

SkyTools 3

Professional Edition

User's Guide

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Table of Contents

Welcome to SkyTools	10
The SkyTools Observing System: Plan, Observe, Log	13
New In SkyTools 3	15
Upgrading from SkyTools 2	18
Getting Started	19
Setting Up SkyTools	19
Observation Planning	22
Planning Visual Observations	23
Planning Imaging Sessions	26
Real Time Observing	33
Real Time Visual Observing	34
Real Time Imaging	37
Charts	43
Logging Observations	46
Current Events	47
Special Events	48
Ephemerides	49
The Tools	50
Nightly Planner	51
Nightly Planner Tool	52
Select Column Scheme Dialog	62
Select Columns Dialog	63
Simple Mode Observing List Columns	64
Visual Mode Observing List Columns	67
Imaging Mode Observing List Columns	69
Update "Current" Observing Lists Dialog	70
Date of Local Evening Dialog	71
The Print/Copy Observing List Dialog	72
Planner Keyboard shortcuts	74
Charts	75
Chart Preferences	77
Chart Preferences: Basic Style Tab	77
Chart Preferences: Basic Style Tab (Printer)	79
Chart Preferences: Component Styles Tab	81
Chart Preferences: Misc Tab	82
Chart Preferences: Stars Tab	84
Chart Preferences: Lines and Outlines Style Tab	86
Chart Preferences: Label Styles Tab	87
Chart Preferences Schemes	88
View Controls	89
The View Controls Dialog: General Properties Tab	89
The View Controls Dialog: Labels Tab	92
The View Controls Dialog: Comparison Stars Tab	95
The View Controls Dialog: View Properties Tab	97
The Trail Dialog	99
The Trace Dialog	101
The Get Starfield Dialog	103
Starfields Currently Displayed	104
Interactive Atlas	105

Using the Interactive Atlas	105
The Context Viewer	110
Using the Context Viewer	111
Visual Simulation Charts	116
Overhead Sky Chart	116
Naked Eye Chart	121
The Telescope (Star Hopping) Chart	126
The Binocular Chart	131
The Thumbnail Viewer	136
Printing Charts	138
The Print Chart Dialog	139
Current Events	142
The Current Events Tool	142
Control Panel	145
Options dialog	148
The Events Calendar	149
The Nightly Events Planner	151
Making Charts for Events	153
Deleting Events	154
Printing Events	155
Creating a Log Entry for an Event	156
Copying Events to the Clipboard	157
Copy All Objects to an Observing List	158
Special Events	159
The Special Events Tool	159
General Tab	162
Two Bodies Tab	164
Satellite Elongations Tab	166
Satellite Events Tab	168
Ephemerides	170
The Ephemerides Tool	171
Controls	173
Results	176
Sort the Ephemeris	178
View/Print a Chart for an Ephemeris Entry	179
Print an Ephemeris	180
Copy an Ephemeris to the Clipboard	181
Create a Log Entry for an Ephemeris Entry	182
Observing Logs	183
The Observation Log Dialog	184
The Log Browser	187
Class Tab	187
Night Tab	189
Observer Tab	191
Location Tab	193
Instrument Tab	195
Search Tab	197
Misc Tab	199
Constellation Tab	201
The Export Observing Logs Dialog	203
The Share Log Entries Dialog	205
The Print/Copy Observing Log Dialog	206
The Print/Copy Observing Logs Dialog	208

The New Log Defaults Dialog	210
The Configure Menu Presets Dialog	211
Real Time Observing	212
Real Time Tool	213
GOTO Telescopes	225
Setting up ASCOM for GOTO Telescopes	228
Pushto Telescopes (or DSCs)	229
Configure the Argo Navis	232
Configure the Sky Commander	233
Configure a Pushto Telescope (DSC) via ASCOM	234
Configure Pushto Indicators	235
Configure Real Time Refresh Rates	237
Data Manager	238
Data Manager: Supplemental Data	240
Supplemental Data Overview	242
Supplemental Data Download	244
Comet File Format	246
Minor Planet File Format	247
Stellar File Format	248
Deep Sky File Format	249
Read Supplemental Data from File	250
Download ASTORB Supplemental Minor Planets	251
Create/Edit Supplemental Comet Osculating Elements	252
Create/Edit Supplemental Minor Planet Osculating Elements	255
Create/Edit Supplemental Stellar Object	258
Create/Edit Supplemental Deep Sky Object	260
Create/Edit Skymark	262
Data Manager: Backup Tab	264
Data Manager: Restore Tab	265
Data Manager: Sync Tab	267
Data Manager: Import Shared Data Tab	271
Data Manager: Notes Tab	273
Data Manager: Web Links Tab	275
Data Manager: Images Tab	277
Data Manager: Plottable Images Tab	279
Data Manager: Share lists	281
Data Manager: Observing Lists Tab	283
Nightly Observing List Generator	285
Designation Search	289
Object Requestor	289
Search Tab	292
Enter Coordinates Tab	294
Browse Designations Tab	296
Database Power Search	299
Database Power Search Tool	299
Database Power Search: Stars Tab	303
Database Power Search: Galactic Deep Sky Tab	305
Database Power Search: Extragalactic Tab	307
Database Power Search: Minor Planets Tab	309
Database Power Search: Comets Tab	311
Exposure Calculator	313
The Exposure Calculator Tool	314
ImageView - the SkyTools Image Viewer	324

SkyTools Preferences	326
SkyTools Preferences: Program Tab	326
SkyTools Preferences: Preferences Tab	329
SkyTools Preferences: Designations Tab	331
SkyTools Preferences: Data Installation Tab	333
Observing with SkyTools	334
Visual Observing	335
Star Hopping	335
Observing the Sun, Moon & Planets	337
Observing Comets	339
Observing Minor Planets	340
Observing Deep Sky Objects	341
Observing Double and Multiple Stars	342
Imaging	343
Deep Sky and Stellar Imaging	343
Lunar and Planetary Imaging	344
Double Star Imaging	345
Solar Imaging	346
Advanced Topics	347
Visual Detection Difficulty Estimation	347
Coordinate Systems	349
Map Projections	352
Technical Reference	353
Designation Formats	356
Reference Points	356
Constellations	357
Prime Solar System Bodies	360
Comets	361
Minor Planets	362
Stars	363
Galaxies	366
Galaxy Groups	368
Quasars	369
Planetary Nebulae	370
Diffuse Nebulae	372
Dark Nebulae	373
Open Clusters	374
Globular Clusters	375
Skymarks	376
FAQ	377
How To...	379
General Topics	380
Improve Performance on a Slow Computer	380
Change SkyTools Global Settings	382
Customize the Catalog Designations	383
Begin a 30-day Trial of an Add-on	384
Purchase an Add-on	385
Unlock an Add-on You Have Purchased	386
Change the Great Red Spot Position	387
Create an Obstructed Horizon	388
Copy Some or All Data from the CDROM to Your Hard Drive	389
Create an Observing Location from GPS	390
Update an Observing Location from GPS	391

Send Feedback	392
Register SkyTools	393
Modify your SkyTools Registration Information	394
Check for Program Updates	395
Telescope Control	396
Configure a Telescope	396
Real Time	397
Change how often screen and charts are updated	397
Planning Tools and Observing Lists	398
Create a New Observing List	398
Create an Observing List from a File	399
Add Objects by Designation to an Observing List	400
Add Objects by Database Filter to Observing List	401
Enter Your Telescope Information	402
Enter Your Binocular Information	403
Change the Date/Night for the Current Observing List	404
Change the Observing Location for the Current Observing List	405
Change the Observer for the Current Observing List	406
Print an Observing List	407
Copy an Observing List to the Clipboard	408
Delete an Observing List	409
Edit/View the Observing List Title/Description	410
Configure the List Columns	411
Update the Current Comets, Minor Planets and Novae Observing Lists	412
Copy/Move Objects from One List to Another	413
Delete Objects from an Observing List	414
Sort the Observing List	415
Limit the Visibility of Objects in the List to a Set Time Period	416
See Object Information for an Object from the Observing List	417
Create a Log Entry for an Object from the Observing List	418
Create Multiple Log Entries for an Object from the Observing List	419
Get an Online DSS image for an Object from the Observing List	420
View a Chart for an Object from the Observing List	421
View a Chart for Multiple Entries in an Observing List	422
Print a Chart for Multiple Entries in an Observing List	423
Print a Chart for an Object from the Observing List	424
Print Multiple Charts from an Observing List	425
View/Print a Chart from the NightBar	426
Charts	427
Set the Time	427
Set the Date	428
Set the Target by Name	429
Set the Observing Location	430
Zoom In/Out	431
Set the Field of View	432
Time-Step Forward/Backward	433
Set the Time Step	434
Select Real-Time Mode	435
Pan Up, Down, Left, and Right	436
Control Which Chart Elements are Displayed	437
Control Labels	438
Control the Star Sizing	439
Control Plottable Images	440

Control Coordinate Grid	441
Draw Motion Trails for Objects	442
Trace Object Motion	443
List Starfields Currently Visible on the Chart	444
Delete a Starfield	445
Print the Chart	446
Copy the Chart to the Clipboard	447
Change the Chart Style	448
Save the Chart Preferences Scheme	449
Apply a Chart Preferences Scheme	450
Customize the Colors, Styles, and Fonts	451
Measure Angular Distance	452
Download DSS Image for Cursor Location	453
Download a Supplemental Starfield	454
Visual Simulation Charts	455
Telescope Charts	456
Switch View Window Positions	456
Customize the View Window Sizes	457
Turn View Windows On/Off	458
Change Eyepieces	459
Select Best Resolution Eyepiece View	460
Set the Orientation of the Eyepiece View	461
Auto-Select Visual Comparison Stars	462
Interactive Atlas	463
Flip the Chart Vertically	463
Mirror the Chart Horizontally	464
Increase/Decrease the Magnitude Limit	465
Set the Magnitude Limits by Object Type	466
Display Information For an On-Screen Object	467
Center the View at the Cursor Position	468
Open the Context Viewer	469
Current Events Tool	470
Print the Event List	470
View the Events in a Calendar	471
Delete Unwanted Events from the List	472
Add Objects to the Appulses/Transits/Occultations List	473
View/Print a Chart for a Particular Circumstance of an Event	474
View/Print a Chart for an Event	475
Print/Copy a Single Event	476
Sort the Circumstances of an Event	477
View the Circumstances of an Event	478
View Today's Events	479
Clear the Event List	480
Copy the Event List to the Clipboard	481
Choose When Events are to be Automatically Deleted	482
Create a Current Events List	483
Special Events Tool	484
Create a Special Events List	484
Ephemerides Tool	485
Create a Position Ephemeris	485
Create a Nightly Optimal Viewing Ephemeris	486
Create a Binary Star Orbit Ephemeris	487
Print an Ephemeris	488

Copy an Ephemeris to the Clipboard	489
View/Print a Chart for an Ephemeris Entry	490
Sort the Ephemeris	491
View/Print a Chart for the Entire Ephemeris	492
Create a Log Entry for an Ephemeris Entry	493
Managing Data	494
Create a New Log Entry	494
Create Multiple Log Entries	496
Browse Log Entries	497
Search Log Entries	498
Associate Notes with an Object	499
Associate Images with an Object	500
Associate Web Links with an Object	501
Get an Online DSS image for an Object	502
Backup Your User Data	503
Restore Your User Data	504
Change How Often you are Prompted for Backup	505
Import an Observing List, Object Notes, Images, Links etc.	506
Share an Observing List via a File	507
Share Observing Logs	508
Share Object Notes	509
Share Images	510
Share Web Links	511
Import Chart Preference Scheme	512
Share Chart Preference Scheme	513
Make an Image Plottable on a Chart Background	514
View Notes Associated with an Object	515
Set a Five-Star Rating for an Object	516
View an Image Associated with an Object	517
View a Web Link Associated with an Object	518
Importing Log Entries	519
Print/Copy Log Entries	520
Imaging	521
Open the Exposure Calculator	521
Add a camera to a telescope	522
Add a filter to a camera	523
Set up for eyepiece projection	524
Set up for afocal projection	525
Misc.	526
Reference Points	526
Obstructed Horizons	527
Plottable Images	529
Observing Lists	530
Supplemental Databases	531
Shared Data	532
DSS Image Sources	533
Visibility Icons	534
USNO-A.2.0 Data Sources	535
SkyTools Date Entry Format	536
Dialogs	537
Observing Sites Dialog	537
Add Location Dialog	540
Drawing your Obstructed Horizon	541

Manual Location Entry Dialog	542
The Daylight Saving Rules Dialog	543
Get GPS Location Dialog	544
Create Obstructed Horizon Dialog	546
Sky Brightness Dialog	549
The Edit Observing Site Dialog	552
Enter File Share Information Dialog	555
Local Time Dialog	556
Date/Time Entry Dialog	557
Observers Dialog	559
The Edit Observer Dialog	560
The Telescopes Dialog	561
The Edit Instrument Dialog	563
The Select New Telescope Dialog	565
The Select Eyepieces to Use with Telescope Dialog	566
The Edit Eyepiece Data Dialog	567
The Telescope Report Dialog	568
The Select Cameras to Use with Telescope Dialog	569
The Configure Eyepiece Projection Dialog	571
The Configure Afocal Projection Dialog	572
The Select Filters to use with Camera Dialog	573
The Select Lenses to use with Camera Dialog	574
The Edit Filter Data Dialog	575
The Edit Neutral Density Filter Dialog	576
The Edit Lens Data Dialog	577
The Edit Camera Data Dialog	578
The Default Settings for New Instrument Dialog	581
The Print/Copy Dialog	583
The Print Dialog	584
Binoculars Dialog	585
The Edit Binoculars Dialog	586
The Object Information Window	587
The Print/Copy Object Information Dialog	592
Event Calendar Options Dialog	594
The Print Calendar Dialog	595
The Get Digital Sky Survey Image Dialog	596
The Get Multiple Digital Sky Survey Images Dialog	599
The Import Plottable Image Dialog	602
The Plottable Image Parameters Dialog	604
The Observing List Information Dialog	606
The Eyepiece Preset String Configuration Dialog	607
The Share File Dialog	608
The Add Object to Observing List Dialog	609
Contacting Skyhound	610
Technical Support	611
Acknowledgements	612
License Agreement	613
Glossary	614

Welcome to SkyTools

SkyTools is software for the observer, bringing together the core tasks of observation planning, charting, real time observing, and logging into a single tool.

The core of the SkyTools approach is to consider the task as a whole rather than as individual pieces attached at right angles to a basic star charting program. While other programs may have similar lists of features, SkyTools integrates these features into a well thought out observing system.

The goal of SkyTools is to empower you, the observer, no matter your level of expertise, to get more out of observing. This is accomplished as efficiently as possible, minimizing your time spent at the computer and maximizing your time under the night sky.

SkyTools may work differently than you expect

If you are used to other astronomical software you may be surprised at how differently SkyTools works. To begin with, when you start the program the first window you see is the planner rather than a display of the sky.

There's a reason for this: it's because SkyTools is target oriented. This means that in the SkyTools world everything revolves around a single astronomical object: the target of observation. The primary purpose of the chart is to help you find the target object in the night sky. The purpose of the planner is to help you identify targets that are interesting, accessible, and well placed for observation. Our philosophy is that the time to make a chart is only after you have decided on a target object.

This philosophy extends to the interface as well. SkyTools makes extensive use of right-click menus. Right-click on an object in the planner to make a chart, log entry, download a DSS image, etc. Similarly, you can right-click on an object on a chart to see the same list of options.

Another difference between SkyTools and other software is the way the different program elements are all put together. A traditional program starts in one place and ends up in another. To do something else, you first have to go back to the start. For instance, a traditional planetarium program starts with a view of the sky. You can typically select an object in the view to bring up a window with information about the object. But this is a dead end. To make a log entry for that object you must close the information window and return to the chart.

SkyTools is designed in a freely flowing manner. As you move about the primary parts of the program, each place you visit becomes a hub that allows you easy access to other functions. And as you go, SkyTools takes advantage of the information on hand to speed things along. For instance, the object information window becomes much more than just a static display of data--it becomes a central location where everything known about an object is brought together, including user notes, log entries, web links, images, and planning functions. It also serves as a hub, from which you can readily create a chart, add the object to an observing list, download a DSS image, or create a log entry. And when you do these things, the context from which the dialog was started is used to make reasonable choices for dates, times, observing locations and the like.

In addition to a target object, there are other basic parameters that come up again and again. These are the *observing location*, *date/time*, *observer*, and *instrument*. With the exception of the date/time, these items are preconfigured for later use. Once the observing locations, observers, and instruments that you use are defined, you need only select one from the list to make a change.

Start with the Nightly Planner

The Nightly Planner is the engine that makes SkyTools go. This is where you should start.

Choose a list of objects to observe and then jump from those objects in the list to the different parts of the program via the right-click menu.

The Tutorials

We have provided a basic set of tutorials. Their purpose is not to explain every aspect of the program, but rather to expose you to the basic philosophy. These tutorials walk you through some basic functions, such as setting up your telescope, making a log entry, and doing some basic planning. Once you see how the program works--once you see the basic idea--using the rest of the program's features should be relatively straight forward.

The Help System

The Getting Started topics in the Help system are another good way to familiarize yourself with the program.

The help system in general is designed rather like the program. It flows as the program does. If you ever find yourself staring at a dialog thinking, "What the heck is this for?" then be sure to avail yourself of the extensive help system. Almost every dialog has a help button and we have worked hard to provide information beyond the obvious, so for heaven's sake, click the Help button!

Another powerful tool is the extensive "How To..." listing. Look for the How To... button on the tool bars. If you ever find yourself thinking, "I know exactly what I want to do but I don't have a clue how to do it!" then by all means take a look at the How To... topics. Chances are you will find exactly what you are looking for.

Summary

By now it should be apparent that the main idea behind SkyTools is the close integration of observation planning, chart making and observing log tools. Each of these tools is powerful by itself, but the real advantage of SkyTools comes in the way each works with the others.

So how the heck do you make a chart with SkyTools? You *could* use the Open a Chart tool button on the main planning tool bar. This will open the last chart you viewed and you could tediously enter the information required to make a new chart: target object, date/time, location, etc.

But that would be missing the point. Right in front of you are lists of objects, events, or even an ephemeris. All the information required to make a chart is already contained therein. You need only right-click on an object in an observing list, or an event, or the line of an ephemeris, and you can quickly create a chart that gets right down to the heart of the matter.

For instance, if you right-click on an object in the observing list, SkyTools takes the current location and observer settings, mixes in the object selected and the optimum time to observe the object on that night, and there you have it--all the information needed to make a chart! And if you are in a hurry, you can send multiple charts to the printer without even looking at them first. This is the power of the SkyTools approach.

To get the most out of the program it is important to use it in the way it is designed to be used (which is quite different from other software you may be used to). Once you get the hang of how it works, you will find that you can accomplish complex tasks quickly and easily.

It is our hope that you will find SkyTools to be a useful tool for both planning your observations and carrying them out, empowering you to get the most out of your observing sessions and saving you time in the process.

The SkyTools Observing System: Plan, Observe, Log

SkyTools contains all of the elements of a traditional planetarium program; all you need to do is start the *Interactive Atlas*. But SkyTools is much more than that. It is designed primarily as an aid to active observers; SkyTools is designed as an observing system. To get the most out of the software, we encourage you to adopt the SkyTools system at least in part.

Plan

The SkyTools system begins with a list of objects or an event that you wish to observe. For finding interesting objects there are many options available, including downloading observing lists directly from our web site, creating your own lists, or using the new Nightly Observing List Generator.

We often read about an interesting object in a magazine, on the web, or on an online forum. When you do, use the *Designation Search* tool. Type the designation into the tool and add the object to your list. Next, open the *Object Information* window for the new object. View the Observing Synopsis. Use the YearBar to get an idea of what times of year are best, or the NightBar to preview it's visibility tonight. Type or paste comments about the object under the *Notes* tab. We've all been there after all - "I wrote down this object to observe, and now I have no idea why!" If there is a web site, add a link to it. If there is an image add a link to the image. And be sure to type in a note headline that will quickly remind you of why this object is of interest.

Eventually you will have a list of objects to observe and a clear dark night will come along. Select the Nightly Planner tab and bring up your list. Narrow down the objects in the list to those best observed that night using the altitude and darkness filters (plus any others that might apply). *Sort the list in optimum viewing time order.*

For those who use printed charts in the field, check off the objects you wish to make charts for and use the *Print Chart for Each Object* feature to automatically create a set of finder charts.

Others may wish to print the observing list.

Observe

Take your charts, observing list, or even your computer out to the field with you. Roughly follow the optimum times indicated on the charts (or list) as your observing order. In some cases the observing window will be narrow. In other cases you need only observe the object within a few hours of the time listed on the chart or list.

For starhopping chart users, start with the naked eye view. Use it to orient yourself to the right part of the sky. Select a bright star near your target and visible on the finding device view. Point your finding device at it. Use the finding device view to navigate your finder to the right spot in the sky. Move to the eyepiece and in most cases, there is your quarry. In the case of tiny, or faint objects, match the stars in the eyepiece view to what you see in the telescope to get a clear idea of where to look for these more challenging objects. You may be surprised how much easier it is to find formerly unattainable objects using this method. Knowing where to look and feeling certain that you are looking at the right spot are the keys to observing challenging deep-sky objects.

Log

There are many ways to record your log entries. Some people use tape recorders. Others type directly into their computer. Still others keep bound notebooks. I like to write my descriptions right on the finder chart. Regardless, if you wish to take advantages of the organization that a computer logbook offers, it is important to get your logs into the computer.

Use the *New Log Defaults* dialog to set up defaults for your observations: enter the observing conditions for that night, the instrument used, the observer - things that aren't going to change - so you don't have to enter these things over and over.

Many people claim that computer logs are too easily lost, or may one day become obsolete. Both of these statements are essentially true. But both these problems can be easily avoided.

The first line of defense is to use the Backup feature found in the *Data Manager* at least once per week. Save your backup files some place where they will not be lost if you have a hard drive failure. The backup folder can be written to CDROM, an external drive, transferred to another computer, etc.

The second line of defense is to print your logs regularly. Keep your printed log entries in a binder somewhere safe. As you add new log entries use the *Search* tab on Log Browser to list only those log entries made since you last printed. Print these log entries and add them to your binder.

So there you have it - one version of the SkyTools observing system. There are lots of variations. Find something that suits you. Now all you need is a clear, dark sky.

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New In SkyTools 3

You will be hard pressed to find any function or dialog in SkyTools that has not been expanded upon or modified. Seemingly every corner of the program has been revised in some way. The primary goal has been to make things more smooth and efficient. New functionality has also been added, but we've tried very hard to expand the functionality of SkyTools without making it more difficult to use or to significantly change how it works. With few exceptions SkyTools 2 users should find switching over to be straight forward.

There are a few things that may have you scratching your head, however, and I'll touch on them here.

Observing Modes

A new Observing Mode selection now appears on the Nightly Planner and Real Time tabs. Available modes are: simple, visual, and imaging (Pro version only). Typically you will match the mode to the type of observing you will be doing. The mode is selected via push buttons located in the upper right of the dialog.

Simple mode -- this mode skips the expensive computations of optimum time, visual detection difficulty or signal to noise ratio. Use this mode if you wish to display object data quickly.

Visual mode -- this mode computes the optimum time to observe each object visually, applying a contrast detection algorithm. Additional columns are available for display: optimum observing window, visual detection difficulty, optimum eyepiece, visual splittability for double star pairs, etc.

Imaging mode -- this mode computes the imaging opportunity window during which imaging is recommended for each object, the total signal-to-noise ratio available during the window, the relative quality of the imaging opportunity, the size of the object on the image, and the effective resolution. For the remaining columns see the imaging features documentation.

Groups

In SkyTools 2 the user could attach data to objects in the form of notes, images, and web links. This user data could also be attached to an observing list exported in the SkyTools .stx format. In this way notes, images and web links associated with the objects in an observing list could be shared between users. Unfortunately this produced problems. A user downloading a list of double stars might find a new (unwanted) set of notes attached to all the objects in the double star listing or so many different notes could be attached that it becomes difficult to find the notes that the user himself had entered.

The solution to this problem is to place all user-attached data into groups. These groups are a means by which the user may organize the user-attached data. You can think of groups like folders that contain data. Observing lists downloaded with attached data will automatically have the data placed into a group of the same name as the observing list. Thus, if you downloaded the Messier list that included all the notes by Messier himself and an image of each object, these notes and images would be placed into the new Messier group. One group at a time is active. In order to select a particular group of notes as the active one, a pull-down menu is now provided on the Nightly Planner and Real Time tabs. As you pass the cursor over the objects in an observing list the note Headlines will be displayed as tool tips from the currently selected group.

In addition, observing lists themselves are organized into observing list groups. These groups are provided to better organize the large numbers of observing lists that many people end up with. Examples of grouping would be to place all double star lists into a Double Stars group, solar system objects into a Solar System group, etc. In order to select an observing list, first select the group and then a list from within that group. Similarly, new observing lists must be assigned to a specific group.

The Data Manager provides tools for managing the attached data and their groups. For instance, notes or observing lists may be moved from one group to another, groups may be renamed, or even deleted.

Another new group has been added: the plottable image group. When you download a DSS image it will be placed into the group you choose on the download dialog. This can get a little confusing because the same image can also be placed into an image group. The difference is that the image group is for any image attached to an object, whereas plottable images can be displayed in the chart background. An image may appear in either group or both. **IMPORTANT:** the plottable images displayed in a chart view are taken from the group selected on the View Controls dialog. For instance, if you have your DSS images in a group called "My DSS images" you will need to select the "My DSS Images" group on the View Controls dialog for them to appear on the chart.

One other addition: the object notes now have a rating field. A 5-star rating button appears on the Notes tab of the Object Information dialog. Left-click this button to select the five-star rating. These ratings are unique to the notes group selected on the dialog. These ratings can also be displayed in a column of the observing list. In that case the ratings will be from the notes group selected on the Nightly Planner or Real Time tabs.

Visual Difficulty

An exciting new feature is the ability to model how difficult an object is to detect in the eyepiece. This capability is leveraged throughout the program, but it is most visible on the planner. New "Difficulty" columns have been added that provide an approximate idea of how difficult an object is to detect in the selected instrument. In addition, we can compare the current difficulty with the best case to give us a good idea of the relative quality of our view.

Nightly Planner Tab

The SkyTools 2 Observing Lists tab has been renamed the Nightly Planner tab. The primary differences are: a telescope selection, the observing mode selection (buttons to the right of the top [hypertext](#)), a notes group selection, and an observing list group selection.

Observing list filter selections will appear based on the observing mode. For instance, a new Visual Detection Difficulty filter appears when the Visual mode is enabled.

Column Configuration

Columns are configurable separately for each observing mode. Column configuration schemes are used. Each observing list may have its own custom column scheme attached to it. That way you can have one set of columns for double star lists and another set of columns for deep sky objects, etc. Column schemes record the columns which are enabled, their widths, and their order. To change a column width simply drag the edge of a column heading. To change the order left-click on a column heading and drag it to the desired location. The column scheme currently selected for the observing list will be modified to reflect the changes you make in column size or order.

Context Viewer

The Context Viewer is a pop-up window attached to the Interactive Atlas that displays the eyepiece view or imaging field of view in a selected telescope. The viewer is started from the Atlas tool bar. Most of the controls are self evident. All of the eyepieces and cameras assigned to the telescope are available to be selected from a [hypertext](#) menu. In addition, the state of various accessories can be selected on this menu. For eyepieces, selecting "Mirror Diagonal" or "2X Barlow" will enable/disable these accessories. If a camera is selected, various imaging accessories can be enabled/disabled as appropriate, such as focal reducers, eyepiece projection, or camera lenses. The available accessories defined via the Favorite Telescopes dialog.

You can choose to either lock the viewer to the target in the atlas, which means it will follow any changes in atlas target, or you can lock it to a telescope, which means it will follow the telescope. The Viewer is also free-floating: an eyepiece circle or imaging rectangular appears on the atlas; you can grab the edge with your mouse and place it anywhere on the chart. The

Viewer will follow. If you move the FOV in this way when locked to the telescope, the telescope will follow. An imaging rectangle can be rotated by grabbing the corner marked with a small circle and dragging it.

If Simulate view from actual conditions is depressed and an eyepiece is selected the Viewer will display a realistic sky background and extinction; if during the daytime or below the horizon it will be blue/blank. If a camera is selected the Viewer will display a simulation of what will be visible on the image at the selected exposure time. This can be useful for accurately pointing your camera.

Nightly Observing List Generator

This is a new tool for automatically generating visual observing lists. See the Nightly Observing List Generator documentation.

Integrated Supplemental Database Editor

The supplemental database editor has been integrated into SkyTools itself and can now be found on the Data Manager. A new class of supplemental objects has been added called Skymarks. A Skymark is a position on the sky with a label. You may create a new Skymark directly from a chart via the right-click menu.

Automatic Update

This function will automatically check for an update via the web, download the update, and then install it. When SkyTools is started it will check our web site to see if an update is ready. Once this check is made it won't check again for 24 hours. If you have a firewall installed, be sure to allow SkyTools 3 to access the Internet.

Imaging Features

Perhaps the most exciting additions to SkyTools are the new imaging features. We found that many observers were using SkyTools to help them plan their imaging sessions or to control their telescope for imaging. Yet the planning tools were all focused on visual observing. This is much like the case where people were using the planner at the telescope in real time--something it was not designed for. Rather than try to make one tool do everything, our solution was to create a new version of the planner (Real Time) that was geared specifically for observing at the telescope. We have taken the same approach to the new imaging features: by adding an imaging mode to the planner we are free to customize it for planning imaging sessions without having to compromise anything in the process. The new *Context Viewer* is the same: it performs similar, but not identical, functions for both visual observing and imaging.

The end result is a happy one: under the hood there are enormous changes to SkyTools to accommodate imaging; thousands of lines of new code have been added; innovations abound. Yet from the perspective of the user there are only a few new additions: an imaging mode on the planner, camera FOV indicators on the Interactive Atlas (via the Context Viewer), and a new tool: the Exposure Calculator. It is this almost seamless integration of imaging into SkyTools, hiding its true power, that we are most happy with. With these tools you can answer complex questions that before were the realm of "rules of thumb." But *asking* these questions does not have to be difficult or time consuming.

One last thought: there are already a lot of very useful software tools for imaging, and most are done quite well. The niche for SkyTools isn't to replace software you already own, but rather to augment it in vital new ways.

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Upgrading from SkyTools 2

Transferring your SkyTools 2 Data

Once you have SkyTools 3 installed and are ready to transfer your SkyTools 2 observing lists, log entries, telescopes and the like, start SkyTools 3 and open the Data Manager.

Select the Sync tab.

Browse to where SkyTools 2 was installed, typically "c:\program files\capellasoft\skytools 2." Find the "user" directory. This is the directory you want to select.

Choose the types of data you want to move to SkyTools 3 by checking the boxes.

Click the Sync button.

Your SkyTools 2 observing lists will be placed into an observing list group called, "Imported from SkyTools 2." Note that many of the stock observing lists for download at our web site have been updated for SkyTools 3. For those lists it may be best to download the new ones.

Similarly, notes, web links, image links, and plottable images will be placed in "Imported from SkyTools 2" groups.

Later, the tools on the Data Manager can be used to move the items you want from the import group to new groups of your own choosing.

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Getting Started

To get the most out of SkyTools first you have to tell it about yourself, your observing equipment, and observing locations. SkyTools uses scientific models to describe the sky and what you can be expected to detect. The accuracy of these models depends on the accuracy of the information you provide.

What needs to be set up:

- Your Observing Locations
- Your Equipment
- Yourself

The next topic explains how:

[Setting Up SkyTools](#)

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Setting Up SkyTools

First start SkyTools and open the Nightly Planner tab.

Set up Your Observing Locations

The current observing location appears to the right of the date in hypertext:

[Texas Star Party](#)

SkyTools uses hypertext quite a bit. The text itself identifies the current selection. Clicking on the hypertext will open a dialog where you can make another selection or configure the available selections.

Click on the observing location to open the Observing Sites dialog. Here you add the usual location information, such as longitude, latitude, elevation, and time zone.

We are going to highlight some of the less common information and consider how it is used by the program:

Sky Brightness/Naked-eye Limit

This is critical information that is used to estimate the degree of local light pollution. It is important to keep in mind that this information does not change much for a given location; it is not meant to be adjusted for the presence moonlight or twilight. This is done automatically. What this is meant to describe is just how dark a dark night is at each location.

Seeing

Astronomical seeing is a measure of how steady the atmosphere is. This value greatly affects estimates of detectability and resolution. Unlike the sky brightness this will change from night to night and for best results should be adjusted accordingly.

Humidity and Air Temperature

These values are used to estimate the amount of atmospheric extinction (dimming of starlight) as you get near the horizon. They are important for accurate modeling of within 30 degrees of the horizon.

Obstructed Horizon

An obstructed horizon defines the area of the sky that is visible from the location. Obstructions could include building, tree, mountains, etc. By defining an obstructed horizon SkyTools can take these things into account when computing the optimum viewing window. If an obstructed horizon is defined and enabled from the dialog, all computations will treat rising and setting as when the object clears or passes behind the local obstructions.

More Details

The Help button on the dialog provides the details of how to create a new location and enter the data. There is also a tutorial to walk you through the process.

Set up Your Instruments

Return to the Nightly Planner.

Your telescopes and binoculars are typically configured only once so they are configured via buttons on the tool bar. Telescopes and binoculars are collectively referred to as instruments. Star hopping charts, the context viewer, and visual detection difficulty computations depend on the telescope, finding device and eyepieces. Camera information is used in the context viewer, exposure calculator, and in computing the imaging windows.

Configure Your Binoculars



Click the Add/Modify Binoculars button on the planner tool bar to open the dialog. Here you can add as many different binoculars as you want. Adding them is pretty straight forward.

Once your binoculars have been created you will be able to select them for use throughout the program and a custom chart is available for each of them.

Configure Your Telescopes



Click the Add/Modify Telescopes button on the planner tool bar to open the dialog. As with binoculars you can add as many telescopes as you wish. A predefined telescope can be used or you can start one from scratch.

For star hopping pay particular attention to setting up your finding devices. The finder scope information is used to generate the all-important finder view of the star hopping charts. This view is the key to happy star hopping.

Don't forget to assign at least one eyepiece by clicking the Add/Edit Eyepieces button. Predefined eyepieces are available or you can create them from scratch. Even a telescope that is usually used for imaging may require some eyepieces for afocal or eyepiece projection.

Click the Add/Edit Cameras button to set up one or more CCDs, Digital cameras, or video/webcams for use with each telescope.

Once your telescopes have been created you will be able to select them for use throughout the program. A custom star hopping/eyepiece chart is available for those with eyepieces assigned. The imaging features, such as the exposure calculator, are available for those telescopes with cameras assigned.

More Details

The Help button on the dialogs provides the details of how to create a new telescope and enter the data. There is also a tutorial to walk you through the process.

Set up The Observers

Return to the Nightly Planner and select either Visual or Simple mode.

The observer information is used to compute visual detection difficulty and visual magnitude limits. Like the observing location the observer is selected and configured via hypertext.

Click the observer hypertext:

[Default Observer](#)

This will open the Observers dialog. SkyTools needs to know two things about each observer: their level of experience and dark adapted pupil diameter.

The experience level and pupil diameter play important roles in modeling the faint detection limit. If you don't know your dark adapted pupil diameter it can be easily estimated from your age.

More Details

The Help button on the dialog provides the details of how to create a new observer and enter the data. There is also a tutorial to walk you through the process.

More Getting Started Topics:

[Observation Planning](#)
[Real Time Observing](#)
[Using the Charts](#)
[Logging Observations](#)
[Current Events](#)
[Special Events](#)
[Ephemerides](#)

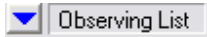
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Observation Planning

The primary planning tool is the Nightly Planner. This tool revolves around the observing list.

