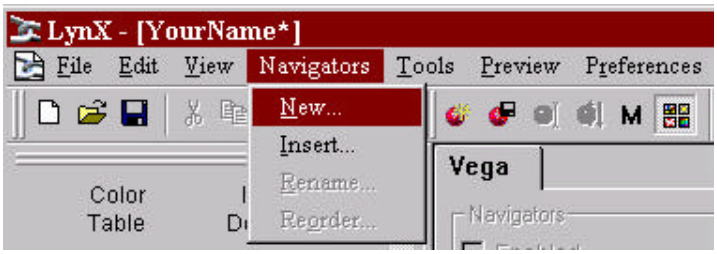
- Type the name 'tank path' into the text entry dialog box. Select 'OK'.



- Use the file browser to define where to write the Control Point file. The Control Point file will hold the list of coordinates you define using the path tool. Assign the name 'tank.cpf' to your control point file.



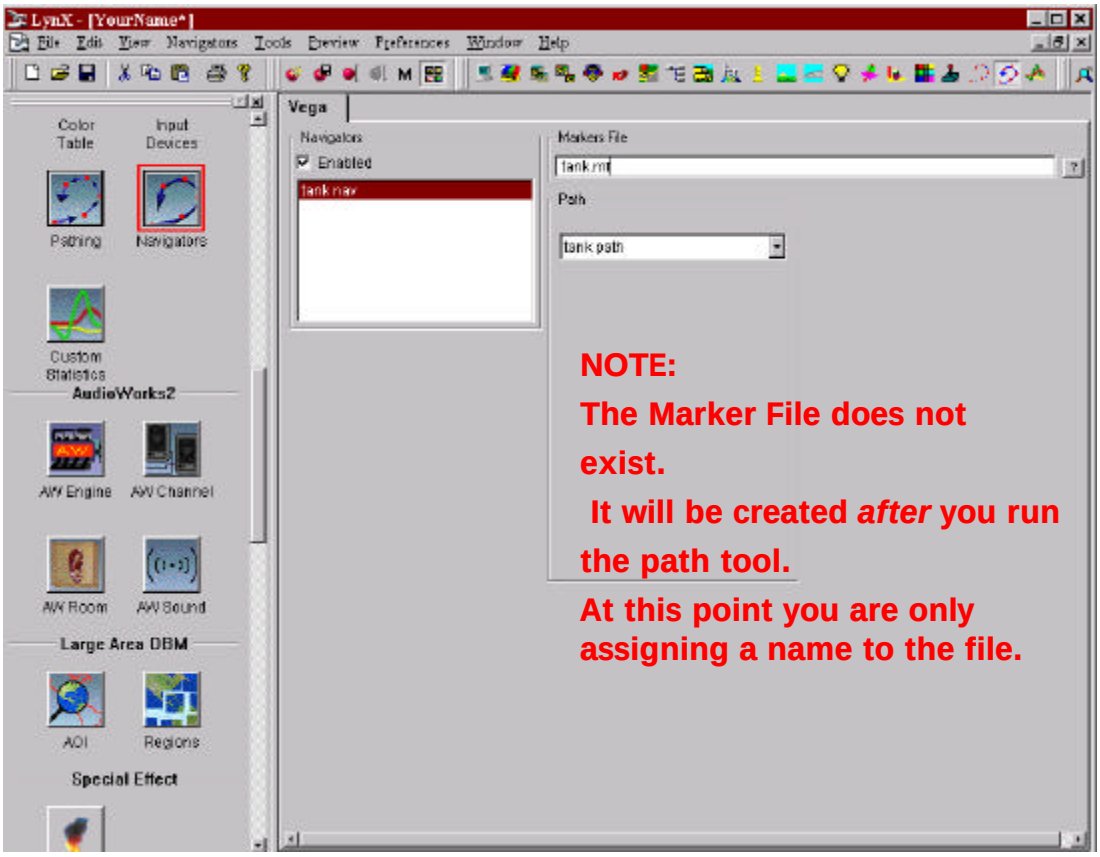
- Go to the Navigator Panel by selecting the Navigator Icon in the Icon Column.



- Go to the LynX Menu Bar. Select Navigators ➔ New '.

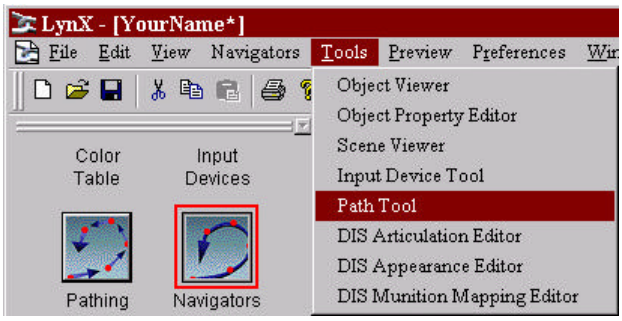
- Type the name 'tank nav' into the text entry dialog box. Select 'OK'.

- Use the file browser to define where to write the Marker File. The Marker File will control how we navigate from one coordinate to the next i.e. initial speed acceleration, orientation.

