



# **Starry Night Pro**

User's  
Guide

FOR MACINTOSH AND WINDOWS

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## Chapter 1

# Getting Started

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### **Before You Start**

This manual assumes that you possess basic computer skills such as clicking, dragging, and selecting with a mouse, the use of the File menu for opening and closing documents, and familiarity with the Cut, Copy, and Paste commands. You should also know how to move windows, use scroll bars, and resize windows. If you do not feel comfortable with these commands, please refer to the documentation that came with your computer.

### **Welcome**

Welcome to Starry Night Pro, the powerful simulator that lets you view the sky as it appears from any location in our Solar System. With it, you can see how the stars and planets will look tonight, tomorrow, or far into the past or future.

You can view the stars as they appear from your own backyard, from a country on the other side of the world, or from another planet. You can witness a total eclipse from the Moon, watch the Sun set from the surface of Mars, or even ride a comet. Set time flowing at whatever pace you desire, backwards or forwards. You are limited only by your curiosity.

Of course, there is no substitute for a clear, dark, star-filled sky. It is one of the most awe-inspiring

sights on Earth. Unfortunately, it is difficult for many of us to experience its wonders because of artificial illumination. If your night sky suffers from urban light pollution, we highly recommend regular excursions to a dark site, where you can view the cosmos in all its magnificence. To enhance your star gazing, you can use Starry Night Pro to print our custom star charts.

Thank you for purchasing Starry Night Pro. Enjoy the program!

## Installing Starry Night Pro

After starting your computer, follow the installation instructions below. A registration number is included with your Starry Night Pro package. When prompted, type in the number exactly as it appears.

***Note:** Before you begin the installation, refer to the ReadMe file on the Starry Night Pro CD for the latest installation information, including system requirements.*

**Windows:** To install Starry Night Pro for Windows, follow these steps.

- 1 Insert the compact disk into the CD-ROM drive.
- 2 Open the “Read Me First” file for instructions and late-breaking product and compatibility information.
- 3 Choose Start | Run and click Browse.
- 4 Select Setup.exe from the Starry Night Pro CD-ROM and click Open.

- 5 Follow the instructions that appear on the screen.

**Macintosh:** To install Starry Night Pro for the Macintosh, follow these steps.

- 1 Insert the compact disk into the CD-ROM drive.
- 2 Open the “Read Me First” file for instructions and late-breaking product and compatibility information.
- 3 Drag the Starry Night Pro folder from the CD to your hard disk.

## Opening Starry Night Pro

When Starry Night Pro starts up, it opens a new, untitled window that shows your current sky looking south. If you open the program at night, you see a star-filled night sky. If you open the program during the day, you see a daytime scene with blue sky and sunshine.

If you want to see the night sky during the day, choose Sky | Daylight.

A horizon and trees are shown to give you some perspective. If it is daytime, shadows from the trees indicate the position of the Sun.

## Setting the Default Time

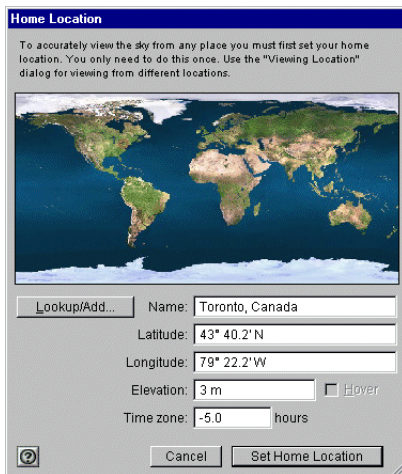
Starry Night Pro uses your computer's clock as the default time for your home location. If the computer's clock is incorrect, make the appropriate adjustments in your computer's Control Panel.



## Setting Your Home Location

Chapter 2: “[Starry Night Pro Basics](#)” shows how to view the sky from *another* location, but it is important that you first correctly set your computer’s home location. Setting the home location only needs to be done once — the first time you use Starry Night Pro.

The first time Starry Night Pro opens, the Set Home Location window asks you to set your current location. Once finished, you do not need to change your home location unless you move or travel.



- 1 Click Lookup.



- 2 Select your location from the list of world locations.
- 3 If your location is not listed, click Add. Enter your latitude and longitude. You must also enter the correct time zone.
- 4 Click Set Home Location.

## Accessing the Complete Star Catalog

In order to access the complete Hubble Guide Star Catalog and see all the millions of celestial objects, insert the Starry Night Pro CD into the CD-ROM drive before you start the program.

When Starry Night Pro opens, it checks for the CD to access the information it needs. Starry Night Pro is completely functional without the CD, but fewer celestial objects are available.

### Online Help

In Windows, tool tips give brief descriptions of toolbar icons and floating palettes. Tool tips appear when you hold the mouse pointer over the icon.



On both Windows and the Macintosh, dialog windows display a Help icon. Click the icon to open your Web browser and link to the corresponding page of the latest version of the online manual.

### Saving

Starry Night Pro has its own file format you can use to return to a saved view at any time. To save your current view, choose File | Save.

### Technical Support

For technical questions about the operation of Starry Night Pro, please refer to Appendix B: “[Examples, Demos, and FAQs](http://www.starrynightpro.com/manual/faq.htm)”. A regularly-updated version can be found online at: <http://www.starrynightpro.com/manual/faq.htm>.

If you are unable to find answers to your questions, please email us at [support@siennasoft.com](mailto:support@siennasoft.com).

### Don't Forget to Register!

Please be sure to fill out your registration card and mail it to Sienna. Registration makes it possible for us to notify you of upgrades and plug-ins as they become available.

You can also register on the Starry Night Pro Web site:

<http://www.starrynightpro.com>.

## Chapter 2

# Starry Night Pro Basics


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### Using the Tool Palette



The Tool Palette gives you quick access to a variety of the program's features and instruments.


The Tool Palette contains a number of buttons and display areas. To use a tool, click its button. When selected, the tool's icon replaces the mouse pointer on your computer screen.

 **Selection Tool:** Highlights objects in the sky. To select multiple objects, press the Shift key while making selections.


 **Hand Tool:** Changes the direction in which you are viewing. Select this tool to drag the sky to the left or right, up or down, until you reach the area

you want to see. When the Hand Tool is selected, Starry Night Pro temporarily switches to the selection tool when you point to a selectable item.


***Tip:** When using any other tool, you can temporarily switch to the Hand tool by holding down the keyboard's space bar.*


 **Constellation Tool:** Selects constellations. Choose this tool and click anywhere in the sky to select the constellation that contains that point.


Double-clicking the tool opens a preferences window that gives you several options for displaying constellations.

 **Location Scroller:** Changes the latitude and longitude from which you are observing. Dragging up or down adjusts your longitude, while dragging left or right adjusts your latitude. For example, while viewing from Earth, you can use this tool to quickly travel anywhere on the Earth's surface.

***Tip:** This tool is particularly useful when you've lifted off into space and want to adjust your view of the planet below you.*


 **Angular Separation Tool:** Displays the angular separation between two objects, as seen from your current viewing position. Select the tool, click on one object, and drag to another.


 **Magnification Tool:** Magnifies your current view. Select the tool and click anywhere in the window to zoom in that direction. To magnify a specific area of the sky, hold down the mouse button and drag to encompass the area you want magnified. Holding down the Ctrl key (Windows) or the Option key (Macintosh) while using the Zoom tool zooms you back out. Double-clicking the tool returns you to a normal field of view. For more information on changing your field of view (FOV), refer to "[Getting a Closer Look](#)" on page 14.


 **Picture Selection Tool:** Use this tool to select an area of the sky that you want to save as a picture. Select the tool, then drag diagonally over the area. Choose Edit | Copy. You can now paste the picture into another program. On a Macintosh you


can also drag a selected area into another application or onto the desktop. Double-clicking the tool selects the entire window.


***Note:** To save the entire window as a graphics file, choose File | Export Image. For more information, refer to "[Exporting Images](#)" on page 77.*


 **Movie Tool:** Use this tool to create QuickTime movies. Select the tool, then drag the area of the sky you want to make a movie of. Double-clicking the tool makes a movie of the entire window. For more information about making Starry Night Pro movies, refer to "[Making Movies](#)" on page 61.

 **Time Button:** Opens and closes the Time palette, where you can set your current time and make time flow backward and forward in increments you choose.

 **Planets Button:** Opens and closes the Planets palette, where you can set your current location to any of the planets, comets, asteroids, or satellites in our solar system.

 **Display Button:** Opens and closes the Display palette, which allows you to set your viewing options.

 **H-R Button:** Opens a palette that displays a Hertzsprung-Russell diagram of all the stars in your current view.

 **Location Button:** Opens the Viewing Location window, from which you can adjust your point of observation. Note that your Viewing Location can differ from your Home Location, which you enter when you first run Starry Night Pro. Your Viewing Location can change with every Starry Night Pro session. You

only need to change your Home Location if you move to a different city or region.



#### Current Location Display:

Displays the name of your current Viewing Location, as well as your latitude and longitude, or heliocentric coordinates if you are viewing from a fixed location. If you adjust your location to hover above a planet, your current longitude displays the word “Hover”.

***Tip:** You can change your latitude and longitude by selecting either and entering a new value.*



**Elevation Buttons:** These two buttons act very much like the rocket engines of a space ship. Press the right button to blast off from a planet’s surface (to an elevation of up to 700 AUs). Press the left button to lower your elevation, as if using a spacecraft’s landing thrusters.



**Return Home:** Returns you to your home location.



#### Current Elevation Display:

Displays your current elevation in meters, kilometers, or AUs (Astronomical Units). Clicking this display opens a popup window that allows you to select from several preset elevations.



**Zoom Buttons:** Adjust the magnification level of your current window. On the Macintosh, press the “near mountain” button to zoom in. To zoom back out, press the “far mountain” button.



**Normal Field of View:** Returns you to a normal field of view, approximately 100 degrees.



**Current View Display:** Displays your current field of view. Clicking this display opens a popup menu that allows you to select from several preset fields of view or add new ones. By default, any Field of View (FOV) indicators you have added (for more information, refer to “[Field of View Indicators](#)” on page 52) are automatically included in the popup list. You can add other FOVs by selecting Edit from the popup list.

#### Window Display Buttons:



Click the left button to display the default view, with menu bars and scroll bars. Click the middle button to display a full screen view, with only the menu bar. Click the right button to display a full screen view, without a menu bar or scroll bars.

***Shortcut:** To switch between hiding and showing any open palettes, press **Ctrl-B** (Windows) or **Command-B** (Macintosh).*

## Looking Around

One of the first things you will probably want to do with Starry Night Pro is to look around the sky. In your backyard this is simple enough to do, and using Starry Night Pro is almost as easy.



Click the Hand tool, click anywhere in the sky and, holding down your mouse button, drag the view left or right, up or down, any way you want. It’s that simple!

You can also use the scroll bars to change the direction in which you are looking. Scrolling down to the bottom of the vertical scroll bar means that you are looking straight down. Scrolling to the top

means that you are looking straight up. The horizontal scroll bar controls the lateral direction in which you view, through all 360° of the compass.

**Tip:** *If you click the horizontal scroll arrow and hold down the mouse button, your lateral view scrolls continuously.*

**Horizon:** The landscape beneath the horizon is coloured green, as if you are standing in a field looking at the sky. When dragged with the Hand tool, the horizon line seems to curve as you move it up and down. Starry Night Pro gives you a view of the sky that is similar to looking through a wide-angle camera lens.

**Tip:** *If you want to make the ground invisible, you can turn it off by selecting Horizon in the Display menu.*

**Zenith and Nadir:** The point of sky directly above your head is known as the Zenith. The point directly below you is known as the Nadir. By default, both the Nadir and Zenith are identified when you are scrolling, since they can be helpful when trying to get your bearings, especially when you are in space. To turn off this feature, choose Settings | Preferences.

When looking straight down, you see a pair of shoes. In space, or on other planets, these shoes are replaced by a space suit.

**Tip:** *You can turn the shoes off by choosing Guides | Feet.*

**Perspective:** Looking around in Starry Night Pro is very much like using your own head and eyes. When you look straight down at your feet, you're unable to look any farther back since your body is

in the way. When looking straight up, you can only look so far before your back can bend no further. To look behind you, either up or down, you must turn to the left or right.

The same limitations hold true while navigating within Starry Night Pro. Upon reaching the Zenith or Nadir in your Starry Night Pro view, you are unable to continue past that point. To view areas past the Zenith or Nadir, you must “turn around” by dragging the view to the side.


If you're located in space, and are looking down at a planet beneath your feet, you may want to change your orientation to Ecliptic or Equatorial by choosing Settings | Orientation. Switching your orientation means that you are no longer oriented with the planet located directly below you, giving you a better view. For more information, refer to “[Orientation](#)” on page 28.

**Getting a Closer Look:** Starry Night Pro opens with a 100° field of view. This means you are viewing a 100° slice of the 360° panorama of the sky. We call this the normal field of view, since it approximates a view of the sky that you see with your own eyes, including some peripheral vision.




The easiest and most convenient way to change your field of view is to use the Zoom buttons, on the Tool Palette. Note that your current field of view is displayed just beneath the buttons. The button on the left zooms the view out to a larger field of view, the middle one zooms in for a more magnified view, and the right button returns the field

of view to normal, or about  $100^\circ$ . Try using these buttons to get the hang of zooming in and out.

**Tip:** *Zooming in too far eventually presents a field of view with no stars. To quickly return to the normal field of view, click the Normal Field of View button  on the Tool Palette.*

It is important to remember that when you zoom in on objects, you are not in fact changing your location. Think of zooming as looking through a more and more powerful telescope, while your feet remain firmly planted. Unless you've locked onto an object, Starry Night Pro displays the effects of the Earth's rotation, so at a high magnification, stars and planets quickly rotate out of view. For information on locking onto an object, refer to "[Using the Planets Palette](#)" on page 22.

 **The Magnification Tool:** Another way of changing your field of view is to use the Magnification tool. Click the tool to activate it, then click anywhere in the window to zoom in that direction.

To magnify a specific area of the sky, hold down the mouse button and drag to encompass the area you want magnified. Holding down the Ctrl key (Windows) or the Option key (Macintosh) while using the Magnification tool will zoom you back out.

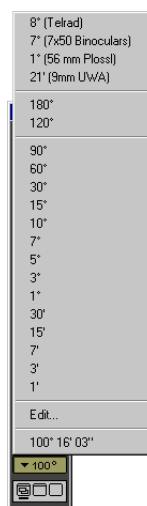
**Tip:** *To change the amount by which the view is zoomed at each step, choose File | Preferences | General and adjust the Zoom Step.*

By default, you are unable to zoom out past the standard view of  $100^\circ$ . To zoom

out to see most of the sky in a single view, choose File | Preferences | General and select "Allow Maximum Zoom Out".

Think of the sky as a huge sphere, one half of which is visible at any particular time. Maximum Zoom Out maps this view onto your computer screen. This is the view of the sky that most planispheres (handheld circular star charts) represent.

**Cool effect:** *If you drag the horizon down to the bottom of the screen while in Maximum Zoom Out mode, the edge of the sky shown represents your local horizon seen in every direction — an extremely wide-angle view indeed!*



**Field of View Menu:** Yet another way to change your zoom setting is to use the popup menu that appears if you hold down your mouse button while the cursor is over the Current Field of View indicator on the Tool palette. Select from any of the preset fields of view.

**Tip:** *If you know the field of view of your binoculars or telescope, you can add its field of view to this popup list by selecting*

*Edit. See also "[Field of View Indicators](#)" on page 52.*



## Changing Your Location

One of the most important factors in determining what you see in any given sky is the location of your observation point. In this section, you'll learn how to adjust your location and how your location determines what you see. You'll find out how to use Starry Night Pro to travel around the Earth and the Solar System.

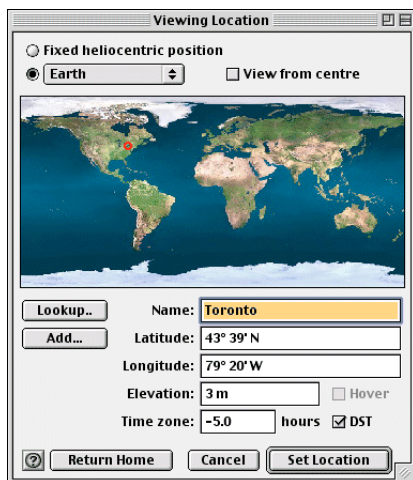
Starry Night Pro displays the planet or satellite on which you're located in the status bar on the bottom of all open windows.



The Tool Palette displays your specific location. In this case, your location is Toronto, latitude 43° north, and longitude 79° west.



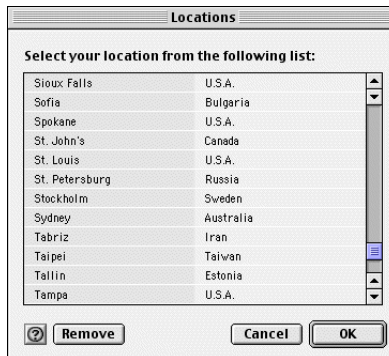
To change your current location, press the Location button on the Tool Palette.



**The Viewing Location Window:** To quickly change your location, click anywhere on the world map. A small red circle appears at your new choice. Press Set Location and you are viewing from your new location. Alternatively, you can enter new latitude and longitude coordinates in the fields below the world map.

To view from above the named location, enter a value into the elevation field. For example, to view the Earth from 5000 km above Toronto, enter 5000 km in the elevation field.

**Selecting Additional Locations:** Many Starry Night Pro users enjoy viewing the night sky from locations all around Earth. To do so, open the Viewing Location window and click Lookup.



You can now switch your viewing location to any of the cities in the list. Note that this does not change your *home* location, set when you first open Starry Night Pro.

**Adding Locations:** Click Add in the Viewing Location window to save your current viewing location in Starry Night Pro's permanent list.



**Removing Locations:** To remove a location from the list, select the location from the hierarchical list, then press the Remove button. A dialog box will appear to confirm your decision to delete the location. Select the Delete button to remove the location, or cancel the operation.


**Viewing From Other Planets:** You can also view the sky from another planet, the moon of another planet, or even from the Sun.

To change your viewing location:


- 1 Click Planets on the Tool Palette.
- 2 Select the planet you want to go to from the Planets Palette.
- 3 Click Go There.

Instantly you are transported to that planet, viewing the sky as it would look from that planet at the same latitude and longitude as your location on Earth.

***Tip:** You can adjust your location on the new planet by setting your location as you did on Earth. The map will now be that of your new planet.*

 **Lifting Off:** Pressing the Elevation Up button on the Tool Palette allows you to “lift off” from your current location. You can see the trees drop away beneath you. If it is currently daytime on Earth, you can see the atmosphere fade as you rise through it on your way into space.

Note that you are still at your original location but at some distance over it, as if attached by a long, invisible pole. As the Earth rotates, you also rotate in space. You

can tell you are rotating due to the apparent motion of the sky and stars. To return to and “land” at your original location, press the  Elevation Down button.

You can use the Elevation tools while located on any object (the Sun, planets, moons, or comets), thereby achieving some extraordinary views of the solar system.

You can speed up your lift-off or landing by pressing Shift as you blast off or re-enter. To adjust your elevation rate, choose File | Preferences | General and adjust the Elevation Step slider.



**Elevation Display Popup:** If you click on the elevation display without releasing, a popup menu opens that lets you select from several preset elevations, or to hover above your present location. The Radius settings allow you to instantly elevate 2, 4, or 8 times the radius of the planet you are located on. The Radius settings are handy for a quick overview of your current location.

**Hovering:** If you are elevated more than 100 km above the surface of the Earth you can “hover” at that location. Hovering allows you to stay at a constant position above any object and, as time passes, watch as it rotates beneath your feet. You can select Hover from either the Elevation display popup or the Viewing Location window. Hover is greyed out if your current elevation is less than 100 km.

Used in combination with the location scroller tool, hovering allows you to achieve fantastic views of the planets and Solar System. For instance, you can hover a few thousand miles off the surface of Saturn, then use the Location Scroller tool to view the rings from every angle. Try hovering several AUs above the surface of the Sun, turn on the planet's orbits, and location scroll to view the ecliptic plane. By trying these examples and exploring with others of your own, you gain a real sense of the three-dimensional relationships between the objects in our solar system.

**Note:** *The point at which you can hover over a planet is limited by the size of the planet. For example, on a smaller planet like Mars, you can hover at a lower elevation (around 50 km), while on a larger planet like Jupiter, you must rise to 1100 km before you can begin to hover.*

**Viewing from a Fixed Location:** To change to a fixed location, click Location on the Tool Palette and select Fixed Heliocentric Position.

A fixed location is entered as a heliocentric ecliptic Cartesian coordinate. The position on the ecliptic plane is given by X and Y coordinates. The Z coordinate takes the location out of the plane of the ecliptic. Heliocentric means that the Sun is the center of the coordinate system, so the point (0,0,0) is at the center of the Sun.

**Note:** *When you switch from a location on Earth to a fixed location, the X, Y, and Z coordinates are taken from your current Earth location. Because it is a fixed location, you'll be left behind as the Earth continues on in its orbit.*

**Fly-bys:** There are times when you may want to watch a celestial event from a fixed point in space. Using the elevation controls, rise above a planet and switch to a fixed location. Increase the rate at which time flows (for more information, refer to "[Manipulating Time](#)" on page 19) and you can watch a planet fly past in its orbit. If you have elevated from the planet's surface in the direction that it is traveling,

you pass through the planet as it moves forward in its orbit.

**Tip:** Noon or midnight is a good time to try fly-bys, since you are lifting off in a direction that is perpendicular to the direction of the planet's orbit.