Observing Lists

An observing list is any list of objects that you wish to observe. The list can be objects that you want to work on over a period of time, or those you want to get on a single night. SkyTools comes with several lists pre-installed, including the Messier objects, the Sun, Moon and Planets, and the RASC Finest NGC Objects. Many others are available at on our web site (see the Import tab of the Data Manager).



A new list can be created via the Observing Lists menu. Observing lists are organized into groups. To select an observing list, first select a group and then a list from within that group. Likewise, when an observing list is created it must be assigned to a group.

There are several ways to add objects to your own observing list:

- The Designation Search tool is used to add objects to an observing list by designation.
- The Nightly Observing List Generator creates lists of objects for visual observation in a specific night and for a specific location and telescope.
- The Database Power Search applies a filtered search to the SkyTools databases, looking for objects to add to your list.

The next topics explain how to use the Nightly Planner:

[Planning Visual Observations](#)

[Planning Imaging Sessions](#)

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Planning Visual Observations

Note: if you didn't already, please begin with the [Getting Started with Observation Planning](#) topic before proceeding.

Select the Nightly Planner tab and choose Visual Observation mode. 

1. The first step is to choose an observing list. Observing lists are organized into groups. Select a group from the upper pull-down menu. Select a list assigned to that group from the lower menu.

2. Choose a date/time, location, instrument, and observer via the hypertext along the top.

3.  Select an appropriate column scheme for your list by clicking on the blue square at the far right of the observing list column headings. You can choose a predefined set of columns, such as Deep Sky or Lunar/Planetary, or define a custom set of columns to suit your taste. Note that the columns you configure apply to visual mode only.

Important: be sure your column scheme has the Optimum window displayed. This group of columns provides information of great interest for planning a night's observations. Other useful columns are Difficulty Level and Difficulty Status. We will refer to each of these columns below.

4. Narrow your list down by applying the filters found at the middle-right portion of the window. Only those objects in the list that meet the selected criteria are displayed. The criteria can limit display to only those objects in a particular constellation, belonging to a particular class, easily detectable in the telescope, or those that are suitably high above the horizon and visible in a dark enough sky on that night.

A good selection of filters is: above 2X (Airmass) only, complete darkness only, and visible (any difficulty). This will only display objects that are high enough for a good look and visible in your telescope in complete darkness.

If you are going to bed at a certain time, drag the red bar at the far-right of the NightBar (graphic at the top of the window) to your bedtime. This will filter out objects that are not best observed before you go to bed.

5. Sort your list in observing order by clicking on the Optimum Time column heading. If the times displayed in the column are in reverse order, click the column again to reverse the direction.

6. Select an object in the list. Note the estimated visual difficulty, optimum time to observe and difficulty status. All columns that depend on a specific time are computed for the optimum time. The difficulty status is indicated by a traffic light. A colored dot appears in the difficulty status column. The color of this dot indicates how the difficulty on this night compares to the difficulty on the best nights. If green, this night is among the best. If yellow it is comparable to the best, and if red this night is not a good one for this object.

Now turn your attention to the Nightbar (the graphic across the top of the window). This graphic describes the entire night, from noon on the left to noon the next day on the right. The brightness of the sky is indicated by the shade of the background. The altitude of the sun is indicated by a yellow line. The top of the graphic is the zenith, the bottom is the horizon. The altitude of the moon is indicated in teal. Most importantly, the altitude of the object you selected is indicated in red.

Objects are best observed when high in the sky. Look for a green horizontal line on the

Nightbar. this line indicates two airmass--the point where you are looking through twice as much air as overhead. It is best to observe objects when they are above this line, if possible.

At a glance it becomes clear whether or not this object will be visible all night or just for a portion of it. Note that the Begin and End times of the observing window will indicate this time range.

How you proceed from here depends on the kind of observing you are planning:

Star Hopping

Right-click on an object and select "View (the telescope you have selected)". The star hopping chart will appear for this telescope. Customize it carefully, adjusting the view sizes, eyepiece selection, types of objects displayed in each view, etc. Be sure to save the View Controls settings for each view by clicking the "Save" button before you exit the dialog.

For a telescope chart pay particular attention to the finder view. Be sure it shows enough sky that it can be easily related to what you see in the naked eye view *and* to what you will see in the finder. It may take some trial and error to get the finder chart tuned for quick and efficient star hopping.

Once you have your finder charts set up, the next step is to print them to take out into the field with you. Be sure your observing list is set up for the proper night, location, and instrument. Have it filtered appropriately and sorted by optimum time.

Select the objects you want to make charts for. If you want to observe all of them, right-click on the red check mark column heading and select *check all*. Otherwise check off only those object you wish to observe by clicking in the red check mark column next to the objects.

Next right-click next to any object with a red check mark and select *Print Chart for Each checked Entry*. The Print Chart dialog will appear. Its a good idea to preview the charts before you print them by pressing the Preview button. You can preview each chart you have chosen to print. Use the Print Chart dialog to customize how the charts will appear. Once you are satisfied with them click Print.

You may also want to print the observing list for reference. To do so select *Print/Copy Observing list* from the Observing list menu.

Take the charts into the field on the night you planned the session. Observe objects in the optimum time order (indicated on each chart). Use the finder chart to locate each object. Many people like to write their log notes directly on the chart for transcribing later.

Observing with a DSC away from the computer

First connect the DSC to the computer and connect to it via the Real Time tab.

If you have a Sky Commander or Argo Navis DSC select *Transfer Observing List to Telescope* from the Observing List menu.

Alternately, if you only wish to observe a subset of the objects listed, first select the objects you want to observe. Check off only those object you wish to observe by clicking in the red check mark column next to the objects. Right-click in the red-check mark column next to any object and select *Transfer Checked Entries to Telescope* from the popup menu.

See the Help button on the transfer dialog for the details of transferring a list to a controller.

Next print the observing list for reference. To do so select *Print/Copy Observing list* from the Observing list menu. Enable the download number for reference if using the Sky Commander.

Take the observing list into the field and observe each object in order near the optimum time indicated.

Observing with a Goto Telescope away from the computer

Print the observing list for reference. To do so select *Print/Copy Observing list* from the Observing list menu.

Take the observing list into the field and observe each object in order near the optimum time indicated.

In some cases you may also want to print an eyepiece chart for a small or faint object that may be difficult to locate in the eyepiece. To do so right-click on the object in the observing list and select "View (your telescope)." Close the finder and naked eye view of the chart by clicking on the view selection buttons on the tool bar. Click on the Print button on the tool bar. The Print Chart dialog will appear. It's a good idea to preview the chart before you print it by pressing the Preview button. Use the Print Chart dialog to customize how the chart will appear. Once you are satisfied with it click Print.

Observing with a Goto Telescope or DSC connected to the computer

See [Real Time Observing](#)

More Getting Started Topics:

[Setting Up SkyTools](#)

[Real Time Observing](#)

[Using the Charts](#)

[Logging Observations](#)

[Current Events](#)

[Special Events](#)

[Ephemerides](#)

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Planning Imaging Sessions

Note: if you didn't already, please begin with the [Getting Started with Observation Planning](#) topic before proceeding.


Select the Nightly Planner tab and choose Imaging mode.



Deep Sky/Stellar Imaging

1. The first step is to choose an observing list. Observing lists are organized into groups. Select a group from the upper pull-down menu. Select a list assigned to that group from the lower menu.

2. Choose a date/time, location, instrument, and camera via the hypertext along the top. Optionally select a filter/lens and the binning mode.

3.  Select an appropriate column scheme for your list by clicking on the blue square at the far right of the observing list column headings. You can choose a predefined set of columns, such as Deep Sky or Lunar/Planetary, or define a custom set of columns to suit your taste. Note that the columns you configure apply to imaging mode only.

Important: be sure your column scheme has the Exposure Start, Duration, and Quality of Opportunity columns displayed. This group of columns provides information of great interest for planning a night's observations. We will refer to each of these columns below.

4. Narrow your list down by applying the filters found at the middle-right portion of the window. Only those objects in the list that meet the selected criteria are displayed. The criteria can limit display to only those objects in a particular constellation, belonging to a particular class, with an exposure opportunity of sufficient quality, with a large enough Signal to Noise (SNR) available, or those that are suitably high above the horizon and visible in a dark enough sky on that night.

A good selection of filters is: above $2X$ (*Airmass*) only, complete darkness only, and *C - acceptable or better*. This will only display objects that are high enough for a good look and are of good quality in complete darkness.

If you are going to bed at a certain time, drag the red bar at the far-right of the NightBar (graphic at the top of the window) to your bedtime. This will filter out objects that are not best observed before you go to bed.

5. Sort your list in observing order by placing a check next to Optimum Sort. This will sort the objects roughly in the optimum order to observe them. Note: with optimum sort off you can sort on individual columns by clicking on the column heading.

6. Select a deep sky object in the list. Note the exposure *start*, *duration*, and *quality of opportunity* (Q) for this object. All columns that depend on a specific time are computed for the start time. The quality of the exposure opportunity is indicated by a letter grade: "A" is excellent, "B" is very good, "C" is acceptable, "D" is poor, and "F" is very poor. This grade indicates how the overall quality of the exposure window on this night compares to that of an ideal night at this location.

Now turn your attention to the Nightbar (the graphic across the top of the window). This graphic describes the entire night, from noon on the left to noon the next day on the right. The brightness of the sky is indicated by the shade of the background. The altitude of the sun is indicated by a yellow line. The top of the graphic is the zenith, the bottom is the horizon. The altitude of the moon is indicated in teal. The altitude of the object you selected is indicated in

red.

Objects are best observed when high in the sky. Look for a green horizontal line on the Nightbar. This line indicates two airmass--the point where you are looking through twice as much air as overhead. It is best to observe objects when they are above this line, if possible.

Note the blue line in the window. This is the exposure quality for the object plotted over the course of the night. This line compares the exposure quality to the optimum for this location. When the line reaches the top the quality is at optimum. At the bottom it is zero.

The exposure quality depends on many factors such as the type, brightness and altitude of the object, the sky brightness, seeing, temperature and humidity. But it also depends on the telescope, camera, filter/lens, and binning.

Important: the seeing, temperature, and humidity must be set for each location on each night via the Observing Sites dialog.

The blue exposure quality line summarizes a wide variety of factors that affect the quality of your images, taking the guesswork out of deciding when (or where) to observe an object.

The Exposure Calculator

Some experimentation may also be in order, with different cameras, locations, nights, and filters. There are a lot of possibilities to explore. This is where the Exposure Calculator comes in. Right-click on your object and select *Exposure Calculator* from the popup menu.

The exposure calculator will open with the same settings as the planner (location, date, etc.). The Nightbar will be the same except that two vertical yellow lines will be drawn. These lines indicate the start and end of the exposure window.

The Exposure Opportunities table breaks the night into blocks (or windows), each which is assigned a quality letter grade. The exposure optimum window from the planner will be pre-selected.

The SNR and Exposure time calculators will also default to the exposure window, displaying detailed results for the window.

The exposure calculator is designed for experimentation. Try experimenting with the different filters, weather conditions, locations, etc. Different imaging windows can be selected from the table, and more than one may be combined.

Questions the calculator can help answer include:


- What is the optimum sub-exposure time for my current conditions?
- What is the estimated Signal to Noise Ratio I will obtain for a given exposure?
- What is the estimated total exposure time needed to reach a specific Signal to Noise Ratio?
- In what order should I expose when using multiple filters?
- How much effect is the moon going to have tonight?
- Should I travel to a dark site?
- What is my field of view?
- How many pixels will an object cover?

Planetary/Lunar/Solar Imaging

1. The first step is to choose an observing list. Observing lists are organized into groups. Select a group from the upper pull-down menu. Select a list assigned to that group from the lower menu.

2. Choose a date/time, location, instrument, and camera via the hypertext along the top.

Optionally select a filter/lens and the binning mode.

3.  Select an appropriate column scheme for your list by clicking on the blue square at the far right of the observing list column headings. You can choose a predefined set of columns, such as Deep Sky or Lunar/Planetary, or define a custom set of columns to suit your taste. Note that the columns you configure apply to imaging mode only.

Important: be sure your column scheme has the Exposure Start, Duration, Quality of Opportunity, Size on image, Effective resolution, and Maximum time w/o rotation smear columns displayed. This group of columns provides information of great interest for planning a night's observations. We will refer to each of these columns below.

4. Narrow your list down by applying the filters found at the middle-right portion of the window. Only those objects in the list that meet the selected criteria are displayed. The criteria can limit display to only those objects in a particular constellation, belonging to a particular class, with an exposure opportunity of sufficient quality, with a large enough Signal to Noise (SNR) available, or those that are suitably high above the horizon and visible in a dark enough sky on that night.

A good selection of filters is: above *2X (Airmass) only*, and A - *excellent only*. This will only display objects that are high enough for a good look and are of excellent quality.

If you are going to bed at a certain time, drag the red bar at the far-right of the NightBar (graphic at the top of the window) to your bedtime. This will filter out objects that are not best observed before you go to bed.

5. Sort your list in observing order by placing a check next to Optimum Sort. This will sort the objects roughly in the optimum order to observe them. Note: with optimum sort off you can sort on individual columns by clicking on the column heading.

6. Select the Sun/Moon or a Planet object in the list. Note the exposure *start, duration*, and *quality of opportunity* (Q) for this object. All columns that depend on a specific time are computed for the start time. The quality of the exposure opportunity is indicated by a letter grade: "A" is excellent, "B" is very good, "C" is acceptable, "D" is poor, and "F" is very poor. This grade indicates how the overall quality of the exposure window on this night compares to that of an ideal night at this location.

Now turn your attention to the Nightbar (the graphic across the top of the window). This graphic describes the entire night, from noon on the left to noon the next day on the right. The brightness of the sky is indicated by the shade of the background. The altitude of the sun is indicated by a yellow line. The top of the graphic is the zenith, the bottom is the horizon. The altitude of the moon is indicated in teal. The altitude of the object you selected is indicated in red.

Objects are best observed when high in the sky. Look for a green horizontal line on the Nightbar. This line indicates two airmass--the point where you are looking through twice as much air as overhead. It is best to observe objects when they are above this line, if possible.

Note the blue line in the window. This is the exposure quality for the object plotted over the course of the night. This line compares the exposure quality to the optimum for this location. When the line reaches the top the quality is at optimum. At the bottom it is zero.

The exposure quality depends on many factors such as the type, brightness and altitude of the object, the sky brightness, seeing, temperature and humidity. But it also depends on the telescope, camera, filter/lens, and binning.

Next note the solid orange line that will also be drawn. This line represents the effective resolution quality. It is similar to the exposure quality, but tracks effective resolution. As with

the blue line it is best to image objects when this line is near the top. In fact, for most objects the line should be *at the very top* when you should be imaging.

Important: the seeing, temperature, and humidity must be set for each location on each night via the Observing Sites dialog. The seeing selection greatly affects the effective resolution!

Taken together the orange and blue lines summarize a wide variety of factors that affect the quality of your images, taking the guesswork out of deciding when (or where) to observe an object.

The Exposure Calculator

Some experimentation may also be in order, with different cameras, locations, nights, and filters. There are a lot of possibilities to explore. This is where the Exposure Calculator comes in. Right-click on your object and select *Exposure Calculator* from the popup menu.

The exposure calculator will open with the same settings as the planner (location, date, etc.). The Nightbar will be the same except that two vertical yellow lines will be drawn. These lines indicate the start and end of the exposure window.

The Exposure Opportunities table breaks the night into blocks (or windows), each which is assigned a quality letter grade. The exposure optimum window from the planner will be pre-selected.

The SNR and Exposure time calculators will also default to the exposure window, displaying detailed results for the window.

The exposure calculator is designed for experimentation. Try experimenting with the different filters, weather conditions, locations, etc. Different imaging windows can be selected from the table, and more than one may be combined.


Questions the calculator can help answer include:

- How long can I image a planet before rotational smear blurs the composite image?
- What is my field of view?
- How many pixels will a planet cover?
- What is the optimum sub-exposure time for my current conditions?
- What is the estimated Signal to Noise Ratio I will obtain for a given exposure?
- What is the estimated total exposure time needed to reach a specific Signal to Noise Ratio?
- In what order should I expose when using multiple filters?
- How much effect is the moon going to have tonight?

Double-Star Imaging

1. The first step is to choose an observing list. Observing lists are organized into groups. Select a group from the upper pull-down menu. Select a list assigned to that group from the lower menu.

2. Choose a date/time, location, instrument, and camera via the hypertext along the top. Optionally select a filter/lens and the binning mode.

3.  Select an appropriate column scheme for your list by clicking on the blue square at the far right of the observing list column headings. You can choose a predefined set of columns, such as Double Stars, or define a custom set of columns to suit your taste. Note that the columns you configure apply to imaging mode only.

Important: be sure your column scheme has the Exposure Start, Duration, Quality of

Opportunity, Size on image, Effective resolution, Double-Star Pair Data, and Star Pair Resolution columns displayed. This group of columns provides information of great interest for planning a night's observations. We will refer to each of these columns below.

4. Narrow your list down by applying the filters found at the middle-right portion of the window. Only those objects in the list that meet the selected criteria are displayed. The criteria can limit display to only those objects in a particular constellation, belonging to a particular class, with an exposure opportunity of sufficient quality, with a large enough Signal to Noise (SNR) available, or those that are suitably high above the horizon and visible in a dark enough sky on that night.

A good selection of filters is: above *2X (Airmass) only*, and *A - excellent only*. This will only display objects that are high enough for a good look and are of excellent quality.

If you are going to bed at a certain time, drag the red bar at the far-right of the NightBar (graphic at the top of the window) to your bedtime. This will filter out objects that are not best observed before you go to bed.

5. Sort your list in observing order by placing a check next to Optimum Sort. This will sort the objects roughly in the optimum order to observe them. Note: with optimum sort off you can sort on individual columns by clicking on the column heading.

6. Select a double star in the list. Note the exposure *start*, *duration*, and *quality of opportunity* (Q) for this object. All columns that depend on a specific time are computed for the start time. The quality of the exposure opportunity is indicated by a letter grade: "A" is excellent, "B" is very good, "C" is acceptable, "D" is poor, and "F" is very poor. This grade indicates how the overall quality of the exposure window on this night compares to that of an ideal night at this location.

Although a double-star system may consist of many pairs of stars, SkyTools automatically chooses the most likely pair for observation (usually the AB pair). All calculations are done for this pair of stars. The data for this pair is listed in the observing list: the letter ID of the components, the magnitude of the companion star, and the current separation between the stars.

Also note the RP column. This is the resolution parameter. A value of 1.0 indicates a pair that is barely resolved under the current conditions. A value less than one indicates that the pair is unresolved. Values greater than one indicate increasingly well-split pairs.

Now turn your attention to the Nightbar (the graphic across the top of the window). This graphic describes the entire night, from noon on the left to noon the next day on the right. The brightness of the sky is indicated by the shade of the background. The altitude of the sun is indicated by a yellow line. The top of the graphic is the zenith, the bottom is the horizon. The altitude of the moon is indicated in teal. The altitude of the object you selected is indicated in red.

Objects are best observed when high in the sky. Look for a green horizontal line on the Nightbar. This line indicates two airmass--the point where you are looking through twice as much air as overhead. It is best to observe objects when they are above this line, if possible.

Note the blue line in the window. This is the exposure quality for the object plotted over the course of the night. This line compares the exposure quality to the optimum for this location. When the line reaches the top the quality is at optimum. At the bottom it is zero.

The exposure quality depends on many factors such as the type, brightness and altitude of the object, the sky brightness, seeing, temperature and humidity. But it also depends on the telescope, camera, filter/lens, and binning.

Next note the solid orange line that will also be drawn. This line represents the effective

resolution quality. It is similar to the exposure quality, but tracks effective resolution. As with the blue line it is best to image objects when this line is near the top. In fact, for most objects the line should be *at the very top* when you should be imaging.

Important: the seeing, temperature, and humidity must be set for each location on each night via the Observing Sites dialog. The seeing selection greatly affects the effective resolution!

Taken together the orange and blue lines summarizes a wide variety of factors that affect the quality of your images, taking the guesswork out of deciding when (or where) to observe an object.

The Exposure Calculator

Some experimentation may also be in order, with different cameras, locations, nights, and filters. There are a lot of possibilities to explore. This is where the Exposure Calculator comes in. Right-click on your object and select *Exposure Calculator* from the popup menu.

The exposure calculator will open with the same settings as the planner (location, date, etc.). The Nightbar will be the same except that two vertical yellow lines will be drawn. These lines indicate the start and end of the exposure window.

The Exposure Opportunities table breaks the night into blocks (or windows), each which is assigned a quality letter grade. The exposure optimum window from the planner will be pre-selected.

The SNR and Exposure time calculators will also default to the exposure window, displaying detailed results for the window.

The exposure calculator is designed for experimentation. Try experimenting with the different filters, weather conditions, locations, etc. Different imaging windows can be selected from the table, and more than one may be combined.

Questions the calculator can help answer include:

- How long can I image a planet before rotational smear blurs the composite image?
- What is my field of view?
- How many pixels will a planet cover?
- What is the optimum sub-exposure time for my current conditions?
- What is the estimated Signal to Noise Ratio I will obtain for a given exposure?
- What is the estimated total exposure time needed to reach a specific Signal to Noise Ratio?
- In what order should I expose when using multiple filters?
- How much effect is the moon going to have tonight?

Observing with a Goto Telescope or DSC connected to the computer
See [Real Time Observing](#)

More Getting Started Topics:

[Setting Up SkyTools](#)

[Real Time Observing](#)

[Using the Charts](#)

[Logging Observations](#)

[Current Events](#)

[Special Events](#)

[Ephemerides](#)

Real Time Observing

The Real Time tool is designed to support observing at the telescope in real time. It is though Real Time that telescopes are connected to SkyTools. And like the Nightly planner, this tool revolves around the observing list.

Telescope Control

Use the *Telescope Control* menu to configure, connect to, and command a telescope. The current status of the connected telescope is displayed, including where it is pointed and what the current target is.

Observing Lists

The Real Time tool uses the same observing lists as the Nightly planner. An observing list is any list of objects that you wish to observe. The list can be objects that you want to work on over a period of time, or those you want to get on a single night. SkyTools comes with several lists pre-installed, including the Messier objects, the Sun, Moon and Planets, and the RASC Finest NGC Objects. Many others are available at on our web site (see the Import tab of the Data Manager).



A new list can be created via the Observing Lists menu. Observing lists are organized into groups. To select an observing list, first select a group and then a list from within that group. Likewise, when an observing list is created it must be assigned to a group.

There are several ways to add objects to your own observing list:

- The Designation Search tool is used to add objects to an observing list by designation.
- The Nightly Observing List Generator creates lists of objects for visual observation in a specific night and for a specific location and telescope.
- The Database Power Search applies a filtered search to the SkyTools databases, looking for objects to add to your list.

The Real Time Difference

The main difference between Real Time and the Nightly Planner is that with the current time is used throughout. If you view a chart, make a log entry, etc., the current time is always assumed. And where the Nightly Planner considers the order in which to observe objects in a list, Real Time considers which objects are best observed now, placing them near the top.

The next topics explain how to use the Nightly Planner:

[Real Time Visual Observing](#)

[Real Time Imaging](#)


Real Time Visual Observing

Note: if you didn't already, please begin with [Getting Started with Real Time Observing](#) topic before proceeding.

Select the Real Time tab and choose Visual Observation mode. 

1. The first step is to choose an observing list. Observing lists are organized into groups. Select a group from the upper pull-down menu. Select a list assigned to that group from the lower menu.

2. Choose a location, observer, and instrument via the hypertext along the top.

3.  Select an appropriate column scheme for your list by clicking on the blue square at the far right of the observing list column headings. You can choose a predefined set of columns, such as Deep Sky or Lunar/Planetary, or define a custom set of columns to suit your taste. Note that the columns you configure apply to visual mode only.

Important: be sure your column scheme has the Separation from Current Telescope Position, Visibility Icon, Difficulty Level and Difficulty Status displayed. We will refer to each of these columns below. This group of columns provides information of great interest for choosing timely objects to observe.

4. Narrow your list down by applying the filters found at the middle-right portion of the window. Only those objects in the list that meet the selected criteria are displayed. The criteria can limit display to only those objects in a particular constellation, belonging to a particular class, easily detectable in the telescope, or those that are suitably high above the horizon and visible in a dark enough sky on that night.

A good selection of filters is: *above 2X (Airmass) only*, and *visible (any difficulty)*. This will only display objects that are high enough for a good look and currently visible in your telescope.

5. Sort your list to bring the most timely objects to the top by checking the box next to Optimum Sort. If the times displayed in the column are in reverse order, click the column again to reverse the direction. With optimum sort off you can sort by clicking on a column heading. An excellent choice is the Visibility Icon column.

6. Select an object near the top of the list. Note the estimated visual difficulty (*Difficulty*) and difficulty status. The difficulty status is indicated by a traffic light. A colored dot appears in the difficulty status column. The color of this dot indicates how the current difficulty compares to the difficulty at the optimum time on the best nights. If green, the current view is among the best. If yellow it is comparable to the best, and if red this it is not a good time for this object.

Now turn your attention to the Nightbar (the graphic across the top of the window). This graphic describes the entire night, from noon on the left to noon the next day on the right. The brightness of the sky is indicated by the shade of the background. The altitude of the sun is indicated by a yellow line. The top of the graphic is the zenith, the bottom is the horizon. The altitude of the moon is indicated in teal. Most importantly, the altitude of the object you selected is indicated in red.

A yellow vertical line indicates the current time. At a glance we can see we are in twilight or moonlight and how long we have to observe before conditions change.

Objects are best observed when high in the sky. Look for a green horizontal line on the Nightbar. this line indicates two airmass--the point where you are looking through twice as much air as overhead. It is best to observe objects when they are above this line, if possible.

At a glance it becomes clear whether the object is on the rise or setting and how close it is to maximum altitude.

How you proceed from here depends on the kind of observing you are doing:

Star Hopping

Right-click on an object and select "View (the telescope you have selected)". The star hopping chart will appear for this telescope. You should spend some time when you are first starting out with SkyTools to customize it carefully, adjusting the view sizes, eyepiece selection, types of objects displayed in each view, etc. Be sure to save the View Controls settings for each view by clicking the "Save" button before you exit the dialog.

For a telescope chart pay particular attention to the finder view. Be sure it shows enough sky that it can be easily related to what you see in the naked eye view *and* to what you will see in the finder. It may take some trial and error to get the finder chart tuned for quick and efficient star hopping.

Once you have your finder charts set up, either display it on the screen or print it out.

Select the objects you want to make charts for. If you want to observe all of them, right-click on the red check mark column heading and select *check all*. Otherwise check off only those object you wish to observe by clicking in the red check mark column next to the objects.

Next right-click next to any object with a red check mark and select *Print Chart for Each checked Entry*. The Print Chart dialog will appear. Its a good idea to preview the charts before you print them by pressing the Preview button. You can preview each chart you have chosen to print. Use the Print Chart dialog to customize how the charts will appear. Once you are satisfied with them click Print.

You may also want to print the observing list for reference. To do so select *Print/Copy Observing list* from the Observing list menu.

Take the charts into the field on the night you planned the session. Observe objects in the optimum time order (indicated on each chart). Use the finder chart to locate each object. Many people like to write their log notes directly on the chart for transcribing later.

Observing with a DSC away from the computer

First connect the DSC to the computer and connect to it via the Real Time tab.

If you have a Sky Commander or Argo Navis DSC select *Transfer Observing List to Telescope* from the Observing List menu.

Alternately, if you only wish to observe a subset of the objects listed, first select the objects you want to observe. Check off only those object you wish to observe by clicking in the red check mark column next to the objects. Right-click in the red-check mark column next to any object and select *Transfer Checked Entries to Telescope* from the popup menu.

See the Help button on the transfer dialog for the details of transferring a list to a controller.

Next print the observing list for reference. To do so select *Print/Copy Observing list* from the Observing list menu. Enable the download number for reference if using the Sky Commander.

Take the observing list into the field and observe each object in order near the optimum time indicated.

Observing with a Goto Telescope away from the computer

Print the observing list for reference. To do so select *Print/Copy Observing list* from the Observing list menu.

Take the observing list into the field and observe each object in order near the optimum time indicated.

In some cases you may also want to print an eyepiece chart for a small or faint object that may be difficult to locate in the eyepiece. To do so right-click on the object in the observing list and select "View (your telescope)." Close the finder and naked eye view of the chart by clicking on the view selection buttons on the tool bar. Click on the Print button on the tool bar. The Print Chart dialog will appear. It's a good idea to preview the chart before you print it by pressing the Preview button. Use the Print Chart dialog to customize how the chart will appear. Once you are satisfied with it click Print.

More Getting Started Topics:

[Setting Up SkyTools](#)
[Observation Planning](#)
[Using the Charts](#)
[Logging Observations](#)
[Current Events](#)
[Special Events](#)
[Ephemerides](#)

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Real Time Imaging


Note: if you didn't already, please begin with [Getting Started with Real Time Observing](#) topic before proceeding.

Select the Real Time tab and choose Imaging mode. 

Deep Sky/Stellar Imaging

1. The first step is to choose an observing list. Observing lists are organized into groups. Select a group from the upper pull-down menu. Select a list assigned to that group from the lower menu.

2. Choose a location, instrument, and camera via the hypertext along the top. Optionally select a filter/lens and the binning mode.

3.  Select an appropriate column scheme for your list by clicking on the blue square at the far right of the observing list column headings. You can choose a predefined set of columns, such as Deep Sky or Lunar/Planetary, or define a custom set of columns to suit your taste. Note that the columns you configure apply to visual mode only.

Important: be sure your column scheme has the Separation from Current Telescope Position, Exposure Start, Duration, and Quality of Opportunity displayed. We will refer to each of these columns below. This group of columns provides information of great interest for choosing timely objects to observe.

4. Narrow your list down by applying the filters found at the middle-right portion of the window. Only those objects in the list that meet the selected criteria are displayed. The criteria can limit display to only those objects in a particular constellation, belonging to a particular class, easily detectable in the telescope, or those that are suitably high above the horizon and visible in a dark enough sky on that night.

A good selection of filters is: *above 2X (Airmass) only*, and *B - very good or better*. This will only display objects that are high enough for a good look and currently visible in your telescope.

5. Sort your list to bring the most timely objects to the top by checking the box next to Optimum Sort. If the times displayed in the column are in reverse order, click the column again to reverse the direction. With optimum sort off you can sort by clicking on a column heading. An excellent choice is the Q column.

6. Select an object near the top of the list. Note the Q grade for each object. The better the grade the better the opportunity for that target. Also note how much time is left in the observing window (Duration).

Now turn your attention to the Nightbar (the graphic across the top of the window). This graphic describes the entire night, from noon on the left to noon the next day on the right. The brightness of the sky is indicated by the shade of the background. The altitude of the sun is indicated by a yellow line. The top of the graphic is the zenith, the bottom is the horizon. The altitude of the moon is indicated in teal. Additionally the altitude of the object you selected is indicated in red.

A yellow vertical line indicates the current time. At a glance we can see we are in twilight or moonlight and how long we have to observe before conditions change.

Objects are best observed when high in the sky. Look for a green horizontal line on the Nightbar. this line indicates two airmass--the point where you are looking through twice as

much air as overhead. It is best to observe objects when they are above this line, if possible.

Now note the blue line in the window. This is the exposure quality for the object plotted over the course of the night. This line compares the exposure quality to the optimum for this location. When the line reaches the top the quality is at optimum. At the bottom it is zero.

The exposure quality depends on many factors such as the type, brightness and altitude of the of object, the sky brightness, seeing, temperature and humidity. But it also depends on the telescope, camera, filter/lens, and binning.

Important: the seeing, temperature, and humidity must be set for each location on each night via the Observing Sites dialog.

The blue exposure quality line summarizes a wide variety of factors that affect the quality of your images, taking the guesswork out of deciding when (or where) to observe an object.

At a glance it becomes clear whether the object is on the rise or setting and how close it is to maximum altitude.

The Exposure Calculator

Some experimentation may also be in order, with different cameras, locations, nights, and filters. There are a lot of possibilities to explore. This is where the Exposure Calculator comes in. Right-click on your object and select *Exposure Calculator* from the popup menu.

The exposure calculator will open with the same settings as the planner (location, date, etc.). The Nightbar will be the same except that two vertical yellow lines will be drawn. These lines indicate the start and end of the current exposure window, with the start line being the current time.

The Exposure Opportunities table breaks the night into blocks (or windows), each which is assigned a quality letter grade. The exposure optimum window from the planner will be pre-selected.

The SNR and Exposure time calculators will also default to the exposure window, displaying detailed results for the window.

The exposure calculator is designed for experimentation. Try experimenting with the different filters, weather conditions, locations, etc. Different imaging windows can be selected from the table, and more than one may be combined.

Questions the calculator can help answer include:

- What is the optimum sub-exposure time for my current conditions?
- What is the estimated Signal to Noise Ratio I will obtain for a given exposure?
- What is the estimated total exposure time needed to reach a specific Signal to Noise Ratio?
- In what order should I expose when using multiple filters?
- How much effect is the moon going to have tonight?
- Should I travel to a dark site?
- What is my field of view?
- How many pixels will an object cover?

Planetary/Lunar/Solar Imaging

1. The first step is to choose an observing list. Observing lists are organized into groups. Select a group from the upper pull-down menu. Select a list assigned to that group from the lower menu.

2. Choose a location, instrument, and camera via the hypertext along the top. Optionally select a filter/lens and the binning mode.



3. Select an appropriate column scheme for your list by clicking on the blue square at the far right of the observing list column headings. You can choose a predefined set of columns, such as Lunar/Planetary, or define a custom set of columns to suit your taste. Note that the columns you configure apply to visual mode only.

Important: be sure your column scheme has the Separation from Current Telescope Position, Exposure Start, Duration, Quality of Opportunity, Size on image, Effective resolution, and Maximum time w/o rotation smear columns displayed. We will refer to each of these columns below. This group of columns provides information of great interest for choosing timely objects to observe.

4. Narrow your list down by applying the filters found at the middle-right portion of the window. Only those objects in the list that meet the selected criteria are displayed. The criteria can limit display to only those objects in a particular constellation, belonging to a particular class, easily detectable in the telescope, or those that are suitably high above the horizon and visible in a dark enough sky on that night.

A good selection of filters is: *above 2X (Airmass) only*, and *B - very good or better*. This will only display objects that are high enough for a good look and currently visible in your telescope.

5. Sort your list to bring the most timely objects to the top by checking the box next to Optimum Sort. If the times displayed in the column are in reverse order, click the column again to reverse the direction. With optimum sort off you can sort by clicking one column heading. An excellent choice is the Q column.

6. Select an object near the top of the list. Note the Q grade for each object. The better the grade the better the opportunity for that target. Also note how much time is left in the observing window (Duration).

Now turn your attention to the Nightbar (the graphic across the top of the window). This graphic describes the entire night, from noon on the left to noon the next day on the right. The brightness of the sky is indicated by the shade of the background. The altitude of the sun is indicated by a yellow line. The top of the graphic is the zenith, the bottom is the horizon. The altitude of the moon is indicated in teal. Additionally the altitude of the object you selected is indicated in red.

A yellow vertical line indicates the current time. At a glance we can see we are in twilight or moonlight and how long we have to observe before conditions change.

Objects are best observed when high in the sky. Look for a green horizontal line on the Nightbar. this line indicates two airmass--the point where you are looking through twice as much air as overhead. It is best to observe objects when they are above this line, if possible.

Now note the blue line in the window. This is the exposure quality for the object plotted over the course of the night. This line compares the exposure quality to the optimum for this location. When the line reaches the top the quality is at optimum. At the bottom it is zero.