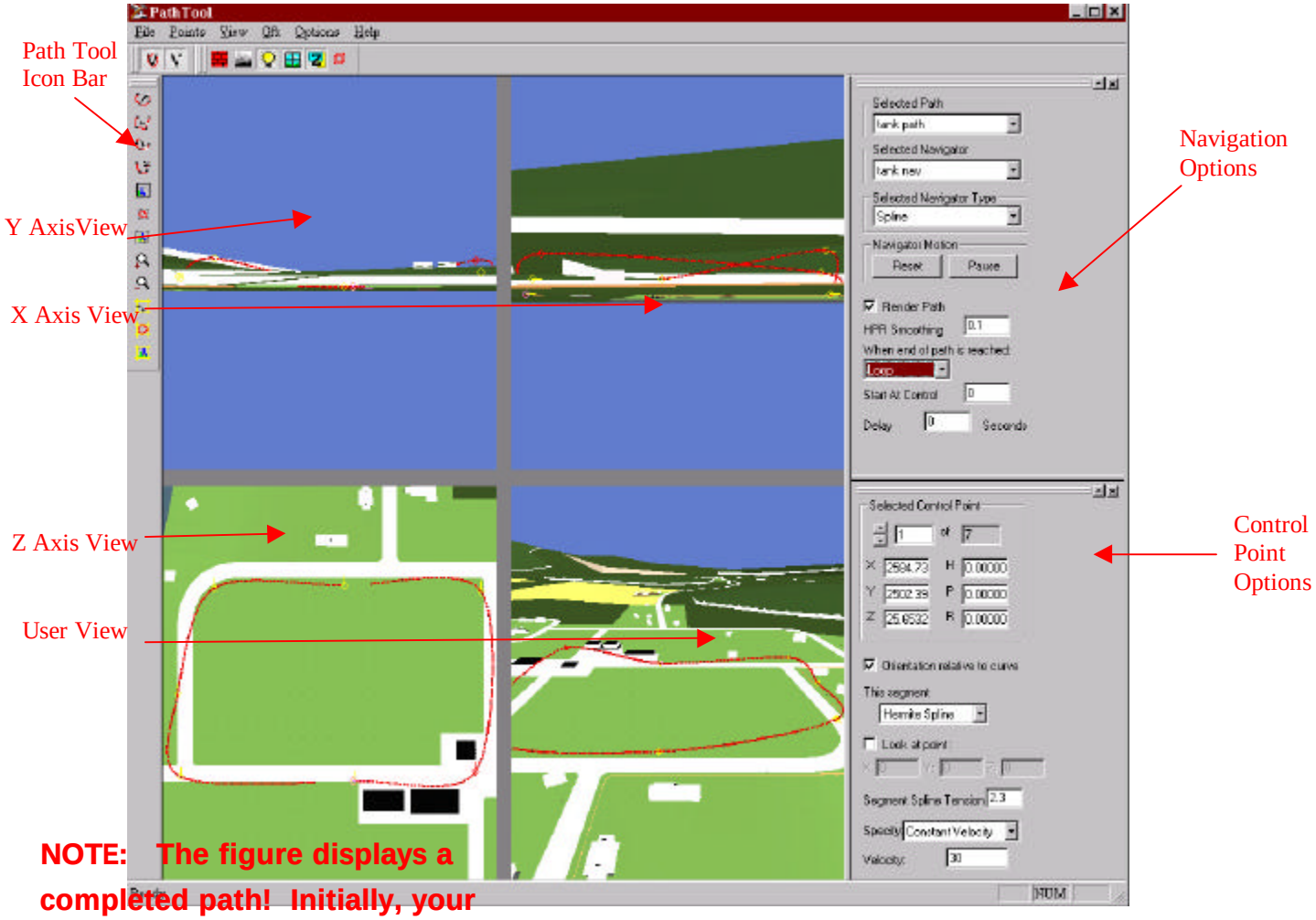


- ❑ Select 'tank path' as the Path ' for 'tank nav' to use as a reference. Verify the Enabled ' widget is checked.
- ❑ Go to the LynX Menu bar. Select File ➔ Save '

- ❑ Invoke the Path Tool. Go to the LynX Menu Bar. Select 'Tools ➔ 'Path Tool'.



- ❑ Your terrain object should be displayed in the path tool channels.



NOTE: The figure displays a completed path! Initially, your path tool will not have a view in the lower right window. This view will be filled in after you save the path and restart the Path Tool.

- Verify that the 'Selected Path' displays 'tank path ' and Selected Navigator ' displays 'tank nav '. If it does not, you will not be able to save your path data.

Add Control Point

Move Control Point

Insert Control Point

Delete Control Point

Pan View

Center View on Selected Path

Center View on Scene

Zoom In

Zoom Out

Move Clip Planes

Center Clip Planes on Path

Center Clip Planes on Scene

NOTE:
The active control point is always rendered in red.
To select a new control point left mouse click in any of the three views.

To modify a point you may either use the Move existing point icon or you may change the coordinates in the Selected Control Point section 'of the Path Tool.