## Manipulating Time

The time of observation is significant in determining what you can see in the night sky. If you compare the view at the beginning of the evening to the one at midnight, you will see that the stars have shifted their position. This is the effect of the Earth rotating on its axis. The movement of the sky is the most obvious effect of the passage of time, but there are many more subtle and interesting effects that can only be seen over longer periods of time.

Changing and manipulating the flow of time offers the most power and promise for learning. Many significant celestial events occur over very long periods of time, making them difficult to observe. Starry Night Pro can compress hundreds or thousands of years of change into a few minutes, making these movements easier to see and comprehend.

**The Current Time:** By default, Starry Night Pro opens new windows at the current time — the time set by your computer's clock. Starry Night Pro displays the current time at the bottom of all open windows.

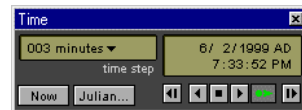
04/07/1999 6:18:38 PM

The symbol between the date and time indicates the direction of current time

flow, as set in the Time Palette. If the triangle points to the right, as it does in this example, time is flowing forward. A left-pointing triangle indicates that time is flowing backward, while a square means that time has stopped.

Your view of the sky updates as time passes. In realtime, the view is updated every 5 seconds. You can adjust the rate at which the view is updated by choosing File | Preferences | Time.

**The Time Palette:** To display, set, and control time, click the Time button on the Tool Palette. The VCR-like controls of the Time Palette give you precise control over the direction and rate that time flows.



**Stop:** Freezes time at the current point.

**Realtime :** Synchronizes the current window with the real flow of time.

**Forward:** Advances the flow of time by the current increments.

**Backward:** Reverses the flow of time by the current increments.

**Single Step Forward:** Advances time by one increment.

**Single Step Backward:** Reverses time by one increment.

**Current Time Display:** The Time Palette displays the active window's current time. To change the current time, click the value you want to change and enter a new value. You can also adjust the time by clicking the

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6:33:57 PM

increment buttons that appear whenever you select a unit or number.

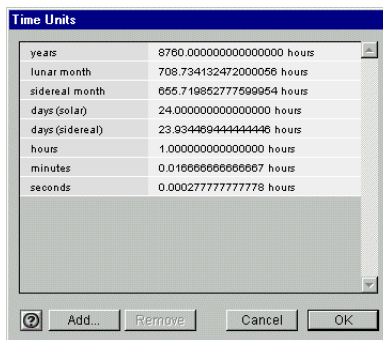
**Tip:** You can also use the up and down arrows on your keyboard to change the value of the selected time element. To switch between the different elements, press Tab.

**Now** **System Time:** To return to the current time, click Now. Your view is adjusted to reflect the time on your computer's clock.


**Note:** If your current viewing location is in a different time zone than your home location, *Starry Night Pro* automatically adjusts the time to your new location's local time. If your current location is in space or on another planet, the time is set to Universal Time, the astronomical standard based on the time at Greenwich, England.

**Time Step:** Use these fields to adjust the rate at which time flows. The default setting is three minutes. You can increase or decrease the flow of time by entering a new number and selecting a new time step, such as hours, days, or years.

You can add new Time Steps by selecting Edit from the popup list that appears when you click the Time Step display.



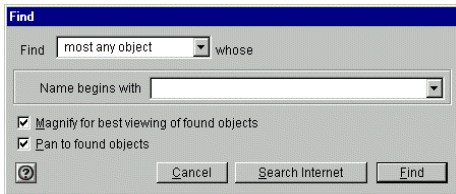
Click Add and enter the value for your new Time Step.

 **Setting the Julian Day:** The Julian Day is the number of days that have elapsed since January 1, 4713 BC. Astronomers sometimes use the Julian calendar in order to avoid the problems resulting from historical calendar changes. To see the current time expressed as a Julian day, click this button to open the Julian Time window. If you want to set the current time to a specific Julian day, enter the Julian day you want to view and click Set Time.

## Finding Objects in the Sky

Starry Night Pro provides you with a number of ways to quickly locate celestial objects.

**Find:** Choose Selection | Find.



If you're performing a general search, select Most Any Object. You can narrow down your search results by specifying the type of object you're looking for, such as Star. Type in the name or first few letters of the object and click Find. Starry Night Pro immediately centers the first match it finds.

Select Pan to Found Object if you want Starry Night Pro to pan to your selection. This feature is handy if you want to see where the new object is relative to your current view.

**Tip:** If you hit the space bar during a pan, the program immediately takes you directly to the object. If something catches your eye and you want to stop the pan, press Esc.

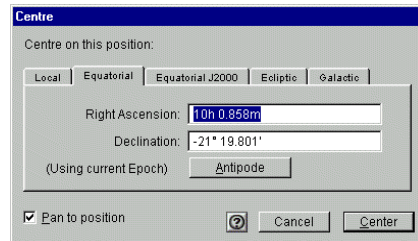
To zoom in on the object for which you are searching, select Magnify For Best Viewing Of Found Objects. To search the World Wide Web, click Search Internet.

**Find Again:** You can search for additional matches to your Find inquiry without re-opening the Find dialog. Choose Selection | Find Again.

*Example: The Messier Marathon Tour*

- 1 Choose Selection | Find.
- 2 Select Find: Messier.
- 3 Enter "M" and press Find. The first object you will find is M1.
- 4 Choose Selection | Find Again. Starry Night Pro takes you to the next Messier object, M2.
- 5 Repeat as often as desired to view all of Messier objects in succession.

**Centering Your View:** To view a precise area of the sky, choose Selection | Centre.

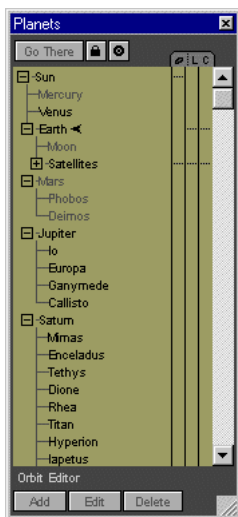


Starry Night Pro can shift your view so that it centers on a location you define using one of several different systems of coordinates. Select the system you want to use and click Centre.

**Tip:** Starry Night Pro can show you the spatial relationship between your current view and the new view. Select Pan To Position, click Centre, and observe. To centre on the point directly behind the defined location, click Antipode, then Centre.

## Using the Planets Palette

**Planets** The Planets Palette allows you to quickly locate planets, moons, and certain comets. To open the Planet Palette, click the Planets button on the Tool Palette.



The palette opens with a list of the planets. Starry Night Pro dims the names of any planets that are not currently above the horizon, letting you know which planets are visible at the current time.

You can also choose to focus on a planet's moons or satellites. Click

beside a planet's name to expand the list of available objects. For Earth, the Moon is available, as are artificial satellites. Clicking again collapses the display to show you only the parent object.

As time passes, you can plot the positions and orbits of the Sun, the planets and their moons. For more information, refer to [“Displaying the Paths of Objects”](#) on page 22. Asteroids and comets are included in their own groups at the end of the list.

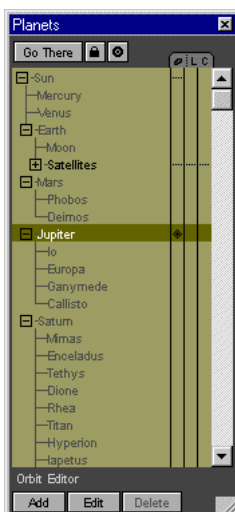
**Centering an Object:** The simplest way to find a planet, satellite, comet, or asteroid is to double-click its name in the Planets Palette. Starry Night Pro centers the planet in the current field of view. If the object is currently beneath the horizon, a dialog box offers you the option of hiding the horizon so that you can view it as though the Earth were transparent.

To view from another planet, satellite, comet, or asteroid, select it on the Planets Palette and click Go There. Your viewing location changes to that of the selected planet.

**Locking On an Object:** To keep a planet or satellite centered in your view as time passes, select the planet from the Planet Palette and press the lock button. Starry Night Pro centers the object in your view and locks it there. Locking is useful for tracking an object's movement over time.

## Displaying the Paths of Objects

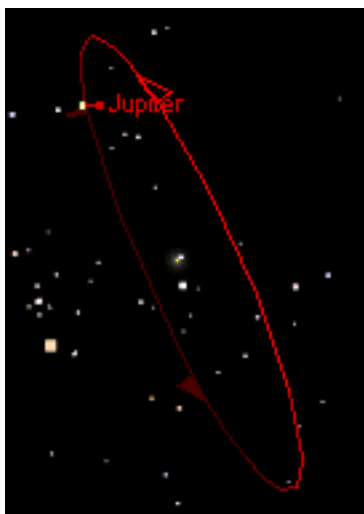
On the Planets Palette, you can see three columns beside each planet or satellite. Toggling these columns allows you to see the orbit, local path, and celestial path of any object you want.



**Orbits:** To display the orbit of any object, click the Orbit column, the first column to the right of the object. Note that each planet has its own customizable orbit color. To find out how to select a new orbit colour, refer to “[Orbit Settings](#)” on page 33. A mark in this column reminds you that

you have the Orbit displayed for this object.

This example shows the orbit of Jupiter. Viewing from the limits of our solar system (this shot was taken from Pluto) allows you to see its entire orbit, including the indicator markers.



The ascending node of the orbit — the point at which the planet crosses up through the ecliptic plane — is marked with a solid wedge. The descending node of the orbit — the point at which the planet crosses down through the ecliptic plane — is marked with a hollow wedge. The point at which the orbit comes closest to the parent body — the pericenter — is marked with a bar.

To turn off a planet’s orbit, click its marker in the orbit column. For information on adjusting how orbits are displayed, refer to “[Displaying the Paths of Objects](#)” on page 22.

**Local Paths:** A local path is the apparent trail an object would leave as it travels in its orbit, as seen from your location. Your location is important. For example, tracking the local path of the moon incorporates the effects of Earth’s rotation. To activate the local path, click in the middle column beside the planet or moon whose local path you want to track. This column has an “L” as its heading.

**Celestial Paths:** A celestial path is the apparent path an objects makes on the celestial sphere — the trail an object leaves over time, in relation to the fixed stars. To activate the celestial path, click in the far right column beside the planet or moon whose local path you want to track. This column has a “C” as its heading.

***Note:** There is no local or celestial path for an object that you are located on, since that object doesn’t move in relation to you.*

***Tip:** To most easily view an object’s orbit, local, or celestial path, increase the increment at which time advances. For*



more information, refer to "[Time Step](#)" on page 20.

**Path and Orbit Options:** You can adjust how paths and orbits are displayed by choosing Settings | Path Settings or Settings | Orbit Settings. For more information, refer to "[Path Settings](#)" and "[Orbit Settings](#)" on page 33.

*Example: The Retrograde Motion of Mars*

In this example we'll display the celestial path of Mars over a few months as seen from Earth.

- 1 If it is daytime, choose Sky | Daylight to bring up the night sky.
- 2 Centre on Mars by double-clicking it on the Planets Palette.
- 3 If Mars is currently below the horizon, choose Sky | Horizon to hide it.
- 4 Click in the C column beside Mars to turn on its celestial path.
- 5 On the Time Palette, set time to increment by 3 days, then press the Flow Forward button.
- 6 Optionally, choose Settings | Path Settings and select the Circular Marker and Date options.

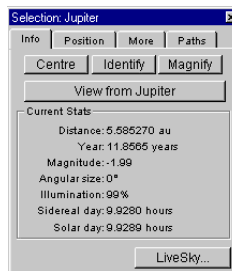
As time flows forward, Mars moves in an easterly direction relative to the stars. Its celestial path shows this movement through the stars. Eventually, you'll see Mars slow down, do a loop, then proceed on again. This apparent change of direction (called retrograde motion) occurs when the planet Earth overtakes and passes Mars as the two orbit the Sun.

**The Orbit Editor:** The Planet Palette also provides access to the Orbit Editor, where you can add newly discovered objects to the solar system, or create planets, comets, and moons of your own.

## Getting Information

Starry Night Pro gives you several ways to find out more information about the objects it displays. You can double-click objects to open a Selection Info window, right-click them for access to contextual menus, and use the Angular Separation tool to determine the distance (in degrees) between any two objects as seen from earth.

**The Selection Info Window:** This feature is a simple but powerful way of getting information about the various objects and constellations in our sky. To open the Info window, use the Selection tool and double-click any planet, Messier object, Deep Sky object, comet, or constellation.



The Get Info window will inform you as to the rise and set times, highest point, altitude/azimuth, RA and DEC, and the constellation in which the object resides. Planet information includes distance, length of year, rotation, and magnitude. For Messier objects, the window will display their NGC number, Object type,





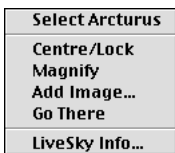
and angular size. In the case of stars, the information also includes the SAO number, color index, spectral class, proper motion RA and DEC, and radial velocity.

***Note:** Objects that are currently circumpolar will have no rise or set time.*

The Selection Info data is based upon the observing time and the observer's location. If you change either of these, the Selection Info window will automatically update any relevant data.


The Selection Info window is really only an introduction. For more information, click LiveSky to link directly to the portion of the LiveSky.com Web site that describes the selected object.

**Contextual Popup Menus:** To view contextual popup menus, use either the Selection () or the Constellation () tools. Place the tool over an object, and right-click with the mouse (Windows) or hold the mouse button down (Macintosh).



The popup menu offers choices appropriate to the selected object. For example, you can use this popup menu to select, centre, or

magnify the object. You can also choose to make the object your viewing location by selecting Go There. For planets, you can also show orbits, local paths, and celestial paths. For many other objects, you can also add an image. For more information, refer to [“Custom Images”](#) on page 73.

**Angular Separation:** If you are trying to find a small or dim object in the sky, it is often helpful to know how many degrees separate it from a brighter, more familiar object. In Starry Night Pro, you can do so using the Angular Separation tool () on the Tool Palette.

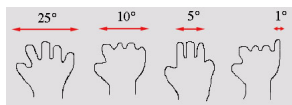
Select the tool, then drag between the two objects for which you'd like to measure separation. As you drag, Starry Night Pro determines and displays the distance covered, in degrees, minutes, and seconds, and, if known, the physical distance between the objects.

When you begin to drag on an object, its name appears, as does the name of any object you drag over. This makes it convenient to find the exact angular separation between two small objects such as stars.

When measuring angular separation near or in the area of a Messier object or NGC object, the tool automatically begins its measurement from the center of that object. To disable this feature, for example, when measuring between two stars within a Messier object, hold down the Alt key (Windows) or the Option key (Macintosh) as you take the measurement.

**Cool effect:** *When outside at night, you can get a rough idea of distances by using another conveniently located measuring instrument — your hand. If you hold your hand at arm's length, the width of your little finger is about 1 degree. Three of your fingers combined together spans approximately 5 degrees, your fist about 10 degrees, and your outstretched hand from thumb to little finger is around 25*

*degrees. These “handy” measurements work for male and female, young and old.*

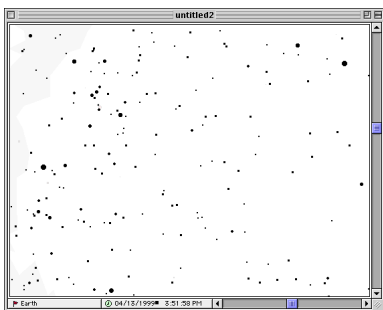


*You can also check the width of the moon. While looking at the Moon, try to estimate how many degrees it covers. Then hold up your hand at arms length to discover it's only half as wide as your little finger — half a degree! Most people imagine the moon to be much larger.*

## Printing

Using woodcuts, the great artist and printmaker Albrecht Dürer produced the first printed star charts in 1515. One of his charts showed all the northern constellations. Another woodcut depicted the southern ones. The Dürer planispheres are quite scarce and were never included in a printed book.

At the opposite extreme, Starry Night Pro offers the fastest and simplest way to print custom star charts. Choose Settings | Chart View.



The dark circles on a white background represent stars. The size of a particular circle reflects the relative brightness of the star.

By default, Starry Night Pro fills the printout with as much of the sky as there is room on the page. If you prefer to print only the area of sky shown in the active window, choose File | Preferences | Printing and deselect Fill Page While Printing.

**Tip:** If you have Onscreen Info turned on (choose Guides | Onscreen Info), it is printed at the bottom of your page, not over top of the star chart.



## Chapter 3

# Setting Up Starry Night Pro

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For many people, Starry Night Pro's default settings are more than enough for them to understand the night sky they view at home, or complete an astronomy project for school. However, many others enjoy creating their own views of the night sky and saving them for repeat viewing.

### Settings Menu



The Settings menu gives you control over the look of almost every object in Starry Night Pro.

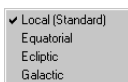
Most frequently, people choose to adjust the display of star and planet labels and to toggle the display of guides.

To preserve your settings, you can save the current view as a Starry Night Pro file and return to it later, or you can save all of your settings as a custom option set. For more information, refer to “[Custom Settings Files](#)” on page 43.

Many of the Settings windows display a button that gives you access to the Label Options for that

particular type of object. For more information, refer to “[Labels](#)” on page 44.

## Orientation



Certain observable phenomena, including the long-term motion of the planets and stars, are much more easily depicted by eliminating the effects of the local horizon. To help you observe these phenomena, Starry Night Pro provides alternatives to the Local orientation.

Starry Night Pro can show you the sky as seen from a specific location in various orientations. The most familiar and intuitive of these we refer to as the Local orientation. Local orientation gives you the view you would see from your backyard, with the point directly above you at the top of the screen, and the point directly beneath your feet at the bottom.

Now, imagine you are on the space shuttle. Because you are floating freely in space, your orientation is no longer obvious — the points directly above and below you are not fixed. You could mimic the Local orientation by pointing your feet at your backyard on Earth, but you could just as easily align yourself with the tilt of the Earth on its axis. Starry Night Pro refers to that alignment as the Equatorial orientation.

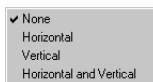
In Local orientation, Starry Night Pro keeps your feet pointed directly toward the center of the Earth, and rotates the sky above you, constantly updating your view. In the Equatorial orientation, Starry Night Pro keeps the North Celestial Pole directly

overhead, keeping your view constant so that you can, for example, observe the motion of other planets.

If you set your orientation to Ecliptic, Starry Night Pro gives you a view as though you were standing on the ecliptic plane, on which all of the planets in our solar system rotate. If you choose Galactic, your view of the sky is the one you would see if you were standing on the same plane as our galaxy, the Milky Way.

In all orientation options except for Local, the horizon is automatically turned off.

## Flip



You can flip your current view horizontally, vertically, or in both directions.

Flipping creates a mirror image of your current view along the axis you choose. It lets you match Starry Night Pro's view with a telescope that inverts sky images. You can then print out charts that match the telescope's view and use those charts during observing sessions.

You can set up Starry Night Pro's Onscreen Info to indicate whether or not your view is flipped. For more information, refer to “[Onscreen Information](#)” on page 50.

## Chart View

Selecting Chart View changes the current view so that it simulates the look of an astronomy chart. Stars are represented by dark circles on a white background. The size of a particular circle reflects the relative brightness of the corresponding star.

## Night Vision

Selecting Night Vision instructs your computer to change its display to red light. Red light is suitable for outdoor, night-time viewing, as it reduces the adjustment your eyes must make when you look up from your portable computer display into the night sky.

Because of the control Night Vision must exert over your computer display, only certain types of computers can support it. Most Macintoshes and some PCs can offer Night Vision.

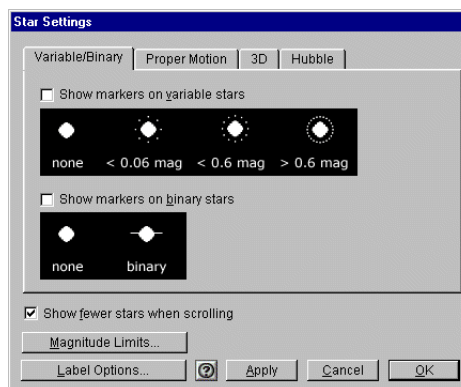
## Stars

Relative to objects in the solar system, the stars move and change very slowly. This is because their enormous distance from us makes their relative distance to each other seem fixed.

The Star Settings window gives you control over various aspects of star appearance, including settings for variable and binary stars, motion, the number of stars shown in 3D, and Hubble stars.

From the Star Settings window, you can also bring up the Magnitudes/Distances Settings and the Label Options windows

by clicking the corresponding buttons. For more information, refer to “[Magnitudes/Distances](#)” on page 31 and “[Labels](#)” on page 44.



**Show Fewer Stars While Scrolling:** To improve performance, you can select this option to turn off higher magnitude stars until you have finished scrolling up or down. You can turn the stars off completely by choosing Sky | Stars.

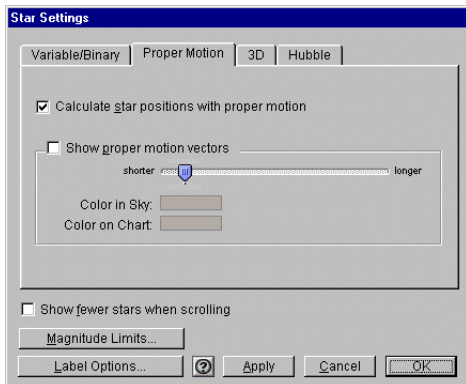
**Variable/Binary:** The Variable/Binary tab gives you display options for variable stars (stars whose luminosity varies) and binary stars (double stars that are gravitationally bound to each other).

For variable stars, you have four display options that categorize variable stars according to the range of luminosity they project.

For binary stars, you can choose to display an orbit to remind you that this star is really two stars, each orbiting the other.