Next note the solid orange line that will also be drawn. This line represents the effective resolution quality. It is similar to the exposure quality, but tracks effective resolution. As with the blue line it is best to image objects when this line is near the top. In fact, for most objects the line should be *at the very top* when you should be imaging.

The exposure quality depends on many factors such as the type, brightness and altitude of the object, the sky brightness, seeing, temperature and humidity. But it also depends on the telescope, camera, filter/lens, and binning.

Important: the seeing, temperature, and humidity must be set for each location on each night via the Observing Sites dialog.

Taken together the orange and blue lines summarizes a wide variety of factors that affect the quality of your images, taking the guesswork out of deciding when (or where) to observe an object.

The Exposure Calculator

Some experimentation may also be in order, with different cameras, locations, nights, and filters. There are a lot of possibilities to explore. This is where the Exposure Calculator comes in. Right-click on your object and select *Exposure Calculator* from the popup menu.

The exposure calculator will open with the same settings as the planner (location, date, etc.). The Nightbar will be the same except that two vertical yellow lines will be drawn. These lines indicate the start and end of the current exposure window, with the start line being the current time.

The Exposure Opportunities table breaks the night into blocks (or windows), each which is assigned a quality letter grade. The exposure optimum window from the planner will be pre-selected.

The SNR and Exposure time calculators will also default to the exposure window, displaying detailed results for the window.

The exposure calculator is designed for experimentation. Try experimenting with the different filters, weather conditions, locations, etc. Different imaging windows can be selected from the table, and more than one may be combined.


Questions the calculator can help answer include:

- What is the optimum sub-exposure time for my current conditions?
- What is the estimated Signal to Noise Ratio I will obtain for a given exposure?
- What is the estimated total exposure time needed to reach a specific Signal to Noise Ratio?
- In what order should I expose when using multiple filters?
- How much effect is the moon going to have tonight?
- Should I travel to a dark site?
- What is my field of view?
- How many pixels will an object cover?

Double-Star Imaging

1. The first step is to choose an observing list. Observing lists are organized into groups. Select a group from the upper pull-down menu. Select a list assigned to that group from the lower menu.

2. Choose a location, instrument, and camera via the hypertext along the top. Optionally select a filter/lens and the binning mode.

3.  Select an appropriate column scheme for your list by clicking on the blue square at the far right of the observing list column headings. You can choose a predefined set of columns, such as Lunar/Planetary, or define a custom set of columns to suit your taste. Note that the columns you configure apply to visual mode only.

Important: be sure your column scheme has the Separation from Current Telescope Position, Exposure Start, Duration, Quality of Opportunity, Size on image, Effective

resolution, and Maximum time w/o rotation smear columns displayed. We will refer to each of these columns below. This group of columns provides information of great interest for choosing timely objects to observe.

4. Narrow your list down by applying the filters found at the middle-right portion of the window. Only those objects in the list that meet the selected criteria are displayed. The criteria can limit display to only those objects in a particular constellation, belonging to a particular class, easily detectable in the telescope, or those that are suitably high above the horizon and visible in a dark enough sky on that night.

A good selection of filters is: *above 2X (Airmass) only*, and *B - very good or better*. This will only display objects that are high enough for a good look and currently visible in your telescope.

5. Sort your list to bring the most timely objects to the top by checking the box next to Optimum Sort. If the times displayed in the column are in reverse order, click the column again to reverse the direction. With optimum sort off you can sort by clicking one column heading. An excellent choice is the Q column.

6. Select a double star in the list. Note the exposure *duration*, and *quality of opportunity* (Q) for this object. Note the Q grade for each object. The better the grade the better the opportunity for that target. Also note how much time is left in the observing window (Duration).

Although a double-star system may consist of many pairs of stars, SkyTools automatically chooses the most likely pair for observation (usually the AB pair). All calculations are done for this pair of stars. The data for this pair is listed in the observing list: the letter ID of the components, the magnitude of the companion star, and the current separation between the stars.

Also note the RP column. This is the resolution parameter. A value of 1.0 indicates a pair that is barely resolved under the current conditions. A value less than one indicates that the pair is unresolved. Values greater than one indicate increasingly well-split pairs.

Now turn your attention to the Nightbar (the graphic across the top of the window). This graphic describes the entire night, from noon on the left to noon the next day on the right. The brightness of the sky is indicated by the shade of the background. The altitude of the sun is indicated by a yellow line. The top of the graphic is the zenith, the bottom is the horizon. The altitude of the moon is indicated in teal. The altitude of the object you selected is indicated in red.

Objects are best observed when high in the sky. Look for a green horizontal line on the Nightbar. This line indicates two airmass--the point where you are looking through twice as much air as overhead. It is best to observe objects when they are above this line, if possible.

Now note the blue line in the window. This is the exposure quality for the object plotted over the course of the night. This line compares the exposure quality to the optimum for this location. When the line reaches the top the quality is at optimum. At the bottom it is zero.

Next note the solid orange line that will also be drawn. This line represents the effective resolution quality. It is similar to the exposure quality, but tracks effective resolution. As with the blue line it is best to image objects when this line is near the top. In fact, for most objects the line should be *at the very top* when you should be imaging.

The exposure quality depends on many factors such as the type, brightness and altitude of the object, the sky brightness, seeing, temperature and humidity. But it also depends on the telescope, camera, filter/lens, and binning.

Important: the seeing, temperature, and humidity must be set for each location on each night via the Observing Sites dialog.

Taken together the orange and blue lines summarizes a wide variety of factors that affect the quality of your images, taking the guesswork out of deciding when (or where) to observe an object.

The Exposure Calculator

Some experimentation may also be in order, with different cameras, locations, nights, and filters. There are a lot of possibilities to explore. This is where the Exposure Calculator comes in. Right-click on your object and select *Exposure Calculator* from the popup menu.

The exposure calculator will open with the same settings as the planner (location, date, etc.). The Nightbar will be the same except that two vertical yellow lines will be drawn. These lines indicate the start and end of the current exposure window, with the start line being the current time.

The Exposure Opportunities table breaks the night into blocks (or windows), each which is assigned a quality letter grade. The exposure optimum window from the planner will be pre-selected.

The SNR and Exposure time calculators will also default to the exposure window, displaying detailed results for the window.

The exposure calculator is designed for experimentation. Try experimenting with the different filters, weather conditions, locations, etc. Different imaging windows can be selected from the table, and more than one may be combined.

Questions the calculator can help answer include:

- What is the optimum sub-exposure time for my current conditions?
- What is the estimated Signal to Noise Ratio I will obtain for a given exposure?
- What is the estimated total exposure time needed to reach a specific Signal to Noise Ratio?
- In what order should I expose when using multiple filters?
- How much effect is the moon going to have tonight?
- Should I travel to a dark site?
- What is my field of view?
- How many pixels will an object cover?

More Getting Started Topics:

[Setting Up SkyTools](#)
[Observation Planning](#)
[Using the Charts](#)
[Logging Observations](#)
[Current Events](#)
[Special Events](#)
[Ephemerides](#)

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Charts

First start SkyTools and open the Nightly Planner tab.

There is a button on the planner tool bar that will open that last chart viewed. But this isn't usually the best way to open a chart because you will likely want to change charts, target, dates/times, etc. It is more efficient to open the chart via a right-click on one of the planning tools, where these values can be preset.

The Interactive Atlas

The interactive atlas functions like a computer version of a fine star atlas. It is a good choice for general charting. It is highly customizable, both in terms of what is displayed and how the displayed items appear.

An atlas chart is defined by three primary parameters: target object, local date/time, and observing location. These parameters are often preset when open the chart from one of the planning tools. Let's try it:

Right-click on any object in the observing list. Select *View Interactive Atlas* from the popup menu. The Interactive Atlas will appear.

The color and font preferences are set via the Chart Preferences dialog, which is also accessed via a button on the chart tool bar.

You may customize which elements are displayed, including labels using the View Controls dialog, started via the View Control tool button.

See the Help button for more details.


The Context Viewer


The Context Viewer is a tool attached to the Interactive Atlas that displays a simulated view in the selected instrument.

Open the Interactive Atlas and click the Context Viewer  button on the tool bar to open it.

Visual Observing

First select a telescope, eyepiece and observer. A simulation of what you would see under the current conditions is displayed. The date, time, and location are all taken from the Atlas. So if you want to change one of these do so on the Atlas.

Click the  button on and off. When depressed this button will switch from a view under optimum conditions (when not depressed) to the view under the current conditions (when depressed). If its currently daytime or the object is below the horizon the effect can be rather dramatic.


It is also important to understand the function of the lock button. When depressed (or locked)  the Context Viewer is locked to the atlas target. What that means is that when you point the atlas at a different target the context viewer will follow.


Have a look on the Interactive Atlas. When you started the context viewer a FOV circle appeared on the atlas. This circle indicate the current position of the view in the context viewer as well as the size of the field of view. Try grabbing the side of the FOV indicator and dragging it about the atlas. The context viewer will faithfully simulate the view at each new position.

The context viewer can be closed at any time, but it is only hidden (until the atlas is closed). The FOV circle will remain on the atlas and you can bring the context viewer back at any time by clicking again on the Context Viewer button.


Imaging

First select a telescope, camera, filter/lens and enter an exposure time. A simulation of what you image under the current conditions is displayed. The date, time, and location are all taken from the Atlas. So if you want to change one of these do so on the Atlas.

Click the  button on and off. When depressed this button will switch from a simulation under optimum conditions (when not depressed) to the simulation under the current conditions (when depressed). If its currently daytime or the object is below the horizon the effect can be rather dramatic.

It is also important to understand the function of the lock button. When depressed (or locked)  the Context Viewer is locked to the atlas target. What that means is that when you point the atlas at a different target the context viewer will follow.

Have a look on the Interactive Atlas. When you started the context viewer a FOV rectangle appeared on the atlas. This rectangle indicates the current position and orientation of the camera. Try grabbing the side of the FOV indicator and dragging it about the atlas. The context viewer will faithfully simulate the view at each new position. Note that one corner has a small circle. This circle marks the nominal lower-left corner. As you pass your cursor over it the cursor will change to a rotation arrow. Click and drag to rotate the camera view. Right-click to view or edit the rotation angle directly.

If you have a telescope connected via Real Time you can lock the context viewer to your telescope by depressing this button: .

With the context viewer locked to your telescope it will always simulate what you see in the eyepiece. And if locked to a Goto telescope it also works the other way around: if you move the context viewer, the telescope will follow!

The simulation in the context viewer can be useful for verifying that you have the correct field by comparing a short exposure image to what you see in the viewer.

The context viewer can be closed at any time, but it is only hidden (until the atlas is closed). The camera rectangle will remain on the atlas and you can bring the context viewer back at any time by clicking again on the Context Viewer button.

The Overhead Sky and Naked Eye Charts

These simulation charts simulate the naked eye sky as seen from a particular location, at a particular time, using a particular instrument.

The Overhead Sky chart displays the entire sky, from horizon to horizon on a circular chart. If you print this chart it works like a planesphere; hold it over your head.

The Naked Eye chart simulates what is seen with the unaided eye, as if you were standing looking in a particular direction. This chart is movable and you can zoom in/out.

As with the other charts you can right-click on any object in the observing list. Select *View Overhead Sky* or *View Naked Eye* from the popup menu to open the chart.

But there is another way to open a chart: on the Nightly Planner or Real Time tools, right-click on the NightBar. A menu will appear to open a chart at the time you clicked-at on the NightBar.

The Telescope (Star Hopping) and Binocular Charts

Each time you define a telescope with eyepieces for use with SkyTools a telescope simulation chart is created, customized for that telescope. The primary purpose of these charts is to aid in the finding of objects at the telescope visually, either with a printed chart or on a laptop in the field.

The telescope Simulation charts have three views: a naked-eye view for general context, a finding-device view to help you point the scope at the right place, and an eyepiece view to aid in finding small or faint objects that may not be readily apparent.

Similarly, a customized Binocular Simulation chart is created for each binocular defined for use with SkyTools. This chart is similar to the telescope chart, except that there is no finding device view.

The look (colors, fonts, star styles, etc.) is defined for the entire chart using the same chart Preferences as the Atlas. But each view can be individually customized as far as what elements are displayed and how they are displayed via the View Controls dialog.

Because there are multiple views in these charts it is important to remember that many of the chart functions require you to select the view to operate on by clicking in the view.

Switch the positions of the views by dragging one into another while holding the shift key down.

Alter the dimensions of the views by dragging the view borders. You can also turn one or more of the views off if not needed via the view buttons on the tool bar.

More Getting Started Topics:

[Setting Up SkyTools](#)
[Observation Planning](#)
[Real Time Observing](#)
[Logging Observations](#)
[Current Events](#)
[Special Events](#)
[Ephemerides](#)


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Logging Observations

Logging Observations of an Object

Most log entries are based on a target object. To log an observation the target object must be in the SkyTools database or in your supplemental database. Each object may have an unlimited number of entries, which are sorted by date and time on the Observing Log dialog.

Each of these log entries consists of a target object, date/time, observing location, instrument used, observer, description of observing conditions and a description of the object.

Any object with a log entry displayed in an observing list will display a log book icon  in the observing list. Click on this icon to see the log entries. Objects viewed in the object information window will also display the same log icon if there are log entries and it too can be clicked on.

The Log Browser

The Observing Log button on the planner toolbar start the Log Browser. The browser displays lists of object with log entries according to the selected criteria (a specific night, instrument, etc. or a combination of criteria using the Search tab).

Notes can be attached to specific nights, instruments, locations, observers, constellations or object classes.

Miscellaneous Log Entries

In addition, you may enter a non-object specific log entry via the Misc tab.

More Getting Started Topics:

[Setting Up SkyTools](#)
[Observation Planning](#)
[Real Time Observing](#)
[Using the Charts](#)
[Current Events](#)
[Special Events](#)
[Ephemerides](#)

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Current Events

An event is a time when something of astronomical interest occurs. Examples of events are a solar eclipse, the occultation of a star by the moon, or the closest approach of two planets in the sky as seen from your location (an appulse).

Select the Current Events tab from the main window to start the Current Events tool. Use this tool to define the types of events you are interested in for the coming months. Use the Options button to choose how many months into the future you wish to search for events of interest.

Once an event list has been generated you can click on the event (left window) to show its details (also referred to here as circumstances). Right-click on an event or circumstance to make charts, create log entries, etc.

The events generated with this tool are displayed on the Events Calendar and the Nightly Events Planner.

More Getting Started Topics:

- Setting Up SkyTools
- Observation Planning
- Real Time Observing
- Using the Charts
- Logging Observations
- Special Events
- Ephemerides

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Special Events

An event is a time when something of astronomical interest occurs. Examples of events are a solar eclipse, the occultation of a star by the moon, or the closest approach of two planets in the sky as seen from your location (an appulse).

Select the *Special Events* tab from the main window to start the Current Events tool. Use this tool to search for historical events, or those that will occur many years from now.

Once an event list has been generated you can click on the event (left window) to show its details (also referred to here as circumstances). Right-click on an event or circumstance to make charts, create log entries, etc.

More Getting Started Topics:

- Setting Up SkyTools
- Observation Planning
- Real Time Observing
- Using the Charts
- Logging Observations
- Current Events
- Ephemerides

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Ephemerides

An ephemeris is a list of positions for a moving object over a period of time. SkyTools makes three kinds of ephemerides: the *position ephemeris* generates positions at regular time intervals, the *optimum viewing ephemeris* generates a list of optimum observing times for each night, and the *binary star orbit ephemeris* generates a list of positions of an orbiting component of a binary star system.

Use the Ephemeris menu to print the ephemeris, generate charts for the entire ephemeris, etc.

Right-click on an ephemeris entry to create a chart, log entry, etc.

More Getting Started Topics:

[Setting Up SkyTools](#)

[Observation Planning](#)

[Real Time Observing](#)

[Using the Charts](#)

[Logging Observations](#)

[Current Events](#)

[Special Events](#)

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The Tools

The primary planning tools are found on the tabs of the main planning window. There are additional tools that work with them such as tools for building observing lists for the Nightly Planner, or for viewing the Current Events results in a calendar.

[The Nightly Planner](#)

[Charts](#)

[Current Events](#)

[Special Events](#)

[Ephemerides](#)

[Observing Logbook](#)

[Real Time Observing](#)

[Exposure Calculator](#)

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Nightly Planner

The Nightly Planner Tool is used to plan observing sessions ahead of time. It is based on the idea of a filtered observing list. The observing list consists of objects that you wish to observe. The Nightly Planner helps you decide which of these objects to observe on a specific night and when to observe each of them.

Observing Modes

The Nightly Planner has three modes of operation: simple, visual, and imaging. The simple mode is provided as a generic means of displaying and filtering observing lists. It is a good choice for large lists on slow computers because it is faster. The visual mode is the mode of choice for visual observers. The imaging mode is the mode of choice for planning imaging sessions.

The Observing List Menu

Don't miss the blue menu button (with diamond) on the left side of the dialog. This menu provides a wide variety of services. See the [Nightly Planner tool](#) page for more detailed information.

Observing List Groups

It is easy to accumulate large numbers of observing lists, so we have provided a means of organizing them into groups. For instance, you may want to put all of your double star lists into double star group. To select an observing list, first select the group, then select the list from those in that group.

Sources of Observing Lists

Observing lists can be downloaded from the web, obtained from a friend, or you can create them yourself. Use the Import Shared Data tab of the Data Manager to obtain lists from the Skyhound web site or to import a shared observing list in the form of a SkyTools shard data file (.stx). Select the Update 'current' lists from web menu item from the Observing List menu (blue diamond menu on the planner) to download the latest comet, minor planet, and nova/supernovae lists.

There are many ways to create your own lists. Use the Designation Search tool add objects to an observing list by hand. Use the Nightly Observing List Generator to quickly and automatically create a list of visually interesting objects for a specific night and telescope. Use the Database Power Search to find objects via a powerful database search engine. Use the Read Objects From File menu item on the observing list menu (blue diamond menu on the planner) to read a list of objects from a file.

Selecting Inputs

Information such as the night, observing location, and telescope is input via the hypertext items across the top of the dialog. Click on the hypertext to make a selection. The current selection is displayed in the hypertext.

Launching from an Object

Perhaps the very heart of soul of SkyTools is the ability to access any feature of the program via a right-click on an object in the observing list. This is how you display charts, create log entries, view object information, etc. for any object in the list.

The NightBar

The NightBar is the graphic at the top of the window. This graphic can tell you at a glance when it will be dark and when an object is high in the sky. In Imaging mode the NightBar plots the quality of the imaging opportunity for an object throughout the night.

More Information

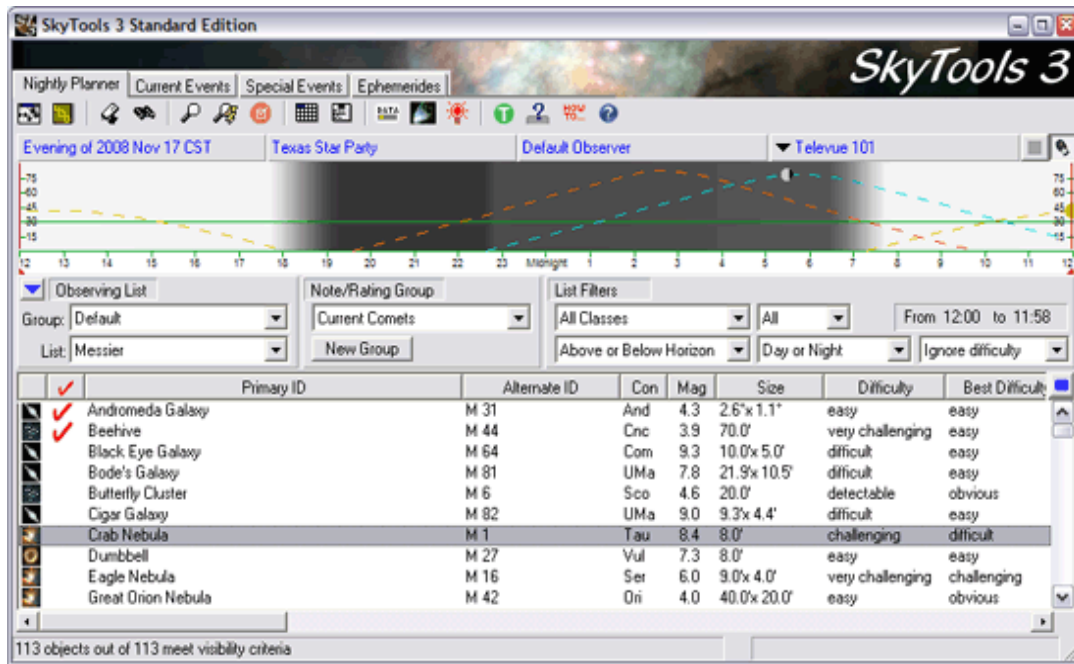
[Nightly Planner Tool](#) (detailed information)

Getting Started with The Nightly Planner

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Nightly Planner Tool

This tool is used for planning observing sessions ahead of time. It is based on the idea of a filtered observing list. The observing list consists of objects that you wish to observe. The Nightly Planner helps you decide which of these objects to observe on a specific night and what time to observe each of them.



Modes of Operation

This tool has three modes of operation: simple, visual, and imaging. The simple mode is provided as a generic means of displaying and filtering observing lists. It is a good choice for large lists on slow computers because it is faster. The visual mode is the mode of choice for visual observers. It adds the visual detection difficulty filter and visual detection difficulty columns to the list. It also adds double star-pair splittability columns. The imaging mode is the mode of choice for planning imaging sessions.

The Tool Bar

This is where you click to start the various tools, configure the program, and start the help system. Some of these tools are directly related to the observing lists used by the Nightly Planner: The Designation Search, Database Power Search, and Nightly Observing List tools are all used to create observing lists for use in the planner.



- The Interactive Chart Tool is the old fashioned, direct way to make charts. Click [here](#) to open the last chart viewed.
- The Observing Log Browser button starts the observing log browser. Use this when you want to browse log entries by category or to perform a filtered search of your log entries.
- Use Add/Modify Scope or Add/Modify Binoculars to enter the information for the

telescope(s) and binoculars you observe with. Once defined, custom simulations charts will be created for the instruments you enter here.

- The Designation Search Tool is used to add objects to an observing list by name or designation.
- The Database Power Search Tool is used to search the SkyTools databases for objects to add to your observing lists.
- The Nightly Observing List Generator is used to create special observing lists for a specific night, telescope, and observing location.
- The Events Calendar displays a monthly event calendar with events that have been discovered via the *Current Event* tool.
- The Nightly Events Planner displays the events discovered by the *Current Events* tool for a single night.
- The Data Manager is the tool used to backup/restore/Sync user data, import/share user data, and manage your data such as object notes, images, web links, plottable images, and supplemental databases.
- The SkyTools Preferences button is used to set global preferences, view your serial number and version information, register your copy of SkyTools, send instant feedback to Skyhound, and to change the database install level.
- Click on the Night Vision button to toggle the red night vision mode on and off. This mode changes all windows on your desktop to shades of red and blanks the desktop background (including icons). The original settings are restored when the program exits.
- Help Contents brings up the contents of this help system.
- The Tab Help button takes you directly to the help for the current selected tab.
- The Help System How To... button brings up the handy How To... help part of the help system. Use this to quickly find out how to do specific operations.

Night, Observing Location, Observer, and Telescope Hypertext

These settings are drawn in hypertext, to indicate that you can click on them.



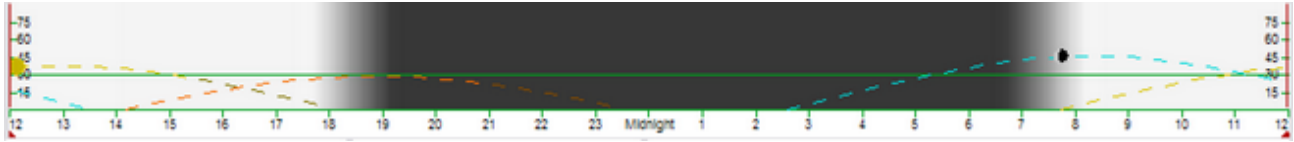
The Evening of... represents the *date of the evening* you wish to observe. The observing location represents the location at which you wish to observe. The NightBar and the data in the observing list will depend on these settings. Click on a selection to change or customize it.

In visual mode the name of the observer indicates the person who will be doing the observing and the telescope indicates which telescope the observer will be using. Click the observer to customize it for yourself. Set up your telescope and binoculars via the tool buttons at the top of the window; once they are defined you can select them by clicking the hypertext. The diamond next to a telescope hypertext selection indicates a menu. The visual limiting magnitude and the visual difficulty for each object is computed based on all of this information taken together. The more carefully you set things up, the more accurate the results. Take particular care in defining the local light pollution by setting a reasonable limiting magnitude/sky brightness for your observing location.

In Imaging mode there are additional selections for the camera, filter, and binning. Cameras and filters must be set up for each telescope via the Add/Modify Telescopes dialog. Once your cameras are defined click the camera hypertext to select the camera to use with the selected telescope.

The NightBar

This window speaks volumes about the night selected. The NightBar displays how dark the sky will be as a function of local time (labeled across the bottom). The effects of moonlight and twilight are accurately represented.

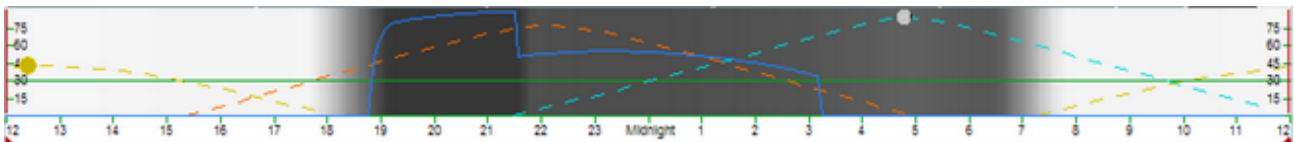


Also represented are lines that display the altitudes of objects vs. time. The horizon is at the bottom of the NightBar and the zenith is at the top. The green horizontal line represents Two Airmass, which is approximately 30 degrees above the horizon. It is always preferable to view objects when they are above this line. The yellow line represents the altitude of the sun, the light blue is the moon, and the red line represents the object currently selected in the observing list, in this case a galaxy. The red line for the object will turn to a darker shade of red if it passes below the local obstructed horizon. An obstructed horizon is defined and enabled/disabled for each location via the location dialog (click on the location hypertext).

According to the NightBar above then, the sun sets at approximately 17:55, with twilight ending at about 19:10. The moon rises at about 2:35. The period of time from the end of twilight to when the moon rises represents the dark period. The galaxy (red line) is best viewed just after twilight ends. It sets behind the obstructed horizon at around 20:50. Thus, the optimum observing window for the galaxy is between 19:00 and 20:50.

The NightBar in Imaging Mode

In imaging mode a blue line represents the relative imaging quality for the selected object.



The relative imaging quality is the quality of an exposure compared to a similar exposure under optimum conditions (from the same location). The prime imaging time for this object is when this line is near the top of the NightBar. The higher the line, the better the opportunity. The primary factors that affect the imaging quality include the brightness of the sky, the Seeing selection for the location, the altitude of the object, and the choice of filter.

Power Tip: Right-click on the NightBar to make an overhead sky or naked eye chart for the time corresponding to the point where you clicked. To see what the overhead sky would look like at sunset, for instance, right click near 18:00 hours and select *View Overhead Sky Chart*.

Observing List Controls

This is where you select the observing list you wish to display. First select an observing list group and then a list from that group. Use the blue menu button to configure the observing list display and to perform basic operations on the selected observing list.

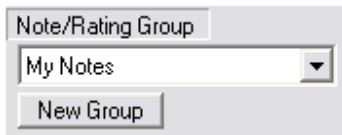


Menu options:

- Refresh List - will display the objects in the list that meet the filter criteria. This is usually only required if you have *Auto Refresh* (below) unchecked.
- Auto Refresh - if checked the objects in the current list will always be displayed. If you change your date, location, or a filter setting, the list will be automatically updated. Turn this off if you want to manually control when the list is updated.
- Auto Sort - if checked the list will be re-sorted each time it is refreshed or displayed. The sorting is controlled by clicking on a column heading. For instance, if you sort on the *Vis* (visibility) column the most visible object will be placed at the top of the list. As time passes a different object may become better visible and it will replace the first at the top.
- Reset Filters - will reset all observing filter selections to the null state (where every objects is displayed).
- New Observing List Group - click to create a new observing list group. Observing list groups are used to organize your observing lists.
- New Observing List - select to create a new observing list.
- View/Edit Title and Description -- allows you to change the observing list name, view or change its description, or assign it to a different group.
- Delete observing list - will delete the currently selected observing list.
- Print/Copy -- will print or copy to the clipboard the list as displayed.
- Configure Columns -- starts the Configure Display Columns dialog. Use this dialog to select the data you want displayed in the columns of the observing list. This dialog can also be started via the blue button to the right of the right-most list column. Column configurations are stored in schemes. Each observing list can have a unique scheme attached to it. Each observing mode has its own set of unique schemes.
- Read objects from file - select to read object designations from an external file. The objects are placed into an observing list of your choice.
- View list a thumbnails - will open the *Thumbnail Viewer* with each object in the observing list displayed as separate thumbnail.
- Transfer Observing List to Telescope -- will upload the objects that have red check marks to the Sky Commander or Argo Navis. The unit must be connected. The objects are uploaded in the same order they currently appear in the list. For the Sky Commander the objects begin as "special object" 00, through "special object" 58. These special object IDs can be displayed in the *Upload Number* column of the observing list. It can be useful to print the observing list once it has been uploaded in order to cross reference each object to the Sky Commander special object ID in the field. Note that the coordinates uploaded for moving objects such as planets or comets are for the *optimum time* computed for each object. A similar function is available on the *Real Time* tab. Use that function to upload coordinates applicable for the current time.
- Update Current Lists from Web -- will download the contents of three special observing lists: *current comets*, *current minor planets* and *current novae*. The contents of these lists are updated with the latest comets brighter than 15th magnitude, interesting minor planets (usually near-earth flybys) and recent novae/supernovae. In order for this feature to work, your computer must be connected to the Internet.

Notes/Ratings Group

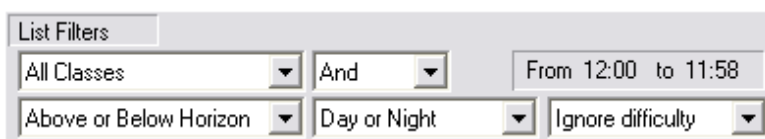
This where you select the active Notes/Ratings group.



The 5-star ratings displayed in the ratings column of the observing list are taken from the active group only, as are the fly up "headlines" displayed when you pass your cursor over an object. Also, when you open an object information dialog from a right-click on the observing list the Notes tab of the dialog will default to the active group.

Observing List Display Filters

These settings filter objects out of the observing list. The main purpose of the Nightly Planner is to take a large list and trim it down to only those objects most appropriately observed on the given night.



The filters all work in concert; only those objects which meet *all* of these criteria taken together are displayed in the list. Arbitrary time limits may also be applied (see below). Only those objects that meet all the criteria within the selected time limits will be displayed.

The exact selection of filters depends on the observing mode selection.
Available in all modes:

- Object Class - limits the objects displayed to the Object Class chosen here.
- Constellation - limits the objects displayed to the Constellation selected.
- Object Altitude - select the Minimum Altitude an object must attain in order to be displayed.
 - Above or Below Horizon will display all objects, regardless of altitude.
 - Above Perfect Horizon Only will limit the objects displayed to those that are currently above the horizon, as well as meet the other two criteria.
 - Above Obstructed Horizon Only will limit the objects displayed to those that are above the obstructed horizon, if defined, as well as meet the other two criteria. If no obstructed horizon is defined this filter is identical to Above Perfect Horizon Only.
 - Above 2 Airmass Only limits the display to those objects that are above an altitude of about 30 degrees, making them ideal targets. You should always observe objects above this altitude, if possible.
 - Near Maximum Altitude will limit the objects displayed to those that are within 33% of their maximum altitude. This is useful to catch objects that never rise above 2 airmass. The final selection is
 - Above 2X & Near Max Alt combines the previous two. In order to be listed the object must be above 2 airmass and within 33% of its maximum altitude.
 - Above 2X or Near Max Alt lists objects that are above 2 airmass *or* within 33% of its maximum altitude.
- Minimum Sky Darkness Conditions necessary for an object to be displayed.
 - Day or Night will display all objects, regardless of the sky conditions

- Twilight/Moonlight OK will display those objects that appear with the sun below the horizon at some point during the night.
- Complete Darkness Only will display only those objects observable away from twilight and moonlight that night.

Available in Visual Mode only:

- Visual Detection Difficulty -limits the objects displayed based on visual difficulty
 - Ignore Difficulty - will display all objects regardless of their difficulty
 - Visible (any difficulty) - the object must be deemed visible at any level of difficulty to the selected observer in the selected instrument to be listed.
 - Obvious - the object must be rated as obvious to the selected observer in the selected instrument to be listed.
 - Easy - the object must be rated as easy or obvious to the selected observer in the selected instrument to be listed.
 - Detectable - the object must be rated as at least detectable to the selected observer in the selected instrument to be listed.
 - Challenging - the object must be rated as challenging (or easier) to the selected observer in the selected instrument to be listed.
 - Very Challenging -the object must be rated as very challenging (or easier) to the selected observer in the selected instrument to be listed. This selection is functionally equivalent to Visible (at any difficulty).

Available in Imaging Mode only:

- Quality of Opportunity - the object must receive this minimum quality opportunity grade to be listed.
 - Any Quality
 - D - Poor or better
 - C -Acceptable or better
 - B - Very good or better
 - A - excellent only
- Total Signal to Noise (SNR) - the observing total SNR available during the observing window must be at least this value for the object to be listed.
 - Any SNR - will display all objects regardless of the SNR
 - Detectable - will display objects with an SNR of at least 3
 - Fair detection - will display objects with an SNR of at least 7
 - Confident detection - will display objects with an SNR of at least 10
 - Good detection - will display objects with an SNR of at least 15
 - Low quality photometry - will display objects with an SNR of at least 25
 - Quality photometry - will display objects with an SNR of at least 100

Arbitrary Time Limits are set by dragging the two vertical red lines found at either end of the NightBar. To change the upper limit, so as to display only those objects that meet the other criteria before you go to bed, click on the red vertical line on the right. Holding the mouse button down, drag the line to the appropriate bedtime. The time is displayed in the arbitrary time limits panel. The left line similarly selects the lower limit. Only those objects that meet the Altitude and Sky Darkness criteria between the times shown will be displayed.

In visual mode you may see objects that list dashed lines instead of optimum viewing times, particularly when you have selected *Twilight/Moonlight OK* and the moon is up. When the

optimum times are computed under these conditions it is possible for SkyTools to decide that the object is not in fact visible. In these cases no optimum times can be computed and these times are replaced by dashes.

Using the Observing List

The observing list is where you pick objects to observe. Only objects that meet the minimum filter criteria are displayed, one object per line.

Select an object to see it plotted on the NightBar (red dashed line).

Right-click on any object to access a variety of functions related to the object, including making charts, creating log entries, setting ratings and observation status, etc.

	✓	📷	📅	123	★★★★★	Primary ID	Alternate ID	Con	RA 2000	Dec 2000	Mag	Size	SBr	(B-V)
					★★★★★	NGC 4945	ESO 219 24	Cen	13h05m26.2s	-49°28'15"	9.3	20.4'x 4.3'	22.3	
					★★★★★	Centaurus A	NGC 5128	Cen	13h25m27.7s	-43°01'07"	7.8	27.5'x 18.2'	22.7	1.00
	✓				★★★★★	NGC 1291	MCG -7-7-8	Eri	03h17m18.6s	-41°06'29"	9.5	9.1'x 6.6'	22.1	0.93
					★★★★★	NGC 55	MCG -7-1-13	Scl	00h15m08.4s	-39°13'13"	8.5	30.2'x 3.4'	21.7	0.55
					★★★★★	NGC 300	MCG -6-3-5	Scl	00h54m53.5s	-37°41'05"	8.8	20.0'x 12.3'	22.9	0.59

Click on any of the column heading buttons to sort the display ordered by the values in that column. It is particularly useful to sort lists by optimum viewing time (visual mode). In Visual or Imaging mode check Optimum Sort to sort the objects best observed right now to the top.