Orientation changes must be entered in the Selected Control Point section of the Path Tool.

Use the Zoom In 'icon to refine your picking area. By holding down the left mouse button in the X,Y, or Z Axis channels you can draw a rubber band to define where you want to zoom in on your terrain '.

- Add new points to the path with the 'Add Control Point' button located at the top of the button column. Set your Z coordinate by clicking the right mouse button to set the Z to zero or moving your mouse into the upper left or right channels of the path tool and left clicking when you reach the desired Z value. Use the 'Zoom In 'icon to refine your picking area.

- Add three to five points to your path by repeating the previous step.

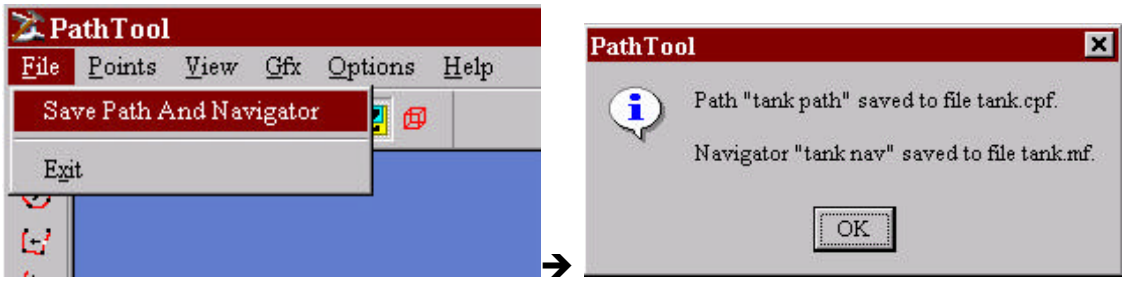
- Adjust the points using the 'Move Control Point' button or modifying the coordinates using the text entry fields.

- In the Navigator Options section, set Selected Navigator Type 'to 'Spline'. Your path should be rendered in red. You may adjust your paths as necessary if you find that part of you path is below the terrain.

- In the Navigator Options section, set When End of Path is Reached 'option to 'loop'.

- It may not seem like it but you are actually moving. You're moving at 1.5 dbu (database units) per second. Adjust your velocity to 50 - 200 dbu is fast enough to make an impression.

- Save your work! Go to the Path Tool Menu Bar.
  Select File ➔select 'Save Path and Navigator'. Binary files will be written to the files specified in the Pathing and Navigator Panels. Press 'OK'.



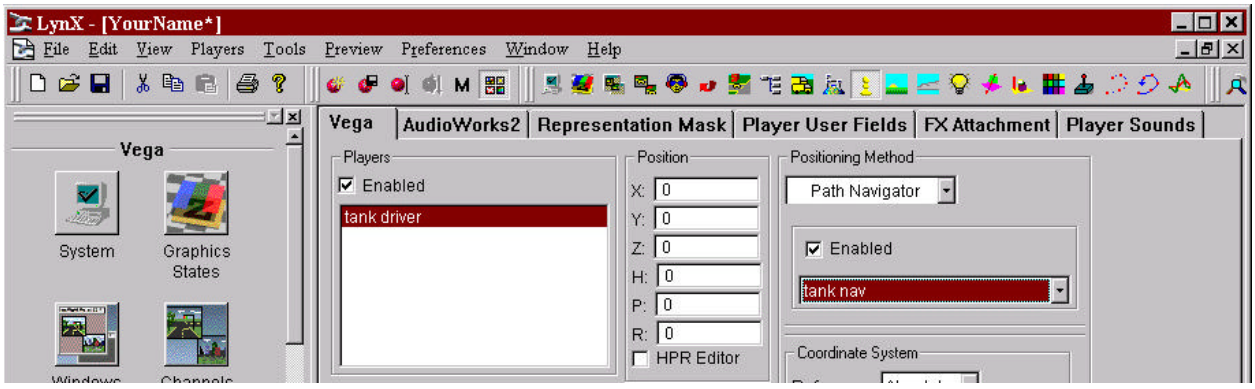
- Exit the path tool. Go to the Path Tool Menu Bar. Select 'File ➔ Exit'.

Goal: Assign the player to follow the Navigator

- Go to the Player Panel by selecting the Player Icon in the Icon Column.

- Set the 'tank driver's' Positioning Method 'to 'Path Navigator 'and select 'tank nav'.

- Check the enable button to activate the navigator.



- Go to the LynX Menu Bar. Select 'Preview' → 'Active Preview'. Your tank player should be following the path you defined with the path tool. You CANNOT adjust the path during an Active Preview session. If you want to change your path at this point you will have to start the path tool make your adjustments and RE-SAVE the Control Point and Marker Files. The path is data we've written to disk using the path tool so you have to rewrite the files *everytime* you want to change the path.

- Move your mouse into the simulation window and press 'ESC' on the keyboard to exit Active Preview.

- Go to the LynX Menu Bar, select 'File' → 'Save'.

This concludes our tutorial. For more details, please see the LynX User's Guide.