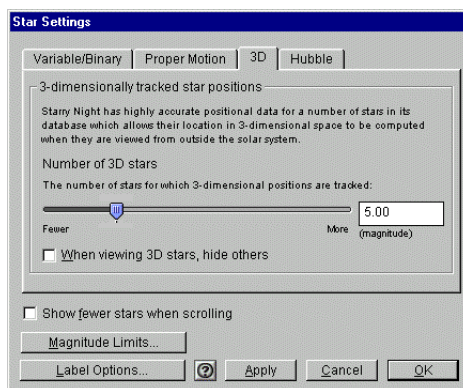
**Proper Motion:** By default, Starry Night Pro tracks the slow motion of stars over time, which you can observe if you

increase the time step and zoom in on a group of stars.



You can also choose to display proper motion vectors, lines that point out the direction and speed the stars move. The length of the proper motion vectors indicate the relative speed of the star. To adjust the colour in which vectors are displayed, click the Colour In Sky or Colour On Chart buttons, and select a colour from the palette.

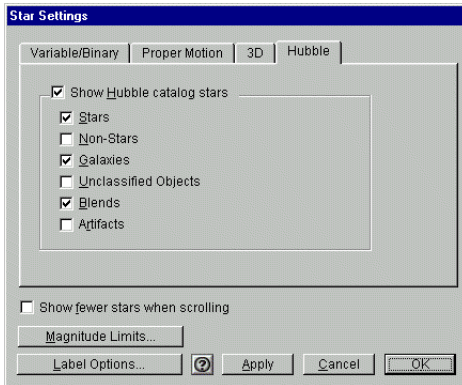
**3D:** Starry Night Pro can display three-dimensional information for many of the stars in its extensive database. This information was provided courtesy of the ESA and the Tycho/Hipparchos catalogue.



By default, Starry Night Pro does not display stars in 3D if their magnitude is less than 5.00. You can use the slider to increase or decrease the magnitude a star must have in order to be displayed in 3D. You can also choose to hide all stars that are of insufficient magnitude to be displayed in 3D.

***Note:** The 3D star settings only apply when viewed from outside our solar system.*

**Hubble:** Many of the stars and galaxies in Starry Night Pro's database were derived from the Hubble Guide Star Catalog (GSC), created in order to aid the orientation of the Hubble Space Telescope.



You can toggle the display of the six categories of objects defined by the Hubble project.

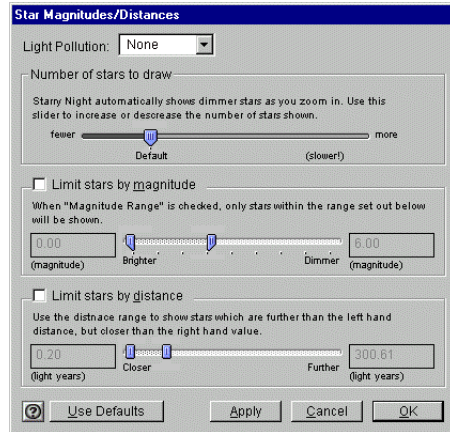
## Magnitudes/Distances

A star's magnitude measures its apparent brightness. The idea for assigning magnitudes originated with Greek astronomer Hipparchos (190-120 BC). He catalogued all the visible stars he could see and assigned them magnitudes from 1 to 6, the brightest stars having a value of 1.

Contemporary astronomers have refined the Hipparchos system, re-assigning some of the brighter objects and adding dimmer stars. The faintest stars that can be seen by the Hubble Space Telescope are in the 26 to 28th magnitude range — very dim stars indeed!

On a dark moonless night in the country, far from the city's light, it is possible to see 1,000 to 2,000 stars, some as dim as sixth magnitude, depending on the time of year and your location on Earth.

***Cool fact:** Astronauts orbiting Earth in the space shuttle can only see the stars while on the night side of Earth, since the day side of the planet is so bright.*



**Light Pollution:** You can mimic the effects of light pollution in a urban environment. Choose from None, Small City, and Large City.

**Number Of Stars To Draw:** Typically, you want to see more detail when you increase the magnification of your view. However, increasing the number of displayed objects decreases the speed at which Starry Night Pro can display them, especially on slower computers. The Number Of Stars To Draw slider increases and decreases the number of stars that Starry Night Pro displays when you zoom in.

***Note:** The complete Hubble Star Guide Catalog included on the CD can display some stars down to 16th magnitude. Insert the Starry Night Pro CD before you start, if you want access to all the stars. By showing lots of Hubble stars, you can get near-photographic quality images of the rich star regions of the Milky Way.*



**Tip:** When looking at lots of Hubble stars, turn off the Milky Way by choosing Sky / Milky Way. This allows the Hubble stars to form their own milky band of stars. You may also want to adjust the brightness and contrast of the stars to achieve the desired photographic effect.

**Limit Stars By Magnitude:** You can set a magnitude range for precise control over the types of dimmer stars and objects that Starry Night Pro displays.

For example, if you live in a city, and your naked eye limiting magnitude is around 4.00, you could adjust the “Dimmer” slider so that Starry Night Pro displays all stars whose magnitudes range between 2.00 and 4.00. That way, what you see on the computer screen will be similar to what you actually see while observing from your urban location.

You may also want to use this control to simulate your telescope view on a given night. If you know the magnitude of the dimmest star that your telescope can make out, setting the “Dimmer” slider to that magnitude gives you a good idea of what you can view through your instrument.

**Note:** We recommend that you use magnitude limiting with caution. If you forget about it, the next time you zoom in, you may wonder what happened to the stars.

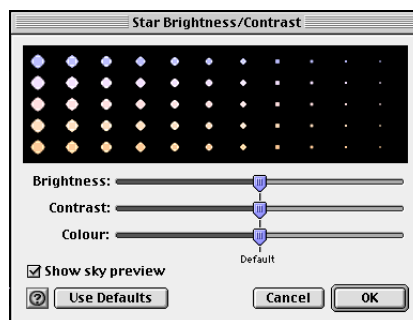
**Limit Stars By Distance:** You can also set up Starry Night Pro to display only those stars whose distance from Earth falls into a certain range.

The Limit Stars By Distance sliders allow you to choose a minimum and a maximum

into which a star's distance must fall in order for Starry Night Pro to display it. By doing so, you improve Starry Night Pro's performance as well as ensuring that you only ask the program to display stars you can see from home.

## Brightness & Contrast

Starry Night Pro gives you complete control over the brightness, contrast, and colour of star display.



The Brightness slider allows you to adjust how brightly the stars are drawn on the computer screen. If you are running Starry Night Pro on a portable computer, or if the room in which you are in is brightly illuminated, raising the brightness of the stars can be helpful. If you have the room lights low and are looking at a number of Hubble stars, you'll probably want to turn down Brightness down.

The Contrast slider increases and decreases the distinction between the brightest and dimmest objects in the sky. If you're viewing from an urban location, you may want to decrease the contrast so that Starry Night Pro's display is closer to your physical view. If you're viewing from a rural location, you can increase the

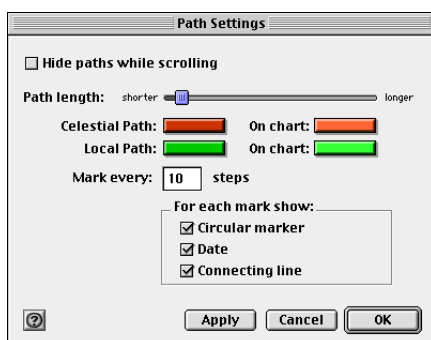


contrast to view a more diverse and complete night sky.

A star's colour is determined by its surface temperature, ranging from blue (hottest) to red (coolest). The Colour slider increases and decreases the extent to which Starry Night Pro displays star colour. Pulling the Colour slider to the right shows more and more of the full spectrum of star colours, to an extent you would never see from Earth. Pulling the Colour slider to the left strips away colour distinctions until all stars appear white.

## Path Settings

As discussed in [“Path and Orbit Options”](#) on page 24, you can customize the way Starry Night Pro displays local and celestial paths

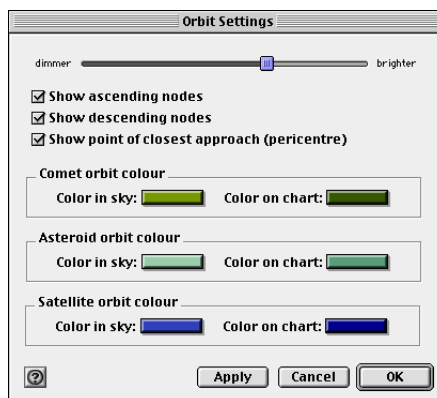


The local path is the apparent trail an object would leave as it travels in its orbit, as seen from your location. The celestial path is the apparent path an objects makes on the celestial sphere — the trail an object leaves over time, in relation to the fixed stars.

You can choose to hide paths while scrolling, set a path length, set path colour, and control the display of path markers.

## Orbit Settings

You can also customize the way Starry Night Pro displays orbits. You can adjust the brightness of the orbit display, turn off the ascending node, descending node, and pericentre markers, and set colours for the orbits of different celestial objects, such as comets, asteroids, and satellites.



**Orbit Brightness:** The slider gives you control over how brightly Starry Night Pro displays orbit paths.

**Show Ascending Nodes:** The ascending node of the orbit (the point at which the planet moves northward through the ecliptic plane), is marked with a solid wedge. If you prefer, you can deselect this option to turn it off.

**Show Descending Nodes:** The descending node of the orbit (the point at which the planet moves southward through the ecliptic plane), is marked with a hollow

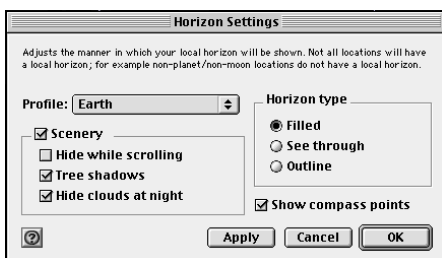
wedge. If you prefer, you can deselect this option to turn it off.

**Show Point of Closest Approach:** The point at which the orbit comes closest to the parent body (the pericenter), is marked with a little stick. If you prefer, you can deselect this option to turn it off.

**Orbit Colours:** You can choose the colour in which you want to display the orbits of comets, asteroids, and satellites. Click the colour buttons to open a colour palette. From that palette, you can select a colour for the object's orbit in the regular night sky and in the black-on-white chart view.

## Horizon

When you are located on a planet, comet, or satellite, Starry Night Pro displays an unobstructed horizon, as if you were viewing from a wide, open plain. Each planet's horizon is displayed in its own colour to help you get your bearings while on other worlds.



**Profile:** By default, Starry Night Pro opens with tree scenery. You may choose between several other scenery sets, or modify any horizon and save it for future viewing. For more information, refer to [“Creating Custom Horizons”](#) on page 76.

**Scenery:** Starry Night Pro must constantly redraw the horizon when you change your view using the scrollbars or Hand tool. You can improve Starry Night Pro's performance by selecting Hide While Scrolling.

Scenery shadows are displayed by default. Besides creating a more realistic landscape, these shadows are useful in that they help you get an idea of the Sun's location. However, you can turn them off by deselecting Tree Shadows.

You can also make your night-time views more realistic by deselecting Hide Clouds At Night. If you prefer an unobstructed view of the night sky, leave this option selected.

**Horizon:** Starry Night Pro defaults to a full horizon, but you can adjust it to display as a thin line by selecting Outline, or make it semi-transparent by selecting See Through.

***Note:** To see the horizon, you must be viewing from a Local orientation on a planet, comet, or satellite.*

By default, Starry Night Pro displays compass points on the horizon. If you find that you don't use or need them, you can turn them off by deselecting Show Compass Points.

To quickly toggle the horizon display, choose Sky | Horizon.

## Planets/Sun

Starry Night Pro gives you many options for the display of our Sun and its planets. You can change the display of a planet's

surface and atmosphere and the transition between its light and dark sides. You can turn shadows on and off and select when to display the Sun's halo. A variety of guides are available to give you perspective.

In the normal field of view, planets are displayed like stars, which is how they appear to us from the Earth's surface. As you get closer to a planet (by zooming up to them or by changing your location) you begin to see the disc image and any phase information.

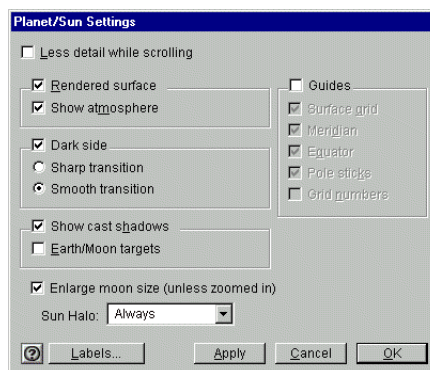
Starry Night Pro depicts the planets using the latest images from NASA and other space agencies. However, because many planets are constantly evolving, these images can quickly become out of date. For instance, the appearance of the gas giants is continuously changing. The Great Red Spot of Jupiter drifts in unpredictable ways, making precise synchronization between Starry Night Pro and observation from Earth difficult. In addition, surface features of some objects, such as Io, the volcanically active moon of Jupiter, change rapidly.

Unfortunately, we have not yet been able to fully image all of the objects in our solar system. Where little or no data is available, Starry Night Pro uses the time-honored tradition of deploying space artists to create the surfaces of distant worlds, such as Pluto, Charon, and Saturn's moon Phoebe.

For information on locating planets in the night sky, turning on their orbits, and tracking their local and celestial paths,

refer to "[Using the Planets Palette](#)" on page 22.

You can toggle the display of planets by choosing Sky | Planets/Sun. Since the Earth is also a planet, it toggles on and off along with the others.



**Less Detail While Scrolling:** When you use the scroll bars or the Hand tool, Starry Night Pro must constantly redraw the detailed images of the planet surfaces. You can improve Starry Night Pro's performance by selecting Less Detail While Scrolling.

**Rendered Surface:** Use this option to toggle detailed planet maps. Deselecting this option gives you less attractive planet surfaces, but increases Starry Night Pro's performance.

**Show Atmosphere:** You can toggle the atmospheres of objects that possess one, such as the Sun, Venus, and Earth. When selected, the object is shown with atmospheric features such as cloud formations. When selected, the Sun appears as though you were viewing it through a hydrogen-alpha filter.

**Dark Side:** For more realistic and exciting viewing, you can choose to display the dark sides of planets. You can improve performance by selecting Sharp Transition, or enjoy the planets in their full glory by choosing Smooth Transition.

**Show Cast Shadows:** In space, planets often cast shadows on other objects. You can choose to turn shadows off for better performance. Doing so automatically deactivates the Earth/Moon target option, described in the next section.

**Earth/Moon Targets:** The Earth and Moon cast shadows upon one another in certain alignments with the sun. The two circles of this target represent the limits of the umbra and the penumbra projected out at the Earth/Moon distance. This feature is useful when watching a solar eclipse from the Moon — you can see the Moon's target approaching Earth before it actually casts its shadow on the Earth.

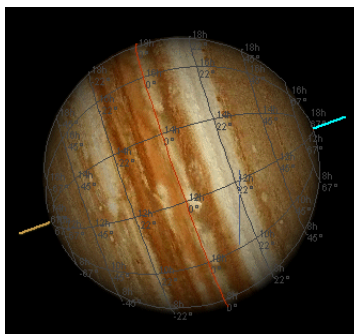
***Note:** You'll probably want to zoom up to see the umbra of the Moon's shadow, since it is very small. This is why total eclipses of the Sun are so rare at any given point on the Earth, and why they only last for such a short time.*

**Guides:** You can turn on several types of guides that help you plot out the surface of a planet and display its poles so that you can view its orientation in space.

The Surface Grid draws lines of latitude and longitude that help you pinpoint specific locations the planet's surface. You can also turn on the Meridian and Equator lines. The Pole Sticks show you the North and South poles of the axis on which the

planet rotates. Grid Numbers measure out the Surface Grid by degrees and hours.

In the following example, we magnified Jupiter and turned on all of its Guides.



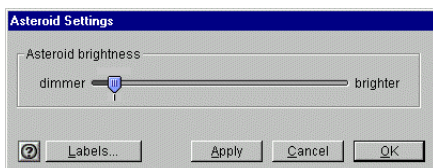
For information on turning planet orbits on and off, refer to [“Using the Planets Palette”](#) on page 22.

**Enlarge Moon Size:** People often perceive the moon to be larger than it actually is. You can choose to enlarge the moon's size when zoomed out. Refer to page [25](#) for a discussion on measuring the size of the moon using the simplest tool: your hand.

**Sun Halo:** The Sun's halo is an atmospheric effect that occurs when the Sun's light is scattered by our atmosphere. The popup menu allows you to adjust whether or not this halo is displayed, and if so, whether it is shown only in daylight, or at all times. If you're viewing a total eclipse of the Sun, we recommend that you turn the Sun's halo on, as this halo also serves as the Sun's corona.

## Asteroids

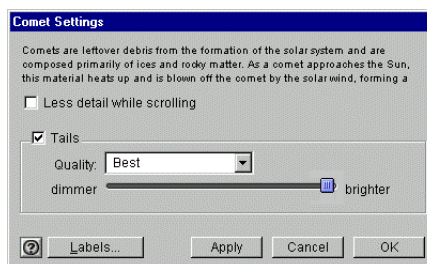
Starry Night Pro loads asteroid information from the Asteroid.txt file, found in the Starry Night Pro data folder on your hard disk. You can update this file with the latest asteroid positions available by visiting [www.starrynightpro.com](http://www.starrynightpro.com).



Since most asteroids are very small, they appear quite dim when seen from Earth. If you like, you can adjust the slider to control the brightness of asteroid display.

## Comets

These ethereal travelers are some of the most beautiful objects to view, if you're lucky enough to see one. Comets, composed primarily of ices and rocky matter, travel around the Sun in highly elliptical orbits. As they approach the inner Solar System, this material heats up and is blown off by solar radiation, forming a tail. Because it is formed by this solar wind, the tail always points away from the Sun. As a result, comets speed out of the inner solar system tail-first.



**Less Detail While Scrolling:** To improve performance, you have the option of displaying comet images of slightly lower quality during horizontal and vertical scrolling.

**Quality:** Select the degree to which you want comets rendered. To improve performance on slower computers, you may want to try switching to Draft or Better quality images.

**Brightness:** The slider control lets you adjust the brightness of comet tails. Due to the eternally optimistic attitude at Sienna Software, we have made every comet a bright comet.

***Note:** This slider is disabled if your screen is set to 256 colours. Even at 256 colours, you can still adjust brightness, but to a more limited extent.*

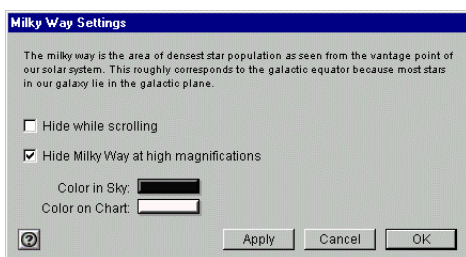
Starry Night Pro loads comet information from the Comet.txt file, found in the Starry Night Pro data folder on your hard disk. You can update this file with the latest comet positions available by visiting [www.starrynightpro.com](http://www.starrynightpro.com).

## The Milky Way

The Sun, along with all the other stars we can see, is located in the Milky Way Galaxy. This disc shaped galaxy is roughly 100,000 light years in diameter and about 13,000 light years thick. It is home to over 300 million suns.

Our solar system is located about two-thirds of the way out from the center. Looking up at the night sky, in the direction of the Milky Way, we are looking through our galaxy edgewise. The misty band of illumination we see is actually the combined light of thousands of stars.

By default, Starry Night Pro displays a guide that indicates the extent of the Milky Way. Because Starry Night Pro includes the entire Hubble Guide Star Catalog of over 19,000,000 objects, it is possible to show a much more realistic view of the Milky Way. To show the Milky Way in this fashion you must increase the number of stars displayed. For more information, refer to “[Magnitudes/Distances](#)” on page 31.



**Hide While Scrolling:** You can improve Starry Night Pro's performance by choosing to turn off the Milky Way whenever you scroll horizontally or vertically.

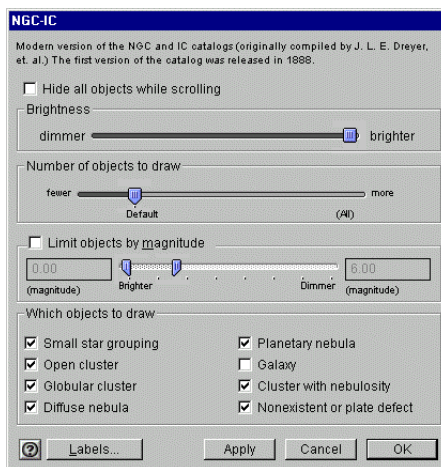
## Hide Milky Way At High Magnifications:

You can choose to turn off the display of the Milky Way at higher magnifications — any field of view greater than 25°.

**Colour:** Click the Colour buttons to display the Milky Way in colours you choose from a palette. You can specify different colours for display in the regular night sky and in the black-on-white chart view.

## NGC/IC Objects

Groups of stars, galaxies, and nebula have been catalogued by astronomers into various lists such as the New General Catalog (NGC), and the Index Catalog (IC). Starry Night Pro displays all of the objects stored in these two catalogs.



**Hide All Objects While Scrolling:** You can improve Starry Night Pro's performance by choosing to turn off every NGC/IC object whenever you scroll horizontally or vertically.



**Number Of Objects To Draw:** You can use this sliding scale to adjust the number of NGC/IC objects Starry Night Pro displays.

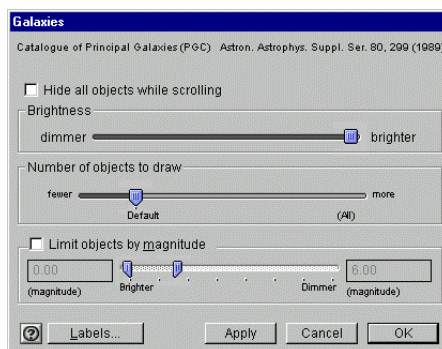
***Note:** The brightness of many of the NGC/IC objects is not known. Because Starry Night Pro determines the number of objects to show depending their brightness, you may want to keep this slider set to its maximum (All).*

**Limit Objects By Magnitude:** The Dimmer and Brighter sliders allow you to set a magnitude range into which objects must fall to be displayed by Starry Night Pro.