To view an object with a log entry icon simply click on the icon.

To change the 5-star rating for an object right-click on the rating icon. Select the icon with the number of stars you want. Note that all changes are saved in the active notes/rating group.

To change the observation status of an objects right-click in the observation status column. Select the status you want from the popup menu. You can also use one of the keyboard shortcuts with the object selected: F5=observed, F6=reobserve, F7=not yet observed, F8=no value.

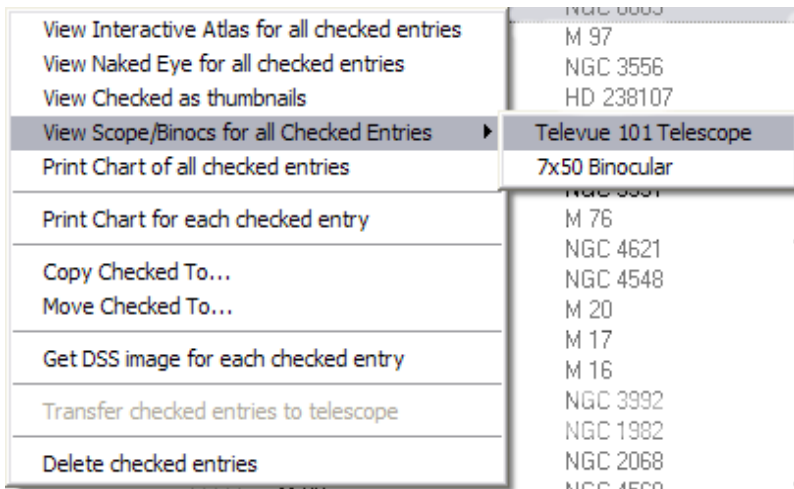
Left-click on an object in the list to highlight (select) it. Right-click on the highlighted object to see this pop-up menu:

Object Info	i
View Interactive Atlas	a
View Overhead Sky	o
View Naked Eye	n
Televue 101	t
View Scope/Binocs	
Center in Current Chart	c
Print Chart	p
Slew Scope to	F3
Slew Scope to and Center in Chart	F4
Create Quick Log Entry	l
Create Log Entry(s)	m
Get DSS image	d
Copy To...	
Move To...	
Delete Entry	Delete

Each selection operates on the highlighted object in the list. If a time is required for the operation, such as when opening a chart, midnight will be used for simple mode. The optimum viewing time will be used in visual mode (if available). The start of the imaging window will be used in imaging mode (if available).

- Object Info will bring up the *Object Information* window that displays the detailed database information available for the object.
- Exposure Calculator will open the exposure calculator for the object.
- View Interactive Atlas -- will open the *Interactive Atlas* with the object as the target.
- View Overhead Sky -- will open the *Overhead Sky Chart* with the object as the target.
- View Naked Eye -- will open the *Naked Eye Chart* with the object as the target.
- "*selected telescope*" -- will open the simulation chart for the telescope/binoculars that are selected at the top of the dialog.
- View Scope/Binocs -- will open a menu containing all of the telescope/binoculars defined. Select one to view the currently selected object in the telescope/binoculars chosen.
- Center in Current Chart - center this object as the chart target if a chart is open.
- Print Chart -- will start the *Print Chart* dialog, targeted at the highlighted object, as seen from the selected observing location, at the optimum time to view the object on that date (assuming there is an optimum time, otherwise the time is that of midnight).
- Slew Scope to / Push Scope to - (real time add-on only) will target the telescope at the selected object.
- Slew/Push Scope to and Center in Chart - (real time add-on only) will target the telescope at the selected object and make it the target of the currently open chart.
- Create Quick Log Entry - creates a log entry for the highlighted object with similar defaults.
- Create Log Entries starts the *New Log Defaults* dialog.
- Get DSS image to download a DSS image centered on the object.
- Copy To... copies or moves the selected object to another observing list.
- Move To... copies or moves the selected object to another observing list.
- Delete Entry deletes the selected object from the observing list

Click in the column under the Multiple Selection Check to select multiple objects. Right click in the check mark column to see this pop-up menu:



Note that none of the items will be active unless there are checked entries in the list.

- Select View (or Print) ... of all Checked Entries to automatically create a chart that plots all of the checked entries on a single chart, each indicated with individual target cross hairs. The selected object will be the primary chart target if checked.
- Use Print Chart for each checked entry to automatically print a separate chart for each of the checked entries. This can be very useful when printing star hopping charts to take into the field.
- Select Delete checked entries to delete them all.
- Select Copy To... or Move To... to copy or move the checked objects to another observing list.
- Transfer checked entries to telescope works similarly to the *Observing Lists* menu (see Observing List Controls above) selection except that only those objects that are checked are transferred.

Observing List Columns

The individual observing list columns can be turned on or off, resized and rearranged. Some have right-click options (see below). Each observing list has a different column scheme associated with it for each observing mode.

To view or change the column scheme click the blue button to the right of the far-right column.

By attaching a column scheme to each list you can have one set of columns for double star lists and another set of columns for deep sky objects, etc. Column schemes record the columns which are enabled, their widths, and their position.

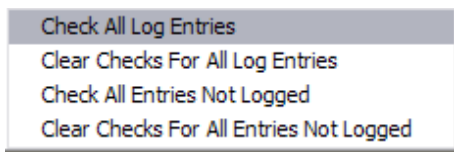
To change a column width simply drag the edge of a column heading. To move a column left-click on a column heading and drag it to the desired location. The column scheme currently selected for the observing list will be modified to reflect the changes you make in column size or location.

The column choices depends on the observing mode selection:

[Simple Mode Observing List Columns](#)
[Visual Mode Observing List Columns](#)
[Imaging Mode Observing List Columns](#)

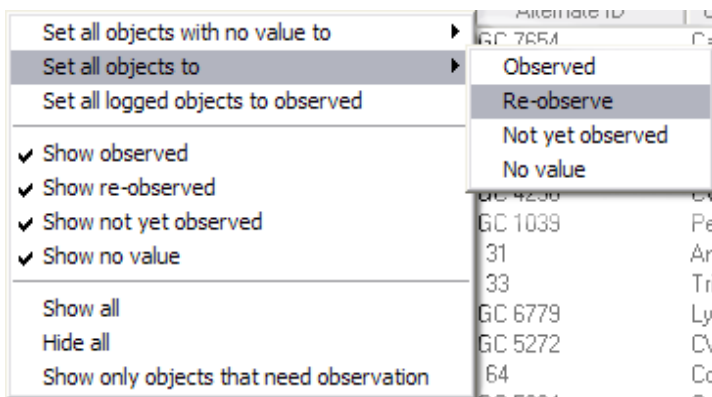
Right-click on the Observing Log column header to see the column options. Place/remove

check marks according to the log status of each object via this popup menu:



This is useful if you want to print charts for only those objects that have log entries, or better yet, those that don't. You can also choose to hide all logged or unlogged objects by checking them.

Right-click on the Observation Status column header to see the column options. The observation status is one of: *observed*, *re-observe*, *not yet observed* or *no value*. Use this menu to set the status of all objects in the list globally or to hide objects of a particular status.

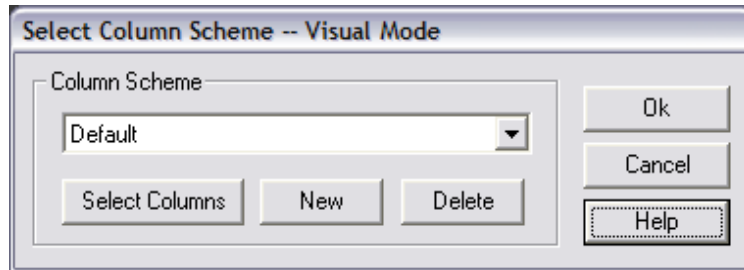


- Set all objects with no value to... - replace the status of any objects with a status of *no value* with the status selected.
- Set all objects to... - set all objects in the observing list to the selected status.
- Set all logged objects to observed - set the status of every object in the observing list with a log entry to *observed*
- Show... - display only those log entries with the checked status. For example, to hide all objects with a status of *observed* clear the check next to *Show observed*
- Show all -check all of the Show... items above.
- Hide all - clear the check for all of the Show... items above.
- Show only objects that need observation -clear the checks for *Show observed* and *Show no value*.

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Select Column Scheme Dialog

This dialog is used to select a column scheme for the current observing list. A column scheme stores which columns are enabled, their sizing and position. Each observing mode (simple, visual, etc.) has its own set of column schemes.



Select A Column Scheme

Select the scheme from the pull down menu and click Ok.

Create a New Column Scheme

Click New. The *Select Columns Dialog* will appear. Select columns and enter a name for your new scheme.

Edit the Columns Displayed for an Existing Column Scheme

Select the column scheme you wish to edit from the pull down menu. Click Edit. When the *Select Columns Dialog* appears make your changes to the column selections.

Changing the order of the Columns

Select a column scheme from pull down menu and click Ok. Back at the Nightly Planner or Real Time tool, left-click on a column heading that you wish to move. Hold the mouse button down and drag the heading to a new location. The column locations will be saved in the currently selected column scheme.

Changing the Column Widths

Select a column scheme from pull down menu and click Ok. Back at the Nightly Planner or Real Time tool, left-click on the divider between column headings and drag the heading to the new width. The column locations will be saved in the currently selected column scheme.

[Select Columns Dialog](#)

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Select Columns Dialog

Use this dialog to select the columns you want displayed in the observing list. The column choices available on this dialog depend on the observing mode selection on the Nightly Planner or Real Time tool. Some columns are only available for a particular mode, and other are only available on the Real Time tool.

Select Columns -- Visual Observing Mode

Basic Data

- ☒ Primary designation
- ☐ Alternate designation
- ☒ Object Class
- ☐ Surface brightness
- ☒ Constellation
- ☐ (B-V) Color index (stars)
- ☒ Size
- ☐ Hour angle
- ☒ Magnitude/opacity
- ☐ Altitude/Azimuth
- ☐ Double star pair data
- ☐ Airmass
- ☐ Distance
- ☐ Rise, Transit, Set
- ☐ Timeliness Index (Ti)
- ☒ Optimum Window

Atlas Chart Numbers

- ☐ Millennium Star Atlas
- ☐ Sky Atlas 2000
- ☐ Uranometria 2000
- ☐ Uranometria 2nd Ed.
- ☐ Herald Bobroff Astroatlas
- ☐ Pocket Sky Atlas

Coordinates

- ☐ 2000 Astrometric
- ☐ Apparent
- ☐ Ecliptical
- ☐ Galactic

Status

- ☐ Observation Status
- ☐ Observing Priority
- ☐ User Rating
- ☐ Log Entry Status

Real Time Only

- ☐ Download Number
- ☐ Visibility Icon
- ☐ Separation from Current Telescope Position

Column Scheme Title

Default

Visual Detection Difficulty

- ☒ Difficulty Level
- ☒ Optimum Difficulty
- ☒ Difficulty Status
- ☒ Optimum Eyepiece

Visual Double Stars

- ☒ Splittability
- ☒ Optimum Splittability
- ☒ Splittability Status

Ok Cancel Help

Place a check next to the columns you want displayed. To save the column choices as a new scheme, type the name of your new scheme into the Column Scheme Title field.

Column Descriptions by Observing Mode

[Simple Mode Observing List Columns](#)

[Visual Mode Observing List Columns](#)

[Imaging Mode Observing List Columns](#)

Simple Mode Observing List Columns

These observing list columns are common to all observing modes.

The text in the () is what appears in the column heading.

Multiple Selection

- Check mark (red check mark icon) - used to mark objects for multiple operations. Left-click in the column to add/clear a check mark. Right-click in this column to see the multiple operations menu.

Basic Data

- Object class icon (blank column icon) - indicates each object's classification (galaxy, star, etc.) via an icon.
- Primary Designation (Primary ID) - the identification for this object. This is the highest designation available for this object in the designation hierarchy for this objects of this class. The designation hierarchy can be customized via the *Designations* tab of the *SkyTools Preferences* dialog.
- Alternate Designation (Alternate ID) - this is the next highest designation available for this object in the designation hierarchy for this objects of this class. The designation hierarchy can be customized via the *Designations* tab of the *SkyTools Preferences* dialog.
- Surface Brightness (SBr) - the brightness of an extended object in magnitudes per square arc second (mag/arcsec²).
- Constellation (Con) - the constellation the object currently resides in.
- Size -(Size) - the angular size of the object in the sky.
- Hour Angle (HA) - the difference between the R.A. of the meridian and the R.A. of the object in hours. Objects on the meridian have an HA of zero. An object that was on the meridian an hour ago has an HA of 1. An object that will be on the meridian in an hour has an HA of -1.
- Magnitude/opacity (Mag) - the V magnitude for a star, the integrated V magnitude for extended objects (except galaxies which are B magnitudes) , or the opacity for a dark nebula. The opacity ranges from 1-6, with 6 being the most dark.
- Altitude/Azimuth (Alt, Az) - these two columns display the altitude and azimuth of the object in the sky at midnight.
- Double star pair (Pair, Mag, Sep) - these three columns display the information for the main star pair for a double star system. The main pair is automatically selected based on the separation and magnitude of the component stars, but it is topically the AB pair. The Pair column displays the star pair selected in the standard double star letter order, where "A" is the primary (brightest) star and the second letter identifies the component. The Mag column displays the magnitude of the component star. The Sep column displays the separation between the two stars, usually in arc seconds.
- Airmass (X) - a measure of how much atmosphere you are looking through at this star at the selected time (midnight). A value of one is overhead. Values increase as you approach the horizon. It is generally a good idea to observe at an airmass of 2 or less.
- Distance (Distance) - the distance of the object from the earth. This is in km for nearby objects, Astronomical Units (AU) for solar system objects, and light years (ly) for galactic objects. For extragalactic objects this is the lookback time in billions of years (Gyr).
- Rise, Transit, Set (Rise, Transit, Set) - these three columns display the times when

the object rises, transits the meridian, and sets. If the observing location has an obstructed horizon and it is enabled the rise and set times refer to the moments when the object is first/last visible above the obstructed horizon (the Observing Sites dialog controls obstructed horizons). Otherwise the perfect horizon is used, including the effect of elevation.

- Timeliness Index (Ti) - an index that helps determine how to prioritize observation when considering how long the object is visible throughout the year. Values range from 0 to 1. A value of 0 means the object is not only circumpolar, but so near the pole it is always visible. This makes it a very low priority because it is always available. A value of 1 means the object has a high priority because it won't be well placed for many nights out of the year. In practice, objects with an index of 1 will probably be too low to observe. Objects that never rise are arbitrarily given a priority of -1. For an observer at a pole all objects will result in 0.
- (B-V) color index (B-V) - the (B-V) color index (mainly for stars). This color index tells you the color of a star and roughly tracks spectral type. An A0 star is 0. Blue stars are negative values. Red stars have values of 2 or more.

Status

- Observing Log (green logbook icon) - indicates objects with log entries. Click on the log book icon to see the log entries for that object.
- Observation Status (Keck dome icon) - these icons indicate a status of *observed*, *re-observe*, or *not observed*. Right-click in the column to change the icon. Right-click on the column heading to see various options. Note that the observation status is a property of the observing list only, not of the object itself (the same object in two observing lists might have a different status).
- Observing Priority (icons with up/down arrows or a flat line) - these icons indicate the observing priority. Priorities are *high*, *normal*, and *low*. The red upward pointing arrow indicates a high priority. The blue downward arrow indicates a low priority. The flat horizontal line indicates a normal priority. Right-click in the column to change the icon. Right-click on the column heading to see various options. This selection can affect the list sorting under certain circumstances, placing those objects with elevated priority higher up the list. Note that the observation status is a property of the observing list only, not of the object itself (the same object in two observing lists might have a different status).
- User Rating (five-star icon) - a user rating. Right-click on the rating to change it. The rating can also be changed via the Notes tab of the Object Info dialog. Rating changes are stored in the notes/ratings group currently active.

Coordinates

- 2000 Astrometric (RA (2000), Dec (2000)) - the J2000 coordinates of the object.
- Apparent (RA (Ap), Dec (Ap)) - the apparent topocentric coordinates of the object.
- Ecliptical (Ecl lon, Ecl lat) - the ecliptical coordinates of the object in degrees.
- Galactic (Gal lon, Gal lat) - the galactic coordinates of the object in degrees.

Atlas Chart Numbers

These are chart (page) numbers where the object can be found in various popular atlases.

- Millennium Star Atlas (Mill)
- Sky Atlas 2000 (S.A.)
- Uranometria 2000 (U2000)
- Uranometria 2nd Edition (Ur. 2)

- Herald Bobroff Astroatlas (H-B)
- Pocket Sky Atlas (PSA)

Real Time Observing Only

- Download Number (No.) - the Sky Commander upload number. This identifies the object in the Sky Commander after an observing list upload.
- Visibility Icon(Vis) - the visibility icon for the current time. The shade of this icon tells how dark the sky is. The height of the dot indicates the altitude of the object. The top is zenith, the bottom is the horizon.
- Separation from current telescope position (Ang. Dist.) - the current angular separation between the telescope and object. Tip: sort on this column to find nearby objects.

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Visual Mode Observing List Columns

These observing list columns are available in visual observing mode only.

See [Simple Mode Observing List Columns](#) for the columns common to all observing modes.

The text in the () is what appears in the column heading.

Optimum Observing Window

These three columns define the window in time when it is best to observe the object on this night. The optimum window considers the altitude of the object, the brightness of the object, type of object, and sky brightness.

- Optimum Window (Begin, Optimum, End) - Begin marks the time that the optimum period to observe the object begins. End marks the time the window ends. Optimum marks the moment in time when the best view comes for that night. To the right of this time is a visibility icon for the optimum time. The shade of this icon tells how dark the sky is. The height of the dot indicates the altitude of the object. The top is zenith, the bottom is the horizon.

Visual Detection Difficulty

These columns indicate how difficult it is to detect the object at the optimum time on the night selected. The night, location, observer, and telescope are all factored into these calculations. The difficulty is computed at the optimum time.

- Difficulty Level (Difficulty) - the visual detection difficulty. This is an approximation of how difficult it is to detect the object in the eyepiece at the optimum time.
- Optimum Difficulty (Best Difficulty) - the optimum visual detection difficulty is for comparison to the current difficulty. This is how difficult it is to observe the object from the current location on a perfect night.
- Difficulty Status (traffic light icon) - this icon provides a quick indication of how the current difficulty compares to optimum. It is green if the current difficulty is at or near optimum, yellow is somewhat inferior to optimum, and red if you should wait for a better night.
- Optimum Eyepiece (Optimum EP) - this typically indicates the optimum eyepiece for visual detection of the object. For double stars it indicates the optimum eyepiece for splitting the primary pair.

Visual Double Stars

These columns indicate how difficult it is to split the main double star pair at the optimum time on the night selected. The night, location, observer, and telescope are all factored into these calculations.

- Splittability (Splittability) - an estimate of how difficult it will be to visually split the primary star pair (Visual mode and double stars only). The primary star pair is typically the AB pair of the system. Another pair may be substituted for telescopes too small to ever split the AB pair.
- Optimum Splittability (Best Splittability) - an estimate of how difficult it will be to visually split the primary star pair under perfect conditions for comparison to the current splittability (Visual mode and double stars only).
- Splittability Status (traffic light icon) - this icon provides a quick indication of how the current splittability compares to optimum (Visual mode and double stars only). It is green if the current splittability is at or near optimum, yellow is somewhat inferior to optimum, and red if you should wait for a better night.

- Optimum Eyepiece (Optimum EP) - for double stars this indicates the optimum eyepiece for splitting the primary pair. Otherwise this typically indicates the optimum eyepiece for visual detection of the object.

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Imaging Mode Observing List Columns

These observing list columns are available in imaging mode only.

See [Simple Mode Observing List Columns](#) for the columns common to all observing modes.

The text in the () is what appears in the column heading.

Imaging-Related

The imaging columns revolve around the imaging window. This is the period of time during the night that offers the best imaging opportunity. The night, observing location, telescope, camera, filter and binning is considered when computing these values.

- **Exposure Start** (Start) - this is the time when the imaging window begins.
- **Exposure Duration** (Duration) - this is the duration of the imaging window.
- **Quality of opportunity** (Q) - this indicates the relative quality of the imaging window as compared to ideal conditions for this location. The following letter grades are assigned:
 - A – excellent
 - B – Very good
 - C – Acceptable
 - D – Poor
 - F – Very poor
- **Total SNR** (SNR) - the approximate total SNR that can be had by imaging for the entire duration of the imaging window.
- **Size on Image**(Img. Size) - the size of the target object in pixels. If the object is larger than the image this column lists the number of separate frames that are required to cover the entire object. If the object is a double star the separation in pixels of the primary star pair will be indicated.
- **Effective resolution** (Resolution) - indicates the mean effective resolution in arc seconds for exposures during the imaging window. This value depends heavily on the *Seeing* parameter selected for the current location.
- **Maximum time w/o rotation smear**(Smear time) - indicates the length of time the object can be imaged before the object's rotation will smear the resulting image. This defines the maximum period of time over which you should stack individual images. This value depends heavily on the *Seeing* parameter selected for the current location.
- **Star pair resolution**(RP) - or *Resolution Parameter*. This describes how well the primary star pair is resolved on your imaging device. A value of less than 1 indicates that the pair is not resolved, 1 indicates they are barely resolved. Values greater than 1 are generally considered acceptable for resolving the two stars. This value depends heavily on the *Seeing* parameter selected for the current location.

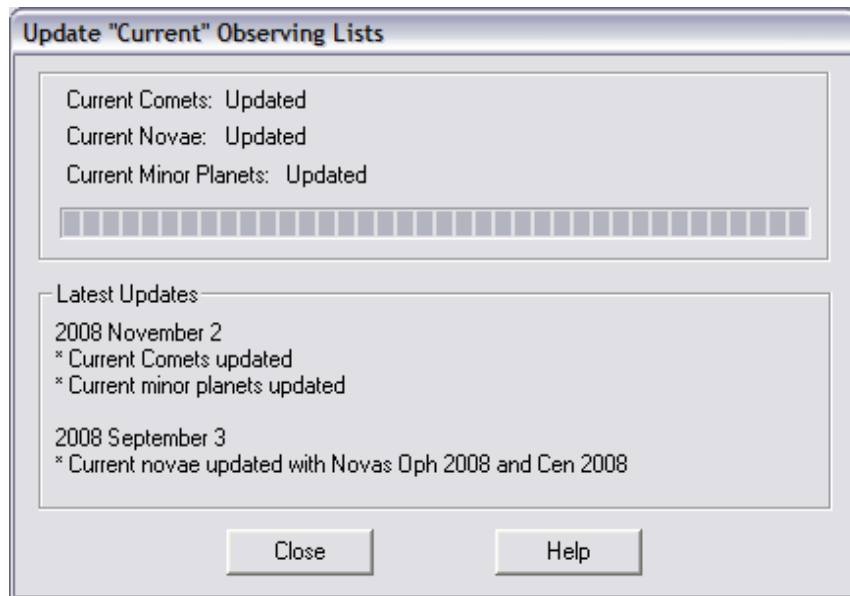
Real Time Only

- **Optimum Exposure Time** (Opt. Exp.) - the optimum sub-exposure time. A sub-exposure is a single image to be stacked with other images later. For CCD cameras the exposure time is typically limited by sky brightness. For digital cameras the exposure time is typically limited by thermal noise.

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Update “Current” Observing Lists Dialog

Use this dialog to download three special observing lists from the Internet. These observing lists contain the latest information about comets, interesting minor planets and novae/supernovae.



You must be connected to the Internet for this dialog to work.

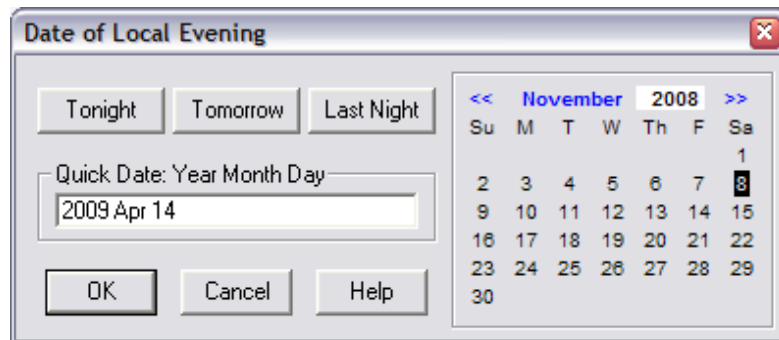
The three "current" observing lists (*current comets*, *current minor planets* and *current novae*) are updated from our Skyhound web site. The results of the download are displayed after each list in the dialog: Updated means that the list has been updated. Unable to download means that for some reason the file could not be downloaded. OK means that the file hasn't changed since the last time you activated this feature.

At the same time interesting headlines are downloaded and displayed in the lower window. To see the full information about many of these sky events, click the [Open Headline Sky News in Browser](#) button.

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Date of Local Evening Dialog

This dialog is used to enter the date for the *evening* you wish to observe. As an example, if you are planning to observe on the night of October 11/12, select October 11, as this is the evening date.



The current date selection is displayed in the calendar on the right.

Select a Year

To select the year, click on the year displayed (2008 above). Type in the year you want and press enter.

Select a Month

Select the month by clicking on the blue hypertext month (November above). Alternately, you can click on the "<<" arrow to view the previous month. Clicking on ">>" will advance to the next.

Select a Day

Select the day by clicking on it in the calendar. A double-click of the day will select that date and close the window.

Enter a Full Date

For an entirely new date, you can click on the Quick Date edit window, type in the date and press enter. Dates are entered in a simple form of the [SkyTools Date Entry Format](#). Enter the year, month, and day, in that order, separated by spaces. The month can be abbreviated to the first three letters or entered as a month number.

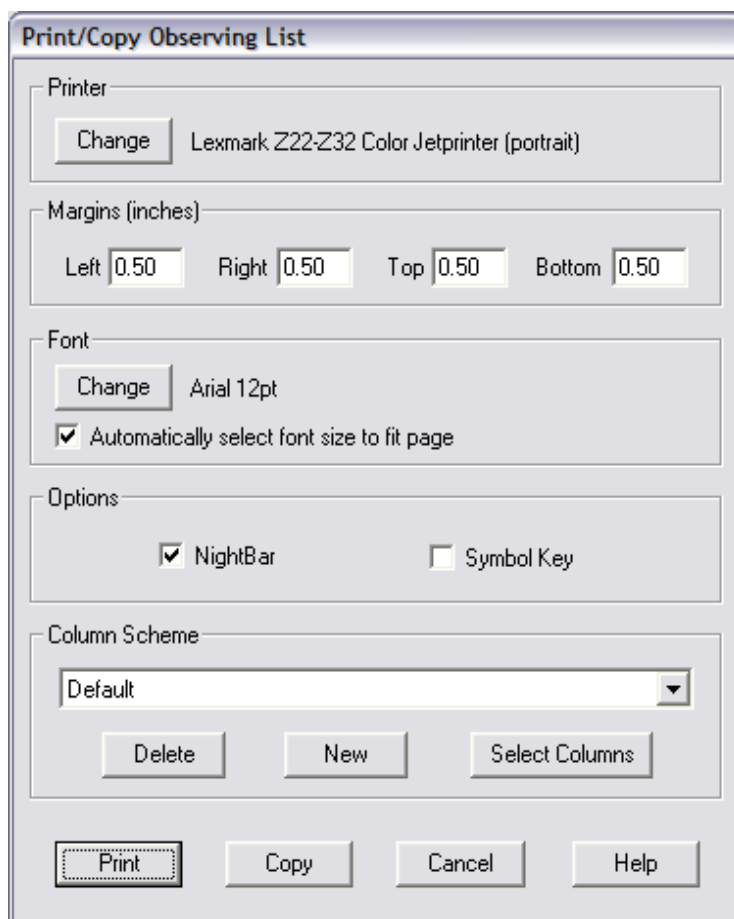
Quick Date Buttons

The easiest way to set the date is to click on one of the quick date buttons: Tonight, Tomorrow or Last Night. Note that these dates are relative to the current date obtained from your computer, not the date currently selected.

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The Print/Copy Observing List Dialog

This dialog is used to print an observing list or copy it to the clipboard for pasting into any word processor or text editor.



The output will match what you see on the screen, including column choices and column order. If you wish to have a special format for printed observing lists, create a printer column scheme and apply it to your list prior to printing it.

The *Printer*, *Margins*, and *Font* properties affect the printed output only.

Use the *Printer* property to select the printer and paper orientation. The name of the printer and the current paper orientation are displayed. To change the printer or paper orientation, click the Change button. The *Printer Setup* dialog will appear.

Use the *Margins* property to set the page margins in inches.

Use the *Font* property to change the base font size and style. Click the Change button to modify the font.

Check Automatically select font size to fit page to have the program automatically select the font size such that the entire width of the printed page will be filled.

Tip: If the fonts are too small to read, try using a Landscape paper orientation.

Click the Print button to start printing.

Click the Copy button to send the text to the clipboard for pasting into any word processor or text editor.

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Planner Keyboard shortcuts

These keyboard shortcuts are functional when a chart window has the input focus. If the chart does not respond to keyboard input, click in it. Some functions are only available for the Interactive Atlas. Others are only appropriate for Simulation charts. Telescope control keys require the Real Time add-on and you must be connected to a telescope. For multi-view charts, many key presses require that a specific view be selected for keyboard input. Click in a view to give it the keyboard focus.

To see this page again press the k key.

General

Object Info	i
Exposure Calculator (pro only)	e
Interactive Atlas	a
Overhead Sky Chart	o
Naked Eye Chart	n
Currently Selected Telescope Chart	t
Center in Current Chart	c
Print Chart	p
Create Quick Log Entry	l
Create Log Entries	m
Get DSS Image	d
Delete Entry	Del
Slew telescope to	F3
Slew Telescope to and center in chart	F4
Sync Telescope to current position	space
Set Observing Priority of object to High	1
Set Observing Priority of object to Normal	2
Set Observing Priority of object to Low	3
Set Observing Priority of object to "no value"	4
Set Observing Status of object to observed	F5
Set Observing Status of object to re-observe	F6
Set Observing Status of object to not observed	F7
Set Observing Status of object to "no value"	F8

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Charts

SkyTools offers two very different and complimentary approaches to drawing the sky: the *Interactive Atlas* and *Sky Simulations*.

The Interactive Atlas

This tool is similar in function to traditional *Planetarium* Software offerings. The on-screen display works like an interactive, highly customizable star atlas (with a single view). When printed, these can be highly customized and make very useful, general-purpose charts.

Context Viewer

This is actually part of the Interactive atlas. It's a window attached to the atlas that displays a telescope simulation. A FOV indicator appears on the atlas at the location of the context viewer. The indicator can be dragged about the atlas and the context viewer will follow.

The Sky Simulations

The sky simulation charts are designed as efficient observing aids, taking most of the work out of matching what is drawn on the charts to what you see in the sky.

These charts use descriptions of your observing instruments and sophisticated algorithms to simulate the field of view and magnitude limits of the real world.

These simulations start with the observing location, taking into account the naked-eye limiting magnitude (faintest star that the observer can see nearly overhead). Next, the observer is considered, taking into account your dilated pupil diameters and level of experience. Lastly, information is stored about your telescopes and binoculars that, together with the other information, can be used to simulate what you will be able to see with your unaided eye, in the eyepiece, or in your finding device. The latter - your finding device - is the key to successful, efficient, and enjoyable star hopping.

There are four separate kinds of simulation charts, each meant to fulfill a particular purpose. Each of these charts is created for a specific location, date/time, observer, and instrument (if we consider your eyes alone an instrument). Each chart takes into account the dimming of stars (and objects) due to atmospheric extinction as you look closer to the horizon.

Overhead Sky Chart - displays the entire visible sky, from horizon to horizon, as seen from a particular location at a particular time. Stars are drawn to the naked-eye limit overhead and are dimmed by atmospheric extinction as they approach the horizon.

Naked-Eye Chart - displays a view that matches what you see with your unaided eyes when looking in a particular direction.

Binocular Chart - has two views: a view that simulates what you would see when looking through the binoculars plus a naked eye view for context.

Telescope Star Hopping Chart - has three views: a view that simulates what you see when looking through an eyepiece at the telescope, a view that simulates what you see through the attached finding device, and a naked eye view for context. These charts are designed with one thing in mind: guiding you quickly and efficiently to your target.

Related Topics

[The Interactive Atlas](#)

[The Overhead Sky Chart](#)

[The Naked Eye Chart](#)

[The Binocular Chart](#)

[The Context Viewer](#)

[The Telescope Star Hopping Chart](#)

[Keyboard Shortcuts](#)

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Chart Preferences

The chart preferences dialog is used to control how the chart looks, including star styles, background colors, basic colors and fonts.

Related Topics

[Chart Preferences Schemes](#)

[Basic Style Tab](#)

[Component Styles Tab](#)

[Misc. Tab](#)

[Stars Tab](#)

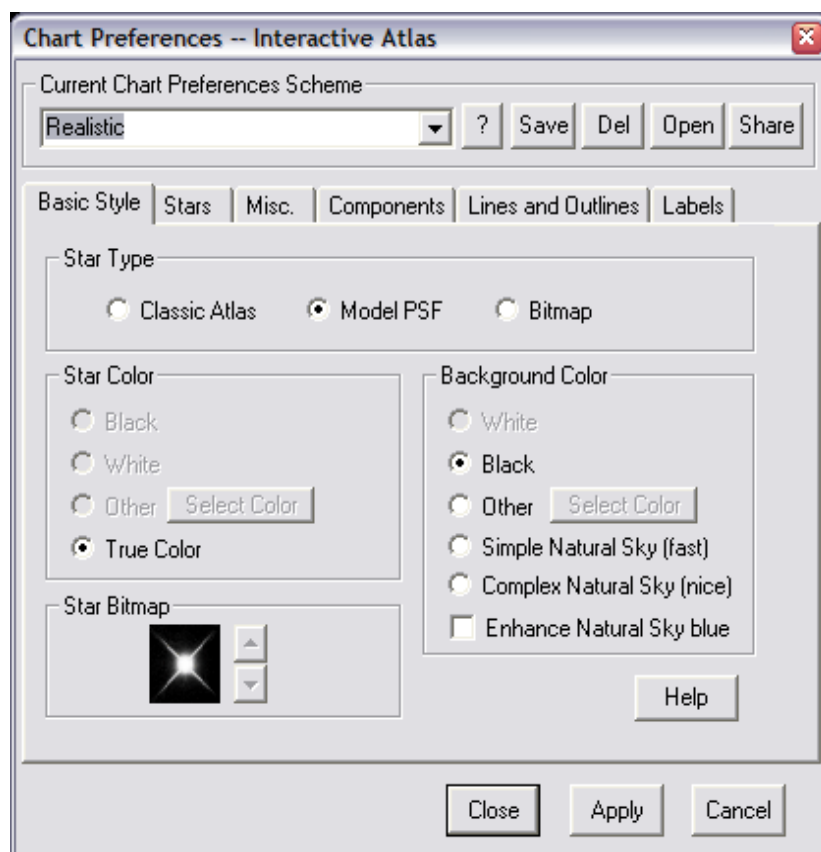
[Lines and Outlines Tab](#)

[Label Styles Tab](#)

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Chart Preferences: Basic Style Tab

The chart preferences dialog is used to control how the chart looks: select the basic chart style, colors, fill styles, and fonts used for the various chart elements here.