**Which Objects To Draw:** You can toggle the display of up to eight NGC/IC objects. By default, Galaxies are not displayed, because Starry Night Pro keeps its own specialized galaxy database. Select Galaxy if you prefer to use the NGC/IC database. For more information, refer to the next section.

## Galaxies

Galaxies provide some of the most glorious viewing opportunities in the night sky. Starry Night Pro includes the Principal Galaxies Catalog (PGC). The Galaxy Settings window gives you control over the number and type of galaxies displayed.



**Hide All Objects While Scrolling:** You can improve Starry Night Pro's performance by choosing to turn off the display of galaxies whenever you scroll horizontally or vertically.

**Number Of Objects To Draw:** You can use this sliding scale to adjust the number of galaxies Starry Night Pro displays.

***Note:** The brightness of many of the galaxies is not known. Because Starry Night Pro determines the number of objects to show depending their brightness, you may want to keep this slider set to its maximum (All).*

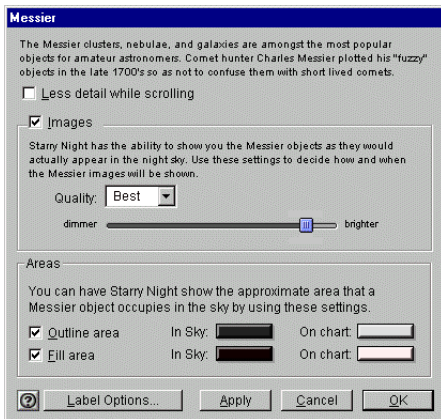
**Limit Objects By Magnitude:** The Dimmer and Brighter sliders allow you to set a magnitude range into which galaxies must fall to be displayed by Starry Night Pro.

## Messier Objects

Among amateur astronomers, some of the most popular celestial bodies are the Messier objects. These were plotted by comet-hunter Charles Messier in the late 1700s. He wanted to catalogue the various “fuzzy” objects in the night sky, so as not to confuse them with the short-lived comets he was trying to discover.

Starry Night Pro displays these star clusters, nebulae, and galaxies by using actual photographs. In the normal field of view, the larger Messier objects can be seen as hazy patches, similar to what you can observe on a very clear and dark night.

Zooming in towards a particular Messier object lets you see what it looks like when photographed using long exposures and/or large telescopes. Some of the Messier objects are displayed in colour. However, even with the very largest telescopes, one sees very little colour or fine detail. These beautiful images are possible only through photographic enhancement.



**Less Detail While Scrolling:** To improve performance, you have the option of displaying Messier images of lower quality during horizontal and vertical scrolling.

**Images:** When you zoom in on a Messier object, you see a telescopic image of that particular object. Some people prefer to substitute their own images for those found in Starry Night Pro and deselect this option. For more information, refer to [“Custom Images”](#) on page 41.

You can adjust the quality of the Messier image Starry Night Pro displays, selecting from Draft, Better, or Best. For increased performance on slower machines, you may want to try switching to Draft or Better quality images.

You can also adjust the brightness of Messier objects using the slider provided. Using this control, you can adjust the object so that its brightness appears as it would through a backyard telescope (as a very dim image), or as captured by a long exposure observatory photograph (a much brighter image).

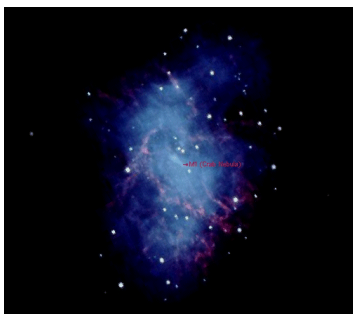
***Note:** On a 256 colour display, this slider is disabled. However, you can adjust the brightness somewhat by switching between Draft, Better, and Best.*

**Areas:** If you choose to turn off Messier images, you can have Starry Night Pro display the approximate area each Messier object occupies in the sky.

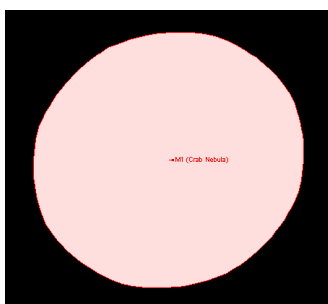
- **Outline Area:** You can choose to draw an outline around the area that any particular Messier object occupies. You can adjust the colour of the outline by pressing the On Chart and In Sky colour buttons and selecting a new colour from the palette.
- **Fill Area:** You can choose to fill in the area that any particular Messier object occupies. You can adjust the colour of the fill by pressing the On Chart and In Sky colour buttons and selecting a new colour from the palette.

For example, suppose you choose to view a well-known Messier object, the Crab Nebula (M1). If you have Images turned on, you see the following picture.





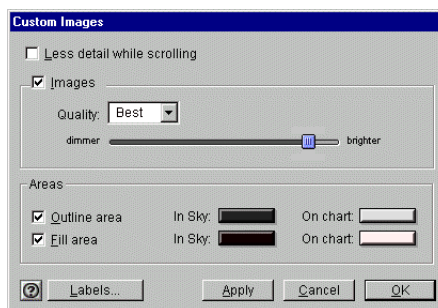
If you turn Images off, but have turned on Fill and Outline, you see the following picture.



## Custom Images

Many Starry Night Pro users are avid astronomers who have access to their own photographic libraries of celestial objects. Starry Night Pro makes it possible for you to add your own images to any area of the sky. For step-by-step instructions on doing so, refer to “[Custom Images](#)” on page 73.

The Custom Images settings window gives you control over the appearance of any images you added to Starry Night Pro.



**Less Detail While Scrolling:** To improve performance, you have the option of displaying custom images of slightly lower quality during horizontal and vertical scrolling.

**Images:** You can adjust the display quality of your custom images, selecting from Draft, Better, or Best. For increased performance on slower machines, you may want to try switching to draft or better quality images.

As in “[Messier Objects](#)” on page 39, you can also adjust the brightness of your custom images using the slider provided.

**Areas:** If desired, you can improve performance by deselecting Images — opting instead to display an outline and/or a fill of the object. The In Sky and On Chart colour buttons give you access to a colour palette from which you can select outline and fill colours.





## Chapter 4

# Customizing Starry Night Pro

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You can personalize your Starry Night Pro viewing experience by adjusting any of several settings, then saving them so that you can return later and find your customizations intact.

### Custom Settings Files

Starry Night Pro allows you to create settings files of the changes you make using its Settings, Guides, and Sky menus. This makes it easier for you to switch quickly between a variety of custom settings.

**Saving Settings Files:** Choose File | Save Settings As ... to save your current options as a settings file you can turn on at any time.

**Default Settings:** Choose File | Save Settings As Default to apply your current settings every time Starry Night Pro opens a new view.

***Note:** If you accidentally save a settings file as the default and want to return to the “out-of-the-box” settings, choose File | Preferences | General and click Factory Defaults.*

**Use Settings:** Choose File | Use Settings to select from any saved settings file or return to the default. After you make a selection, the current view immediately adopts the new settings.

*Example: Creating a settings file for printing charts*

- 1 If Daylight is on, choose Sky | Daylight to turn it off.
- 2 Choose Settings | Chart View.
- 3 Choose Guides | Local | Settings and turn on the Local Equator, Local Meridian, Zenith and Nadir, and Background Grid.
- 4 Choose File | Save Settings As ...
- 5 Name your settings file, and click Save.

Whenever you want to print a star chart, you can now choose File | Use Settings and select the set you named in step 5, above. Starry Night Pro applies the star chart settings to the current view, and you're ready to print.

**Note:** To delete a settings file, search your hard disk for the file then drag it into the Recycling Bin or Trash.

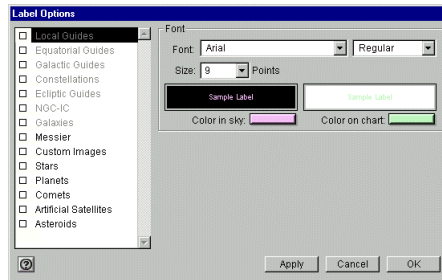
## Labels

Starry Night Pro can display labels that tell you the names of many of the objects in the night sky.

To turn on all labels, choose Sky | Labels | All. To turn them off, choose Sky | Labels | None. You can toggle the display of labels for types of objects such as Constellations and Planets/Sun by selecting them from the Labels menu.

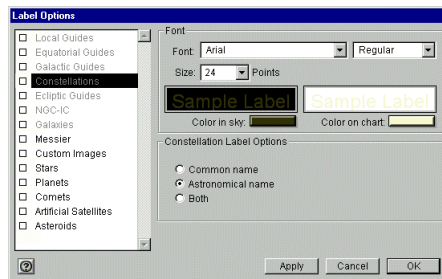
For many objects, label options give you control over the number and type of labels displayed. You can also control label text size, colour, and fonts, in order to quickly distinguish between the various objects.

To edit label displays, choose Sky | Labels | Label Options.



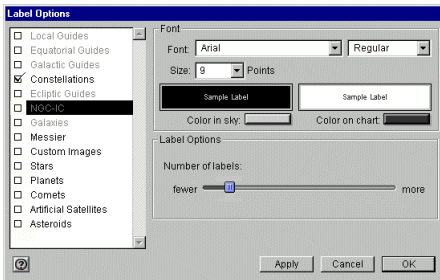
**Guide Label Options:** For Local, Equatorial, Galactic, and Ecliptic guides, you can modify the label text by selecting its font, style, and size. You can also adjust the colour in which the label is displayed by clicking the Colour In Sky and Colour On Chart buttons.

**Constellation Label Options:** In addition to controlling the font in which labels are displayed, you can also choose the type of constellation name.



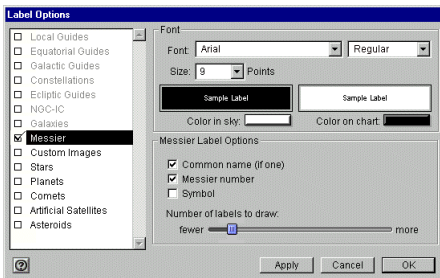
By default, Starry Night Pro displays the Astronomical Name of a constellation, for example, Ursa Major. If you choose to display Common Names, the same constellation is labelled The Great Bear.

**NGC/IC Objects, Galaxies, and Custom Images Label Options:** As with other labelled objects, you can control the font in which the labels for these objects are displayed.



Displaying labels for all of these objects would result in a sky filled with labels, instead of stars! The Number Of Labels slider lets you decide how many NGC/IC, Galaxy, and Custom Image labels you want to display.

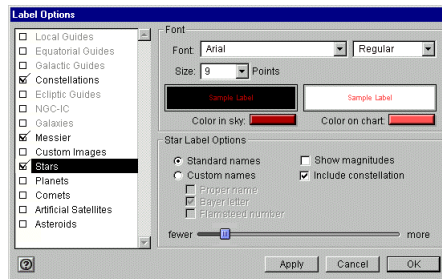
**Messier Label Options:** For Messier objects, you have the standard font modification options, along with the Number Of Labels slider that lets you restrict how many Messier Object labels you display.



Under Messier Label Names, the Common Name option displays the colloquial name of the Messier object, while the Messier Number option displays the number Charles Messier assigned to the object. For

example, Messier object M6 is also known as the Butterfly Cluster. You can choose to display either the name or number, both, or neither.

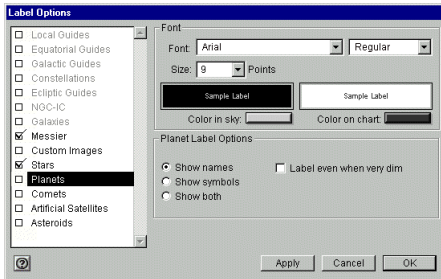
**Star Labels Options:** As with other labelled objects, you can modify the font in which the star label is displayed. You can also use a slider to adjust the number of star labels displayed.



Stars are known by many names and numbers, and you can control the name or number by which the star is labelled. You can choose to display the Standard Name by which a star is known, or under Custom Names, choose to display its Proper Name, Bayer Letter, and Flamsteed Number.

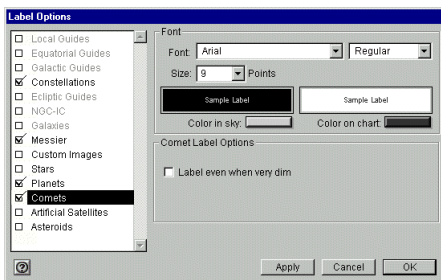
You can also choose to display the star's magnitude in its label, as well as the constellation to which it belongs.

**Planets/Sun Label Options:** In addition to control over the font used in the label display, you can modify the Planet/Sun label to include Names, Symbols, or Both. For example, selecting Both means that for Venus, the label displays its name and the universal symbol for femininity.



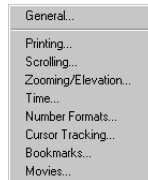
At certain points in their orbits, far-off planets, such as Uranus and Neptune, may appear as very dim spots, particularly if you have factored in the light pollution of an urban environment. For such planets, you can choose whether or not to Label Even When Very Dim.

**Comets, Asteroids, and Artificial Satellites Label Options:** As with other labelled objects, you have control over the font used in the label display.



Comets, asteroids, and artificial satellites may at times be only faintly visible from Earth. By default, Starry Night Pro does not label those objects at such times. You can display their labels by selecting Label Even When Very Dim.

## Preferences



For control over how Starry Night Pro looks and responds, choose File | Preferences. Preferences are global in nature. Once set, they are automatically used as the default

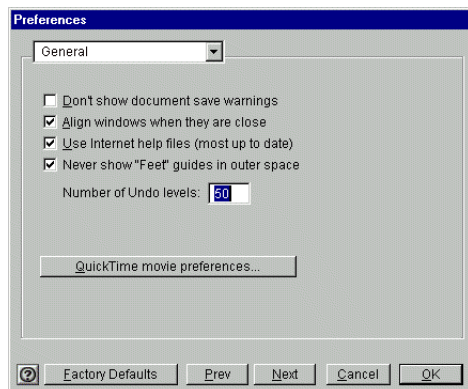
preferences and applied every time you open Starry Night Pro.

**Tip:** A quick way to access the Preferences window is to double-click on the Selection Tool.

**Next and Previous:** The Next and Previous buttons allow you to navigate through each window in the Preferences menu.

**Factory Defaults:** Resets all preferences to “right out of the box” specifications.

**General:** The General Preferences window gives you control over basic Starry Night Pro functionality.



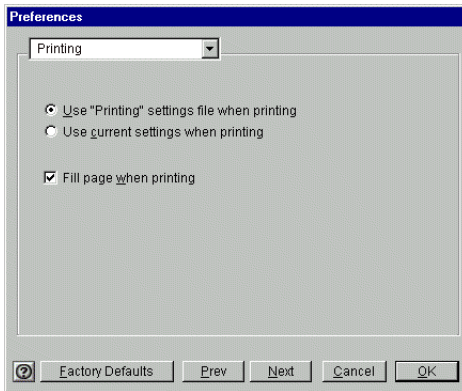
If you don't need to be reminded to save a Starry Night Pro view when you close it, you can select Don't Show Document Save Warnings.

If you don't have an Internet connection for access to the latest Starry Night Pro help files, you should deselect Use Internet Help Files. Instead, you will view the most current help files available at time of shipping.

Number Of Undo Levels sets the number of actions you can reverse by choosing Edit | Undo. Note that increasing this number places a heavier demand on computer memory and may reduce system performance.

You also have access to the QuickTime Movie Settings window. For more information, refer to "[Movies](#)" on page 50.

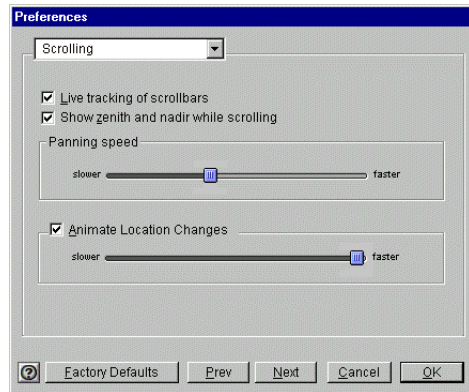
**Printing:** Starry Night Pro comes with a settings file that is optimized for printing.



If you prefer, you can choose to use your Current Settings File.

When you print, Starry Night Pro sends the contents of the window to the printer plus as much of the surrounding area as it can. Deselect Fill Page While Printing if you prefer to print only what you see in the window.

**Scrolling:** Scrolling preferences control the manner in which Starry Night Pro updates the screen when you use the scroll bars, the Hand tool, or other features that change your view.



Selecting Live Tracking Of Scrollbars means that your view is updated constantly when you scroll horizontally or vertically across the night sky. If you have a slower computer, you may want to deselect this option to increase performance. Your view does not update until you release the scroll button.

By default, the point directly above you (Zenith) and the point directly below you (Nadir) are shown. If you want, you can deselect Show Zenith And Nadir While Scrolling.

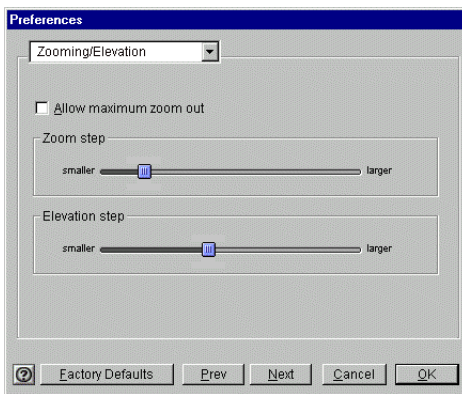
Functions such as Find (choose Selection | Find) offer the exciting experience of panning across the sky to zoom in on the object of your search. To increase or decrease the speed of this animation, adjust the Panning Speed slider.

Selecting Animate Location Change simulates the experience of flying through



space and landing on an object after setting it as your viewing location. If you right-click (click and hold on the Macintosh) an object and select Go There, Starry Night Pro takes you on a ride that's out of this world. We recommend leaving the animation speed slider set to its maximum, unless you have a very fast computer and find that the animation sequence is over too quickly.

**Zooming/Elevation:** Zooming and Elevation preferences give you control over the way Starry Night Pro changes your magnification and altitude.

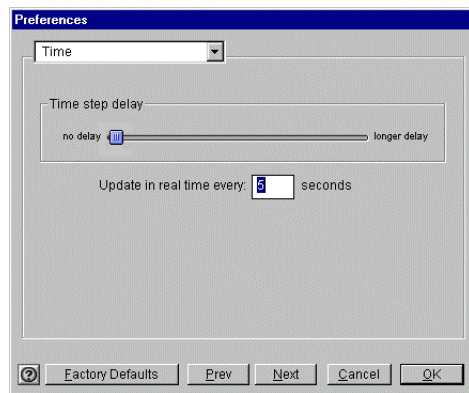


If you select Allow Maximum Zoom Out, you can zoom out to the maximum view of 180°.

The Zoom Step slider adjusts the rate at which Starry Night Pro increases and decreases your magnification when you click on an object or area with the magnification or demagnification tools. By increasing this slider, you will zoom in or out faster, since each zoom step is larger.

The Elevation Step slider adjusts the rate at which Starry Night Pro increases and decreases your altitude when you blast-off or retro-thrust using the elevation tools. By increasing this slider, you can change your elevation at a faster rate, since each elevation step is larger.

**Time:** The Time Preferences window gives you control over the speed at which your screen updates when you increase the time step.

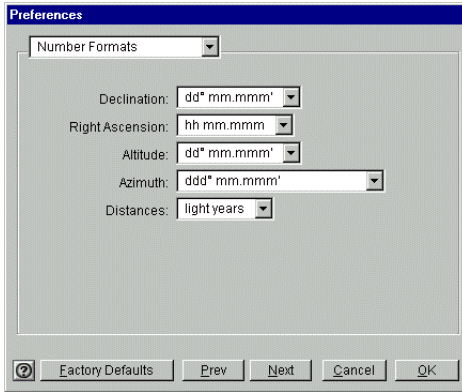


When you speed up the flow of time by increasing the Time Step, Starry Night Pro updates your view as though you were watching a time-lapse video. The Time Step Delay slider allows you to insert an artificial delay, as though time were stopping for a moment after each increment.

The Update In Real Time text box sets the number of seconds between screen updates when time is flowing at a normal rate. The default setting is 5 seconds. If set to 0, the screen will update as fast as your computer will let it. On slower computers, it is best to set this default to a higher value.



**Number Formats:** The Number Formats preferences window gives you control over the numeric information displayed when you hover your cursor over any celestial object.



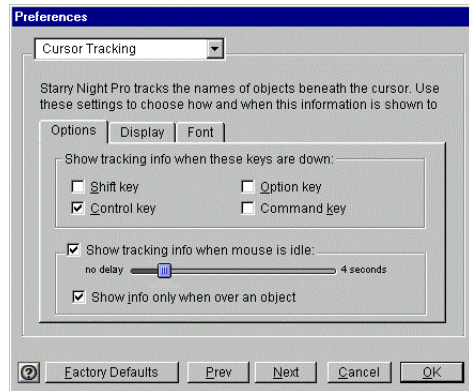
There are a number of different formats in which Declination, Altitude, Right Ascension, and Azimuth are described. These popup menus let you choose how each of these terms is displayed throughout Starry Night Pro.

- **d:** degrees
- **m:** minutes
- **s:** seconds

The numbers of each letter indicates decimal places of the format. For example, dd mm.mmm indicates that degrees will be displayed by up to two digits, with minutes being displayed by up to two digits rounded off to three decimal places — 25° 30.123'.

For Distances, you can choose to view the amount of space between you and any celestial object in either light years or parsecs.

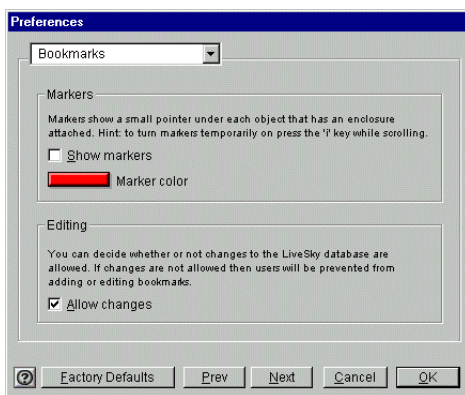
**Cursor Tracking:** When you hover the mouse over an object, Starry Night Pro displays basic information about it, such as its name and distance from Earth. You can control how and what information is displayed.



Information appears when you hover the cursor over an object, or when you press a key while doing so. On the Option tab, you can select which key you want to use to toggle object information, as well as how long the mouse must hover over the object before information is displayed.

The Display tab gives you control over which object information is displayed, including Name, Magnitude, Distance, and so on. You can also choose the colour in which you want to display the information, both in the regular sky and on the star chart. The Font tab lets you choose the size, style, and font of the text in which the information is displayed.

**Bookmarks:** You can associate Web pages and email addresses with any of the objects shown in Starry Night Pro. This window allows you to alter the appearance of those bookmarks.

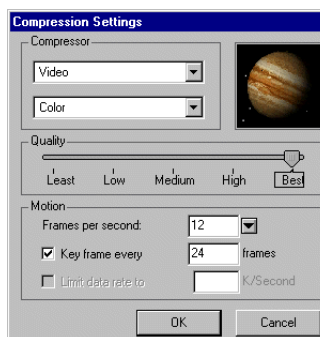


Under Markers, you can choose whether or not to display bookmark information. You can also select the colour used in the bookmark indicator.

Under Editing, you can choose to prohibit users from making changes to the bookmarks you have saved. Users often take advantage of this feature in a classroom environment, or whenever many users have access to the same computer.

For more information on bookmarks, refer to “[Custom Bookmarks](#)” on page 72.

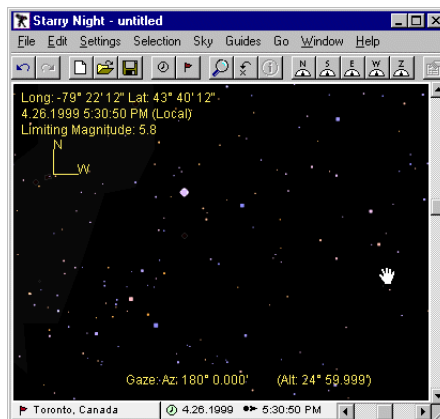
**Movies:** In “[Making Movies](#)” on page 61, we show you how to create QuickTime movies of celestial phenomena you can watch unfold in Starry Night Pro. The Movie preferences window gives you control over the settings used to make these movies.



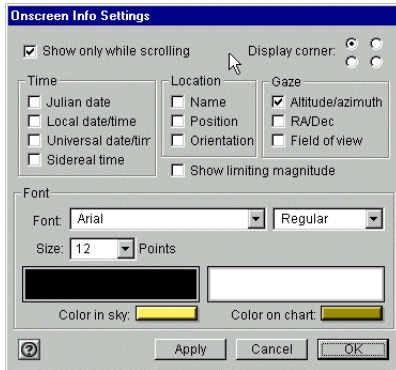
You can select the Compressor method you want to use and whether you want the movie to appear in Colour or Black and White. You can adjust the quality of your video output, including resolution and the number of frames displayed per second.

## Onscreen Information

A good way to keep track of the specifics of your current view of the night sky is to use Starry Night Pro's onscreen information display. You can display Time, Location, and Gaze information, either as a constant or only while scrolling.



To turn on onscreen information, choose **Guides | Onscreen Info**. To adjust your onscreen information display, choose **Guides | Onscreen Info Settings**.



**Show Only While Scrolling:** You can choose to display onscreen information only when scrolling or changing your view using the hand tool.

**Display Corner:** Choose the corner of your display in which you want to show onscreen information.

**Time:** Select how you want to view the time in the onscreen information display.

- *Julian Date:* Displays the Julian date.
- *Local Date and Time:* Displays the local time and date if your current viewing location is on Earth.
- *Universal Date and Time:* Displays the Universal date and time.

**Location:** Select how you want to view location information in the onscreen information display.

- *Name:* Displays the city and country name of your current location. If you are located above an object, its name appears as well.

- *Position:* Displays your location by listing your latitude and longitude on Earth, or your heliocentric coordinates in space.
- *Orientation:* Displays a direction indicator that points North and West. If you have flipped your view by choosing **Settings | Flip**, that information is displayed as well. The onscreen information display is a good way of tracking your Flip status.

**Gaze:** Select from these options to display information about the direction in which you are currently looking. Gaze information always appears in the bottom center of your screen, regardless of your Display In Corner settings.

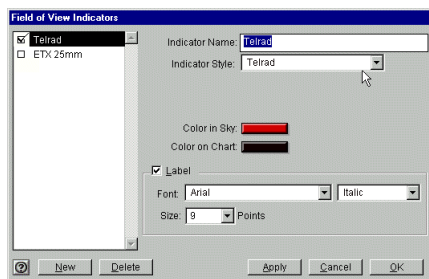
- *Altitude and Azimuth:* Displays the altitude and azimuth of your current view (measured at the center of the window).
- *RA and Dec:* Displays the Right Ascension and Declination of your current view, as measured at the center of the window.
- *Field of View:* Displays your current Field of View (FOV), in degrees.

**Show Limiting Magnitude:** Toggles the display of your limiting magnitude, the magnitude of the dimmest object you can see in your current view. Limiting magnitude is derived as a combination of your Magnitude/Distance settings, and your current magnification.

**Font and Colour:** You can adjust the colour and font of the onscreen information display using the text boxes and buttons provided.

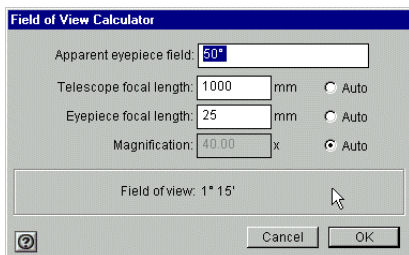
## Field of View Indicators

You can display guides that show the field of view (FOV) through several popular instruments. You can also add guides specific to your telescope eyepiece or binoculars. Choose **Guides | Field Of View Indicators**.



**Adjusting FOV Indicator Settings:** For Indicator Style, you can choose from four options.

- *Telrad*<sup>TM</sup>: Displays the “bulls-eye” guides of a Telrad<sup>TM</sup> spotting device.
- *Circle*: Displays a circular guide that approximates many types of instruments. You can adjust the diameter of the circle to the FOV offered through your instrument. If you aren't sure of your instrument's FOV, press Calculator.



To determine the field of view currently available through your instrument, enter its specifications in the text

boxes. Starry Night Pro automatically calculates your FOV from the values you enter and displays it at the bottom of the dialog.

- *CCD*: Displays the rectangular guide of the CCD eyepiece. You can adjust the height and width of the FOV, as well as setting an angle of inclination, if any.
- *Rigel QuickFinder*: Displays the smaller “bulls-eye” of the Rigel eyepiece.

You can adjust the colour and font of the FOV indicator display using the text boxes and buttons provided.

**Adding FOV Indicator Settings:** If you view the night sky through a number of different instruments, you may want to customize your FOV Indicator Settings by adding them to the defaults supplied.

To add a new FOV Indicator Setting:

- 1 Choose **Guides | Field Of View Indicators**.
- 2 Click **New**. An “Untitled Indicator” option appears in the checklist.
- 3 Name your new indicator and set its FOV as described in the previous section.
- 4 Click **Apply**.

You can remove an FOV indicator by selecting it and clicking **Delete**.

## Constellations

People have always joined together patterns of stars to create images in the night sky. The most well known of these are those that have been handed down to us from the Arabians, Greeks, and Romans. Contemporary astronomers use these ancient constellations as guide to map the stars into various regions.

Starry Night Pro lets you display the constellations in several different ways, using any combination of name, stick figure, classical etching, or boundary. To toggle the display of any of the constellations, choose Guides | Constellations and select the display style you want to turn on or off.

**Note:** If you've selected a constellation but cannot see the image, it may be that you are zoomed in too close (past  $3^\circ$  or so). Zoom out a bit to view the constellation's image.

**Stick Figures:** Displays either Rey's or the classical illustrations of constellations, depending on the setting.

**Boundaries:** Displays the constellations' boundaries as set by the International Astronomical Union (IAU).

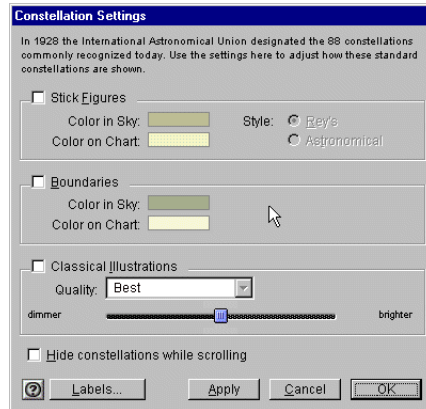
**Classical Illustrations:** Depicts the constellations as illustrations, many of which are inspired by Bayer's *Uranometria*, the classic 17th century book of constellation etchings.

**Labels:** Displays the names of the constellations.

**Zodiac Only:** Displays only the constellations of the Zodiac — those

constellations through which the ecliptic plane passes.

**Settings:** Opens the Constellation Settings window, from which you can control the display of constellation illustrations.



- **Stick Figures:** Toggles the display of Rey's or astronomical illustrations. Select a Sky or Chart colour by clicking the colour buttons.

**Rey's:** Sets the constellation stick figures to those devised by H.A. Rey, in his book *The Stars, a New Way to See Them*. It shows the constellations in a graphical way, with the shapes suggesting what the names imply. For example, Ursa Major, the Great Bear, is depicted as a stylized bear.

**Astronomical:** Depicts the constellation stick figures in the classical format.

- **Boundaries:** Toggles the display of the IAU constellation boundaries. Select a Sky or Chart colour by clicking the colour buttons.
- **Classical Illustrations:** Toggles the display of Bayer's constellation illustrations. The Quality selection box allows you to increase performance on

slower machines by switching to Draft or Better quality images.

- *Dimmer Slider:* Adjusts the brightness the classical etching's image is on the screen.
- *Hide While Scrolling:* Select to improve performance on slower machines.

You can adjust the Constellation Tool's options by double-clicking on the tool. These options apply only when using the tool and are global in nature — they apply to all open windows.

## Local Guides

You can display a grid over your Starry Night Pro view that is based upon your location and altitude and azimuth measurements (an altaz grid). This grid, along with the nearest meridian, the horizon line, and the Zenith and Nadir, fall into the category of Local Guides.

**Note:** *Local Guides are based on your local horizon, which appears slightly above the actual horizon due to the refraction of light in the atmosphere.*

To toggle the display of any of these local guides, choose Guides | Local and select the guide you want to turn on or off.

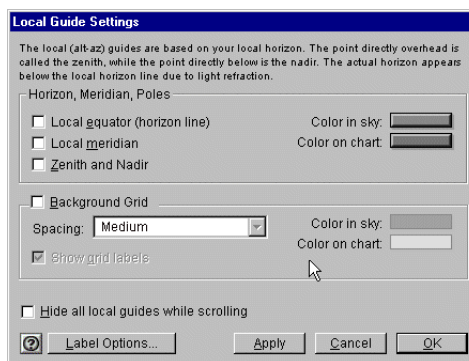
**Horizon:** Displays your local horizon, which appears slightly above the actual horizon due to the refraction of light by the atmosphere.

**Meridian:** Displays the closest meridian (line of longitude) to your location.

**Grid:** Displays an altaz grid and, by default, the altitude and azimuth number of each gridline. The altaz grid is helpful for pinpointing the location of particular objects in the sky, as seen at a specific time from your location.

**Zenith and Nadir:** Displays indicators for the Zenith (the point directly above you) and Nadir (the point directly below you).

**Local Guide Settings:** Opens the Local Guides Settings window, which gives you control over the appearance of all the local guides.



You can adjust any of the following settings:

- *Horizon, Meridian, and Poles:* Toggle the display of the corresponding guides. Select a Sky or Chart colour for the guides by clicking the colour buttons.
- *Background Grid:* Toggles the display of the altaz grid. You can adjust the spacing of the gridlines to Fine, Medium, or Coarse and elect to turn off the altitude and azimuth numbers. Altitude measures the angle of an object above or below the horizon. The local horizon is a base line of 0°,



counting up to the Zenith at  $90^\circ$  and down to the Nadir of  $-90^\circ$ .

Azimuth is based on the compass direction of an object. This angle is measured from the north ( $0^\circ$ ), through the east ( $90^\circ$ ), the south ( $180^\circ$ ), west ( $270^\circ$ ), back north again ( $360^\circ$  or  $0^\circ$ ).

Select a Sky or Chart colour for the altaz grid by clicking the colour buttons.

- *Hide Local Guides While Scrolling:* Select to improve performance on slower computers.

## Equatorial Guides

Looking up into the night sky, you can imagine that the stars are fixed to an imaginary sphere surrounding our planet. To specify locations on this celestial sphere, astronomers use a system of coordinates similar to the latitude and longitude measurements used to map Earth.

The equatorial guides show this sphere mapped onto the sky. They are based upon the celestial equator (a projection of the Earth's equator onto the celestial sphere), and the celestial poles (a projection of the north and south geographic poles).

Declination measures an object's angular distance north or south of the celestial equator (an object of  $0^\circ$  declination is directly on the celestial equator).

Declination is usually given in degrees minutes and seconds of arc ( $^\circ$ ,  $'$ ,  $''$ ).

The east-west measurement is called the right ascension (RA), and is most often

measured in hours, minutes, and seconds (h, m, s), from 0 to 24 hours.

***Note:** You can change the numbering format used to display RA and Dec. For more information, refer to “[Number Formats](#)” on page 49.*

The zero-point of Right Ascension (RA) is based upon the Vernal Equinox, the point at which the Sun crosses the celestial equator on its way north in the Spring. Since the vernal equinox slowly changes over time due to the precession of the Earth, the equatorial coordinate system upon which it is based also changes. This means that an object's position given in RA and Dec will change depending on the date. To standardize astronomical positions, astronomers often refer to an object's position using the coordinate system of a particular date. For example you will often see positions given in J2000 coordinates, using the equatorial coordinate system of Jan 1, 2000.

To toggle the display of equatorial guides, choose Guides | Equatorial and select the guide you want to turn on or off.

**Equator:** Displays the celestial equator, the projection of the Earth's equator onto the celestial sphere.

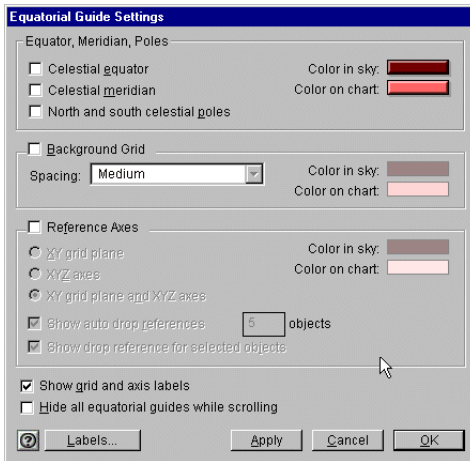
**Meridian:** Displays the celestial meridian, the projection of the Earth's Prime Meridian onto the celestial sphere.

**Grid:** Turns on the equatorial grid and, by default, the RA and Dec of each gridline.

**Reference Axes:** Displays the equatorial reference plane, with the Sun at its center.

**Celestial Poles:** Displays the projection of the Earth's poles onto the celestial sphere.

**Settings:** Opens the Equatorial Guides Settings window, which gives you control over the appearance of all the equatorial guides.



**Equator, Meridian, Poles:** Toggle the display of the corresponding guides. Select a Sky or Chart colour for the guides by clicking the colour buttons.

**Background Grid:** Toggles the display of the equatorial grid. You can adjust the spacing of the gridlines to Fine, Medium, or Coarse. Select a Sky or Chart colour for the background grid by clicking the colour buttons.

**Reference Axes:** For the grid which illustrates the equatorial plane, you can choose to display the XY Grid Plane, the XYZ Axes, or both. Select a Sky or Chart colour for the reference axes by clicking the colour buttons.

**Show Auto Drop References:** You can choose to display the amount by which objects “drop” off the plane. Starry Night

Pro draws a coloured triangle between three points: the object, the plane beneath it, and the Sun. You can also select the number of objects for which you want to display drop references. For the sake of simplicity, you should keep this number low.

**Show Drop Reference for Selected Objects:** You can choose to display drop references only for objects you select with the pointer tool.

**Show Grid and Axis Labels:** Toggles the display of the text and numbers used to identify the grid and axes. To adjust the font used in the display, click Labels.

**Hide All Equatorial Guides While Scrolling:** Select to improve performance on slower computers.

## Ecliptic Guides

Ecliptic guides are based on the ecliptic plane, which is the plane of the Earth's orbit around the Sun, and are measured by the ecliptic latitude and ecliptic longitude. The ecliptic latitude is measured from 0° at the ecliptic to 90° North and -90° South at the ecliptic poles. The ecliptic longitude, also in degrees, is measured from the Vernal equinox eastward.

To toggle the display of ecliptic guides, choose Guides | Ecliptic and select the guide you want to turn on or off.

**Ecliptic:** Displays the Ecliptic equator, a projection of the plane of the earth's orbit onto the celestial sphere.

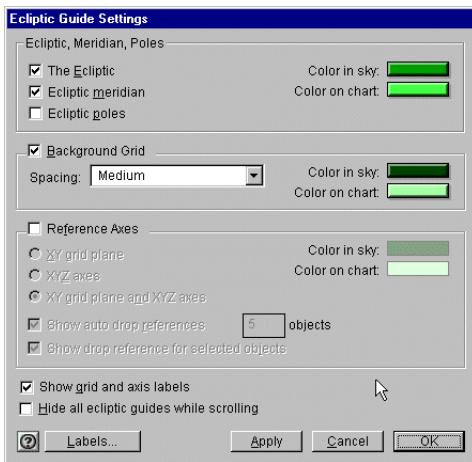
**Ecliptic Meridian:** Displays a guide to the plane running perpendicular to the ecliptic.



**Grid:** Displays the gridlines of ecliptic longitude and latitude.

**Reference Axes:** Displays the ecliptic reference plane, with the Sun at its center.

**Settings:** Opens the Ecliptic Guides Settings window, which gives you control over the appearance of all the ecliptic guides.



**Ecliptic, Meridian, Poles:** Toggle the display of the corresponding guides.

**Background Grid:** Toggles the display of the ecliptic lines of latitude and longitude. You can adjust the spacing of the gridlines to Fine, Medium, or Coarse. Select a Sky or Chart colour for the background grid by clicking the colour buttons.

**Reference Axes:** For the grid which illustrates the ecliptic plane, you can choose to display the XY Grid Plane, the XYZ Axes, or both. Select a Sky or Chart colour for the reference axes by clicking the colour buttons.

**Show Auto Drop References:** You can choose to display the amount by which

objects “drop” off the plane. Starry Night Pro draws a coloured triangle between three points: the object, the plane beneath it, and the Sun. You can also select the number of objects for which you want to display drop references. For the sake of simplicity, you should keep this number low.

#### Show Drop Reference for Selected

**Objects:** You can choose to display drop references only for objects you select with the pointer tool.

**Show Grid and Axis Labels:** Toggles the display of the text and numbers used to identify the grid and axes. To adjust the font used in the display, click Labels.

**Hide All Ecliptic Guides While Scrolling:** Select to improve performance on slower computers.

## Galactic Guides

Astronomers sometimes use the galactic coordinate system to indicate the location of an object in respect to the orientation of our galaxy, the Milky Way. Galactic latitude has its baseline of  $0^\circ$  along the plane of the galaxy (the center of the Milky Way) with poles of  $90^\circ$  in Coma Berenices and  $-90^\circ$  in Sculptor. Galactic longitude's 0 hours is located in the direction of the center of the galaxy (in Sagittarius), increasing in an easterly direction.

To toggle the display of Galactic guides, choose Guides | Galactic and select the guide you want to turn on or off.

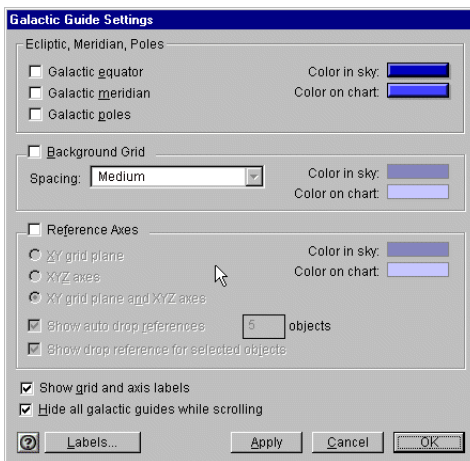
**Equator:** Displays the Galactic equator, the baseline of the plane of the Milky Way.

**Galactic Meridian:** Displays a guide to the plane running perpendicular to the galactic.

**Grid:** Displays the galactic plane's gridlines of longitude and latitude.

**Reference Axes:** Displays the galactic reference plane, with the Sun at its center.

**Settings:** Opens the Galactic Guides Settings window, which gives you control over the appearance of all the equatorial guides.



**Galactic, Meridian, Poles:** Toggle the display of the corresponding guides. Select a Sky or Chart colour by clicking the colour buttons.