The *basic style* primarily refers to how the stars and the chart background are drawn, which gives the chart it's overall look.

Star Type

Choose one of three basic star types:

- Classic Atlas - draws stars as they appear on an atlas, as filled circles. Each star is

outlined in the background color so overlapping stars are visible. You may select a star color and any background color for this style. The View Controls setting to display variable stars with concentric circles applies only to this style. This style is most appropriate for high-resolution printed charts.

- Modef PSF - draws realistic looking stars that are always on light on a dark background with true colors based on their B-V color index. This style is not appropriate for printing (unless you own an ink factory!). It is intended for use on your monitor, and excels on a laptop in the field.
- Bitmap - draws a pre-selected star bitmap. The bitmap is chosen via the Star Bitmap property. The selection of bitmaps available will depend on the star color chosen.

Star Color

Choose how to color the stars:

- Black - colors all stars black. Best for light backgrounds such as printed charts.
- White - colors all stars white. best for dark backgrounds.
- Other - assign a color to all stars. Click the Select Color button to choose the star color.
- True Color - colors stars based on their (B-V) color index. This is a close approximation of the visual appearance of a star. The richness (or saturation) of the star colors is controlled from the Stars tab.

Background Color

Choose how to draw the chart background:

- White - colors the background white. best for printed charts.
- Black - colors the background black. Best with light colored or true color stars.
- Other - colors the background as the selected color. Click the Select Color button to select the background color.
- Simple Natural Sky (fast) - this selection will shade the sky background naturally based on the sky brightness model. Local light pollution, moonlight, and daylight are all modeled. With this selection the entire sky is shaded the same color to improve performance. The shade is computed for the zenith for the overhead sky and naked eye charts, or at the center of the chart otherwise.
- Complex Natural Sky (nice) - this selection will shade the sky background naturally based on the sky brightness model. Local light pollution, moonlight, and daylight are all modeled. The milkyway is also accurately displayed. The sky brightness is modeled at each point in the sky, which can be time consuming on slower computers. If the charts draw too slowly use the *Simple Natural Sky* instead.

Enhance Natural Sky Blue - check this box to add a blue hue to the natural sky (applies to simple or complex).

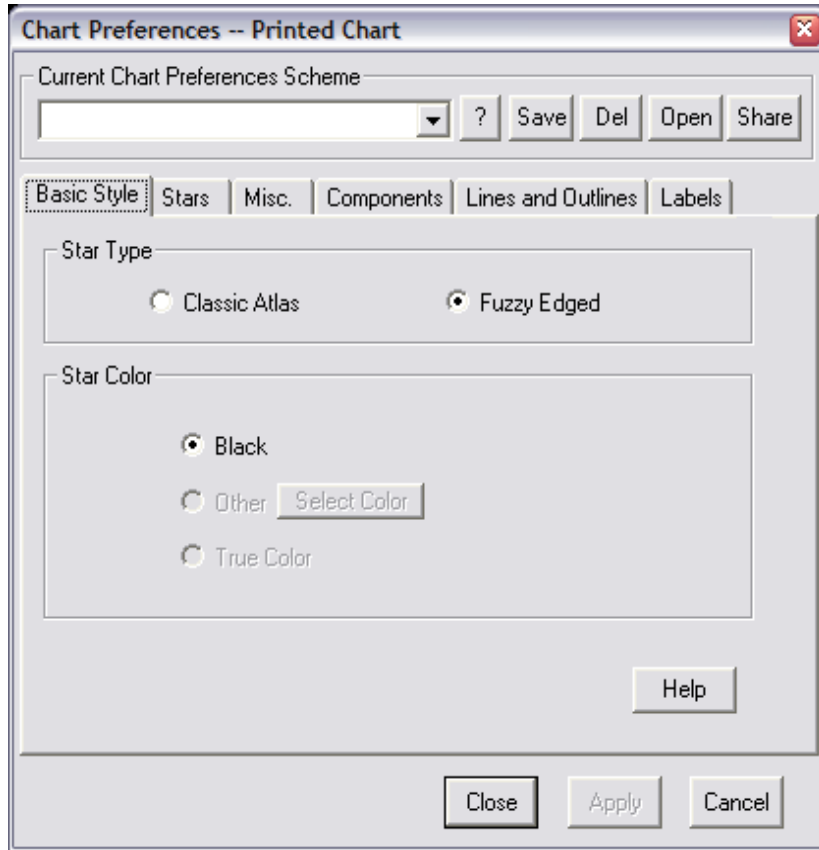
Star Bitmap

This option is only available when the star type is set to Bitmap. Select the star bitmap you want to use to generate stars on the chart by clicking the up/down buttons.

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Chart Preferences: Basic Style Tab (Printer)

The chart preferences dialog is used to control how the chart looks: select the basic chart style, colors, fill styles, and fonts used for the various chart elements here.



The *basic style* primarily refers to how the stars and the chart background are drawn, which gives the chart it's overall look.

Star Type

Choose one of three basic star types:

- Classic Atlas - draws stars as they appear on an atlas, as filled circles. Each star is outlined in the background color so overlapping stars are visible. You may select a star color and any background color for this style. The View Controls setting to display variable stars with concentric circles applies only to this style. This style is most appropriate for high-resolution printed charts.
- Fuzzy Edged - draws a black star bitmap.

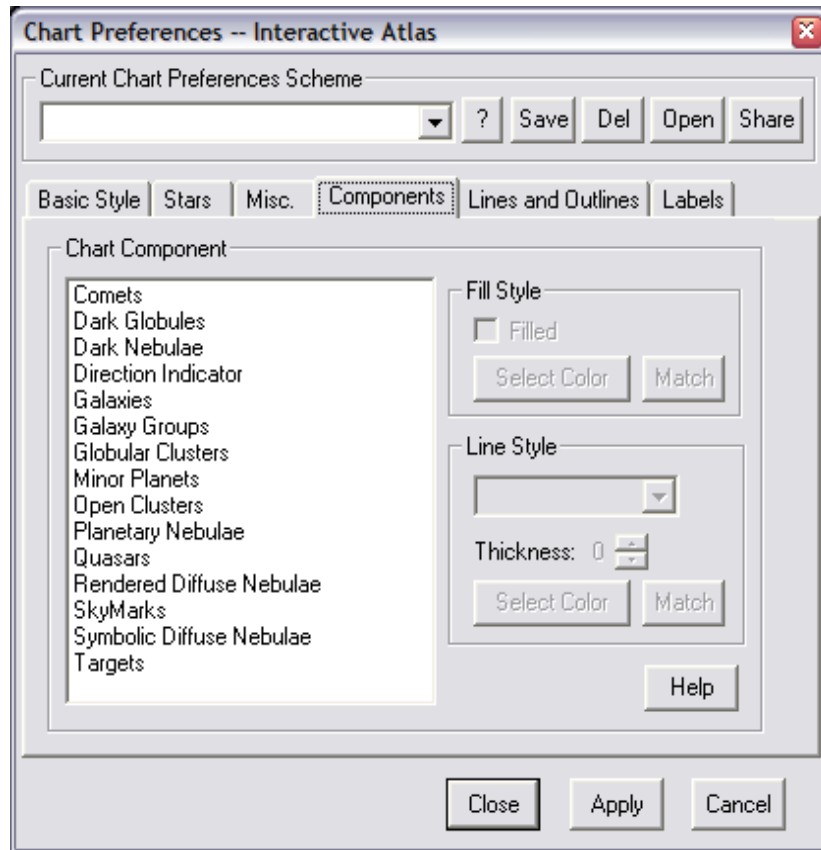
Star Color

Choose how to color the stars:

- Black - colors all stars black. Best for light backgrounds such as printed charts.
- Other - assign a color to all stars. Click the Select Color button to choose the star color.
- True Color - colors stars based on their (B-V) color index. This is a close approximation of the visual appearance of a star. The richness (or saturation) of the star colors is controlled from the Stars tab.

Chart Preferences: Component Styles Tab

The chart preferences dialog is used to control how the chart looks: select the basic chart style, colors, fill styles, and fonts used for the various chart elements here.



This tab is used to customize the appearance of each of the basic chart components (objects, targets, etc.).

Chart Component

Select the component you would like to modify.

Fill Style

Check Filled if you wish the object to be filled with a solid color. Click Select Color to select the fill color. Click Match to make the fill color match the Line Style color.

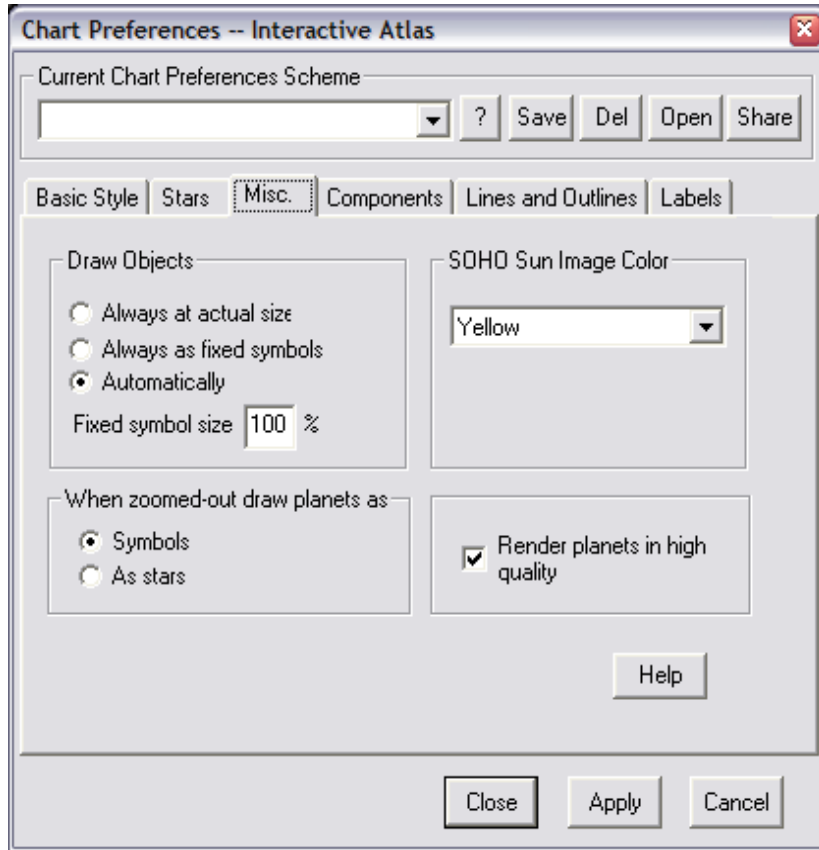
Line Style

Each object has an outline. Select the outline style (solid, dashed, dots, dash-dots, or dash-dot-dot). Use the spin buttons to select line thickness (in pixels). Click Select Color to select the outline color. Click Match to make the outline color match the fill color.

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Chart Preferences: Misc Tab

The chart preferences dialog is used to control how the chart looks: select the basic chart style, colors, fill styles, and fonts used for the various chart elements here.



Draw Objects

Select how you want deep sky objects to be drawn as you zoom out from them:

- Always at actual size - will draw them as they are until they become tiny dots.
- Always as fixed symbols - will draw objects as symbols of fixed size
- Automatically - will draw at actual size until the object becomes very small, then a fixed-size symbol will be used

Fixed symbol size - enter the size in percent that you want the fixed symbols drawn at. If your symbols are too small, increase this value. If they are too large, decrease it.

SOHO Sun Image Color

Choose how the SOHO real time sun image is shaded. The natural color of this image is orange, but it can also be drawn as grayscale or colored yellow.

When zoomed-out draw planets as

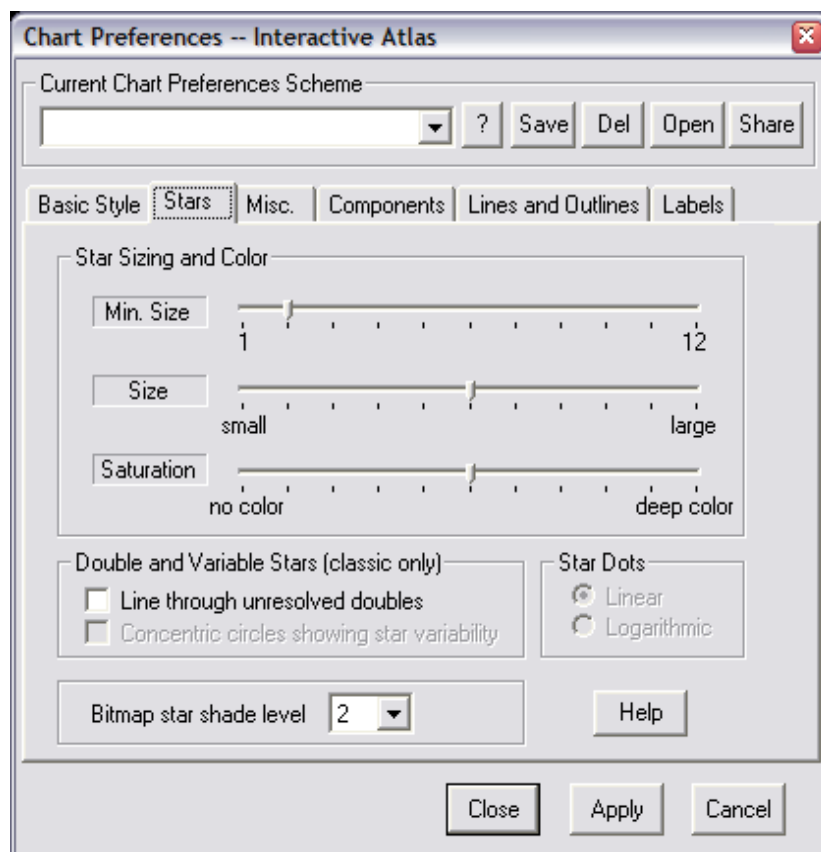
Select how you want planets to be drawn as you zoom out from them. When zoomed in close the planet will be drawn to scale. As you zoom out it will become tiny. Select Symbols to draw a fixed-size planet symbol at the location of the planet. Select As stars to draw the planet as it would be seen to the eye.

Render planets in high quality - this should normally be checked. Uncheck to improve performance on slower computers.

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Chart Preferences: Stars Tab

The chart preferences dialog is used to control how the chart looks: select the basic chart style, colors, fill styles, and fonts used for the various chart elements here.



The Stars tab determines how stars are displayed on the chart. The basic star style is chosen on the Basic Style tab. This tab controls the star sizing, color saturation, and other aspects of drawing the stars.

Star Sizing and Color

This controls the detailed appearance of the stars in this view. If you have difficulty seeing the smallest stars, which are drawn for the magnitude limit of the chart, then use the slider to increase the minimum star size. Create star dots sized to your taste by experimenting with the star size slider.

For stars drawn in true color, the degree of saturation (or richness) of the star colors is controlled via the star colorsaturation slider.

Double and Variable Stars (classic only)

Check the box next to *Line through unresolved doubles* to draw a line across stars that are double, but you are zoomed out to far to see the separate components. Check the box next to *Concentric circles showing shar variability* to draw circles around the star dot that indicate the range of brightness of a variable star. This choice is only available for *Classic Atlas* style stars.

Star Dots

This property affects the sizes of *Classic Atlas* or *Bitmap* stars only. Selecting *Linear* star sizing produces stars that grow in size linearly with decreasing magnitude numbers. Selecting *Logarithmic* star sizing produces stars that grow faster, producing a greater overall range of star sizes. In most cases linear star sizing is recommended.

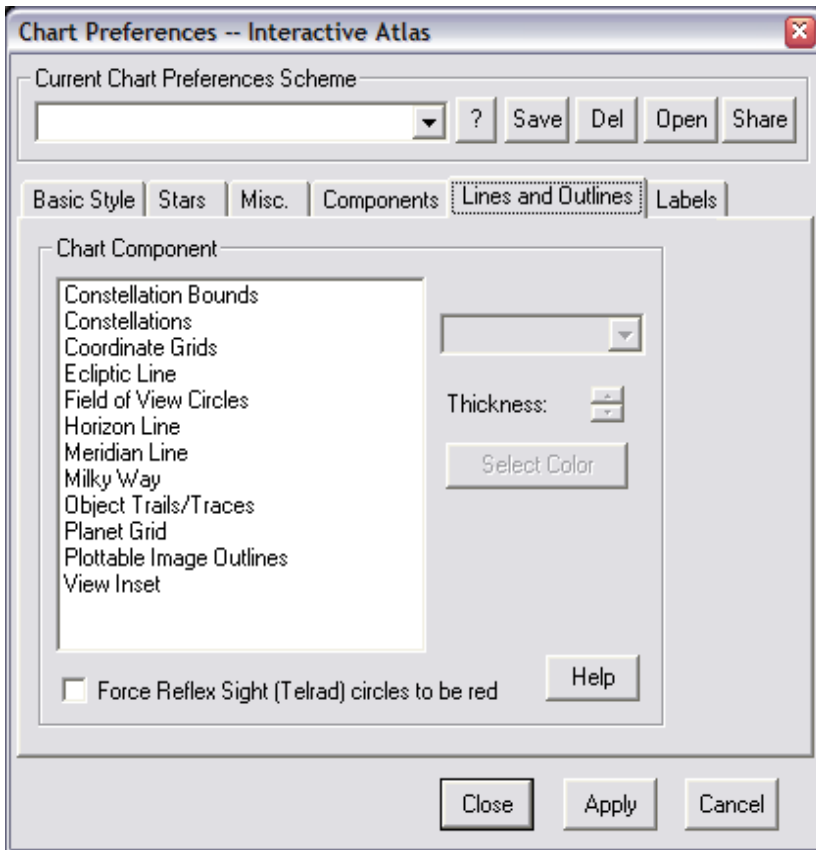
Bitmap star shade level

This property is used with Bitmap stars only. The numbers (0-6) determine how well the stars are drawn when small. Experiment to obtain the best looking stars. The default value is 2.

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Chart Preferences: Lines and Outlines Style Tab

The chart preferences dialog is used to control how the chart looks: select the basic chart style, colors, fill styles, and fonts used for the various chart elements here.



The lines and outlines style tab is used to customize the appearance of each of the chart components that appear as lines or outlines (no fill).

Chart Component

Select the chart component from the list that you wish to modify.

Select a line style (solid, dashed, dots, dash-dots, or dash-dot-dot). Use the spin buttons to select a line thickness (in pixels).

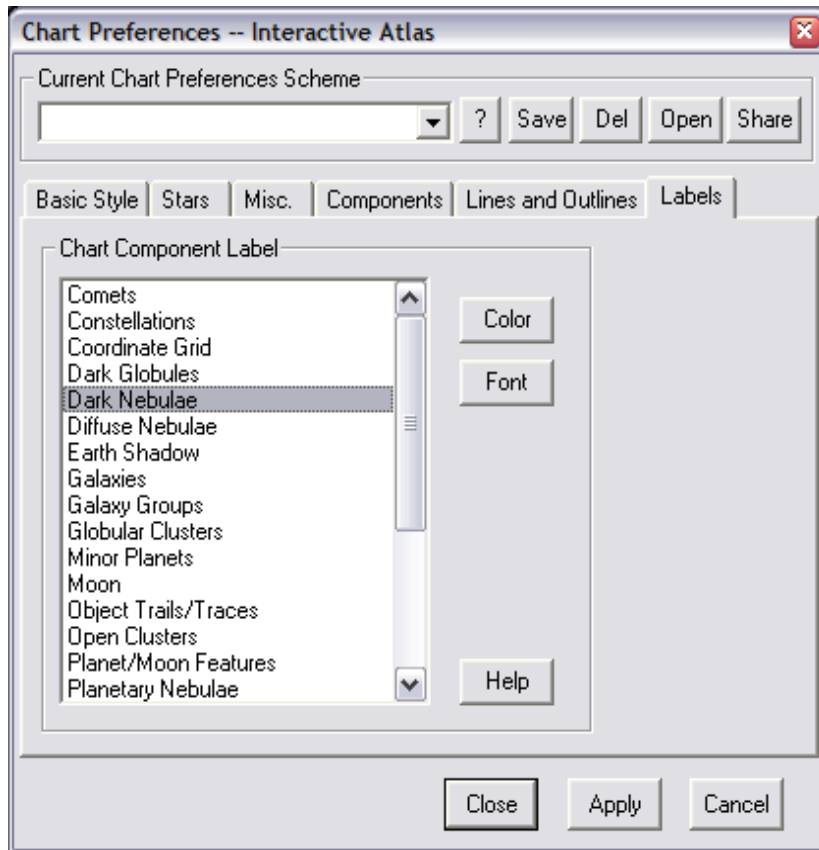
Click Select Color to select the outline color.

Check the Force Reflex Sight (Telrad) circles to be red box to draw these circles (as defined in your telescope finding device property) bright red. If this box is not checked these circles will be drawn with the *Field of View Circles* color.

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Chart Preferences: Label Styles Tab

The chart preferences dialog is used to control how the chart looks: select the basic chart style, colors, fill styles, and fonts used for the various chart elements here.



The label styles tab is used to customize the appearance of each of the chart labels.

Chart Component Label

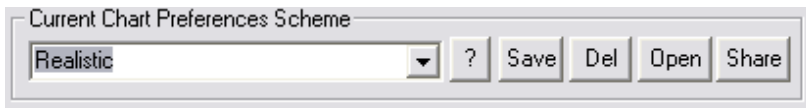
Select the label you wish to modify from the list.

Click Color to set the label color.

Click Font to select the label font, size, and other attributes.

Chart Preferences Schemes

All of the settings in the Chart Preferences dialog can be saved as a *Chart Preferences Scheme*.



Save a Scheme

To save the current settings as a chart scheme that can be recalled later (perhaps to be applied to another chart) type a name for your scheme and click on the **Save** button. If you use a name that has been used previously that scheme will be overwritten.

Keep in mind that saving the current settings as a scheme is only necessary if you want to recall these settings for another chart or if you want to switch between color/font schemes.

Recall a Saved Scheme

To recall a chart scheme select it from the menu and click **Open**. Note that this will change all of the current settings.

Share a Scheme

To share the chart preferences scheme click **Share**.

Delete a Scheme

To delete a scheme first select a scheme and then click **Del**.

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View Controls

This dialog is used to control what is displayed in the selected view and in some cases how it is displayed. Some charts have more than one map view; each map view has its own individual settings. Click in a map view to select it. The selected view will be outlined in red. Clicking the *View Controls* tool button will start the View Controls dialog and any changes made will be for the selected view only.

Let's first look at the bottom of the dialog. Click on the *Save* button to save the current view control settings as the default for this map view. Otherwise, any changes made to the map view will only be in effect as long as the chart is displayed. To restore your previously saved settings, click on the *Restore* button. It is important to note that the default view control settings will be applied when a chart is printed non-interactively (e.g. directly from an item in an observing list, or from an event in the event list).

Related Topics

[General Properties Tab](#)

[Labels Tab](#)

[View Properties Tab](#)

[Comparison Stars Tab](#)

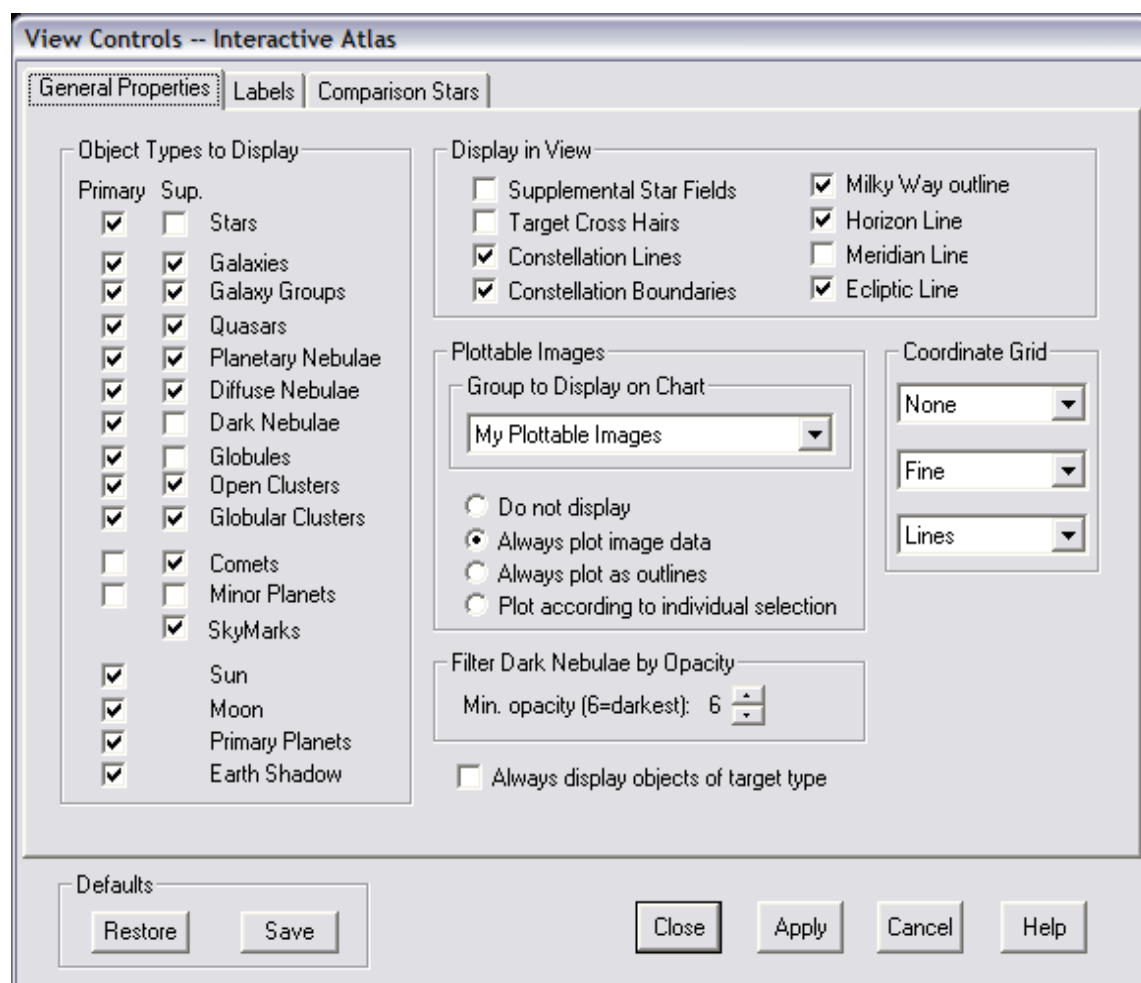
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The View Controls Dialog: General Properties Tab

This dialog is used to control what is displayed in the selected view and in some cases how it is displayed. Some charts have more than one map view; each map view has its own individual settings. Click in a map view to select it. The selected view will be outlined in red. Clicking the *View Controls* tool button will start the View Controls dialog and any changes made will be for the selected view only.

Let's first look at the bottom of the dialog. Click on the *Save* button to save the current view control settings as the default for this map view. Otherwise, any changes made to the map view will only be in effect as long as the chart is displayed. To restore your previously saved settings, click on the *Restore* button. It is important to note that the default view control settings will be applied when a chart is printed non-interactively (e.g. directly from an item in an observing list, or from an event in the event list).

The general properties tab controls the display of the basic elements of the view.



Objects to Display

Check each of the items in the to display them in the map view. Objects will be displayed from the primary database if a check appears in the Primary column. A check in the Sup. column indicates that objects of this type from your corresponding supplemental database will be displayed.

Display in View

The display of additional elements is controlled via this property:

-
- Target Cross Hairs are small ticks drawn around the target object(s).
- Constellation Lines are the stick-figure outlines of the constellations.
- Constellation Boundaries are the demarcations between constellations.
- Milky Way outline is an outline of the brighter portions of the Milky Way.
- Horizon Line signifies the apparent perfect horizon as well as an obstructed horizon (if an obstructed horizon is defined and enabled for the viewing location).
- Meridian Line is a line that runs down the meridian in the local sky. The meridian runs north/south and splits the sky into rising and settings halves.
- Ecliptic Line is the line of the ecliptic. This is the path of the Sun as seen from the earth.

Plottable Images

These are images that can be displayed in the chart view background. Select the plottable image group to display in the view. Only one group can be plotted at a time. Configure when the images are displayed:

- Do not display - will not display the images under an circumstances
- Always plot image data - will always plot the images
- Always plot as outlines - will plot the outlines of all images rather than the image data
- Plot according to individual selection - each plottable image can have its display turned on/off via its properties. This selection will plot the images based on the property of each individual image.

Coordinate Grid

This property controls the display of coordinate lines or ticks. You may choose between coordinate grid lines, or regularly plotted tick marks. The separation of the grid lines or ticks can be controlled by selecting one of, coarse, medium, or fine.

Coordinate types are:

- Eq. J2000 -standard equatorial coordinates referred to the J2000 equinox.
- Eq. Apparent -equatorial coordinates referred to the equinox of the date.
- Horizon - coordinates with respect to the local horizon, measured in azimuth and altitude.
- Ecliptic -coordinates with respect to the ecliptic. Ecliptic coordinates are referred to the celestial equator.
- Galactic -coordinates with respect to the galactic plane.

Filter Dark Nebula by Opacity

Select a minimum opacity for dark nebula to be displayed from 1 to 6. If 1 is selected all dark nebulae will be drawn. If 6 is selected only those dark nebulae with the highest opacity (6) will be drawn. Intermediate opacities work in the same manner.

Check always display objects of the target type to force the target to be visible, even if objects of that type are turned off.

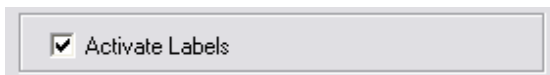
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The View Controls Dialog: Labels Tab

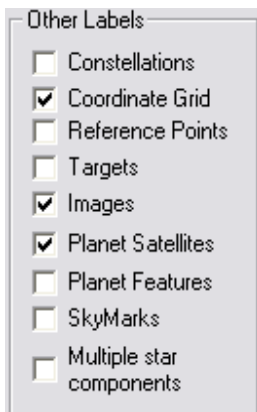
This dialog is used to control what is displayed in the selected view and in some cases how it is displayed. Some charts have more than one view; each view has its own individual settings. Click in a map view to select it. The selected view will be outlined in red. Clicking the *View Controls* tool button will start the View Controls dialog and any changes made will be for the selected view only.

Let's first look at the bottom of the dialog. Click on the *Save* button to save the current view control settings as the default for this map view. *Otherwise, any changes made to the map view will only be in effect as long as the chart is displayed.* To restore your previously saved settings, click on the *Restore* button. It is important to note that the default view control settings will be applied when a chart is printed non-interactively (e.g. directly from an item in an observing list, or from an event in the event list).

The labels tab controls which labels are displayed and how they are displayed. The *Activate Labels* check box acts as a master switch to turn all labels off. If checked the labels that are defined will be displayed. If unchecked, no labels will be displayed.



The Other Labels property controls the labeling of various elements in the view.



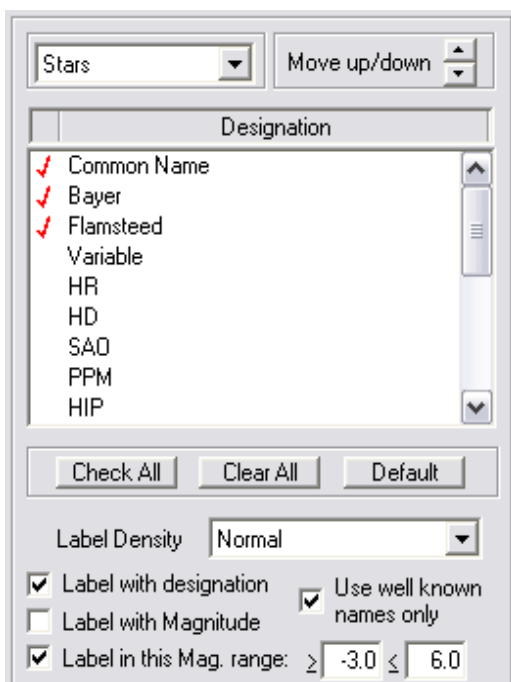
These labels are either on (checked) or off (unchecked). Most are self-explanatory. Images refer to the labeling of plottable images drawn in the view background. These images are labeled by the image file name. Reference points are the compass points around the horizon (N for north, E for east, etc.) and the zenith (Z). Multiple star components are the component letters assigned individual components in a multiple star system. By convention the brightest star is component A, the second brightest is B, etc. Note that there are some exceptions to this convention.

The labels for the Sun, Moon, Major Planets, Comets, Minor planets and Dark Globules are simple on/off switches.

Object Labels



The rest of the labels are much more flexible. A check here turns the labels on or off as for the other objects, but how the labels behave is controlled via the property on the right (shown below).



The property shown above controls the label display for various types of objects. To edit the behavior of the labels for a specific class of object select that object class from the pull-down menu (top left). In the diagram above *Stars* are selected.

Changing the Hierarchy

For each class of object there is a hierarchy of names. This hierarchy is displayed in the Designation label hierarchy list.

Only those designations that are checked will be used as labels. To turn a specific designation on or off, click in the column to the left of the designation. A red check indicates that this designation will be used in labeling.

The designations that appear at the top of the list will be used first, if they exist. For instance, in the example above, common names, Bayer, Flamsteed designations are checked. The other designations will be ignored. If the star has a common name this name will be used for the label because *Common Name* is at the top of the list. If it has no common name, then the Bayer designation will be used instead. If there is no Bayer designation, the Flamsteed designation will be used for the label. If no valid designation is found, no label will be drawn for that object.

To change the hierarchical order, select the designation you wish to promote/demote in the list. Click the up spin button (Move Up/Down property) to promote the selected designation. Click the down spin button to demote it. In this way you can completely customize the use of designations to suit your taste.

Similar hierarchies exist for other classes of objects and they work in the same way.

Label Density

This is used to control label clutter. If set to *All* every label will be drawn. If there are many faint objects the labels can become quite dense. Select a density to selectively display labels instead. For instance, if you select *Very Sparse* only a few labels will be displayed. These will tend to be the or more interesting brighter objects.

Label with Designation

Check this box to see a designation label appear. You must have *Label with designation* checked or no designation will be drawn.

Label with Magnitude

Check this box to label the object with a magnitude. If the *Label with Designation* box is also checked the magnitude label will be appended.

Label in this Mag. range

Another way to cut down on the clutter is to limit your labeling to objects of the type selected within a specific magnitude range (excluding dark nebulae, which don't have magnitudes).

Check this box to limit the labeling to only those objects that have magnitudes within the range specified. In the example above labels are limited only to those stars with magnitudes between magnitude -3 and 6, inclusive.

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The View Controls Dialog: Comparison Stars Tab

This dialog is used to control what is displayed in the selected view and in some cases how it is displayed. Some charts have more than one view; each view has its own individual settings. Click in a view to select it. The selected view will be outlined in red. Clicking the *View Controls* tool button will start the View Controls dialog and any changes made will be for the selected view only.

Let's first look at the bottom of the dialog. Click on the *Save* button to save the current view control settings as the default for this map view. *Otherwise, any changes made to the map view will only be in effect as long as the chart is displayed.* To restore your previously saved settings, click on the *Restore* button. It is important to note that the default view control settings will be applied when a chart is printed non-interactively (e.g. directly from an item in an observing list, or from an event in the event list).

The comparison stars tab is a powerful feature for observers who wish to make visual magnitude estimates of variable stars or comets. This feature will automatically select comparison stars that meet your criteria and mark them on your chart. Before using this feature you should center your chart on the object you wish to make a visual estimate for. The stars selected will be based on their visual (V) magnitude.

To enable the auto-selection of comparison stars check *Auto-select On*.

Choose how you want the resulting selections to be marked on the chart. Select *Mark Only* to draw tick marks around the selected comparison stars. Select *Label with Magnitude* to label each selection with the star's magnitude.