**Background Grid:** Toggles the display of the galactic lines of latitude and longitude. You can adjust the spacing of the gridlines to Fine, Medium, or Coarse. Select a Sky or Chart colour for the background grid by clicking the colour buttons.

**Reference Axes:** For the grid which illustrates the galactic plane, you can choose to display the XY Grid Plane, the

XYZ Axes, or both. Select a Sky or Chart colour for the reference axes by clicking the colour buttons.

**Show Auto Drop References:** You can choose to display the amount by which objects “drop” off the plane. Starry Night Pro draws a coloured triangle between three points: the object, the plane beneath it, and the Sun. You can also select the number of objects for which you want to display drop references. For the sake of simplicity, you should keep this number low.

**Show Drop Reference for Selected Objects:** You can choose to display drop references only for objects you select with the pointer tool.

**Show Grid and Axis Labels:** Toggles the display of the text and numbers used to identify the grid and axes. To adjust the font used in the display, click Labels.

**Hide All Galactic Guides While Scrolling:** Select to improve performance on slower computers.



## Chapter 5

# Advanced Features

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### Multiple Windows

One of the most useful features of Starry Night Pro is its ability to open multiple functional windows. This opens up many exciting possibilities for the user. For example, you can view an event from several different locations at the same time, or view the sky at several different times.

**Synchronizing Time and Location:** Starry Night Pro's drag-aware interface makes it easy to synchronize the times and/or locations of multiple windows. If two windows are open, you can synchronize their locations by dragging the location flag from one window to the other. Similarly, you can synchronize two windows' times by dragging the Time display from one window to the other.

***Note:** Time is always dragged as Universal Time. On Earth, however, Starry Night Pro displays the time in your local time zone.*

*Example: Simultaneously viewing a solar eclipse from the Earth, the Moon, and the Sun*

Multiple windows are an excellent way to view the alignment of planets. In this exercise, we will examine a total solar eclipse from three viewpoints: the Earth, the Moon, and the Sun.

To view the eclipse from the Earth:

- 1 Open a new window, and save it as "Eclipse (from Earth)".
- 2 On the Tool Palette, set Latitude to 21°N.
- 3 Set longitude to 103°W (this location is in Mexico).
- 4 Set the date to July 11 1991 AD.
- 5 Set the time to 12:03 PM
- 6 Set the time step to 10 minutes.
- 7 Using the Planet Palette, lock on the Moon.
- 8 To view the eclipse, press the Time Forward button.

To view the eclipse from the Moon:

- 1 Open a new window, and save it as "Eclipse (from Moon)".
- 2 Adjust this window's size so that you can see the "Eclipse (from Earth)" window that you previously created.
- 3 Drag the Time Information of "Eclipse (from Earth)" into the "Eclipse (from Moon)" window. This synchronizes the time and time step of the two windows.
- 4 Using the Planet Palette, select the Moon and click Go There. Your viewing location is now on the Moon.
- 5 On the Planet Palette, lock on the Earth. You should now be able to see the shadow of the Moon (the Penumbra) projected onto the Earth.
- 6 If you want, use the Zoom tool and zoom up to about 1°, so that you can see the umbra. This is the tiny area of

total shadow where, from Earth, you can see the total eclipse of the Sun.

***Note:** You may want to hide the clouds on the Earth in order to see the planet's surface better. Choose Settings | Planets/Sun and deselect Show Atmosphere.*

To view the eclipse from the Sun:


- 1 Open a new window and save it as "Eclipse (from Sun)".
- 2 Adjust this window's size so that you can see the other two windows.
- 3 On the Planet Palette, select the Sun and click Go There. You are now located on the Sun.
- 4 Using the Planet Palette, lock on the Moon. Hide the horizon if necessary.
- 5 Drag the Time Information of "Eclipse (from Earth)" into the window. This will synchronize the time and time flow of the two windows.
- 6 Using the Zoom tool, zoom in towards the Moon until about 17". This should give you a nice view of the Moon in front of the Earth, with the penumbra visible on the Earth's surface.

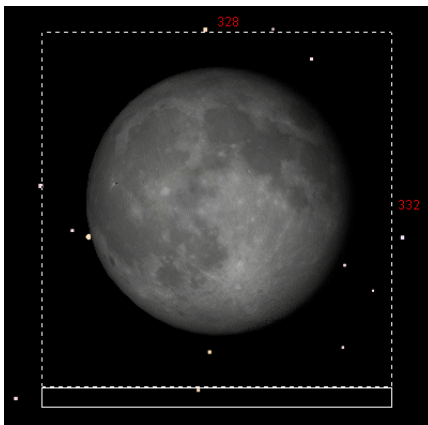
With three windows open, you can view the eclipse from all three locations simultaneously. Adjust your windows' sizes and positions so that they are all visible on your computer screen. Then adjust the time in the "Eclipse (from Earth)" window so that the eclipse is just beginning. Run time forwards, then quickly drag the window's Time information into the other two windows, synchronizing all three of the times. The eclipse now unfolds in all three windows.

## Making Movies

The Movie tool can be used to make spectacular movies of any Starry Night Pro view. Movies are played back using the QuickTime viewer, so you can send Starry Night Pro movies to your friends and colleagues. They need not have Starry Night Pro.

Starry Night Pro's Movie tool lets you record a graphically intensive event (such as a planet flyby) and play it back as a smooth QuickTime sequence.

 To make a movie, select the Movie tool on the Tool palette and drag over the area of a Starry Night Pro window that you want to record. As you drag, a selection rectangle is formed, which we call the Movie Box.

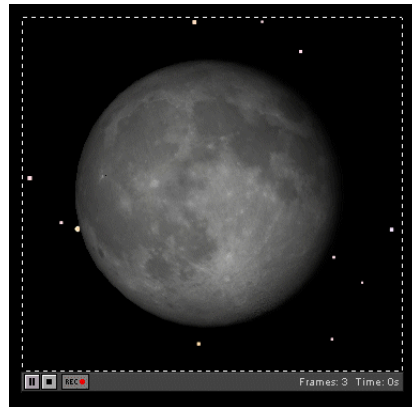


During this process, the pixel length of the sides is displayed, which is useful if you are designing your movie to fit into a predetermined area.


**Note:** The minimum size for a Movie Box is 101 pixels by 81 pixels.


Once you have sized your movie, release the mouse button. A Save window asks you to name your movie file and choose where to save it.


**Movie Controls:** After you have named and saved the movie, the Movie Box's controls appear.



There are three Movie controls: the Pause button, the Stop button, and the Record button.

 The **Pause** button pauses the recording of the movie. This enables you to adjust any time or location information between frames.

 The **Stop** button completes the recording process, and closes the QuickTime window.

 The **Record** button resumes the recording of a movie after it has been paused.

You can also use the buttons on the Time palette to stop and start the movie. If time is running, the Movie Box begins recording movement immediately. If

you'd like to tweak the view a bit, stop time on the Time palette before using the Movie tool's Pause button. You can then zoom, scroll, or grab your way to the perfect shot before clicking the Record button to start your recording.

**Note:** *The Movie Box doesn't record cursors, so you don't have to worry about getting a "hand" in the shot.*

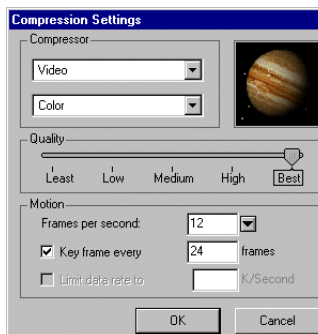
When recording, the Movie Box saves a frame every time the Starry Night Pro window is updated. This means that if your time step is set at 3 seconds, every time Starry Night Pro moves time ahead 3 seconds, one frame is recorded. This frame information is displayed in the right-hand corner of the Movie box's controls, along with the movie's total running time.

Starry Night Pro also updates its windows when you use the Grabber tool or the scroll tools, so these movements are incorporated into your movies. Click the Pause button to stop the recording, scroll the view a little, then continue recording by pressing the Record button. By repeating this process several times, you can create fantastic three-dimensional animations.

**Tip:** *Turn on Onscreen info from the Guides menu when making a movie if you want to show a running log of location, view direction, or time.*

**Note:** *A movie can quickly take up a lot of space on your hard drive, so don't leave it running too long.*

**Adjusting Recording Settings:** To adjust any of several recording settings, choose File | Preferences | Movies. Changing these settings can affect the size and quality of your movies.



- **Compressor:** This popup lets you choose from several different compression formats. Depending on the compression format chosen, a second popup menu may allow you to choose from several colour options.
- **Quality:** The slider lets you adjust the quality of the recording. The better the quality, the larger the file size.
- **Motion:** Within this box you can adjust frames per second, key frames, and limit data rates.

**Playing Back QuickTime Movies:** You can use any QuickTime movie player to play back and/or edit your movies. To play back a movie, double-click the file in the folder where you saved it.

## Using the Orbit Editor

You can use the Orbit Editor to create new celestial objects. For instance, if a comet or Moon has been recently discovered, you can use the Orbit Editor to add it to Starry Night Pro, simply by entering its orbital elements. The Orbit Editor also allows you to add surface and atmosphere maps to your new objects.

Adding your own objects to the solar system is a great way to learn about celestial mechanics. The Orbit Editor lets you view the shapes, sizes, and positions of a new orbit, as well as use sliders to adjust these aspects in realtime. This feature makes it clear what each particular orbital element means, and how the orbit is affected when adjustments are made.

To use the Orbit Editor:

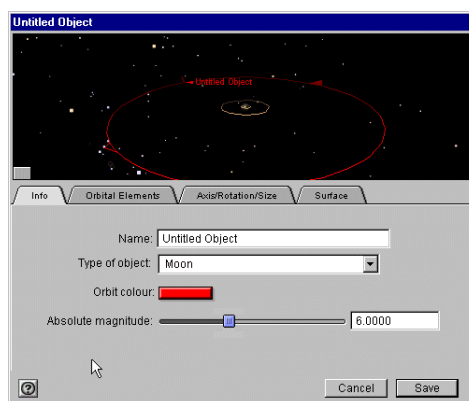
- 1 Open the Planets Palette.
- 2 Using the Selection tool, select the body (the Sun, a planet, or a Moon) around which you want the new object to orbit.
- 3 Press the Add button to open the Orbit Editor Window.

The Orbit Editor opens with a default view of your new orbit. A series of tabs allow you to adjust orbit options and settings.

Starry Night Pro calculates a preferred field of view for each tab folder, one that reflects the function of the tab. For example, the view of your new object from the Surface tab is closer than that of the view from the Orbital Elements tab.

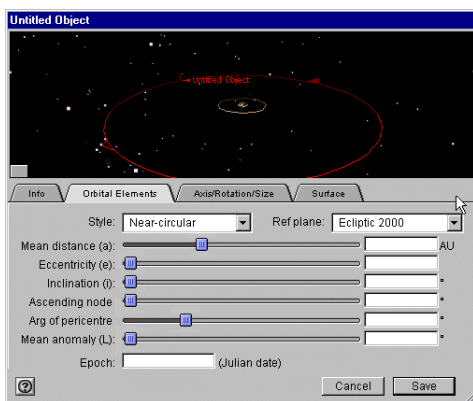
***Tip:** The Orbit Editor window is a functional and resizable Starry Night Pro window. You can use any of Starry Night Pro's tools to adjust your view of it.*

**Info Tab:** On this tab, you name your object, and from a popup menu, select the object type, such as Moon, planet, and so on.



You can also adjust the orbit colour, and the Absolute Magnitude of the object. Absolute Magnitude is the brightness of the object seen from 10 parsecs, or 32.6 light years.

**Orbital Elements Tab:** This tab contains popup menus, sliders, and data input boxes which control the attributes of the new orbit.



In order to specify orbits, or for that matter, the position of any astronomical object, it is necessary to have a reference system. There are two standard reference planes, the equatorial plane of the Earth and the ecliptic plane (the plane of Earth's orbit around the Sun). However, due to precession, the equatorial and the ecliptic planes are slowly changing their positions relative to the background stars.

Consequently, an astronomical reference plane is dependent upon the time of the observations.

- **Reference Plane:** The Ref Plane popup menu allows you to select from ecliptic and equatorial standards by which all of the orbital element data are measured.
  - *Ecliptic:* An ecliptic reference plane based on the time of your current Starry Night Pro window.
  - *Ecliptic 1950:* An ecliptic reference plane based on the J1950.0 standards.
  - *Ecliptic 2000:* An ecliptic reference plane based on the J2000.0 standards, established by the International Astronomical Union (IAU) in 1976.

- *Equatorial:* An equatorial reference plane based on the time of your current Starry Night Pro window.
- *Equatorial 1950:* An equatorial reference plane based on the J1950.0 standards.
- *Equatorial 2000:* An equatorial reference plane based on the J2000.0 coordinates, established by the IAU in 1976.

Adjusting sliders and entering orbital elements into data boxes is relatively easy. Understanding what these numbers represent is a little more difficult. Orbital elements remain a mystery to most people, due in part to the complex names these numbers have acquired, and secondly to the trouble many people have in thinking three-dimensionally. To make matters even more complicated, often an orbital element will have several different names.

Several numbers are required to establish an object's orbit. These orbital elements, first defined by Johannes Kepler at the turn of the 17th century, place an object on an elliptical path at a particular time, and orient it about a parent body.

**Note:** *The real world is more complex than the Keplerian model, since there are other factors that can influence an orbit, including the gravitational influence of other planets, gravity anomalies of the parent, and atmospheric drag on an object if it is in a low orbit.*

- **Mean Distance:** Kepler's third law of orbital motion gives us a precise relationship between the speed of a satellite and its distance from the parent. Objects that are close to the



parent orbit quickly, while objects farther away orbit more slowly. The implication is that if we specify either the speed at which the object is moving or its distance from the parent, we've measured similar values. In effect, Mean Distance and Mean Motion are two ways of describing the same thing.

The convention with planets is to call this number the Mean Distance. Planets in circular orbits would travel at a constant distance from their parent body, but since most planetary orbits are elliptical, this distance is constantly changing. The common practice is to average this distance, and record it as Mean Distance. It is usually measured in AUs.

The convention with satellites is to call this number the Mean Motion. Satellites in circular orbits travel at a constant speed, but since most orbits are elliptical, their speed is constantly changing as they orbit. The common practice is to average the speed, call it the Mean Motion, and record it in units of revolutions per day.

Comets orbits are extremely elliptical, so the distance between comet and parent body is usually measured at pericenter, the point in their orbit where they are closest to the parent. This distance is called the Pericenter distance, and is given in units of AU.

For objects in orbit about the Sun, such as comets, pericenter distance is called Perihelion distance.

- **Eccentricity:** Eccentricity describes the shape of the orbit, based on a ratio of the distance of the focus from the center of the orbit's ellipse to the length

of its semi-major axis. A circular orbit has an eccentricity of 0, while an extremely elliptical orbit, such as that of a comet, has a value close to 1. The eccentricity of hyperbolic orbits is greater than 1.

- **Inclination:** The orbit's elliptical shape lies in a plane known as the orbital plane. The orbital plane always goes through the center of the parent object, but may be tilted at any angle relative to the parent's equator. Inclination is the angle between the orbital plane and the equatorial plane, measured between  $0^\circ$  and  $180^\circ$ . If the orbit lies in the ecliptic plane, the inclination is  $0^\circ$ . At  $90^\circ$ , the orbit is perpendicular to the ecliptic, while an inclination of greater than  $90^\circ$  describes a retrograde orbit.

Satellites with an inclination near  $0^\circ$  are said to have equatorial orbits, because the satellite orbits around the equator. Those whose orbits are inclined near  $90^\circ$  are called polar, because the satellite crosses over the north and south poles.

**Cool fact:** *Spy satellites are often polar orbiting. From this inclination, they can examine all parts of the Earth as it rotates underneath them.*

- **Ascending Node:** This angular measurement specifies the point at which the orbit crosses northward through the ecliptic plane.

The ascending node is also sometimes called the Longitude of the Ascending Node, and is measured from the Prime Meridian of the parent body.

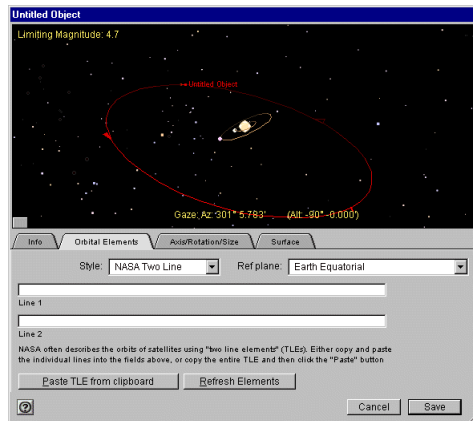
- **Argument of Pericenter:** The pericenter is the point on the orbit which is closest

to the parent body. The Argument of Pericenter specifies the angular location of the pericenter, and is measured in degrees.

The value is determined by measuring the angle (measured at the center of the parent) from the ascending node to pericenter. For example, when the Argument of Pericenter is  $0^\circ$ , the pericenter occurs at the same place as the ascending node. That means that the planet would be closest to the Sun just as it rises up through the ecliptic plane. Likewise, when the Argument of Pericenter is  $180^\circ$ , the planet, as it rises up through the ecliptic plane, is at its farthest from Sun.

- *Mean Anomaly*: Mean Anomaly describes exactly where on the orbit the new object is located at the specified time. It is measured as an angle over one revolution, starting from  $0^\circ$  at the pericenter.
- *Epoch*: A set of orbital elements is a portrait of an orbit, at a specific time. The Epoch specifies this time. In most cases, this time is expressed as a Julian date. However, NASA has its own epoch system that is commonly used for describing satellite orbits. Its format lists the year, the number of days, then the percentage of the day. For example 1997045.5 would translate as February 14th, 1997, at 12 hours UT.

**Satellite Orbital Elements:** If, on the Info tab, for Type Of Object, you chose Artificial Satellite, the Orbital Elements tab appears quite differently.

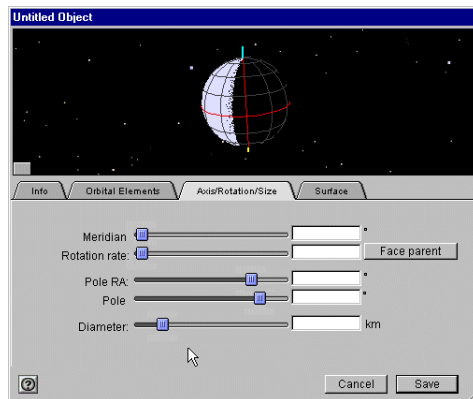


For style, you have four options:

- Pericentric
- Near-Circular
- NASA Two Line
- AMSAT

Each of these options presents sliders and dialog boxes that give you different ways of calculating the orbit of your satellite.

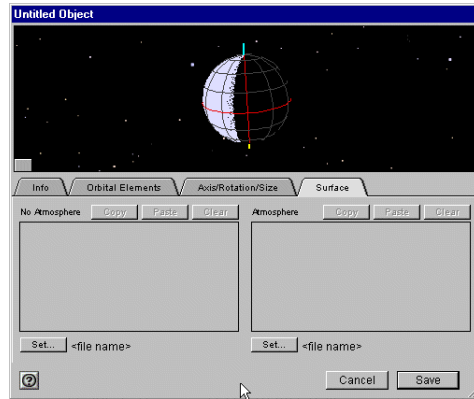
**Axis/Rotation/Size Tab:** Using these sliders and data boxes, you can enter information about your new planet's rotation rate, pole positions, and diameter.



- *Meridian*: Sets the position of the object's prime meridian, in J2000 equatorial coordinates.
- *Rotation Rate*: Sets the rate at which the new object spins on its axis.
- *Face Parent*: Over time, many objects in the solar system become gravitationally locked, that is, they keep the same face towards their parent at all times. Our Moon is a good example of this phenomenon. Clicking this button automatically locks your object by setting its rotation to match its orbital period.
- *Pole RA*: Sets the Right Ascension of the object, in this case meaning the horizontal angle of the poles.
- *Pole Dec*: Sets the Declination of the object, in this case meaning the vertical angle of the poles.
- *Diameter*: Sets the size of your new object, measured in kilometers.

***Note:** Comet tail lengths are determined as a result of both absolute magnitude and size of the comet nucleus (diameter).*

**Surface Tab:** On this tab, you can create a surface for your new object by importing an image file or pasting in information.



- *Atmosphere*: Controls the appearance of your planet's surface when its atmosphere is turned on in Planet/Sun settings. Click Set to select an image file or Paste to paste in information from your favourite imaging application.
- *No Atmosphere*: Controls the appearance of your planet's surface when its atmosphere is turned off in Planet/Sun settings. Click Set to select an image file or Paste to paste in information from your favourite imaging application.

***Note:** The major moons and planets that ship with Starry Night Pro cannot be edited using the Orbit Editor.*

Adding images to your new objects can be a lot of fun. Besides using the latest photos from space probes, you can add any picture you like: your pets, your family, Elvis, you name it! Just copy any image to your clipboard, then use the orbit editor to paste it onto your new object.

- *Copy*: This copies the contents of the map window to your computer's clipboard. You can use this feature to copy the maps of other planets if you

want to add them to your new object. Select a planet on the Planet Palette and push the Edit button that appears at the bottom of the palette. Go to that planet's Surface tab, and click Copy. You can now paste that information into the Surface tab of the new orbital object.

- *Paste*: This pastes the contents of the computer's clipboard into the map window.
- *Clear*: This clears the map window, without copying to the clipboard.

**Note:** *The Orbit Editor can use almost any image as a surface map, as long as you can copy it to the clipboard. It can even use the images selected and copied with the picture selection tool.*

- *Image size and appearance*: There is some restriction on image size. The maximum size is 1500 by 1500 pixels, while the minimum is 25 by 25 pixels. If the picture is too big or too small, your computer will beep twice and not allow the paste. We recommend using images that are about 600 pixels long by 300 pixels high.

Whatever picture you do use, its width is wrapped around the planet, and the height of it will go from pole to pole. Because Starry Night Pro maps the image on a sphere, your image will be distorted in the northern and southern latitudes. Keep the important parts of your image near the "equator". For examples, use the Orbit Editor or Location window to look at the images of the planets or the comets. Their images can give you an idea how an object's map relates to the appearance of the planet.

- *Seams on objects*: If you have an image-editing program, such as Adobe Photoshop, you can adjust your images so that the seam (where the end of the pictures meet when wrapped on a planet) is minimized or invisible. Select one end of the picture (for example, the right third of the image), and Cut it. Then slide the remaining two-thirds of the image all the way over to the right. Paste in the first piece, and position it so that it is now the left side of the image. You should now have an obvious seam where the two pieces are joined. At this point, you can use the image-editing program to clean up the seam, blending the two sides together so that the join is less obvious. Now select the entire picture and copy it. Then, using the Orbit Editor, paste it into your Starry Night Pro object. The place on the object where the two sides of the image meet should now be seamless.

*Example: Adding a new planet between the orbits of Mars and Jupiter*

- 1 Open a new window.
- 2 Open the Planet Palette, then select the Sun.
- 3 Press the Add button at the bottom of the Planet Palette.
- 4 The Orbit Editor Window opens, giving you a default view of your new object's orbit. Since you selected the Sun, the default orbit is just past Earth's.
- 5 On the Info tab, for Type Of Object, select Planet.
- 6 Name your new planet.

- 7 Adjust the Orbit colour and Absolute Magnitude if desired.
- 8 Click the Orbital Elements tab.
- 9 Using the Planet Palette, turn on Mars' orbit. By default, Jupiter's orbit is already on.
- 10 Use the Elevation up button on the Tool palette to rocket out just past Jupiter's orbit (about 10 AUs). Here, you'll have a better view by which to adjust your new planet's orbit.
- 11 Using the Mean Distance slider, adjust your planet's orbit so that it lies between that of Mars and Jupiter.
- 12 Close the Orbit Editor window.
- 13 Select your new planet on the Planet Palette, and click Go There.

**Orbit Editor Hints:** Orbital elements for comets, asteroids, or satellites can be found in magazines such as "Sky & Telescope" and "Astronomy", or on the World Wide Web. For links to sites which contain recent orbital element data, check the Starry Night Pro Web site at: [www.starrynightpro.com](http://www.starrynightpro.com).

**Converting Orbit Editor Dates:** The Orbit Editor requires you to input dates as a Julian day value. If the original date is in ordinary format, there is an easy way to convert it to a Julian day.

- 1 Enter the ordinary date into the Time palette.
- 2 Click the Set Julian button.
- 3 Copy the Julian date and close the dialog.

- 4 Go back to the Orbit Editor and paste in the Julian date.
- 5 To find the NASA epoch, switch to the AMSAT style. Starry Night Pro automatically converts the date for you.

You can also perform similar actions in order to convert a Julian date or NASA date to a normal date.

- 1 Plug your NASA epoch into the appropriate AMSAT data box,
- 2 Switch styles to Pericentric.
- 3 Copy the Julian day from the Epoch data box.
- 4 Press the Julian button on the Time Palette.
- 5 Paste in the new Julian day.
- 6 Set the time. The Time palette displays the Julian date as a normal time.

**Orbit Editor Calculations:** You may notice that some numbers you enter may change when switching between different styles. For instance, if you've entered  $485^\circ$  in an Ascending Node box, move to another style, then return, the number will have changed to  $125^\circ$ . Starry Night Pro has recalculated the number, but in effect, the value of the orbital element remains the same. The new number displayed is mathematically equivalent to the original number that you entered.

You also may notice that sliders may change when adjusting certain elements. This is because Starry Night Pro is recalculating the position of the sliders.

For instance, if you adjust the Rotation rate of an object using the sliders, the

Meridian slider will jump to a new position. Note that the Meridian drawn on the object has not moved. Starry Night Pro has recalculated the Meridian position to keep it synchronized with J2000 standards.

***Note:** Data box entries are not recalculated in such a fashion.*

**Adding Multiple Objects:** The Orbit Editor lets you add individual planets, moons, asteroids, comets, and satellites, or for learning about orbital elements. Sometimes, you may want to add a number of objects at once.

You can add multiple objects most easily by writing their data directly to the Satellites.txt, Asteroids.txt, or Comets.txt files stored in the Starry Night Pro data folder. You can download updated versions of these files from the Starry Night Pro Web site at: [www.starrynightpro.com](http://www.starrynightpro.com).

## Custom Data Files

Starry Night Pro reads the positions of the stars, deep sky objects, and other astronomical objects from proprietary data files. These data files are optimized for the rapid access the program needs to quickly plot out the thousands of stars and other objects displayed.

It's possible to add your own custom data to a Starry Night Pro view. After compiling your custom data into a text file (for format examples, refer to the Starry Night Pro CD), choose File | Build Data File and drill down to the text file's location.

Starry Night Pro prompts you to name the new data file. Ensure that you give the data file an .ssd extension and save it to the Starry Night Pro data folder

## Digitized Sky Survey

Using Starry Night Pro, you can connect to the Digitized Sky Survey. Starry Night Pro shows over 19 million celestial objects, but this is only a tiny fraction of the stars and objects that can be seen from Earth using telescopes.

On the Internet, the Space Telescope Science Institute (STScI) hosts a very large database, called the Digitized Sky Survey (DSS). This survey contains large, high-resolution pictures of the entire night sky. The database is so large that it is distributed on a few hundred CD-ROMs. Starry Night Pro makes it easy look at the thousands of galaxies, nebulae, and other astronomical phenomena that are contained in this database.

The STScI offers an online form you can fill out to request a picture of the sky. Starry Night Pro makes this process considerably easier.

You can also load images from the Digitized Sky Survey right into the Starry Night Pro window, where you can edit and save them for future viewing. For more information, refer to "[Custom Images](#)" on page 73.

*Example: Viewing the Horsehead Nebula using the Digitized Sky Survey.*

Starry Night Pro comes with many fine photos of celestial objects, but a picture of the Horsehead Nebula is not included on

the CD-ROM. However, you can use the Digitized Sky Survey to load a picture of the Horsehead Nebula onto your browser.

- 1 Choose Sky | NGC/IC. A checkmark indicates that Starry Night Pro is already displaying NGC/IC objects.
- 2 Choose Edit | Find and search for “horsehead”. Starry Night Pro should locate the object which is also known as IC 434.
- 3 Now zoom in to a field of view about 20' (20 arcmin), so that there are only a few of Starry Night Pro's millions of stars showing on the screen. If you like you can open an info window by double-clicking the object.
- 4 Choose Sky | Digitized Sky Survey to obtain the image that corresponds to the area you have selected. Note that if the menu item is dimmed it means that your magnification is too great or too small. The Digitized Sky Survey only supports pictures up to 30' on a side.

Getting a picture from the Digitized Sky Survey to your browser can take up to a few minutes, so you have to be patient. The reason for the delay is that the Digitized Sky Survey's computer has to assemble your request from its extensive database.

One way to explore with the Digitized Sky Survey is to turn on the NGC/IC objects or Galaxy objects and look for an interesting cluster of galaxies. Zoom in on a promising cluster and then ask for the Digital Sky Survey image for a detailed view.

*Note: To display all deep sky objects, choose Settings / NGC/IC Objects or Settings / Galaxies and deselect Limit Objects By Magnitude.*

## LiveSky.com

LiveSky unites the power and ease-of-use of Starry Night Pro with the vast sea of information on the Internet. With LiveSky, you can easily link from any star, planet, or other celestial object to any place on the Internet or your local hard drive.

You can search the LiveSky.com Web site for information concerning any object you can select in Starry Night Pro. The LiveSky site has hundreds of links to the best astronomical sites around the world.

In addition you can add your own custom bookmarks to any of the millions of objects in Starry Night Pro. Bookmarks can take the form of URLs such as <http://www.cnn.com> or email addresses such as <mailto:contact@siennasoft.com>.

*Example: Linking from the Moon to a Web page about the Moon*

- 1 Select the Moon (and only the Moon).
- 2 Choose Selection | LiveSky Info.

At this point your browser should go to the LiveSky.com Web site and retrieve a page that contains several links to places on the Internet with more information about the Moon. Try these links to read interesting facts and trivia about the Moon, and to see lots of pictures and figures.

The LiveSky bookmark feature is active for every object in Starry Night Pro. Some objects will have lots of data, but for many

stars and dim objects the LiveSky site may not have any specific information.

**Note:** You can also use LiveSky with constellations by selecting them with the constellation tool.

## Custom Bookmarks

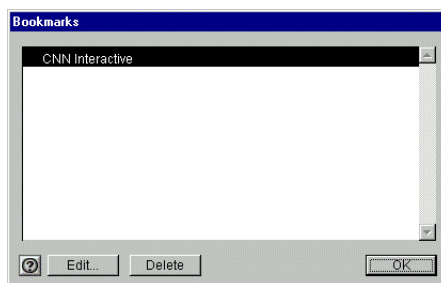
You can add your own Web page and email bookmarks to any object in Starry Night Pro. On the Macintosh you can also add local files such as pictures and text notes.

*Example: Add your own Web page bookmark to the Moon.*

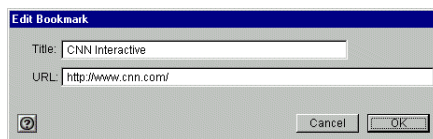
The Internet is so vast that it is impossible for the LiveSky Web site to link to all sites that relevant to the Moon. With Starry Night Pro bookmarks, you can link your favorite Web pages to any object in the Night Sky. With 19 million objects and counting, the Starry Night Pro development team like to say that we've built the world's largest bookmark engine.

To link a Web page to the Moon:

- 1 Using your Web browser, open a page you want to bookmark.
- 2 Switch back to Starry Night Pro and select the Moon.
- 3 Choose Selection | Add Bookmark.
- 4 Once you have created a bookmark, you can edit it by selecting the object and choosing Selection | Edit Bookmarks.



- 5 Select the bookmark and click Edit.



- 6 Edit the name or URL.

**Cool effect:** You can use LiveSky as a way of bookmarking any of your favorite Internet sites. For example you could bookmark the Sun with a weather information Web page.

*On a Macintosh you can drag and drop email or URL addresses from any text editor to Starry Night Pro. For example, select an email address and drag it into the Starry Night Pro window. You will notice constellations and stars “lighting up” as you drag the address towards the object you want to bookmark. When you get there, the object itself will light up. Let go of the mouse button. You can also drag in Web site addresses from your Web browser.*

**Finding Your Custom Bookmarks:** After you have made several bookmarks you may lose track of where they all are. Use this feature to quickly find them.

Choose Edit | Find and search for the name or the first few letters of the name of the



bookmark you want. Starry Night Pro centers the object that contains the bookmark. For example if you have put Maury's email address on the Moon, choose Edit | Find and enter Maury. Starry Night Pro centers your view on the Moon.

**Adding References to Local Files Using Drag and Drop (Macintosh Only):** You can add references to files on your hard disk to Starry Night Pro. Drag and drop to reference anything of which you can make an alias.

**Adding Text Notes to an Object (Macintosh Only):** You can also add notes to any object by using drag and drop. Type a note in SimpleText or any other word processor that supports Drag and Drop. Select all of the text in your note and drag it into the Starry Night Pro window. Drop the text on the object to which you want to add the note. To make changes to the title or contents, choose Selection | Edit Bookmarks.

**Bookmark Preferences:** Choose File | Preferences | Bookmarks to edit bookmark appearance. For more information, refer to "[Bookmarks](#)" on page 50.

**Exporting Bookmarks:** You can turn your collection of LiveSky Web site bookmarks into a list of links in an HTML file you can open in your Web browser. This feature is handy if you want to make a personal Web page with all of your favorite links.

**Using Contextual Menus:** Select an object in the sky and right-click with the mouse (Windows) or hold the mouse button down (Macintosh). Choose LiveSky Web Info from the contextual popup menu that opens.

**Bookmark Files:** Whenever you create a new bookmark by dragging or using menu commands with LiveSky, you are adding to the file "Personal Bookmarks" in Starry Night Pro\Starry Night Pro\User Bookmarks (Windows) or in System\Preferences\Sienna Preferences (Macintosh).

This file is saved automatically when you quit the application. When Starry Night Pro quits, the previous bookmarks file is renamed "Personal Bookmarks.bak", so there is a backup of your bookmarks. The backup only lasts until the next time you run Starry Night Pro.

***Tip:** If you like your bookmarks, then please back them up — as you would any important document!*

**Protecting Your Bookmarks:** In the Starry Night Pro Data folder there is a folder called "Bookmark Libraries", where you can store bookmarks that you want to prevent from being edited or deleted. For example, you could rename your Personal Bookmarks file "My Nice Links" and move it to the Bookmark Libraries folder. Any bookmark file found in this folder is considered unchangeable.

The Bookmark Libraries folder allows you to send and receive bookmark files, or to distribute a common set of bookmarks to many individuals.

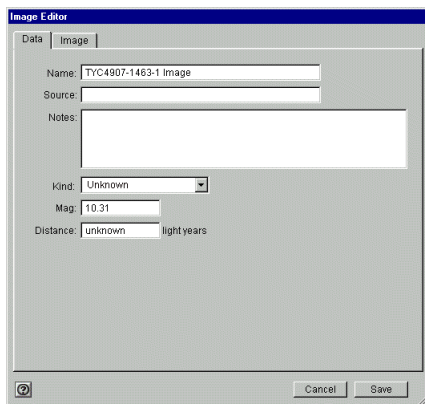
## Custom Images

Starry Night Pro lets you add images of any area of the night sky. You can use your own images, or download them from the Digitized Sky Survey. The Image Editor

allows you to resize and orient the image to integrate it seamlessly with your Starry Night Pro view.

**Adding Your Own Images:** If you use a CCD camera for taking photos of the night sky, or if you have astronomy pictures you received from friends or downloaded from the World Wide Web, you can extend Starry Night Pro by adding the pictures using the Image Editor.

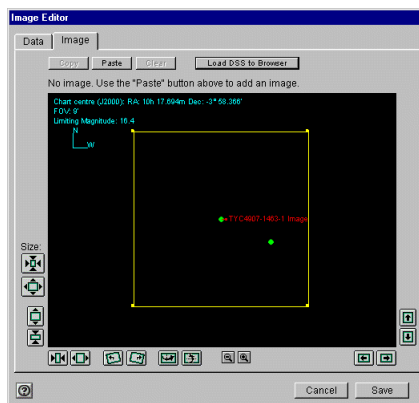
- 1 Download or acquire the image file you want to add to Starry Night Pro.
- 2 Open the image in your favourite image-editing application and copy it to your clipboard.
- 3 In Starry Night Pro, right-click (click and hold on a Macintosh) the object or area of the sky where you want to add your image.
- 4 Choose Add Image from the contextual popup menu.



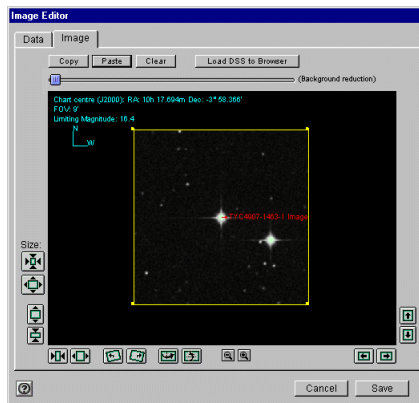
- 5 The Image Editor opens with the Data tab selected. Name your image for future reference. Optionally, you can record a picture source, notes, the kind

of object, its magnitude, and its distance.

- 6 Click the Image tab.



- 7 Click Paste to open your image in the Image Editor.



- 8 All near stars appear in green, making it easier to visually align your image with any stars that might be in it.
- 9 Align the image using the controls available in the Image Editor. There are controls for sizing, shifting, flipping, and rotating the image as needed.

- 10 When you are satisfied that your image is correctly aligned, click Save.

### Adding Images from the Digitized Sky Survey:

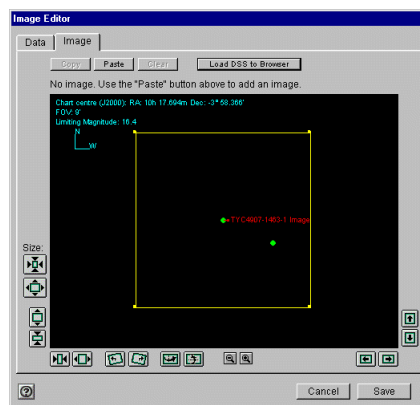
**Survey:** You can use Starry Night Pro's Web link to the Digitized Sky Survey on to download and paste in images of galaxies, nebula, or any other object.

To add an image using the Digitized Sky Survey:

- 1 Select and right-click (click and hold on the Macintosh) a galaxy or NGC/IC object of which you would like to download a photograph.

***Note:** It's fun to browse around the sky looking for interesting objects. Turn on all Galaxies and NGC-IC objects and look for clumps of stars.*

- 2 Choose Add Image from the contextual popup menu.
- 3 The Image Editor opens with the Data tab selected. Name your image for future reference. Optionally, you can record a picture source, notes, the kind of object, its magnitude, and its distance.
- 4 Click the Image tab.



Starry Night Pro will have automatically guessed at the size of the image you wish to download, based on the original object you selected. In most cases you should accept the default size, but you can enlarge, shrink or shift the image bounds as needed.

Both Digitized Sky Survey images and the Image Editor are oriented equatorially. Do not rotate the image boundaries before requesting the DSS image.

- 5 Request the DSS image by pressing "Load DSS to Browser". Your Web browser opens and begins downloading the DSS image for that area of the sky. This may take a few minutes, depending on the server load.
- 6 Once the image is downloaded, copy it to your clipboard.
- 7 Return to the Image Editor and click Paste.
- 8 Align the image using the controls available in the Image Editor. There are controls for sizing, shifting, flipping, and rotating the image as needed.

- 9 When you are satisfied that your image is correctly aligned, click Save.

**Replacing Messier Images:** You can also replace the image of a Messier object with one of your own images.

- 1 Right-click (click and hold on the Macintosh) the image of the Messier object you want to replace.
- 2 Choose Edit Image from the contextual popup menu.
- 3 The Image Editor opens to the Data tab. Switch to the Image tab.
- 4 Paste in your new image and position it using the Image Editor's controls.
- 5 Click Save to permanently replace the Starry Night Pro Messier image with your own.

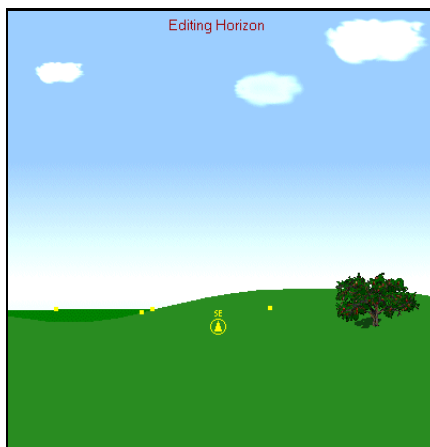
**Note:** Use caution when replacing Starry Night Pro's Messier images. Once you replace an image, you cannot return to the original image without reinstalling Starry Night Pro.

## Creating Custom Horizons

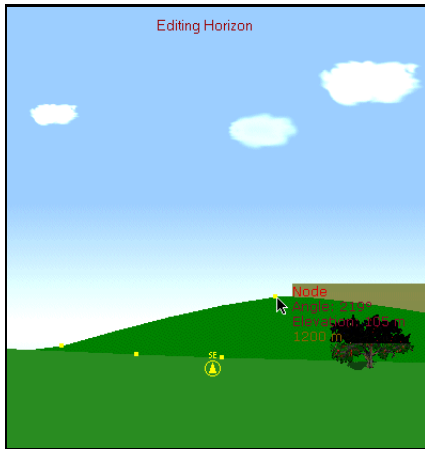
To make your viewing experience even more realistic, you can modify your surroundings in Starry Night Pro to more closely resemble the area in which you live.

To modify the scenery set:

- 1 Choose Edit | Edit Horizon.



- 2 A series of yellow squares, or nodes, appear on the far and near horizons. If you click and drag a node, you can adjust the topography of the landscape in the current view.



- 3 If you click on an object in the scenery, such as an apple tree or cloud, you can drag it left or right to adjust its lateral position, or drag it up and down to adjust its distance from you.
- 4 To save your changes, choose Edit | Save Horizon.

**Caution!** This alters the default horizon file “Earth.txt” that opens with every new Starry Night Pro document.

To save your changes without altering the default horizon file, save under a different filename, for example, “My Backyard.txt”.

From now on, you can open the My Backyard horizon by choosing Settings | Horizon and selecting My Backyard from the Profile selection box.

***Note:** If you save a horizon under a planet’s name, for example, “Jupiter.txt”, that horizon appears whenever you change your viewing location to the corresponding planet.*

## Exporting Images

You can export any Starry Night view to a variety of image file formats. The resulting picture is an exact duplicate of what you see on your screen, without any of the Starry Night Pro palettes, windows, or toolbars.

To export a Starry Night view to an image file:

- 1 Choose File | Export As Image.



- 2 Select the image file type you want. You can choose from JPEG, Windows bitmap (BMP), Photoshop file format, Macintosh PICT, or QuickTime image.
- 3 Save the file to the desired location.





## Appendix A

# Menu Reference

---

### File Menu

This section describes the function of each of the File menu's commands. Use this menu to open, close, and save Starry Night Pro documents, set preferences, and quit the program.

**New:** Opens a new Starry Night Pro document called "untitled".

**Open:** Brings up a dialog box from which you can select the file you want to open.

**Close:** Closes the active document or window. Not available when no windows are open.

**Save:** Saves changes to the active document. Not available if you have not made changes since the active document was last saved or because no documents are open.