Select a magnitude range for the comparison star selection. In the example above stars will be chosen between magnitude 6.0 and 9.5, inclusive.

Select a minimum Magnitude Pedigree for the stars selected. Not all catalog sources are equally accurate: magnitudes for stars from the Guide Star Catalog are notoriously poor, for instance, and should only be used if no other, more appropriate, comparison stars can be found.

If you select *Any* SkyTools will not discriminate between magnitude sources: it will report comparison stars regardless of the source of the magnitudes.

Selecting Tycho-2 or photometric will limit the selection to only those stars that have magnitudes from the Tycho-II catalog or from a UBV photometric standard catalog. The Tycho-II catalog contains a large number of stars, but the photometric accuracy is not as reliable as the stars from the UBV photometric standard catalogs.

Selecting UBV Photometry only will limit the selection to only those stars that appear in one of the photometric standard star catalogs used as a source of magnitudes for SkyTools.

If you wish to limit the selection to a B-V color range check the Acceptable B-V range check box. Enter the acceptable range to the right. In the example above only those stars with a B-V value between 0.0 and 1.0, inclusive, will be used. Use the table below to convert spectral class to B-V color index.

Main Sequence Spectral Class	B-V color
O5	-0.32
B0	-0.30
B5	-0.16
A0	0.00
A5	0.15
F0	0.29
F5	0.42
G0	0.58
G5	0.69
K0	0.85
K5	1.16
M0	1.42
M5	1.61

From Mihalas and Binney, 1981, *Galactic Astronomy*

Note that SkyTools will automatically eliminate variable stars, suspected variable stars, and unresolved multiple stars from the resulting selection.

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The View Controls Dialog: View Properties Tab

This dialog is used to control what is displayed in the selected view and in some cases how it is displayed. Some charts have more than one view; each view has its own individual settings. Click in a view to select it. The selected view will be outlined in red. Clicking the *View Controls* tool button will start the View Controls dialog and any changes made will be for the selected view only.

Let's first look at the bottom of the dialog. Click on the *Save* button to save the current view control settings as the default for this map view. *Otherwise, any changes made to the map view will only be in effect as long as the chart is displayed.* To restore your previously saved settings, click on the *Restore* button. It is important to note that the default view control settings will be applied when a chart is printed non-interactively (e.g. directly from an item in an observing list, or from an event in the event list).

The properties on the view properties tab appear for the telescope/binocular charts only and are used to control the special elements associated with each of the views of these charts. Not all of these controls are appropriate for all views. If not appropriate for the view they will be disabled.

Check *Reflex Sight* if you are using a non-magnifying finding device. This will show up as up to three rings as defined in the *Telescope Dialog* for your instrument.

Check *Eyepiece Field of View Circle* to paint a circle representing the eyepiece (or binocular) view.

Check *Finder Field of View Circle* to paint a circle representing the view in a magnifying finder.

Check *Inset Showing Other View* to draw a rectangle in the view displaying the dimensions of one of the other chart views. Select the chart view you wish to have displayed, as appropriate.

Check *Direction Indicator* to display a direction indicator in the bottom-left hand corner of the view. These indicators can indicate the direction of *North and East* (N and E) or *Zenith (also know as up) and Left* (Z and L).

Initial Eyepiece View Orientation: For the eyepiece view you may select how you want the initial view to be oriented, with respect to the horizon or with respect to the equatorial coordinate system. The *Horizon* choice will place *Zenith* at the top or bottom of the view (depending on the instrument's natural orientation). Similarly, the *Equatorial* selection will

place North either at the top or bottom of the view.

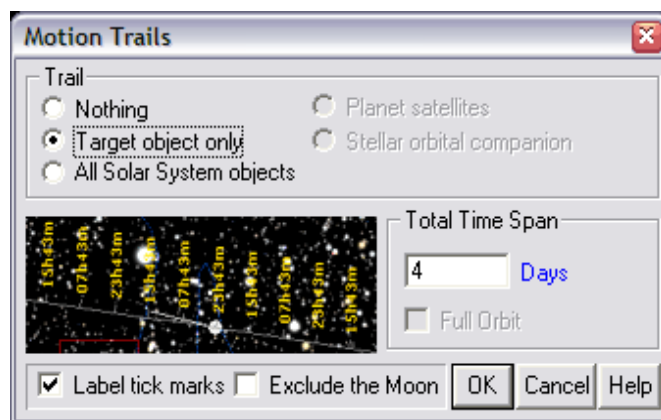
Check Force Target to be Visible to override the visual detection difficulty model. When checked the target object will always be displayed whether or not the model determines it to be visible, even in broad daylight.

Check Enable Drift Alignment Mode to enable the drift alignment aids in an eyepiece view. Use this to align your telescope mount to the celestial pole in conjunction with the Mount Alignment tool.

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The Trail Dialog

This dialog controls the display of trails left by the motion of objects moving across the chart.



Trail

Your choice of objects to trail depends on the chart's target object. Trailing the Target Object only makes sense if it moves. Thus, this choice will be disabled if the target object is not a member of the solar system. Similarly, it only makes sense to trail the satellites (moons) if the target object is a planet with satellites, and the same holds true for the orbital companions of binary stars. You can always select to trail All Solar System Objects.

- Trail Target Object Only: This setting will show the motion of the chart's target over the time period specified, centered on the date/time of the chart.
- Trail All Solar System Objects will draw trails for all solar system objects which appear in the map view during the specified time span. The moon can be a real nuisance in the case because it moves so much faster than most other objects. Check the Exclude The Moon box to exclude the moon from being trailed.
- Trail Target Planet's Satellites will draw trails for all the satellites orbiting a planet which are visible on the chart. The planet must be the chart's target object. Check the Full Orbit box to see one full orbit about the planet plotted for each satellite.
- Trail Target Star's Orbital Companion will draw a trail for a selected component of a long period binary star system. Either the primary or secondary component must be the target object. In some cases, such as for the star Almaak, component C orbits component B. For best results, target the chart at the B component. This can be done by selecting the AB pair from the component list in the object requestor window, or by recentering the chart to the component B. Check the Full Orbit box to see one full orbit.

Total Time Span

Enter a time span for the motion trail in the time span field, and select the units for this time span by clicking on the blue hypertext unit ("Days" above) until the proper unit appears. Alternately, check the Full Orbit box to show the entire orbit of the planet's satellites, or for a component of a long period binary star.

Motion trails are centered on the date/time at which the rest of the chart is drawn. For instance, in the example above a trail will be drawn showing the motion of all solar system objects over a period of 30 days--starting fifteen days previous to the chart date/time and ending fifteen days later.

Label tick marks

Tick marks are drawn at regular time intervals along the trail. This interval is adjusted such that the tick marks are always about the same distance apart to make them easier to read, while at

the same time keeping to a regular interval (such as 1 day, or every 4 hours, every 30 minutes etc.) *The tick marks are always drawn on the right side of the trail, relative to the object's direction of motion.* If you imagine the trailed object as a train running along a track, the tick marks would always be drawn on the right as you faced the front of the train. You can use this to determine the direction of the object's motion, even if the ticks aren't labeled. Check the Label tick marks box to add time/date labels to the trail(s).

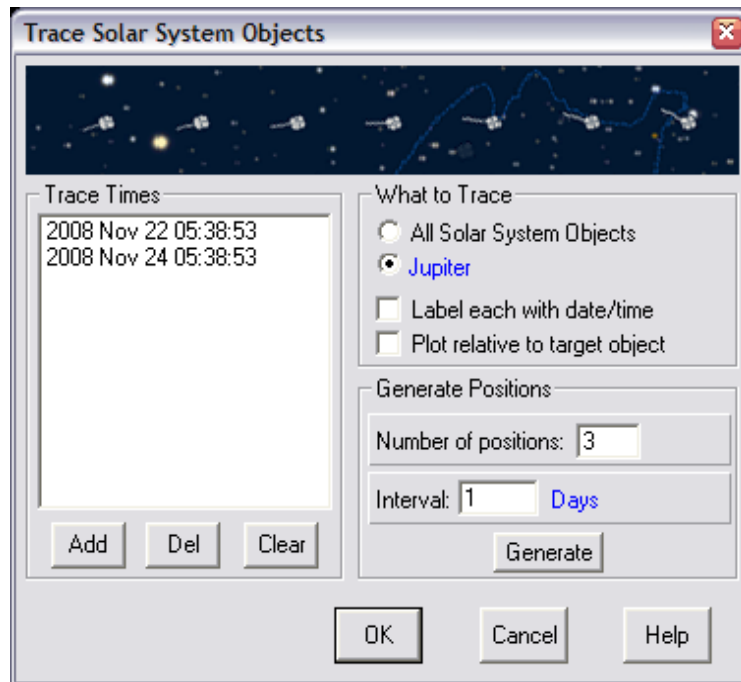
Exclude the moon

Check this box to exclude the moon when trailing all solar system objects.

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The Trace Dialog

This dialog is used to plot multiple positions of one or more moving objects.



The object(s) selected will be plotted at their location at each of the times in the Trace Times list.

To trace all solar system objects visible in the map view, choose to trace **All Solar System Objects**.

Alternately, you can trace a single object by selecting the second radio button and clicking on the blue hypertext object name (often labeled "Nothing..." as shown above). This will start the object requestor dialog--from there select a solar system object to trace.

To add a trace time to the list click on the **Add** button. This will start the date/time entry dialog. Select a new date/time at which to plot the object(s) on the map view.

To delete the selected trace time, click on the **Delete** button or press the Delete key on the keyboard.

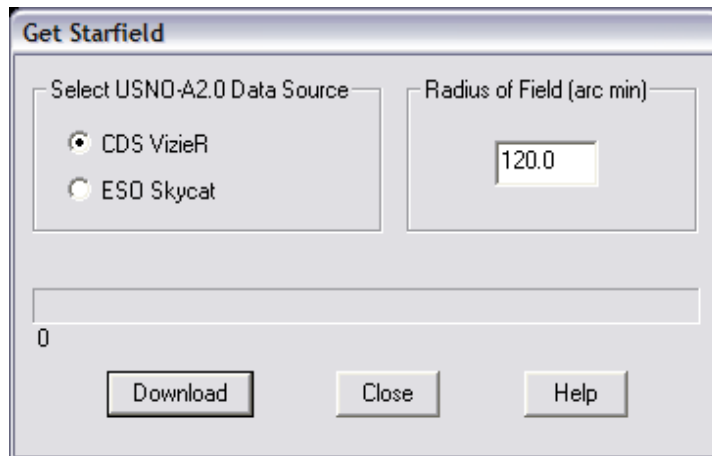
To clear the list of times (and effectively turn tracing off) click on the **Clear** button.

Rather than entering the trace times by hand, it is also possible to automatically generate a list of trace times. First enter the number of trace times to add to the list ("5" above). Next enter the trace interval ("1" above) and click on the blue hypertext unit string ("Days" above) until the proper unit is selected. Finally, click on the **Generate** button to add the new trace times to the list.

The automatically generated trace times are centered on the chart time. Trace times are not generated at the same time as the chart, as all objects are already plotted for that time. As an example, if you add 5 new times at 1 day intervals as shown above, two plot times will be added one and two days prior to the time of the chart, and two times will be added one and two days after that time. So if the chart time was midnight on the 10th, trace times would be added for midnight of the 8th, 9th, 11th, and 12th.

The Get Starfield Dialog

This dialog is used to download supplemental starfields from the web. A supplemental starfield is a field of stars that are fainter than those provided with SkyTools. Their source is the USNO-A-2.0 catalog. These stars are displayed on the chart in a circular radius around the chart center (at the time the download was made).



To download a starfield select a field radius in arc minutes (limited to two degrees, or 120'). Select a Data Source: the two sources listed provide essentially the same information, but one or the other may not always be available. Click Download.

A progress bar will indicate how much data has been downloaded. Note that it may take many minutes to download a large field for users with slow connections.

See Also

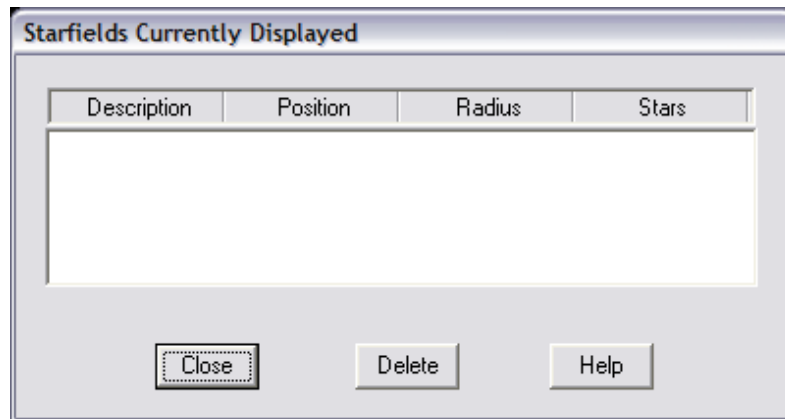
[USNO-A-2.0 Data Sources](#)

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Starfields Currently Displayed

This dialog lists all of the supplemental starfields that visible in the selected view of the chart. A supplemental starfield is a field of stars downloaded from the web via the #Get Starfield Dialog.. These stars are fainter than those provided with SkyTools. Their source is the USNO-A-2.0 catalog from various web sites.

The primary purpose of this dialog is to allow you to manage your starfields, perhaps deleting any that are unwanted.



To delete an unwanted starfield select it from the list and click **Delete**.

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Interactive Atlas

The interactive atlas is the computer version of a fine star atlas. This tool provides the same functionality of traditional star charting software.

Related Topics

[Using the Interactive Atlas](#)
[The Context Viewer](#)

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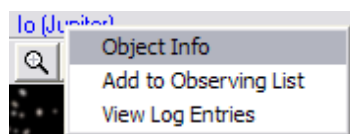
Using the Interactive Atlas

The interactive atlas is the computer version of a fine star atlas.

To change the chart target, date, time or location, click on the blue hypertext labels at the top of the window.



Right-click on the chart target to see a menu:



Select *Object Info* to view the object information for the target, add it to an observing list or view any log entries.

Aborting

If you mistakenly choose to draw a million galaxies and don't wish to wait for the result, you may abort by clicking the round red button that appears at the bottom of the window.

Zooming via the Mouse

To zoom into a specific area left click with the mouse and drag a rectangle around the area you wish to see more closely. To zoom out depress the *Control* key and holding it down left click with the mouse and drag a rectangle around the area you wish to zoom out of.

You may also rotate the mousewheel forward to zoom in, and backward to zoom out.

Controlling the Field of View

The field of view is the horizontal extent of the chart: a field of view of ten degrees will result in a chart that is always ten degrees wide, either on the screen or printed.



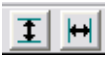
Click the + button (Page Up Key) to zoom in and the - button (Page Down Key) to zoom out.

Clicking the third button brings up the Set *Field of View* dialog where you can set the field of view directly.

Controlling the Orientation

You may flip or mirror the view to match what you see in the eyepiece by clicking the

appropriate button on the tool bar. A flip reverses the view in the up/down direction. A mirror reverses the view left/right.



Controlling the Limiting Magnitude

You may quickly increase or decrease the magnitude limit by clicking on the Brighter (fewer stars) or Fainter (more stars) tool buttons.



Click the button on the right for complete control over the magnitude limits.

Controlling Time

In addition to changing the date/time directly by clicking on hypertext you can time-step forward or backward by a set time interval or force the program to maintain the current time.

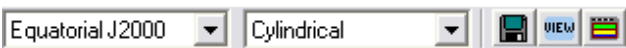


Clicking the Real Time Mode (clock) button will immediately set the chart to the current date/time. The chart will update regularly to maintain the current time. How often the chart is updated can be changed via the *Configure Real Time refresh rates* menu selection on the *Telescope Control* menu (Real Time).

Clicking one of the Time Step buttons will move the chart time forward or back by the time step indicated. To change the time step type in a number and click the hypertext menu to select the appropriate units.

Primary Chart Controls

Together these controls configure the chart.



Select a coordinate system for the chart from the left pull down menu. Coordinate choices are:

- Equatorial J2000 - standard equatorial coordinates referenced to the J2000 equinox.
- Equatorial of Date - equatorial coordinates references to the equinox of the date.
- Horizon -coordinates with respect to the horizon. With the selection the chart is oriented with respect to the horizon but objects below the horizon are still displayed.
- Horizon Simulation -coordinates with respect to the horizon. With the selection the chart is oriented with respect to the horizon and the visibility of objects as the approach the horizon is modeled. Nothing is visible below the horizon.
- Ecliptic -coordinates with respect to the ecliptic. With this selection the chart is oriented with respect to the ecliptic (path of the Sun).
- Galactic - with this selection the chart is oriented with respect to the plane of the galaxy.

Select a map projection. Choices are:

- Auto -this the prererred selection. As you zoom in/out the best projection will be automatically selected.

- Cylindrical -this projection is like wrapping the celestial sphere on a cylinder. If the full sky is displayed the chart would be rectangular with the equator running horizontally through the center. The celestial poles lie along the top and bottom edges. This projection is undistorted at the equator. The distortion increases as you move towards either pole.
- Gnomonic - this projection displays the sky as a simple tangent. It has the property that all great circle arcs plot a straight lines on the sky. It is commonly used to plot meteor trails.
- Sterographic - this is a polar projection. Typically this projection is used to display the polar region of the sky. This projection is undistorted at the center. The distortion increases as you move away from the center. The scale becomes distorted, but the spatial relationships remain largely undistorted.
- Orthographic -this projection displays only half of the sky at a time. In full view, the projection looks like a round globe. This projection is undistorted at the center. The distortion increases as you move away from the center in any direction. Both scale and spatial relationships become distorted.
- Aitoff All Sky -draws a chart of the entire sky only.



Scenario

This tool button brings up the *Scenario* dialog. A scenario consists of a target object, date/time, and location. Scenarios of interest may be saved to be easily recalled later.



View Controls

This tool button brings up the *View Controls* dialog, which controls what elements are displayed in the chart view and how they are displayed.



Chart Preferences

This tool button brings up the *Chart Preferences* dialog, which controls the look of the chart. This dialog is used to control all aspects of the look of the chart, including the star style and color, background color, fonts for labels, and the styles and colors of various other elements.



Context Viewer

Click this tool button to open the Context Viewer. The context viewer is a window attached to the Atlas that displays a simulated field of view.



Motion Trails

This tool button brings up the Motion Trails dialog, which allows you to generate a trail showing the path of a moving object over time.



Motion Trace

This button brings up the Motion Trace Dialog, which allows you to generate a list of positions for an object over time. The object's motion can be shown at selected intervals.



Print Chart

This tool button brings up the Print Chart Dialog, which allows you to customize your chart before sending it to the printer.



Copy Chart to Clipboard

This tool button brings up the Copy Chart to Clipboard dialog, which allows you to send a copy of the chart to the Clipboard for pasting into another application, such as an image processing program.

The Cursor

When over a chart the mouse cursor is displayed in one of two modes. If over a target object the cursor is a blue circle. When you see this cursor you may double-click to see the *Object Information* for this object. Right-clicking and selecting View Info accomplishes the same thing. If you select an image the Plottable Image Edit window appears instead of Object Information. You may use this window to make fine adjustments to the image, such as the size and rotation angle.

When the cursor is not over an object it appears as a set of green crosshairs. The position of the center of the cursor is displayed in the status bar at the bottom left edge of the chart window:

 J191850.0-210800 (star) in Sgr, V13.9

Click the blue button to configure what is displayed in this window. Depress the shift key to disable the detection of objects as the cursor moves, displaying position information only.

The Right-Click Menu

A right-click on the chart brings up the various options available in a pop up menu. The exact action taken by most of these functions depends on where the mouse cursor was when right-clicked.

Object Info	Insert
Center View at Cursor	Home
Add Object at Cursor To Observing List	
Create Quick Log Entry for Object at Cursor	
Angular Measure	a
Get DSS Image at Cursor	d
Create Skymark at Cursor	x
Copy J2000 Coordinates at Cursor	C
Get Starfield at Chart Target	S
Center Context Viewer at Cursor	?
Center View on Context Viewer	?
Slew to Chart Target	F2
Slew to Cursor	F3
Slew to and Center at Cursor	F4
Sync Telescope	Space
Sync Telescope to cursor	
Center Chart at Scope Position	Bksp
View Controls	Ctrl-v

- Object Info - if the cursor is over an object the *Object Information* window will open with the information for that object. You may also double-click on the object to start the dialog.
- Exposure Calculator - click to open the exposure calculator for the object beneath the cursor.
- Center View at Cursor - the object or position under the cursor will be moved to the center of the chart.
- Add Object at Cursor to Observing List - the object under the cursor will be added to an observing list of your choosing.
- Create Log Entry for Object at Cursor - a log entry will be created for the object under the cursor.

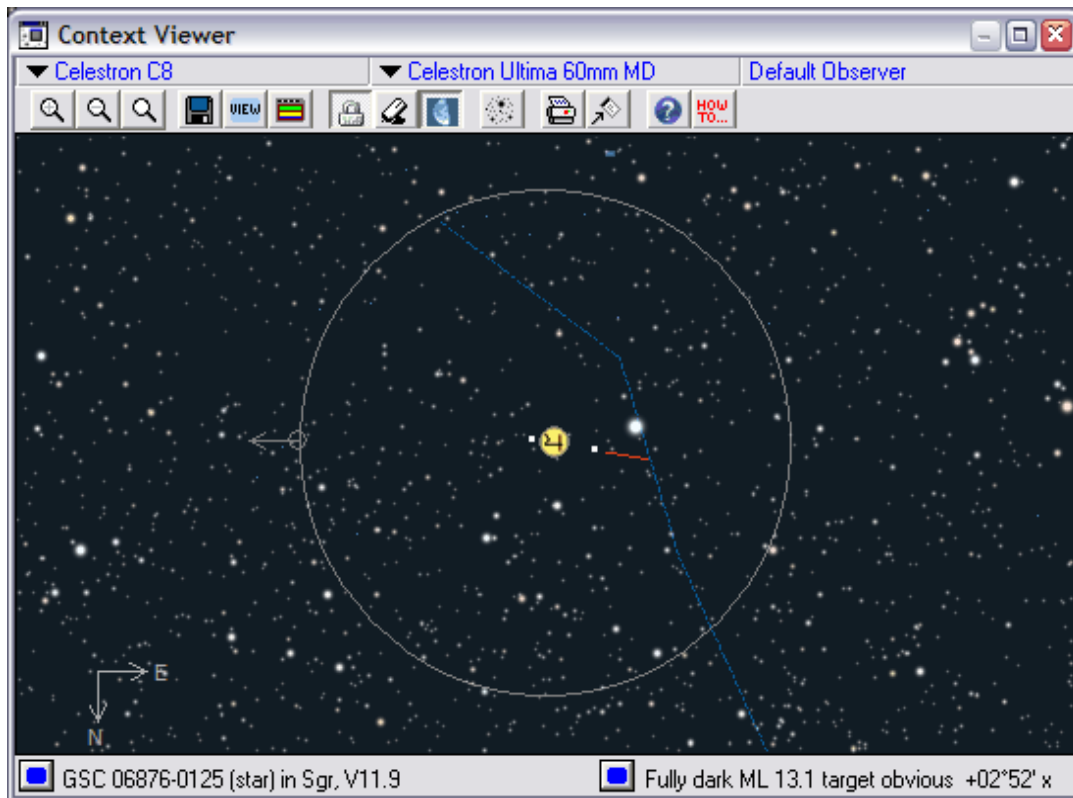
- Angular Measure - is used to measure the angular separation and position angle between two points (or objects) on the chart. The origin of the measurement will be the object (or position) under the cursor when you right-clicked to bring up the menu. As you move the cursor around the chart the angular distance between the original point and the point under the cursor is displayed in the bottom of the chart window (along with the position angle in degrees, measured from the original position).
- Get DSS Image at Cursor - will start the [Get Image](#) dialog, used to download a DSS image from the Internet centered on the object (or position) under the cursor when you right-clicked on the chart.
- Create Skymark at Cursor -- will create a Skymark in the skymark database at the coordinates of the cursor.
- Copy J2000 Coordinates at Cursor -will copy the coordinates at the cursor to the Window clipboard for pasting into an text-based application.
- Get Starfield at Chart Target - will start the [Get Starfield](#) dialog, used to download a supplemental starfield of faint USNO A-2.0 stars from the Internet. Unlike the other functions, the starfield will always be placed at the chart center. (Standard Editon Only)
- Center Context Viewer at Cursor - will cause the Context Viewer to reposition to the coordinates of the cursor. The Context Viwer must be open and not locked to the atlas for this option to be available.
- Center View on Context Viewer - will cause the atlas to be reposition to the coordinates of the center of the Context Viewer. The Context Viewer must be open and not locked to the atlas for this option to be available.
- Slew/Push to Chart Target (Real Time) - selects the current chart target as the telescope target. This will cause GOTO telescopes will slew to the center of the chart.
- Slew/Push to Cursor (Real Time) - selects the object/position under the cursor as the telescope target object. This will cause GOTO telescopes to slew to the object/position.
- Slew/Push to and Center at Cursor (Real Time) - selects the object/position under the cursor as the telescope target object~~and~~positions the chart such that the object/position will be at the center. This will cause GOTO telescopes to slew to the object/position.
- Sync Telescope (Real Time) - Synchronize the telescope to the current~~telescope~~ target (as indicated on the Real Time tool).
- Sync Telescope to Cursor (Real Time) - Synchronize the telescope to the object/position under the cursor.
- Center Chart at Scope Position (Real Time) - positions the chart such that the current position of the telescope is centered.
- View Controls will open the View Controls.

Related Topics

[Keyboard Shortcuts](#)
[The Context Viewer](#)

The Context Viewer

The Context Viewer is a window attached to the Interactive Atlas that simulates an instrument. It is started from a button on the Interactive Atlas toolbar. Once the viewer is opened a field of view rectangle appears on the atlas. This rectangle indicates the size and position of the telescope field of view.




In addition to using the FOV rectangle on the atlas to position your camera for your exposure, the Context Viewer can be used to verify or refine the camera position. The viewer approximates for a given exposure time what you would see on an image at the proper location. Compare a short exposure of the real sky to the simulated display in the viewer to refine the position.


To relocate the camera grab the edge of the rectangle on the atlas and drag it to another location. To rotate the camera view grab the circle that appears in one corner of the rectangle and drag it to a new rotation angle. The rotation angle is saved with the camera data and will remain in effect until you drag it to a new angle.


The Context Viewer has its own View Controls, Chart Preferences, and Scenario selection just like any other chart.

Note that in addition to a camera selection the eyepieces assigned to the telescope can be selected as well. This will put the viewer automatically into visual observation mode. Likewise selecting a camera will switch to imaging mode. Selecting an accessory, filter, or lens, works in the same way as on the planner.

Enter an exposure time (and units—click to toggle minutes/seconds). Objects will appear in the viewer based on their estimated SNR for the exposure. The exposure starts at the time indicated on the atlas. The brightness of the sky background is also roughly modeled.

To lock the viewer to the atlas target click to depress the  button on the viewers tool bar. When this button is depressed the context viewer will move to follow the atlas.

To lock the viewer to a telescope connected to SkyTools via the *Real Time* tab click to depress the  icon. When depressed the viewer will always display the location where the telescope is pointed. Conversely, if you move the viewer to another location the telescope will follow. Note that this button will only depress if a telescope is connected.

The viewer will simulate the exposure based on the current conditions (as per the time and location indicated on the Interactive Atlas) if the  button is depressed. If this button is not depressed the exposure will be simulated for optimum conditions (a dark night when the object is transiting the meridian).

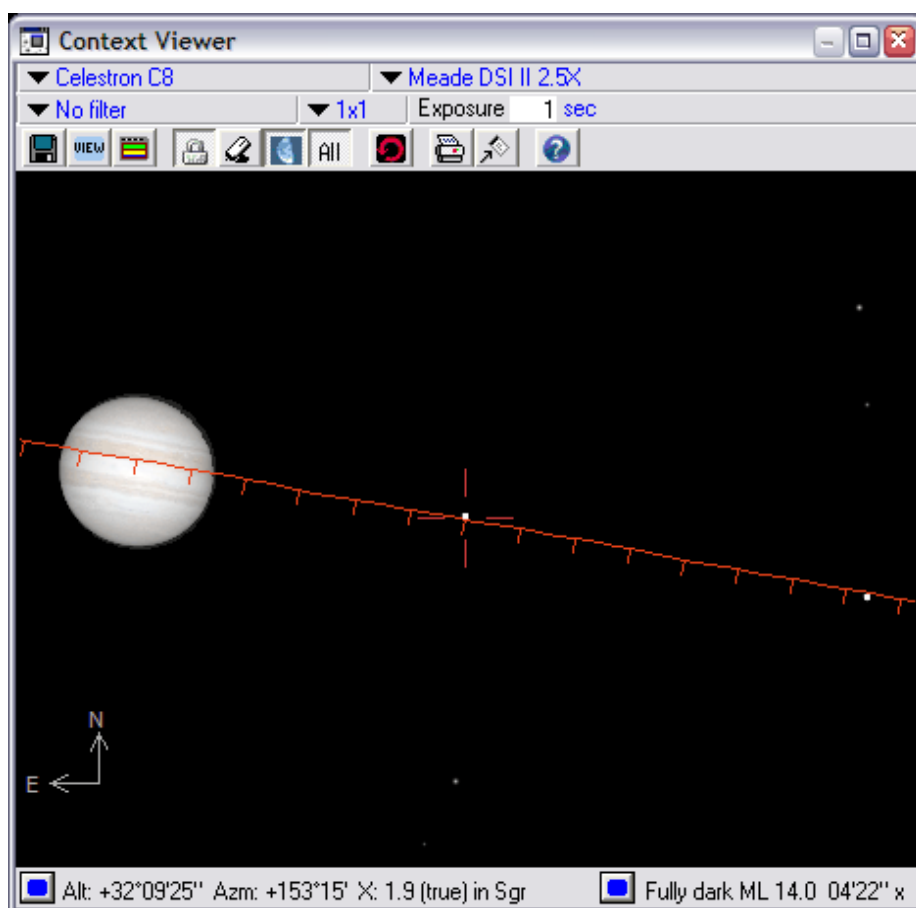
To force the display of all deep sky objects depress the  button.

The viewer may be closed at any time by clicking on the X in its window. This only hides the viewer. It remains in its current state until the atlas is closed. It can be returned to the screen by clicking the Context Viewer button on the atlas toolbar.

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Using the Context Viewer

The Context Viewer is a window attached to the Interactive Atlas that simulates an imaging device or the view in a telescope or binoculars. It is started from a button on the Interactive Atlas toolbar. Once the viewer is opened a field of view rectangle appears on the atlas. This rectangle indicates the size and position of the telescope field of view.



If an eyepiece is selected, the viewer itself simulates what you see in the telescope. If a camera is selected it simulates the camera field of view. The viewer may be closed at any time by clicking on the X in its window. This only hides the viewer. It remains in its current state until the atlas is closed. It can be returned to the screen by clicking the Context Viewer button on the atlas toolbar.

Select a Telescope, Eyepiece/Camera, observer, etc.
Click the hypertext menus to select a telescope, eyepiece or camera.

The choices will depend on the eyepiece/camera selection. If an eyepiece is selected the observer appears as a selection.

If a camera is selected, choices appear for a filter or (lens as appropriate), binning, and exposure time.

Exposure Time

This option is available only when a camera is selected. Enter an exposure time and click the hypertext to select the units. After a brief moment the view will refresh to display a simulated exposure. Objects will appear in the viewer based on their estimated SNR for the exposure. The brightness of the sky background is also roughly modeled. The exposure starts at the time indicated on the atlas.

Eyepiece/Camera Accessories

At the bottom of the eyepiece/camera selection menu are items for selecting telescope accessories.

If an eyepiece is selected the accessory selections are a Barlow lens or mirror diagonal. Choosing one of these selections will toggle it on/off. Note that the Barlow lens must first be set up for the telescope on the Favorite Telescopes dialog before it will appear here.

If a camera is selected the accessory selections include focal extenders, focal reducers, afocal projection and eyepiece projection. For digital cameras a Piggyback mode is also included. The available accessories are configured from the Camera subdialog of the Add/Modify Telescopes dialog. For projection only one configuration is available at a time. To change the configuration, such as switching in eyepiece, use the Camera subdialog of the Add/Modify Telescope dialog.

Aborting

If you mistakenly choose to draw a million galaxies and don't wish to wait for the result, you may abort by clicking the round red button that appears at the bottom of the window.

Controlling the Field of View

The field of view is the horizontal extent of the chart: a field of view of ten degrees will result in a chart that is always ten degrees wide, either on the screen or printed.



Click the + button (Page Up Key) to zoom in and the - button (Page Down Key) to zoom out.

Clicking the third button brings up the Set *Field of View* dialog where you can set the field of view directly.



Scenario

This tool button brings up the *Scenario* dialog. A scenario consists of a target object, date/time, and location. Scenarios of interest may be saved to be easily recalled later.



View Controls

This tool button brings up the *View Controls* dialog, which controls what elements are displayed in the chart view and how they are displayed.



Chart Preferences

This tool button brings up the *Chart Preferences* dialog, which controls the look of the chart. This dialog is used to control all aspects of the look of the chart, including the star style and color, background color, fonts for labels, and the styles and colors of various other elements.



Lock the viewer to the atlas target

Click to depress the button . When depressed the context viewer will move to follow the atlas. Even when locked you may move the viewer freely in the atlas, but when you retarget the atlas the viewer will follow.



Lock the viewer to a telescope

When depressed the viewer will always display the location where the telescope is pointed. Conversely, if you move the viewer to another location the telescope will follow. Note that this button will only depress if a telescope is connected.



Simulate the exposure based on the current conditions

When depressed the current sky conditions (sky brightness and object altitude) will be simulated. For instance, if daytime, the view will be blue. The time and location indicated on the Interactive Atlas are used for the current time. If this button is not depressed the view will be simulated for optimum conditions (a dark night when the object is transiting the meridian).



Force the display of all deep sky objects

When depressed all deep sky object, no matter how faint, no matter how bright the sky, will be displayed in the viewer.



Rotate View

When depressed this button will rotate the view by 180 degrees. This is useful after a Pier Flip.



Print Chart

This tool button brings up the Print Chart Dialog, which allows you to customize your chart before sending it to the printer.



Copy Chart to Clipboard

This tool button brings up the Copy Chart to Clipboard dialog, which allows you to send a copy of the chart to the Clipboard for pasting into another application, such as an image processing program.

The Cursor

When over a chart the mouse cursor is displayed in one of two modes. If over a target object the cursor is a blue circle. When you see this cursor you may double-click to see the *Object Information* for this object. Right-clicking and selecting View Info accomplishes the same thing. If you select an image the Plottable Image Edit window appears instead of Object Information. You may use this window to make fine adjustments to the image, such as the size and rotation angle.

When the cursor is not over an object it appears as a set of green crosshairs. The position of the center of the cursor is displayed in the status bar at the bottom left edge of the chart window:



J191850.0-210800 (star) in Sgr, V13.9

Click the blue button to configure what is displayed in this window. Depress the shift key to disable the detection of objects as the cursor moves, displaying position information only.

Sky Report and Field of View

In the bottom right of the window the sky conditions and field of view are displayed:

 Fully dark ML 14.0 04'22" x 03'15"

A summary of the current level of sky darkness, naked eye limiting magnitude, and field of view are displayed.

Click the blue button to see a full sky report.

The Right-Click Menu

A right-click on the chart brings up the various options available in a pop up menu. The exact action taken by most of these functions depends on where the mouse cursor was when right-clicked.