**Save As:** Saves the active document with a new name. Not available when no documents are open.

**Save A Copy As:** This command saves a back-up copy of the active document with a new name, keeping the currently active document open.

**Revert:** This command reverts the window to the last saved version of the active document.

**Page Setup (Macintosh only):** Displays a dialog box in which you can set paper size, orientation, and other printer options.

**Save Settings As:** Saves any changes you have made to Starry Night Pro's Settings, Sky, or Guides menus as a custom settings file you can turn on at any time by choosing File | Use Settings.

**Save Settings As Default:** Saves any changes you have made to Starry Night Pro's Settings, Sky, or Guides menu as the default view that opens with every new document.

**Use Settings:** Allows you to select from any of your saved settings files.

**Build Data File:** Starry Night Pro generates its sky views from data files, formatted for optimal access speed. You can create your own data files in text format, then choose this command to convert the text file to a data file the program can read. For more information, refer to "[Custom Data Files](#)" on page 70.

**Export Sky Data:** You can export positional information for all of the objects in your current viewing window. This command opens a dialog box that lets you select where you want to save the data. Because the data file is tab-delimited text, you can open it as a Microsoft Excel spreadsheet, for example.

**Export Bookmarks:** You can save all of the bookmarks you have associated with objects in the night sky. This command creates an HTML file in which your bookmarks are saved as links. For more information, refer to "[Custom Bookmarks](#)" on page 72.

**Export As Image:** Saves the current view in a number of image file formats. For more information, refer to "[Exporting Images](#)" on page 77.

**Preferences:** Opens the Preferences submenu, where you control much of Starry Night Pro's functionality. For more information, refer to "[Preferences](#)" on page 46.

**Print:** Displays a dialog box in which you can specify the number of copies you want to print, along with other printing options. Starry Night Pro always prints in Chart view, with black stars on a white background. This command is not available when no documents are open.

**Print One Copy (Macintosh only):** Instructs your printer to print one copy of the active document, without opening the printer window.

**Exit (Windows) or Quit (Macintosh):** Quits Starry Night Pro. If you have not saved changes made to any open documents, you are asked whether you want to save your changes. You can disable the save query by choosing File | Preferences | General.

You may also be prompted to save changes you made to the horizon or, using the Orbit Editor, to the planet database.

## Edit Menu

Use this menu to cut, copy, and paste text and images, to undo your last action, or to edit the appearance of the horizon.

**Undo:** Selecting the Undo command cancels the effects of the previous action. "Can't Undo" appears if it is impossible to undo your last action. Choose File | Preferences | General to increase or decrease the number of actions remembered by Starry Night Pro.



**Redo:** Re-performs your last undone action.

**Cut:** Removes the selected text and temporarily places it in the computer's clipboard.

**Copy:** Copies the selected text or picture to the clipboard.

**Paste:** Inserts any copied text at the insertion point.

**Edit Horizon:** Activates nodes and pictures on the horizon so that you can adjust their appearance. You can move and resize objects such as trees and clouds, and drag the horizon to create new peaks and valleys. For more information, refer to "[Creating Custom Horizons](#)" on page 76.

**Save Horizon:** Saves any changes you have made to the current horizon. This command is not available unless you have edited the horizon.

**Save Horizon As:** Allows you to save the horizon under a different filename. Once saved to the Horizons folder, you can switch to your new horizon by choosing Settings | Horizon and selecting the corresponding Profile.

## Settings Menu

**Orientation:** From the Orientation submenu, you can choose from Local (Standard), Equatorial, Ecliptic and Galactic perspectives. For more information, refer to "[Orientation](#)" on page 28.

**Flip:** Changes the view to a mirror image — horizontally, vertically, or both. Often used to adjust the current view to match what you see through your telescope. For more information, refer to "[Flip](#)" on page 28.

**Chart View:** Changes the current view to Chart mode, which simulates the look of an astronomy chart, suitable for printing. For more information, refer to "[Chart View](#)" on page 29.

**Night Vision:** Changes the onscreen display to one suited for night-time viewing. For more information, refer to "[Night Vision](#)" on page 29.

**Stars:** Opens the Stars Settings window, giving you control over how stars are displayed.

**Star Magnitudes/Distances:** Opens the Magnitudes/Distances Settings window, which gives you control over the number and type of stars displayed.

**Brightness and Contrast:** Opens a settings window which gives you precise control over how Starry Night Pro displays stars in the night sky.

**Path Settings:** Opens a settings window which allows you to specify the colour and fonts used to display the apparent motion of planets through the night sky.

**Orbit Settings:** Opens a settings window which, for planets and moons, allows you to specify the colour and fonts used to display orbits.

**Horizon:** Opens a settings window where you specify the type and appearance of the horizon you want to see.

**Planet/Sun:** Opens a settings window in which you can control several aspects planet and Sun appearance.

**Asteroids:** Opens a settings window in which you can control how brightly asteroids are displayed.

**Comets:** Gives you control over the number of comets displayed, as well as their appearance.

**Milky Way:** By default, the Milky Way is hidden at high magnifications. Opens a window that lets you can adjust this and other settings.

**NGC/IC:** Controls the number and appearance of objects classified by the New General Catalog and the Index Catalog.

**Custom Images:** Gives you control over the appearance of images you imported into Starry Night Pro. For more information, refer to “[Custom Images](#)” on page 73.

**Messier:** From this window, you can choose if and how to display images or outlines of the objects catalogued by Charles Messier.

**Galaxies:** Lets you limit the number of galaxies displayed, by criteria such as brightness and magnitude.

## Selection Menu

**Find:** Lets you specify the object you want found and centered in the view. For more information, refer to “[Finding Objects in the Sky](#)” on page 21.

**Find Again:** Finds the next item matching the criteria last used in the Find command.

**Centre:** Opens a dialog that lets you specify the exact coordinates of an object or position on which you want to centre the view. Choose from Local, Equatorial, Equatorial J2000, Ecliptic, and Galactic coordinate systems.

**Select None:** Deselects any objects highlighted using the Selection tool.

**Centre Selected:** Positions the selected object in the middle of the current view.

**LiveSky Info:** Links to the LiveSky.com Web site for expanded, updated information about the selected object.

**Add Image:** Opens the Image Editor, which lets you import images, either from the clipboard or from the World Wide Web. For more information, refer to “[Custom Images](#)” on page 73.

**Edit Image:** Available when an imported image is the currently selected object. Opens the Image Editor, which lets you adjust the size and position of the imported image.

**Add Bookmark:** Bookmarks the selected object to the Web page currently open in the browser window. This command is not available if your Web browser is not running.

**Edit Bookmarks:** Allows you to change the names of your bookmarks, along with the URLs to which they point.

## Sky Menu

**Horizon:** Hides or shows your local physical horizon in the active document. Not available when planets are turned off, no documents are open, or your viewing orientation is not Local.

**Daylight:** Turns daylight on and off in the active document. Not available when planets are turned off, no documents are open, you are viewing in chart format, or if the planet from which you are viewing has no atmosphere.

**Light Pollution:** Adjusts the display to mimic the effects of artificial light in small and large urban environments.

**Digitized Sky Survey:** Loads a photographic image of the area of the sky you are currently viewing into your Web browser. For more information, refer to “[Adding Images from the Digitized Sky Survey](#)” on page 75.

**What’s Up Tonight:** Opens your Web browser to the portion of the LiveSky.com site that lists regularly updated astronomical activity for your area.

**Labels:** Opens a submenu that gives you control over the display of identifying labels for various types of objects.

**Planets:** Toggles the display of planets. When you turn off the display of planets, the local horizon and daylight will not be shown, as the Earth is also a planet.

**Artificial Satellites:** Toggles the display of the various objects human beings have blasted into orbit around the Earth.

**Comets:** Toggles the display of these long-distance voyagers.

**Stars:** Toggles the display of most of the objects in the night sky. For more precise control over their display, refer to “[Stars](#)” on page 29.

**Mark Variables:** Applies a special symbol to stars whose magnitude varies.

**Mark Binaries:** Applies a special symbol to stars that appear as one, but are really two in slow rotation.

**The Milky Way:** Toggles the display of the broad cloud of light representing our galaxy.

**NGC/IC:** Toggles the display of objects classified under the New General Catalog and the Index Catalog.

**Custom Images:** Toggles the display of images you have imported into the current view. For more information, refer to “[Custom Images](#)” on page 73.

**Messier:** Toggles the display of the clusters, nebulae, and galaxies classified by Charles Messier. You can choose proper images of each object or coloured outlines representing their areas.

**Galaxies:** Toggles the display of symbols that highlight the presence of galaxies.

## Guides Menu

You can use the Guides menu to quickly turn on and off representations of the

planes of reference that help astronomers plot out the night sky.

**Onscreen Info:** Displays information such as time, date, and location in the active document. For more information, refer to Chapter 4: “[Customizing Starry Night Pro](#)”.

**Onscreen Info Settings:** Gives you precise control over the type and appearance of onscreen information displayed.

**Field Of View Indicators:** Offers you a selection of guides that mimic the view through a corresponding telescopic instrument.

**Constellations:** Toggles the display of several different types of illustrations that represent traditional groupings of stars.

**Local Guides:** Toggles the display of different types of local guides. For more information, refer to “[Local Guides](#)” on page 54.

**Equatorial Guides:** Toggles the display of different types of guides that represent the projection of Earth's equator onto the celestial sphere. For more information, refer to “[Equatorial Guides](#)” on page 55.

**Ecliptic Guides:** Toggles the display of guides that project the ecliptic plane (the plane of the Earth's orbit) onto the celestial sphere. For more information, refer to “[Ecliptic Guides](#)” on page 56.

**Galactic Guides:** Toggles the display of guides that project the galactic plane, or the plane of the Milky Way, onto the celestial sphere. For more information, refer to “[Galactic Guides](#)” on page 57.

**Reference Markers:** Toggles the display of labels that mark the Vernal and Autumnal Equinoxes and the Summer and Winter Solstices.

**Feet:** Toggles the display of a pair of shoes (or a space suit) when looking straight down towards the Nadir.

## Go Menu

**Viewing Location:** Changes your current viewing location, whether from Earth, another planet, or the outer solar system. This command does not affect your home location, set when you start up Starry Night Pro for the first time.

**Return Home:** Resynchronizes your Viewing Location with your Home Location.

**Set Home Location:** Opens a window that gives you control over the location Starry Night Pro has recorded as your current, physical position on Earth, measured by latitude and longitude. You only need to change your home location if you travel or move.

**Inner Solar System:** Changes your current viewing location to one just beyond the orbit of the Earth.

**Outer Solar System:** Changes your current viewing location so that you can see the orbits of all the planets, including Pluto.

## Window Menu

You can use this menu to switch between document windows and to show or hide the Time palette, Planet palette, Display palette, and Hertzsprung-Russell diagram. At the bottom of the Window menu, you can find a list of all the currently open views.

**Scrollbars:** Toggles the display of horizontal and vertical scrollbars. Since you can navigate within a window so easily with the Hand tool, some people turn off the scrollbars to maximize the size of the display.

**Toolbar (Windows only):** Toggles the display of the buttons that act as shortcuts to much of Starry Night Pro's functionality.

**Hide Floating Palettes:** This menu command toggles any currently open floating palettes.

**Time:** Toggles the display of the Time palette. For more information, refer to "[Manipulating Time](#)" on page 19.

**Planets:** Toggles the display of the Planets palette. For more information, refer to "[Using the Planets Palette](#)" on page 22.

**Display:** Toggles the Display palette, which in turn lets you toggle the display of most of the objects in the night sky.

**H-R diagram:** Toggles the display of a Hertzsprung-Russell diagram of all the stars in your current view. For more information, refer to "[H-R Button](#)" on page 12.

## Help Menu

**Online Starry Night Pro Manual:** Opens your Web browser to the HTML version of this guide.

**Check For Starry Night Pro Updates:** Opens your Web browser to the Sienna Web page that contains information on any updates or upgrades to your current version of Starry Night Pro.

**Starry Night Pro Website:** Takes you to <http://www.starrynightpro.com>, the online home of all things Starry Night.

**About Starry Night Pro:** Opens a product version information window.





## Appendix B

# Examples, Demos, and FAQs

---

### Examples

The following examples demonstrate the power of Starry Night Pro. These examples are a great way to learn the program and provide a good introduction to astronomy in general.

*Example: Creating a new asteroid*

Celestial mechanics is usually passed over in introductory Astronomy courses, because the mathematics and time needed to grasp orbital concepts is just too involved for most students.

Starry Night Pro changes all this. By providing an interactive simulator where the orbital elements of an object can be changed in a visual manner, a complex subject is made not only understandable, but fun.

In this scenario we will put an asteroid into orbit around the Sun, and observe how the orbital elements affect the orbit. The goal is to gain insight into the meaning of each of the orbital elements.

- 1 Open the Opens a settings window which and select the Sun by clicking on it once.
- 2 Click Add to create the new object and open the Orbit Editor.

- 3 By default, the name of the new object is “Untitled”. Give the asteroid a new name.
- 4 For Type of Object, select Asteroid.
- 5 Click the Orbital Elements tab.
- 6 Use the sliders to interactively change each of the orbital elements. For example, try moving the inclination slider. You’ll get firsthand knowledge of the meaning of “inclination” — a tilt in the orbit — and the slider provides almost instantaneous feedback to any changes you make.
- 7 Try the other sliders:
  - *Ascending Node*: moves the node markers around (the little triangles).
  - *Arg of Pericenter*: moves the pericenter marker around (the little line). The pericenter marks the spot where the new planet comes closest to the parent body around which it orbits.
  - *Mean Distance*: the size of the orbit.
  - *Eccentricity*: the higher the number, the more elliptical the orbit.
  - *Mean Anomaly*: the position of the planet in the orbit.
- 8 Click the Axis/Rotation/Size tab. Use the Pole Position and Diameter sliders to further customize your new asteroid.
- 9 If you like, you can paste in planet maps on the Surface tab.
- 10 Press Save. The asteroid you have created is now a first class citizen of Starry Night Pro.
- 11 On the Planets Palette, select the new asteroid and click Go There.

12 Double-click Earth on the Opens a settings window which. You are looking at Earth from the vantage point of the new asteroid.

13 To eliminate the planet you have created, select it and press Delete.

For more detailed information about inclination, eccentricity, and other values you can manipulate with the Orbit Editor, refer to “[Orbital Elements Tab](#)” on page 63.

*Example: The Ecliptic Plane*

When we look at the sky we see stars in every direction, but planets are always found within a relatively narrow band of sky that defines the constellations of the zodiac. The planets and the Sun wander about this limited region of sky but never leave it. Why?

The answer lies in the relative positions of our viewing platform (the Earth) and its fellow planets in the solar system. Instead of being strewn about the Sun in random positions, all of the planets’ orbits are confined to a fairly flat disc. The projection of this disc onto our sky is the zodiacal band.

**STEP 1:** Illustrating that the planets are confined to a narrow strip of sky.

- 1 Open the Opens a settings window which.
- 2 Planet by planet, turn on their orbits. Start at Mars and continue to Neptune. Pluto is a special case since its orbital plane is on an incline to that of the rest of the planets.



- 3 Now turn on the orbits of Mercury and Venus. Mercury and Venus are particularly interesting because they circle the Sun within the Earth's orbit.

**STEP 2:** Show that the planets are found in the constellations of the zodiac.

- 1 Choose Guides | Constellations | Zodiac Only.
- 2 Choose Guides | Constellations | Stick Figures.
- 3 Choose Guides | Constellations | Constellation Options and select Boundaries.
- 4 Click OK. You can now see the orbits of the planets passing through the zodiacal constellations. In fact, the planetary orbits define the zodiacal constellations.

**STEP 3:** The same example from a wider perspective.

- 1 Choose Sky | Labels | Planets/Sun to turn on planet labels.
- 2 Choose Guides | Constellations | Zodiac Only to display only the zodiacal constellations.
- 3 Using the Opens a settings window which, turn on the orbits of the planets from Mercury to Neptune.
- 4 Also on the Opens a settings window which, select the Sun and click the Lock button.
- 5 Do a "lift-off" using the Elevation Up button. Lift off to a point about 40 to 50 AUs above Earth.

The disc-like nature of the orbits can be seen if you use the Location Scroller on the main Tool Palette. As you scroll, you can clearly see the plane of the orbits, and their relationships to each other.

**STEP 4:** Introducing the Ecliptic Plane

- 1 Choose Guides | Ecliptic | Settings.
- 2 Select The Ecliptic and Reference Axes and click OK.
- 3 Use the location scroller to rotate the green grid of the ecliptic plane. Observe the close correlation between the plane of the Earth's rotation and that of the other planets.
- 4 Lift off to 150 AU and turn on the orbit of Pluto to see how far it varies from the ecliptic plane.
- 5 On the Planets palette, turn on the orbit of the Hale-Bopp comet to compare it to the ecliptic plane

## Demos and Presentations

Whether you're giving a proposal to NASA on plans for the next generation space telescope, or just showing your friends the highlights of tonight's sky, Starry Night Pro is the perfect presentation tool. We designed it to make it easy for you to quickly open prepared files, or to change the entire look of the program with just a drag and drop.

**Example Files:** Creating example files is easy — just set up the view you like, then choose File | Save (or Save As). To view an example file, choose File | Open or simply drag its icon into any open Starry Night Pro window.

Making an example file preserves all aspects of your view, including the time flow. When you re-open the file, time is automatically flowing at the rate you left it. This can prove handy during a presentation, since you won't have to use the Time palette to get time flowing; just drag and drop the file and away it goes.

By creating a folder of the example files and placing it on your desktop, your entire presentation can be just a drag and drop away.

**Settings Files:** Settings files can also be saved and opened in a fashion similar to example files. This makes it easier for you to switch quickly between a variety of custom settings, without changing the time, location, or perspective. For information about creating custom settings files, refer to "[Custom Settings Files](#)" on page 43.

**Multiple Windows:** The ability to open multiple windows in Starry Night Pro can provide your audience with breathtaking views of the solar system. If you want to quickly open multiple windows, just drag and drop saved files into Starry Night Pro.

For an example of how to use multiple windows to view an eclipse from three different locations simultaneously, refer to "[Multiple Windows](#)" on page 59.

**Removing scrollbars:** You can toggle the scrollbars by choosing Windows | Scrollbars. Since you can so easily navigate through a window with the Hand tool, some people like to turn off the scrollbars for aesthetic reasons, especially during a presentation.

**QuickTime Movies:** You can make spectacular movies of any Starry Night Pro view. These can be played back using any QuickTime viewer, so you can use Starry Night Pro movies on almost any computer.

The Movie tool lets you record a graphically intensive event (such as a planet flyby) and play it back as a gorgeous QuickTime. Even a slow computer can take all the time it wants to render a screen update, record it as a movie frame, and then work on the next screen. Once the recording is finished, you can use it in your presentation. Your audience can view the event more quickly and smoothly as a movie.

For more information refer to "[Making Movies](#)" on page 61.

## Frequently Asked Questions

The following questions are the ones most commonly asked by new users. If you're new to Starry Night Pro, you'll find them a great place to start looking for the information you need.

**Why are my Time and Location incorrect when Starry Night Pro opens?** Most probably, your home location or time zone have been set incorrectly. See Setting your Home Location in the Getting Started chapter.

**Starry Night Pro keeps accessing the CD-ROM and that's slowing things down. How do I fix it?** On the Macintosh, make sure you are running Starry Night Pro from your hard disc, not the CD-ROM.

Starry Night Pro will attempt to read Hubble stars from your CD-ROM if it is

mounted. All this data will, of course, slow down your computer to various degrees. You only want to have the Starry Night Pro CD-ROM mounted when viewing the Hubble stars. If you're not interested in seeing all the Hubble Data, make sure the CD-ROM is not in your drive when you start Starry Night Pro.

#### **How do I see the phases of the Moon?**

- 1 Making sure your viewing location is on the Earth, select the Moon on the Opens a settings window which and click the lock button.
- 2 You may also want to turn off the horizon — choose Sky | Horizon.
- 3 Zoom up toward the Moon to get a closer look.
- 4 On the Time Palette, adjust the Time Step to solar days. Press the Flow Forward button, and as the days progress, you can see the phases of the moon

**How do I turn off the feet?** Select Feet from the Guides menu, and the feet will toggle off. If you prefer not to see the feet at all, toggle them off and choose File | Save Settings As Default.

**How do I see an eclipse?** We've included example files of many of solar and lunar eclipses on the CD-ROM. To view one of them, drag and drop the file over any open Starry Night Pro window.

If you know the time and location of any other eclipse, reset your time and location on the Time palette and in the Location window to that of the eclipse, and observe.

#### **How do I go to Mars or another planet?**

Open the Opens a settings window which, select Mars or any of the other planets, moons, or comets. Click Go There and you will instantly be viewing from that object. If you want to adjust your location on the object, use the Location Scroller tool or click on the Location button on the Tool Palette.

**How do I find a constellation?** Select Find from the Edit Menu, then type in the name of the constellation you want to find.

**How do I turn on star names?** Choose Sky | Labels | Stars. To adjust the appearance of star labels, select Sky | Labels | Label Options.

**How do I see the stars on the day I was born?** On the Time palette, adjust the date and time to your birthday. If you were born during daylight, choose Sky | Daylight so that you can see the stars as they appeared at the moment of your birth.

**How do I add my own planets or comets?** With Starry Night Pro, you can add new or recently discovered planets using the Orbit Editor. For more information, refer to "[Using the Orbit Editor](#)" on page 63.

**How do I print out a star chart?** Adjust your window to the view you want, then choose File | Print. By default, Starry Night Pro prints in Chart View. You may first want to turn on star names or other Starry Night Pro options.





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