Object Info	Insert
Exposure Calculator	e
Center View at Cursor	Home
Add Object at Cursor to Observing List	
Create Quick Log Entry for Object at Cursor	
Angular Measure	a
Get DSS Image at Cursor	d
Create Skymark at Cursor	x
Copy J2000 Coordinates at Cursor	C
Slew to Chart Target	F2
Slew to Cursor	F3
Slew to and Center at Cursor	F4
Sync Telescope	Space
Sync Telescope to cursor	
Center Chart at Scope Position	Bksp
View Controls	Ctrl-v

- Object Info - if the cursor is over an object the *Object Information* window will open with the information for that object. You may also double-click on the object to start the dialog.
- Exposure Calculator - click to open the exposure calculator for the object beneath the cursor.
- Center View at Cursor - the object or position under the cursor will be moved to the center of the chart.
- Add Object at Cursor to Observing List - the object under the cursor will be added to an observing list of your choosing.
- Create Log Entry for Object at Cursor - a log entry will be created for the object under the cursor.
- Angular Measure - is used to measure the angular separation and position angle between two points (or objects) on the chart. The origin of the measurement will be the object (or position) under the cursor when you right-clicked to bring up the menu. As you move the cursor around the chart the angular distance between the original point and the point under the cursor is displayed in the bottom of the chart

window (along with the position angle in degrees, measured from the original position).

- Create Skymark at Cursor -- will create a Skymark in the skymark database at the coordinates of the cursor.
- Get DSS Image at Cursor - will start the Get Image dialog, used to download a DSS image from the Internet centered on the object (or position) under the cursor when you right-clicked on the chart.
- Copy J2000 Coordinates at Cursor -will copy the coordinates at the cursor to the Window clipboard for pasting into an text-based application.
- Slew/Push to Chart Target (Real Time) - selects the current chart target as the telescope target. This will cause GOTO telescopes will slew to the center of the chart.
- Slew/Push to Cursor (Real Time) - selects the object/position under the cursor as the telescope target object. This will cause GOTO telescopes to slew to the object/position.
- Slew/Push to and Center at Cursor (Real Time) - selects the object/position under the cursor as the telescope target object ~~and~~ positions the chart such that the object/position will be at the center. This will cause GOTO telescopes to slew to the object/position.
- Sync Telescope (Real Time) - Synchronize the telescope to the current *telescope* target (as indicated on the Real Time tool).
- Sync Telescope to Cursor (Real Time) - Synchronize the telescope to the object/position under the cursor.
- Center Chart at Scope Position (Real Time) - positions the chart such that the current position of the telescope is centered.
- View Controls - will open the view controls dialog.

Related Topics

[The Context Viewer](#) (overview)

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Visual Simulation Charts

The visual simulation charts simulate the view as seen to the unaided eye, through binoculars and telescopes. These charts employ sophisticated sky brightness and detectability models to determine what is visible to the observer.

Related Topics

[The Overhead Sky Chart](#)

[The Naked Eye Chart](#)

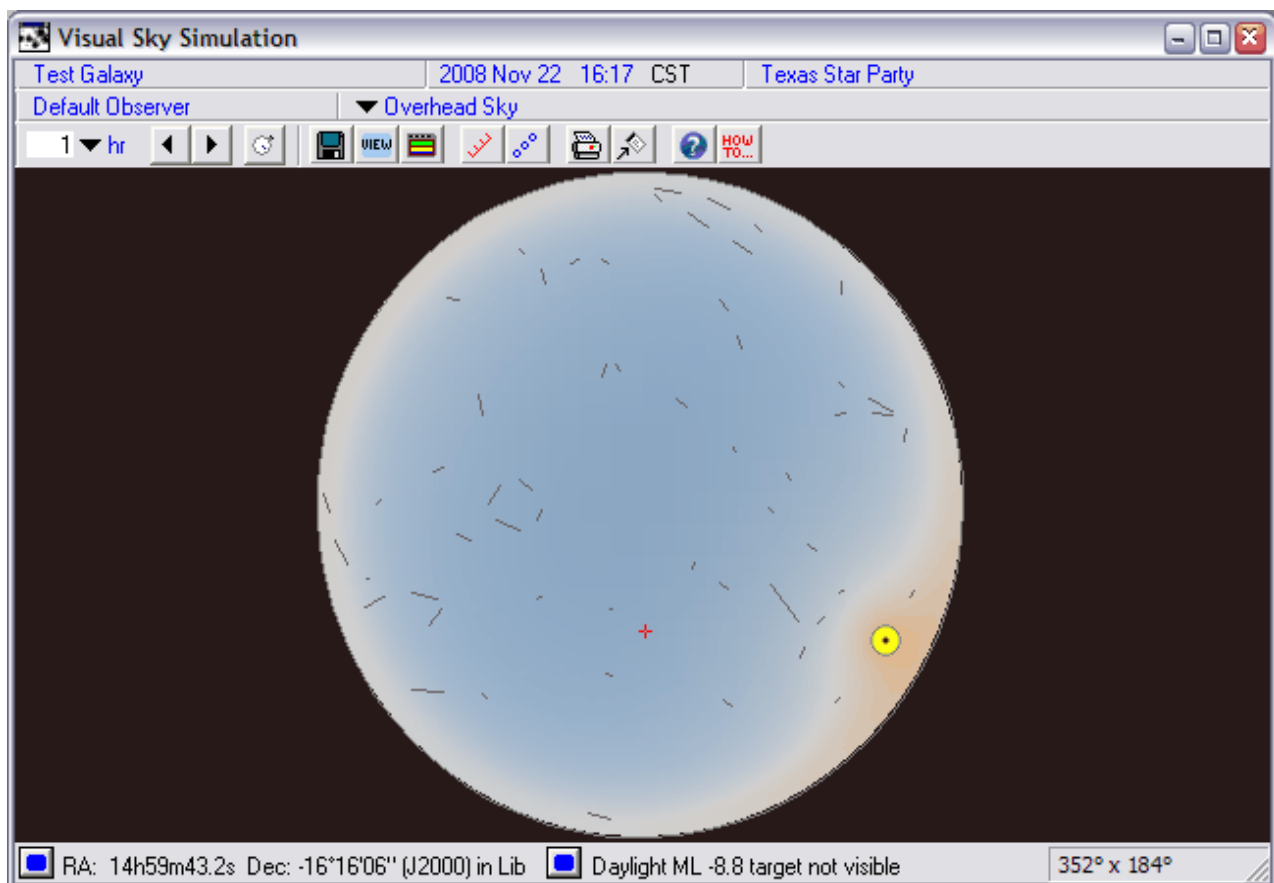
[The Telescope \(Star Hopping\) Chart](#)

[The Binocular Chart](#)

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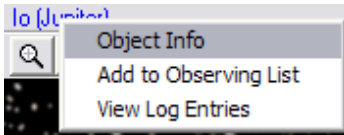
Overhead Sky Chart

This chart is designed to give a view of the entire overhead sky as seen at a particular time and from a particular location. The magnitude limit is simulated from the sky brightness entered for the location via the *Observing locations* dialog.



To change the chart target, date, time, location, and observer, or to switch to another type of chart, click on the hypertext labels at the top of the window.

Right-click on the chart target to see a menu:



Select *Object Info* to view the object information for the target, add it to an observing list or view any log entries.

Aborting

If you mistakenly choose to draw a million galaxies and don't wish to wait for the result, you may abort by clicking the round red button that appears at the bottom of the window.

Controlling Time

In addition to changing the date/time directly by clicking on hypertext you can time-step forward or backward by a set time interval or force the program to maintain the current time.



Clicking the Real Time Mode (clock) button will immediately set the chart to the current date/time. The chart will update regularly to maintain the current time. How often the chart is updated can be changed via the *Configure Real Time refresh rates* menu selection on the *Telescope Control* menu (Real Time).

Clicking one of the Time Step buttons will move the chart time forward or back by the time step indicated. To change the time step type in a number and click the hypertext menu to select the appropriate units.



Scenario

This tool button brings up the *Scenario* dialog. A scenario consists of a target object, date/time, and location. Scenarios of interest may be saved to be easily recalled later.



View Controls

This tool button brings up the *View Controls* dialog, which controls what elements are displayed in the chart view and how they are displayed.



Chart Preferences

This tool button brings up the *Chart Preferences* dialog, which controls the look of the chart. This dialog is used to control all aspects of the look of the chart, including the star style and color, background color, fonts for labels, and the styles and colors of various other elements.



Motion Trails

This tool button brings up the Motion Trails dialog, which allows you to generate a trail showing the path of a moving object over time.



Motion Trace

This button brings up the Motion Trace Dialog, which allows you to generate a list of positions for an object over time. The object's motion can be shown at selected intervals.



Print Chart

This tool button brings up the Print Chart Dialog, which allows you to customize your chart before sending it to the printer.



Copy Chart to Clipboard

This tool button brings up the Copy Chart to Clipboard dialog, which allows you to send a copy

of the chart to the Clipboard for pasting into another application, such as an image processing program.

The Cursor

When over a chart the mouse cursor is displayed in one of two modes. If over a target object the cursor is a blue circle. When you see this cursor you may double-click to see the *Object Information* for this object. Right-clicking and selecting View Info accomplishes the same thing. If you select an image the Plottable Image Edit window appears instead of Object Information. You may use this window to make fine adjustments to the image, such as the size and rotation angle.


When the cursor is not over an object it appears as a set of green crosshairs. The position of the center of the cursor is displayed in the status bar at the bottom left edge of the chart window:

 J191850.0-210800 (star) in Sgr, V13.9

Click the blue button to configure what is displayed in this window. Depress the shift key to disable the detection of objects as the cursor moves, displaying position information only.

Sky Report and Target Visibility

In the bottom right of the window the sky conditions and visibility of the target object are displayed:

 Daylight ML -8.8 target not visible

A summary of the current level of sky darkness, naked eye limiting magnitude, and the visual detection difficulty are displayed.

Click the blue button to see a full sky report.

The Right-Click Menu

A right-click on the chart brings up the various options available in a pop up menu. The exact action taken by most of these functions depends on where the mouse cursor was when right-clicked.

Object Info	Insert
Add Object at Cursor to Observing List	
Create Quick Log Entry for Object at Cursor	
Angular Measure	a
Get DSS Image at Cursor	d
Create Skymark at Cursor	x
Copy J2000 Coordinates at Cursor	C
Slew to Chart Target	F2
Slew to Cursor	F3
Slew to and Center at Cursor	F4
Sync Telescope	Space
Sync Telescope to cursor	
Center Chart at Scope Position	Bksp
View Controls	Ctrl-v
Add/Edit Obstructed Horizon	
Delete Obstructed Horizon	

- o Object Info - if the cursor is over an object the *Object Information* window will open

with the information for that object. You may also double-click on the object to start the dialog.

- Exposure Calculator - click to open the exposure calculator for the object beneath the cursor.
- Add Object at Cursor to Observing List - the object under the cursor will be added to an observing list of your choosing.
- Create Log Entry for Object at Cursor - a log entry will be created for the object under the cursor.
- Angular Measure - is used to measure the angular separation and position angle between two points (or objects) on the chart. The origin of the measurement will be the object (or position) under the cursor when you right-clicked to bring up the menu. As you move the cursor around the chart the angular distance between the original point and the point under the cursor is displayed in the bottom of the chart window (along with the position angle in degrees, measured from the original position).
- Get DSS Image at Cursor - will start the [Get Image](#) dialog, used to download a DSS image from the Internet centered on the object (or position) under the cursor when you right-clicked on the chart.
- Create Skymark at Cursor -- will create a Skymark in the skymark database at the coordinates of the cursor.
- Copy J2000 Coordinates at Cursor -will copy the coordinates at the cursor to the Window clipboard for pasting into an text-based application.
-
- Slew/Push to Chart Target (Real Time) - selects the current chart target as the telescope target. This will cause GOTO telescopes will slew to the center of the chart.
- Slew/Push to Cursor (Real Time) - selects the object/position under the cursor as the telescope target object. This will cause GOTO telescopes to slew to the object/position.
- Slew/Push to and Center at Cursor (Real Time) - selects the object/position under the cursor as the telescope target object and positions the chart such that the object/position will be at the center. This will cause GOTO telescopes to slew to the object/position.
- Sync Telescope (Real Time) - Synchronize the telescope to the current *telescope* target (as indicated on the Real Time tool).
- Sync Telescope to Cursor (Real Time) - Synchronize the telescope to the object/position under the cursor.
- Center Chart at Scope Position (Real Time) - positions the chart such that the current position of the telescope is centered.
- View Controls will open the View Controls.
- Add/Edit Obstructed Horizon - this chart also serves as the primary tool for creating and editing an obstructed horizon (a horizon with mountains, buildings, trees, etc. Use this selection to start the editor. See [Obstructed Horizons](#) for more information.
- Delete Obstructed Horizon - this selection will only be enabled if an obstructed horizon exists for this location. Use the selection to delete the obstructed horizon completely.

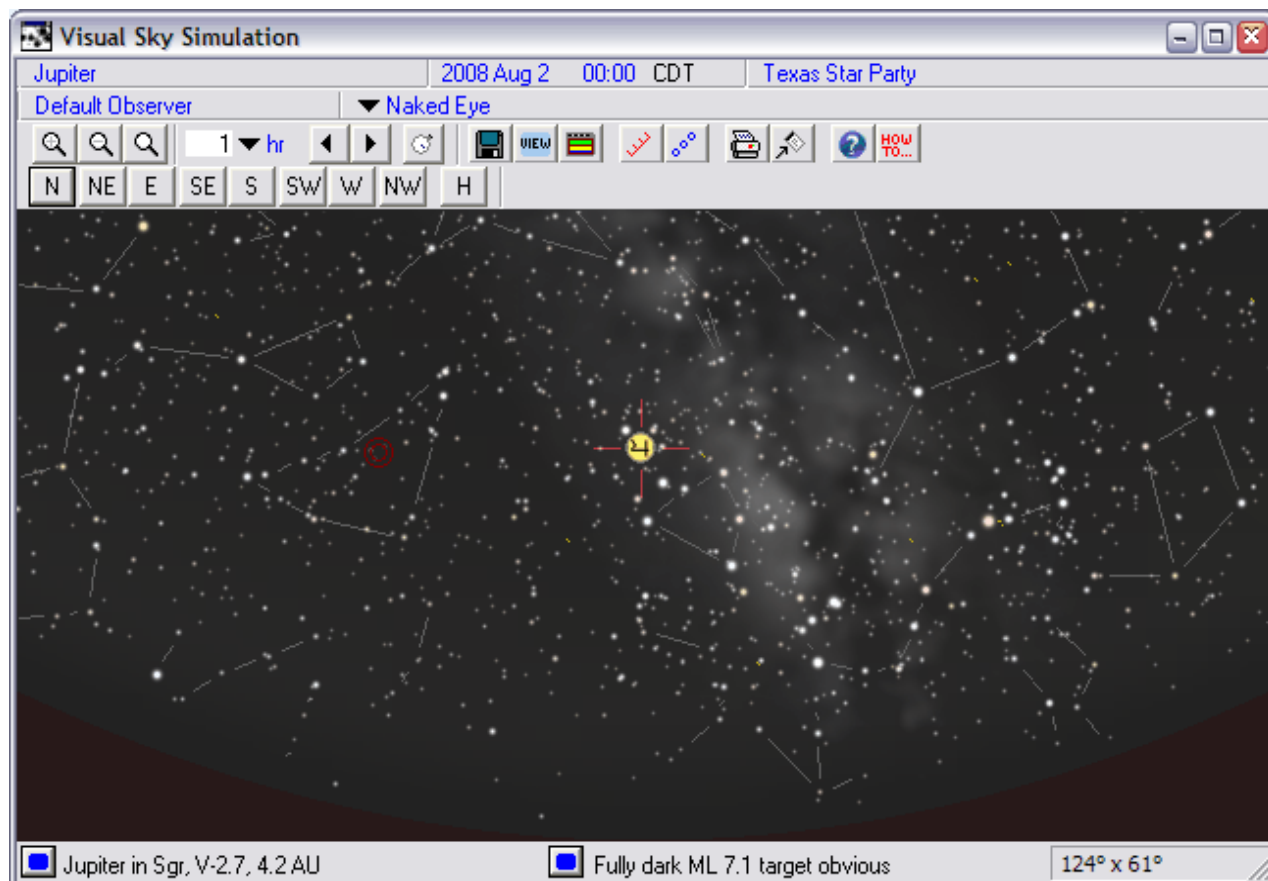
Related Topics

[Keyboard Shortcuts](#)

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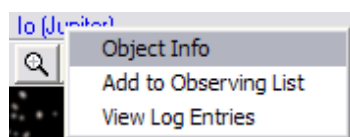
Naked Eye Chart

This chart is designed to show the sky as it appears to the naked eye. Like the overhead sky chart the magnitude limit is derived from the sky brightness set for the location, but unlike that chart the view can be zoomed and moved about the sky.



To change the chart target, date, time, location, and observer, or to switch to another type of chart, click on the hypertext labels at the top of the window.

Right-click on the chart target to see a menu:



Select *Object Info* to view the object information for the target, add it to an observing list or view any log entries.

Aborting

If you mistakenly choose to draw a million galaxies and don't wish to wait for the result, you may abort by clicking the round red button that appears at the bottom of the window.

Zooming via the Mouse

To zoom into a specific area left click with the mouse and drag a rectangle around the area you wish to see more closely. To zoom out depress the *Control* key and holding it down left click with the mouse and drag a rectangle around the area you wish to zoom out of.

You may also rotate the mousewheel forward to zoom in, and backward to zoom out.

Controlling the Field of View

The field of view is the horizontal extent of the chart: a field of view of ten degrees will result in a chart that is always ten degrees wide, either on the screen or printed.



Click the + button (Page Up Key) to zoom in and the - button (Page Down Key) to zoom out.

Clicking the third button brings up the Set *Field of View* dialog where you can set the field of view directly.

Controlling Time

In addition to changing the date/time directly by clicking on hypertext you can time-step forward or backward by a set time interval or force the program to maintain the current time.



Clicking the Real Time Mode (clock) button will immediately set the chart to the current date/time. The chart will update regularly to maintain the current time. How often the chart is updated can be changed via the *Configure Real Time refresh rates* menu selection on the *Telescope Control* menu (Real Time).

Clicking one of the Time Step buttons will move the chart time forward or back by the time step indicated. To change the time step type in a number and click the hypertext menu to select the appropriate units.



Scenario

This tool button brings up the *Scenario* dialog. A scenario consists of a target object, date/time, and location. Scenarios of interest may be saved to be easily recalled later.



View Controls

This tool button brings up the *View Controls* dialog, which controls what elements are displayed in the chart view and how they are displayed.



Chart Preferences

This tool button brings up the *Chart Preferences* dialog, which controls the look of the chart. This dialog is used to control all aspects of the look of the chart, including the star style and color, background color, fonts for labels, and the styles and colors of various other elements.



Motion Trails

This tool button brings up the Motion Trails dialog, which allows you to generate a trail showing the path of a moving object over time.



Motion Trace

This button brings up the Motion Trace Dialog, which allows you to generate a list of positions for an object over time. The object's motion can be shown at selected intervals.



Print Chart

This tool button brings up the Print Chart Dialog, which allows you to customize your chart before sending it to the printer.



Copy Chart to Clipboard

This tool button brings up the Copy Chart to Clipboard dialog, which allows you to send a copy

of the chart to the Clipboard for pasting into another application, such as an image processing program.

Direction Buttons

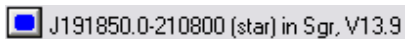
These buttons reposition the view in the direction clicked on. N is north, NE is northeast, etc. H will position the chart such that the horizon is visible at the bottom.



The Cursor

When over a chart the mouse cursor is displayed in one of two modes. If over a target object the cursor is a blue circle. When you see this cursor you may double-click to see the *Object Information* for this object. Right-clicking and selecting View Info accomplishes the same thing. If you select an image the Plottable Image Edit window appears instead of Object Information. You may use this window to make fine adjustments to the image, such as the size and rotation angle.

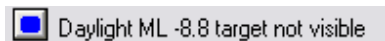
When the cursor is not over an object it appears as a set of green crosshairs. The position of the center of the cursor is displayed in the status bar at the bottom left edge of the chart window:



Click the blue button to configure what is displayed in this window. Depress the shift key to disable the detection of objects as the cursor moves, displaying position information only.

Sky Report and Target Visibility

In the bottom right of the window the sky conditions and visibility of the target object are displayed:



A summary of the current level of sky darkness, naked eye limiting magnitude, and the visual detection difficulty are displayed.

Click the blue button to see a full sky report.

The Right-Click Menu

A right-click on the chart brings up the various options available in a pop up menu. The exact action taken by most of these functions depends on where the mouse cursor was when right-clicked.

Object Info	Insert
Add Object at Cursor to Observing List	
Create Quick Log Entry for Object at Cursor	
Angular Measure	a
Get DSS Image at Cursor	d
Create Skymark at Cursor	x
Copy J2000 Coordinates at Cursor	C
Slew to Chart Target	F2
Slew to Cursor	F3
Slew to and Center at Cursor	F4
Sync Telescope	Space
Sync Telescope to cursor	
Center Chart at Scope Position	Bksp
View Controls	Ctrl-v
Add/Edit Obstructed Horizon	
Delete Obstructed Horizon	

- Object Info - if the cursor is over an object the *Object Information* window will open with the information for that object. You may also double-click on the object to start the dialog.
- Exposure Calculator - click to open the exposure calculator for the object beneath the cursor.
- Add Object at Cursor to Observing List - the object under the cursor will be added to an observing list of your choosing.
- Create Log Entry for Object at Cursor - a log entry will be created for the object under the cursor.
- Angular Measure - is used to measure the angular separation and position angle between two points (or objects) on the chart. The origin of the measurement will be the object (or position) under the cursor when you right-clicked to bring up the menu. As you move the cursor around the chart the angular distance between the original point and the point under the cursor is displayed in the bottom of the chart window (along with the position angle in degrees, measured from the original position).
- Get DSS Image at Cursor - will start the [Get Image](#) dialog, used to download a DSS image from the Internet centered on the object (or position) under the cursor when you right-clicked on the chart.
- Create Skymark at Cursor -- will create a Skymark in the skymark database at the coordinates of the cursor.
- Copy J2000 Coordinates at Cursor - will copy the coordinates at the cursor to the Window clipboard for pasting into an text-based application.
-
- Slew/Push to Chart Target (Real Time) - selects the current chart target as the telescope target. This will cause GOTO telescopes will slew to the center of the chart.
- Slew/Push to Cursor (Real Time) - selects the object/position under the cursor as the telescope target object. This will cause GOTO telescopes to slew to the object/position.
- Slew/Push to and Center at Cursor (Real Time) - selects the object/position under the cursor as the telescope target object *and* positions the chart such that the object/position will be at the center. This will cause GOTO telescopes to slew to the object/position.

- Sync Telescope (Real Time) - Synchronize the telescope to the current *telescope* target (as indicated on the Real Time tool).
- Sync Telescope to Cursor (Real Time) - Synchronize the telescope to the object/position under the cursor.
- Center Chart at Scope Position (Real Time) - positions the chart such that the current position of the telescope is centered.
- View Controls will open the View Controls.
- Add/Edit Obstructed Horizon - this chart also serves as the primary tool for creating and editing an obstructed horizon (a horizon with mountains, buildings, trees, etc. Use this selection to start the editor. See [Obstructed Horizons](#) for more information.
- Delete Obstructed Horizon - this selection will only be enabled if an obstructed horizon exists for this location. Use the selection to delete the obstructed horizon completely.

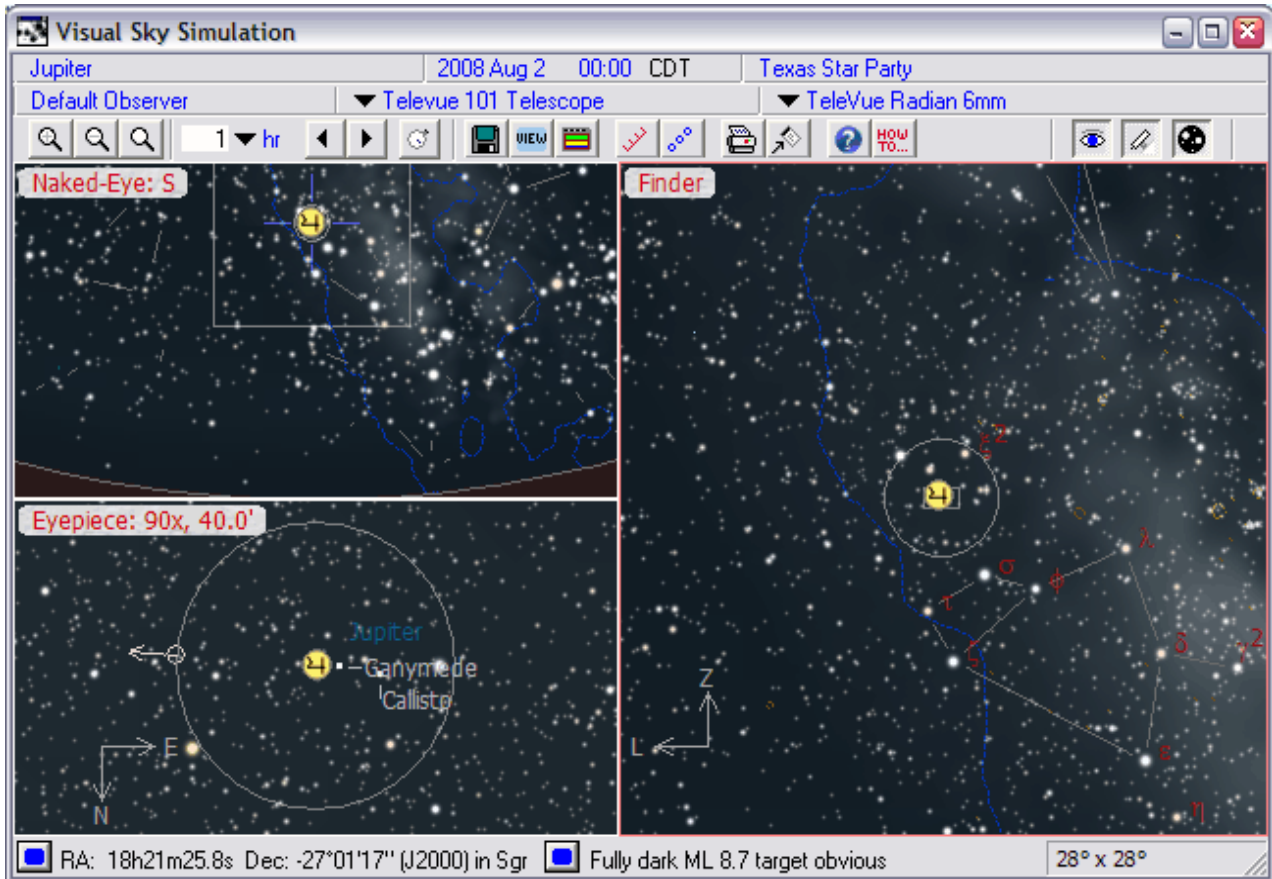
Related Topics

[Keyboard Shortcuts](#)

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The Telescope (Star Hopping) Chart

The primary purpose of this chart is star hopping. It is custom-created for a particular telescope, eyepieces and finding devices.



The chart is made up of three views. Each view serves a particular purpose and functions independently of the others. Many of the functions outlined later in this section operate on the selected view only. Click on a view to select it. A red outline appears around the currently selected view.

- Eyepiece View - displays a simulation of what you would see in your telescope with the target object centered. The selection of available eyepieces appears in the control area at the top of the window. The circle centered in this view represents the actual field of view seen in the eyepiece currently selected. The arrow emanating from the field of view circle is the drift direction indicator which indicates the direction that stars will drift (west) on a telescope without a drive (or if the drive is turned off). This feature is useful in the field to quickly identify the orientation of the view. The entire view can be rotated to any arbitrary angle by dragging the arrow with the mouse.
- Finding Device View - displays a simulation of what you would see in your finding device with the target object centered. The finding device can be a magnifying finder or non-magnifying "reflex sight" such as a TelRad. This view is the key to successfully finding object quickly and easily. Depending on how it is set up, the field of view of your magnifying finder may be drawn as a circle, multiple circles may be drawn for your reflex sight, the telescope eyepiece field of view may be drawn as a circle, and/or an *inset* rectangle showing the dimensions of the eyepiece view may be drawn.
- Naked Eye View - this is similar to the Naked Eye chart. This view shows the

general location of the target object in the naked-eye sky. Note that, in order to keep the horizon visible as a point of reference, the target may not be drawn at the center of the chart. It may instead be found above or below the chart center. You may choose a selection of helpful reference aids including: field of view circles representing the view in your magnifying finder and/or eyepiece, non-magnifying reflex-sight circles, or *inset* rectangles showing the dimensions of the other views.

Changing The Chart Layout

To switch the positions of two of the views, left click on the first view. Depress and hold the shift key and holding the mouse button down, drag the chart view icon into the second view. The positions of the two views on the chart will be reversed.

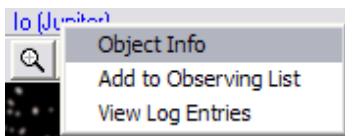
To change the dimensions of the views place the mouse cursor over the border between two views. The cursor should change to little arrows. Depress the left mouse button, and holding it down, drag the border until it appears at the intended location and release the button. For a three-view chart it is possible to drag all borders simultaneously by placing the mouse at the "four corners" location where all charts meet, and dragging from there.

Keyboard shortcuts Eyepiece view only: F9, Finder view only: F10, Naked Eye View only: F11, All views: F12

Changing the Target, Date/Time, Location and Observer

To change the chart *target*, *date*, *time*, *location*, and *observer*, or to switch to another type of chart, click on the hypertext labels at the top of the window.

Right-click on the chart target to see a menu:



Select *Object Info* to view the object information for the target, add it to an observing list or view any log entries.

Aborting

If you mistakenly choose to draw a million galaxies and don't wish to wait for the result, you may abort by clicking the round red button that appears at the bottom of the window.

Changing the Eyepiece

Click the hypertext label that indicates the currently selected eyepiece. A menu will appear with each of the eyepieces defined for the telescope. To change eyepiece select one from the menu. In addition to the eyepieces you will see an item labeled *Best Resolution*. The best resolution setting will match the practical resolving capability of the telescope (Dawes limit) to the resolution of the display device (screen or printer), approximating the detail you would expect to see on planets and displaying the apparent separation of double stars.

At the bottom of the eyepiece selection menu are items for selecting a barlow lens or mirror diagonal. Choosing one of these selections will toggle it on/off. Note that the Barlow lens must first be set up for the telescope on the Add/Modify Telescopes dialog before it will appear here.

Zooming via the Mouse

To zoom into a specific area left click with the mouse and drag a rectangle around the area you wish to see more closely. To zoom out depress the *Control* key and holding it down left click with the mouse and drag a rectangle around the area you wish to zoom out of.

You may also rotate the mousewheel forward to zoom in, and backward to zoom out of the current view.

Controlling the Field of View

The field of view is the horizontal extent of the chart: a field of view of ten degrees will result in a chart that is always ten degrees wide, either on the screen or printed.



Click the + button (Page Up Key) to zoom in and the - button (Page Down Key) to zoom out.

Clicking the third button brings up the Set *Field of View* dialog where you can set the field of view directly.

Controlling Time

In addition to changing the date/time directly by clicking on hypertext you can time-step forward or backward by a set time interval or force the program to maintain the current time.



Clicking the Real Time Mode (clock) button will immediately set the chart to the current date/time. The chart will update regularly to maintain the current time. How often the chart is updated can be changed via the *Configure Real Time refresh* rates menu selection on the *Telescope Control* menu (Real Time).

Clicking one of the Time Step buttons will move the chart time forward or back by the time step indicated. To change the time step type in a number and click the hypertext menu to select the appropriate units.



Scenario

This tool button brings up the *Scenario* dialog. A scenario consists of a target object, date/time, and location. Scenarios of interest may be saved to be easily recalled later.



View Controls

This tool button brings up the *View Controls* dialog, which controls what elements are displayed in the chart view and how they are displayed.



Chart Preferences

This tool button brings up the *Chart Preferences* dialog, which controls the look of the chart. This dialog is used to control all aspects of the look of the chart, including the star style and color, background color, fonts for labels, and the styles and colors of various other elements.



Motion Trails

This tool button brings up the Motion Trails dialog, which allows you to generate a trail showing the path of a moving object over time.



Motion Trace

This button brings up the Motion Trace Dialog, which allows you to generate a list of positions for an object over time. The object's motion can be shown at selected intervals.



Print Chart

This tool button brings up the Print Chart Dialog, which allows you to customize your chart before sending it to the printer.



Copy Chart to Clipboard


This tool button brings up the Copy Chart to Clipboard dialog, which allows you to send a copy

of the chart to the Clipboard for pasting into another application, such as an image processing program.

The Cursor

When over a chart the mouse cursor is displayed in one of two modes. If over a target object the cursor is a blue circle. When you see this cursor you may double-click to see the *Object Information* for this object. Right-clicking and selecting View Info accomplishes the same thing. If you select an image the Plottable Image Edit window appears instead of Object Information. You may use this window to make fine adjustments to the image, such as the size and rotation angle.

When the cursor is not over an object it appears as a set of green crosshairs. The position of the center of the cursor is displayed in the status bar at the bottom left edge of the chart window:

 J191850.0-210800 (star) in Sgr, V13.9

Click the blue button to configure what is displayed in this window. Depress the shift key to disable the detection of objects as the cursor moves, displaying position information only.

Sky Report and Target Visibility

In the bottom right of the window the sky conditions and visibility of the target object are displayed:

 Daylight ML -8.8 target not visible

A summary of the level of sky darkness, naked eye limiting magnitude, and the visual detection difficulty are displayed *for the selected view*.

Click the blue button to see a full sky report.

The Right-Click Menu

A right-click on the chart brings up the various options available in a pop up menu. The exact action taken by most of these functions depends on where the mouse cursor was when right-clicked.

Object Info	Insert
Center View at Cursor	Home
Add Object at Cursor to Observing List	
Create Quick Log Entry for Object at Cursor	
Angular Measure	a
Get DSS Image at Cursor	d
Create Skymark at Cursor	x
Copy J2000 Coordinates at Cursor	C
Slew to Chart Target	F2
Slew to Cursor	F3
Slew to and Center at Cursor	F4
Sync Telescope	Space
Sync Telescope to cursor	
Center Chart at Scope Position	Bksp
View Controls	Ctrl-v

- Object Info - if the cursor is over an object the *Object Information* window will open with the information for that object. You may also double-click on the object to start

the dialog.

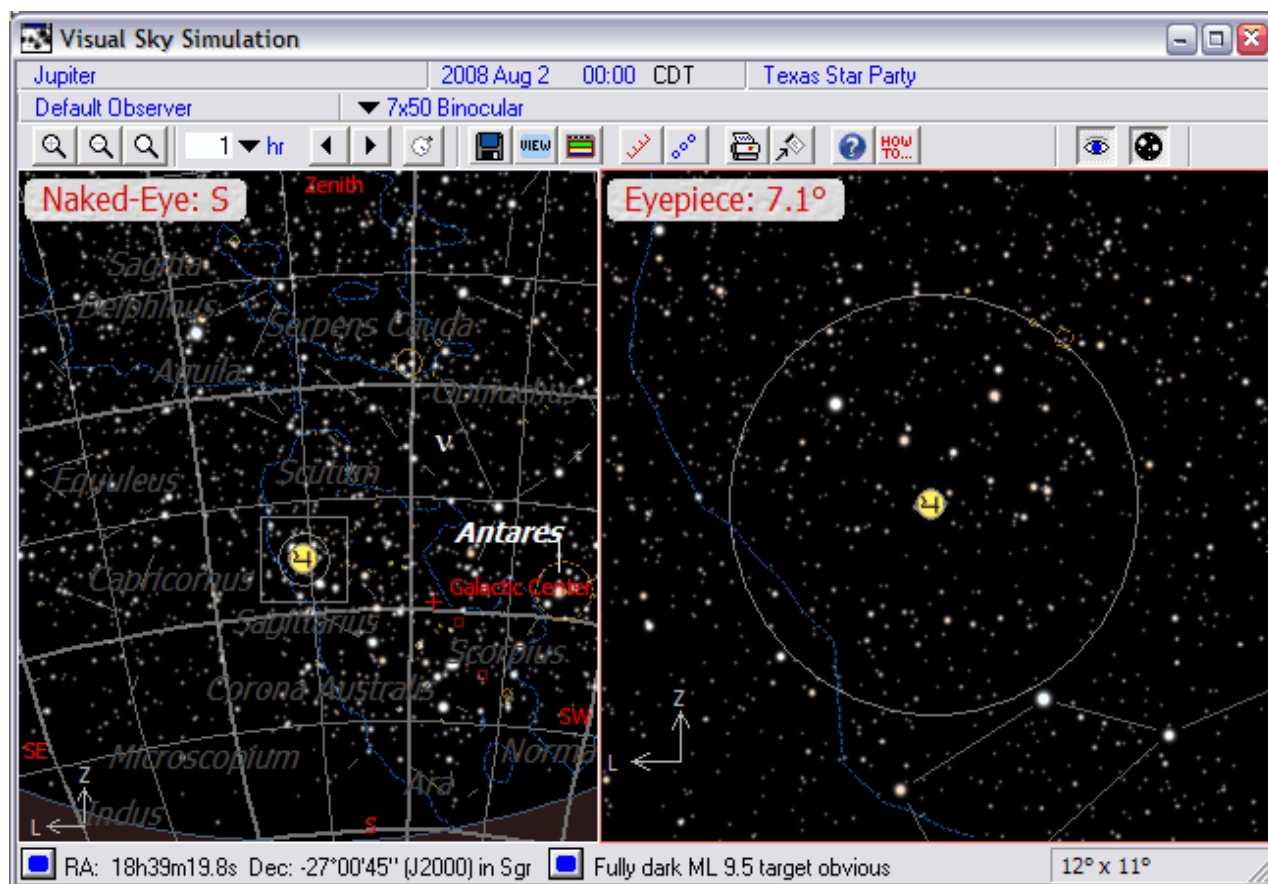
- Exposure Calculator - click to open the exposure calculator for the object beneath the cursor.
- Add Object at Cursor to Observing List - the object under the cursor will be added to an observing list of your choosing.
- Create Log Entry for Object at Cursor - a log entry will be created for the object under the cursor.
- Angular Measure - is used to measure the angular separation and position angle between two points (or objects) on the chart. The origin of the measurement will be the object (or position) under the cursor when you right-clicked to bring up the menu. As you move the cursor around the chart the angular distance between the original point and the point under the cursor is displayed in the bottom of the chart window (along with the position angle in degrees, measured from the original position).
- Get DSS Image at Cursor - will start the [Get Image](#) dialog, used to download a DSS image from the Internet centered on the object (or position) under the cursor when you right-clicked on the chart.
- Create Skymark at Cursor -- will create a Skymark in the skymark database at the coordinates of the cursor.
- Copy J2000 Coordinates at Cursor -will copy the coordinates at the cursor to the Window clipboard for pasting into an text-based application.
-
- Slew/Push to Chart Target (Real Time) - selects the current chart target as the telescope target. This will cause GOTO telescopes will slew to the center of the chart.
- Slew/Push to Cursor (Real Time) - selects the object/position under the cursor as the telescope target object. This will cause GOTO telescopes to slew to the object/position.
- Slew/Push to and Center at Cursor (Real Time) - selects the object/position under the cursor as the telescope target object and positions the chart such that the object/position will be at the center. This will cause GOTO telescopes to slew to the object/position.
- Sync Telescope (Real Time) - Synchronize the telescope to the current *telescope* target (as indicated on the Real Time tool).
- Sync Telescope to Cursor (Real Time) - Synchronize the telescope to the object/position under the cursor.
- Center Chart at Scope Position (Real Time) - positions the chart such that the current position of the telescope is centered.
- View Controls will open the View Controls.

Related Topics

[Keyboard Shortcuts](#)

The Binocular Chart

Custom created for a particular pair of binoculars, this chart is designed to aid in the finding of objects in binoculars.



The chart is made up of two views. Each view serves a particular purpose and functions independently of the other. Many of the functions outlined later in this section operate on the selected view only. Click on a view to select it. A red outline appears around the currently selected view.

- Eyepiece View - displays a simulation of what you would see in your telescope with the target object centered. The selection of available eyepieces appears in the control area at the top of the window. The circle centered in this view represents the actual field of view seen in the eyepiece currently selected.
- Naked Eye View - this is similar to the Naked Eye chart. This view shows the general location of the target object in the naked-eye sky. Note that, in order to keep the horizon visible as a point of reference, the target may not be drawn at the center of the chart. It may instead be found above or below the chart center. You may choose a selection of helpful reference aids including: field of view circle representing the view in your binoculars, or an *inset* rectangle showing the dimensions of the other view.

Changing The Chart Layout

To switch the positions of two of the views, left click on the first viewDepress and hold the shift key and holding the mouse button down, drag the chart view icon into the second view. The positions of the two views on the chart will be reversed.

To change the dimensions of the views place the mouse cursor over the border between two

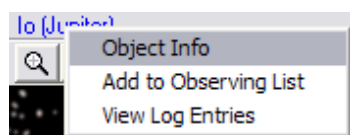
views. The cursor should change to little arrows. Depress the left mouse button, and holding it down, drag the border until it appears at the intended location and release the button. For a three-view chart it is possible to drag all borders simultaneously by placing the mouse at the "four corners" location where all charts meet, and dragging from there.

Keyboard shortcuts Eyepiece view only: F9, Finder view only: F10, Naked Eye View only: F11, All views: F12

Changing the Target, Date/Time, Location and Observer

To change the chart *target*, *date*, *time*, *location*, and *observer*, or to switch to another type of chart, click on the hypertext labels at the top of the window.

Right-click on the chart target to see a menu:



Select *Object Info* to view the object information for the target, add it to an observing list or view any log entries.

Aborting

If you mistakenly choose to draw a million galaxies and don't wish to wait for the result, you may abort by clicking the round red button that appears at the bottom of the window.

Changing the Eyepiece

Click the hypertext label that indicates the currently selected eyepiece. A menu will appear with each of the eyepieces defined for the telescope. To change eyepiece select one from the menu. In addition to the eyepieces you will see an item labeled *Best Resolution*. The best resolution setting will match the practical resolving capability of the telescope (Dawes limit) to the resolution of the display device (screen or printer), approximating the detail you would expect to see on planets and displaying the apparent separation of double stars.

At the bottom of the eyepiece selection menu are items for selecting a barlow lens or mirror diagonal. Choosing one of these selections will toggle it on/off. Note that the Barlow lens must first be set up for the telescope on the Add/Modify Telescopes dialog before it will appear here.

Zooming via the Mouse

To zoom into a specific area left click with the mouse and drag a rectangle around the area you wish to see more closely. To zoom out depress the *Control* key and holding it down left click with the mouse and drag a rectangle around the area you wish to zoom out of.

You may also rotate the mousewheel forward to zoom in, and backward to zoom out of the current view.

Controlling the Field of View

The field of view is the horizontal extent of the chart: a field of view of ten degrees will result in a chart that is always ten degrees wide, either on the screen or printed.



Click the + button (Page Up Key) to zoom in and the - button (Page Down Key) to zoom out.

Clicking the third button brings up the Set *Field of View* dialog where you can set the field of view directly.

Controlling Time

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Scenario

This tool button brings up the *Scenario* dialog. A scenario consists of a target object, date/time, and location. Scenarios of interest may be saved to be easily recalled later.



View Controls

This tool button brings up the *View Controls* dialog, which controls what elements are displayed in the chart view and how they are displayed.



Chart Preferences

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The Cursor

When over a chart the mouse cursor is displayed in one of two modes. If over a target object the cursor is a blue circle. When you see this cursor you may double-click to see the *Object Information* for this object. Right-clicking and selecting View Info accomplishes the same thing. If you select an image the Plottable Image Edit window appears instead of Object Information. You may use this window to make fine adjustments to the image, such as the size and rotation angle.

When the cursor is not over an object it appears as a set of green crosshairs. The position of the center of the cursor is displayed in the status bar at the bottom left edge of the chart

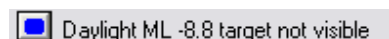
window:



Click the blue button to configure what is displayed in this window. Depress the shift key to disable the detection of objects as the cursor moves, displaying position information only.

Sky Report and Target Visibility

In the bottom right of the window the sky conditions and visibility of the target object are displayed:



A summary of the level of sky darkness, naked eye limiting magnitude, and the visual detection difficulty are displayed *for the selected view*.

Click the blue button to see a full sky report.

The Right-Click Menu

A right-click on the chart brings up the various options available in a pop up menu. The exact action taken by most of these functions depends on where the mouse cursor was when right-clicked.

Object Info	Insert
Center View at Cursor	Home
Add Object at Cursor to Observing List	
Create Quick Log Entry for Object at Cursor	
Angular Measure	a
Get DSS Image at Cursor	d
Create Skymark at Cursor	x
Copy J2000 Coordinates at Cursor	C
Slew to Chart Target	F2
Slew to Cursor	F3
Slew to and Center at Cursor	F4
Sync Telescope	Space
Sync Telescope to cursor	
Center Chart at Scope Position	Bksp
View Controls	Ctrl-v

- Object Info - if the cursor is over an object the *Object Information* window will open with the information for that object. You may also double-click on the object to start the dialog.
- Exposure Calculator - click to open the exposure calculator for the object beneath the cursor.
- Add Object at Cursor to Observing List - the object under the cursor will be added to an observing list of your choosing.
- Create Log Entry for Object at Cursor - a log entry will be created for the object under the cursor.
- Angular Measure - is used to measure the angular separation and position angle between two points (or objects) on the chart. The origin of the measurement will be the object (or position) under the cursor when you right-clicked to bring up the menu. As you move the cursor around the chart the angular distance between the original point and the point under the cursor is displayed in the bottom of the chart

window (along with the position angle in degrees, measured from the original position).

- Get DSS Image at Cursor - will start the [Get Image](#) dialog, used to download a DSS image from the Internet centered on the object (or position) under the cursor when you right-clicked on the chart.
- Create Skymark at Cursor -- will create a Skymark in the skymark database at the coordinates of the cursor.
- Copy J2000 Coordinates at Cursor -will copy the coordinates at the cursor to the Window clipboard for pasting into an text-based application.
-
- Slew/Push to Chart Target (Real Time) - selects the current chart target as the telescope target. This will cause GOTO telescopes will slew to the center of the chart.
- Slew/Push to Cursor (Real Time) - selects the object/position under the cursor as the telescope target object. This will cause GOTO telescopes to slew to the object/position.
- Slew/Push to and Center at Cursor (Real Time) - selects the object/position under the cursor as the telescope target ~~object~~and positions the chart such that the object/position will be at the center. This will cause GOTO telescopes to slew to the object/position.
- Sync Telescope (Real Time) - Synchronize the telescope to the current *telescope* target (as indicated on the Real Time tool).
- Sync Telescope to Cursor (Real Time) - Synchronize the telescope to the object/position under the cursor.
- Center Chart at Scope Position (Real Time) - positions the chart such that the current position of the telescope is centered.
- View Controls will open the View Controls.

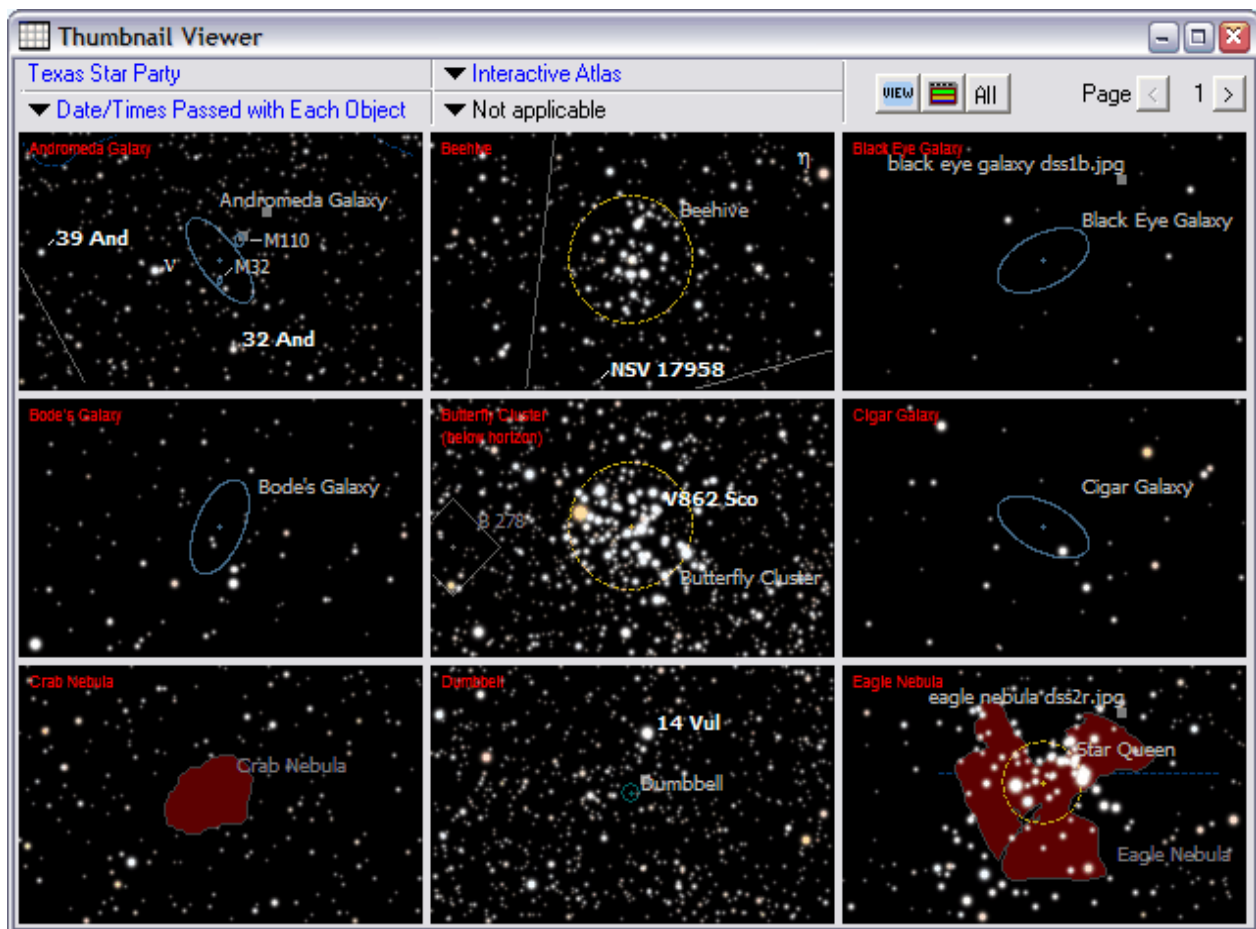
Related Topics

[Keyboard Shortcuts](#)

-0-

The Thumbnail Viewer

This tool makes multiple charts in small thumbnail views.



Each thumbnail, or cell, contains a chart in miniature. They can be Interactive Atlas charts or telescope/binocular eyepiece charts.

Observing Location

Click the location hypertext to change observing locations. The observing location has a larger affect on the eyepiece views than on Atlas views.

Chart Type

Select the type of chart to draw for each object. Atlas charts do not simulate the current sky conditions. The eyepiece charts simulate the sky brightness and altitude at the current time for the *cell*.

Date/Times

Click to choose from:

- Date/Times passed with each object - select this to use the date/and time passed from the calling part of the program. For instance, if the thumbnails were generated from an observing list in visual mode the optimum time to view each object is passed with the thumbnail.
- Select a universal date/time - select to enter a single date/time to use for the display of all thumbnails.

Eyepiece

If a telescope eyepiece chart is selected as the chart type, select the eyepiece to use for the view here. The selected eyepiece will be used for all charts. As on the other charts, there is also a selection to enable/disable a Barlow lens and mirror diagonal.



View Controls

This tool button brings up the *View Controls* dialog, which controls what elements are displayed in the chart view and how they are displayed.



Chart Preferences

This tool button brings up the *Chart Preferences* dialog, which controls the look of the chart. This dialog is used to control all aspects of the look of the chart, including the star style and color, background color, fonts for labels, and the styles and colors of various other elements.

Thumbnail Options

Click this button to open the Thumbnail options dialog. This dialog is used to select the number of thumbnails, how they are labeled, and what happens when you double-click on a thumbnail.

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Printing Charts

SkyTools charts may be printed in two ways: from a chart displayed on the screen, or directly from one of the planning tools (without first being displayed). In either case the same Print Chart dialog will appear.

When printing from a chart already displayed on the screen, the view control settings (which elements are displayed and how) will be inherited from the chart you are viewing: if the grid lines are on in the displayed chart, they will also be on in the printed chart.

When printing directly from a planning tool the default view control settings are used. The view control defaults are stored with each chart when the user clicks the Save button on the *View Controls* dialog.

Note that for multiple-view charts the view layout - their size, position, and display status - will be that which was last displayed on the screen: if you turn off all but the eyepiece view in your telescope chart, any later printing of this chart will only show the eyepiece view.

Because printed charts are fundamentally different from those displayed on the screen, the printed charts have their own unique chart preferences. Chart preferences define what the chart looks like: the background color, star style, fonts, colors, and styles of various chart elements. These chart preferences are set via the Chart Preferences button on the *Print Chart* dialog - they are completely independent from the ones used to display a chart on the screen.

[The Print Chart Dialog](#)

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The Print Chart Dialog

This dialog is used to print a chart.

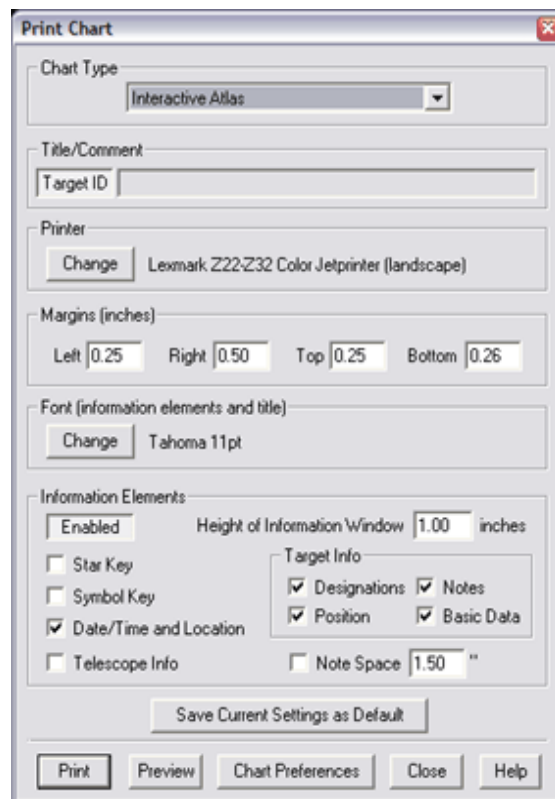


Chart Type

Select the chart you wish to print. Possibilities include the single-view Interactive Atlas style, Overhead Sky, Naked eye, and various binocular and telescope charts custom-created for the instruments you have told SkyTools about.

Title/Comment

Enter an optional *Title/Comment* to appear in the upper-left corner of the printed page. Alternately, if the Target ID button is selected the title defaults to the ID of the target object.

Printer

Select the printer and orientation. The current printer and paper orientation (landscape or portrait) are displayed. To change them, click the *Change* button. This will start the *Print Setup* dialog where you can make these changes. The printer selection will remain in effect until SkyTools is closed. The next time SkyTools is started, the system default printer will be the selected printer. The paper orientation is saved for the selected chart when the *Save Current Settings as Default* button is clicked.

Margins

Enter the printer margins. SkyTools will print the chart within these boundaries.

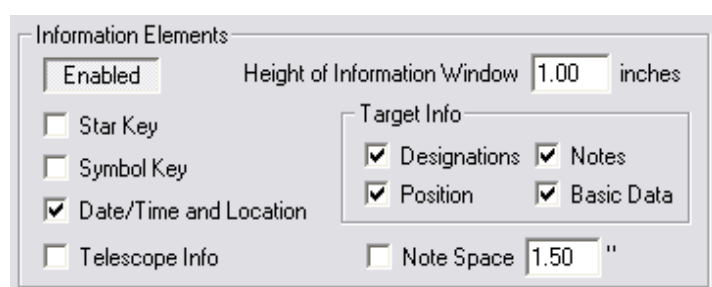
Font

Use the *Font* property to select the base font for the information elements (and chart title/comment). The currently selected font name, size, and style is displayed. To change the font, click the *Change* button. Doing so will start the *Font* dialog, which is used to pick a font, size, and style.

Information Elements

SkyTools can print various information on the page in addition to the chart itself. These

Information Elements are printed in the *Information Window* at the bottom of the printed page.



Click the Disabled/Enabled button to enable or disable the display of the information window on the printed page.

- Height of Information Window - enter a height, in inches. The information window is squeezed in at the bottom of the chart - the larger the information window, the smaller the actual chart will be in the vertical dimension.
- Date/Time and Location will print these elements in the information window.
- Target Info is where you determine how much information about the chart will be printed in the information window. Check Designations to print a list of alternate designations (the primary designation for the target is always printed). Check Position to print the J2000 position of the target. Check Notes to include user notes (entered via the Object Information Window). The notes will be taken from the notes group currently active in the Nightly Planner or Real Time tool (whichever was last displayed). Notes can be quite lengthy, so use this feature judiciously. Check Basic Data to print target data of interest, including the magnitude, size, and surface brightness.
- Star Key will print a key linking the sizes of the printed star dots with magnitudes. For multi-view charts the star key is only appropriate for one of the views: the eyepiece view if there is one, otherwise the finder view (if there is one) or finally, the naked eye view.
- Symbol Key will display a key for linking the appearance of various objects with the object type.
- Note Space will include a blank area for you to add hand-written notes. This space will fill the height of the information window. Enter a horizontal size for the space, in inches. Note that other elements may be truncated or crowded in order to make room for this space.
- Telescope Info will include information about the telescope and eyepiece. Camera information will also be displayed, if appropriate,

Save Current Settings as Default

Click this button to save any of your changes made on this dialog, including chart preferences, margins, and printer. Unless you click this button your changes will be lost when you exit the dialog.

Chart Preferences

Click this button to set the color, fonts, and other display attributes for the chart. When done, click Save Current Settings as Default or your changes will be lost when you exit the dialog.

Print Preview

The print preview window give you the chance to see what the chart is going to look like before you print it to paper.

The default view shows the full page as it would appear on paper. Click the **Zoom In** button (or click with the left mouse button) to see more detail. To zoom out click the **Zoom Out** button or

right-click the mouse.

If multiple charts have been created for the printer via the *Print Chart for Each Checked Entry* menu selection in an observing list, you may preview each of the charts in turn using the Next Page and Prev Page buttons.

Related Topics

[Printing Charts](#) (overview)

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Current Events

Overview

Astronomical events are interesting happenings in the sky that occur at a specific moment in time, or over a finite period of time. Current events are astronomical events that will occur in the near future as seen from the specified location. For investigating events that occurred in the past or distant future use the Special Events tool.

Types of Events

SkyTools can search for events of the following types:

- Appulses - when two objects pass closely in the sky
- Occultations - when one object blocks our view of another
- Transits - when one object appears to pass across the face of another
- Solar Eclipses - when the moon passes in front of the sun
- Lunar Eclipses - when the moon passes through the shadow of the earth
- Lunar phases - such as new, first quarter, full, etc.
- Meteor showers - the peak time of the shower
- Planetary phenomena such as oppositions, conjunctions and greatest elongations
- Jupiter satellite events such as transits, occultations, eclipses, and shadow transits
- Elongations of planetary satellites - the time when they are farthest from the planet
- Jupiter Great Red Spot transits - the period of time the GRS is visible

Event List

Events are computed for a period of time into the future (selected on the [options dialog](#)). Each event is listed in the window on the left side of the dialog. If an event is selected from the list its circumstances are displayed in the window at the bottom of the dialog. For instance, a solar eclipse may be listed on the left as an event on a certain date. If you select the solar eclipse the times of each contact are listed at the bottom. These contact times, *circumstances* divide the event into specific moments in time.

The list of events can be printed or copied to the clipboard via the [Events](#) menu.

Each event can be plotted on a chart via a right-click on the event. Similarly, a specific circumstance can be plotted on a chart via a right-click on the circumstance. Other functions can be accessed similarly, such as creating a log entry for an event.

The event list can be displayed in the [events calendar](#). The events that occur on a specific night can be displayed in the [nightly events planner](#).

Additional Topics

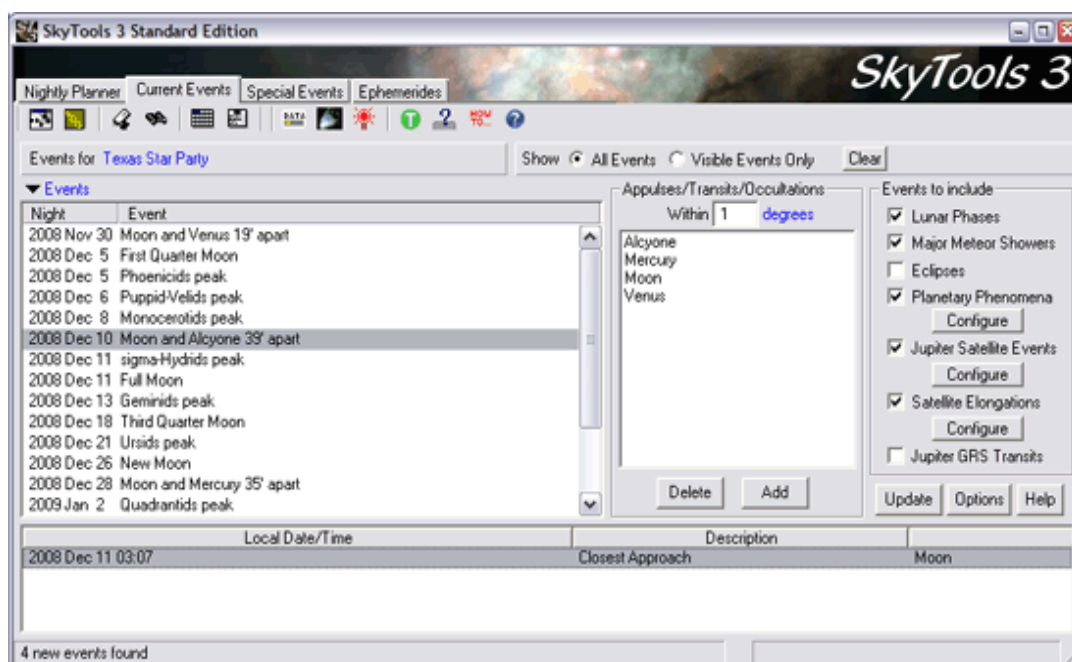
[The Current Events Tool](#)

[The Events Calendar](#)

[The Nightly Events Planner](#)

The Current Events Tool

The Current Events function is designed to search for upcoming astronomical events. The events discovered by this function are listed on this dialog, the Events Calendar and Nightly Events Planner.



To create an event list set your [options](#), make your selections via the [control panel](#) and click Update.

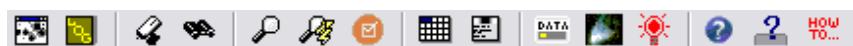
A summary of each of the events discovered is listed in the left window. This event list is always in time order. Select an entry to see its details (also called circumstances) listed in the bottom window. Click one of the column headings in the bottom window to sort the circumstance list in the appropriate order for that column.

To limit the display of events to only those that are visible from the selected location select the *Visible Events Only* radio button. Note that this selection does not affect what is reported when you run a search: it only affects what is displayed. To see all of the events reported select the *All Events* radio button.

To clear the event list click Clear.

The Tool Bar

This is where you click to start the various tools, configure the program, and start the help system. Some of these tools are directly related to Current Events: the Events Calendar, and Nightly Events Planner display the results of the Current Events tool.



- The Interactive Chart Tool is the old fashioned, direct way to make charts. Click [here](#) to open the last chart viewed.
- The Observing Log Browser button starts the observing log browser. Use this when you want to browse log entries by category or to perform a filtered search of your log entries.
- Use Add/Modify Scope or Add/Modify Binoculars to enter the information for the telescope(s) and binoculars you observe with. Once defined, custom simulations charts will be created for the instruments you enter here.
- The Designation Search Tool is used to add objects to observing lists by name or

designation.

- The Database Power Search Tool is used to search the SkyTools databases for objects to add to your observing lists.
- The Nightly Observing List Generator is used to create special observing lists for a specific night, telescope, and observing location.
- The Events Calendar displays a monthly event calendar with events that have been discovered via the *Current Events* tool.
- The Nightly Events Planner displays the events discovered by the *Current Events* tool for a single night.
- The Data Manager is the tool used to backup/restore/Sync user data, import/share user data, and manage your data such as object notes, images, web links, plottable images, and supplemental databases.
- The SkyTools Preferences button is used to set global preferences, view your serial number and version information, register your copy of SkyTools, send instant feedback to Skyhound, and to change the database install level.
- Click on the Night Vision button to toggle the red night vision mode on and off. This mode changes all windows on your desktop to shades of red and blanks the desktop background (including icons). The original settings are restored when the program exits.
- Help Contents brings up the contents of this help system.
- The Tab Help button takes you directly to the help for the current selected tab.
- The Help System How To... button brings up the handy How To... help part of the help system. Use this to quickly find out how to do specific operations.

[Control Panel](#) [Options](#)

Additional Topics

[Making Charts for Events](#)

[Deleting Events](#)

[Printing Events](#)

[Copying Events to the Clipboard](#)

[Copy All Objects to an Observing List](#)

[Creating a Log Entry for an Event](#)

Additional Functions

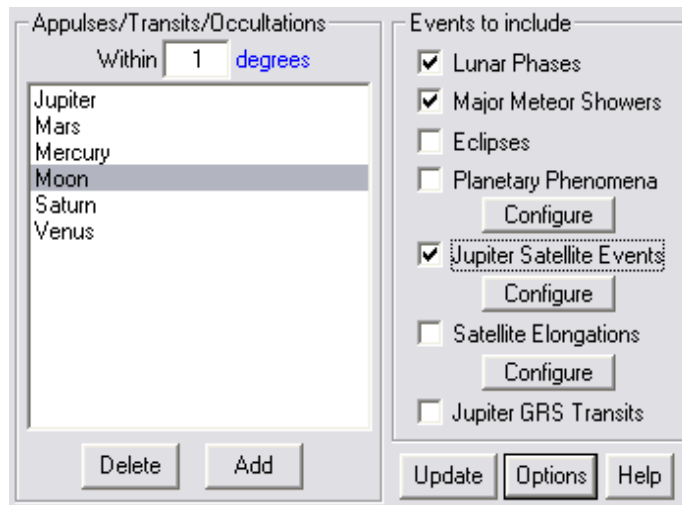
[The Events Calendar](#)

[The Nightly Events Planner](#)

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Control Panel

Use the control panel to define your search parameters.



Appulses/Transits/Occultations

This control consists of a list of objects. SkyTools watches for close approaches between any two of these objects. When a close approach occurs the exact time when the object passes closest is determined: this is an appulse. If the two objects pass closer than the value set in the Within... property, an appulse will be reported.

If the two objects overlap then a transit or occultation is reported instead.

To add an object to the list by click the **Add** button. \

To delete an object, select the object from the list and click **Delete**.

Lunar Phases

Check this box to list the moment in time when the phases of the moon (full, first quarter, etc.) occur.

Major Meteor Showers

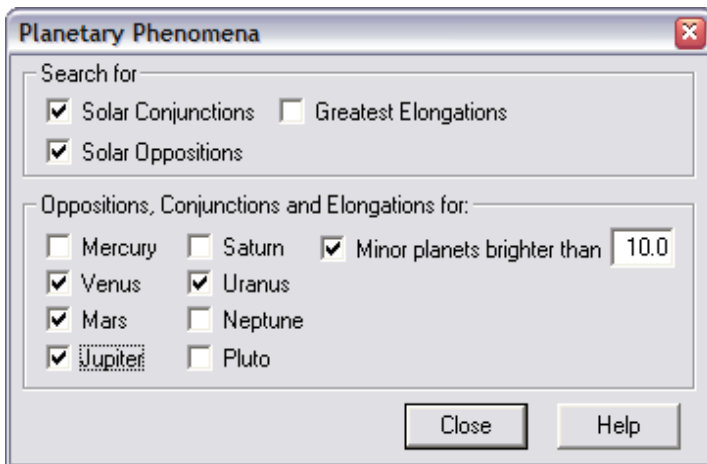
Check this box to list when a meteor shower reaches its peak intensity.

Eclipses

Check this box to list all solar and lunar eclipses visible from the selected location.

Planetary Phenomena

This computes oppositions, solar conjunctions, and greatest elongations for the major planets, and oppositions for asteroids. Click the **Configure** button to see your options.



Check the box next to each object you wish to consider. All minor planets *from the primary reference database* that become brighter than the magnitude indicated will also be included.

Check the types of events you wish to consider:

- Solar Conjunctions - when an object is in conjunction with the Sun. This occurs when the object comes closest to the Sun as seen from the Earth. These are not computed for minor planets.
- Solar Oppositions - when an object is in the opposite direction of the Sun as seen from the Earth. This is the best time to observe objects that lie farther away from the Sun than the Earth (Venus and Mercury never have oppositions).
- Greatest Elongations - when an object that orbits closer to the Sun than the Earth appears to be at its greatest distance from the Sun. Greatest elongations can occur to the west or the east of the Sun and are labeled as such. This option is only really useful for Venus and Mercury and represents the best dates to observe them. These are not computed for minor planets.

Jupiter Satellite Events

These are Jupiter moon events such as shadow transits.



Select one or more of Jupiter's satellites.

Choose the types of events you are interested in:

- Transit - when a satellite passes in front of Jupiter and can be seen silhouetted upon

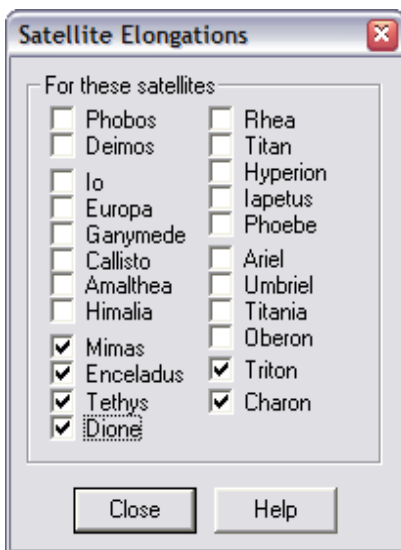
it.

- o Shadow Transit - when a satellite casts its shadow on Jupiter.
- o Eclipse - when a satellite passes behind the limb of Jupiter.
- o Occultation - when a satellite passes into Jupiter's shadow.

These events often occur in stages. Ingress refers to the time the event begins. Egress refers to the time the event ends.

Satellite Elongations

These are the times when planetary satellites (moons) are farthest from the parent planet, marking your best chance to observe them. This function can be particularly useful for observing the moons of Mars, the inner satellites of Saturn and for those looking for a challenge, even Pluto's moon, Charon. Click the Configure button to see your options:



Check the box next to the satellites you wish to include in search.

Jupiter GRS Transits

Check this box to list all transits of the Great Red Spot across the face of Jupiter.

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Options dialog

This dialog is used to set how many months into the future to search (always from today's date) and how to handle the deletion of events that have already passed.

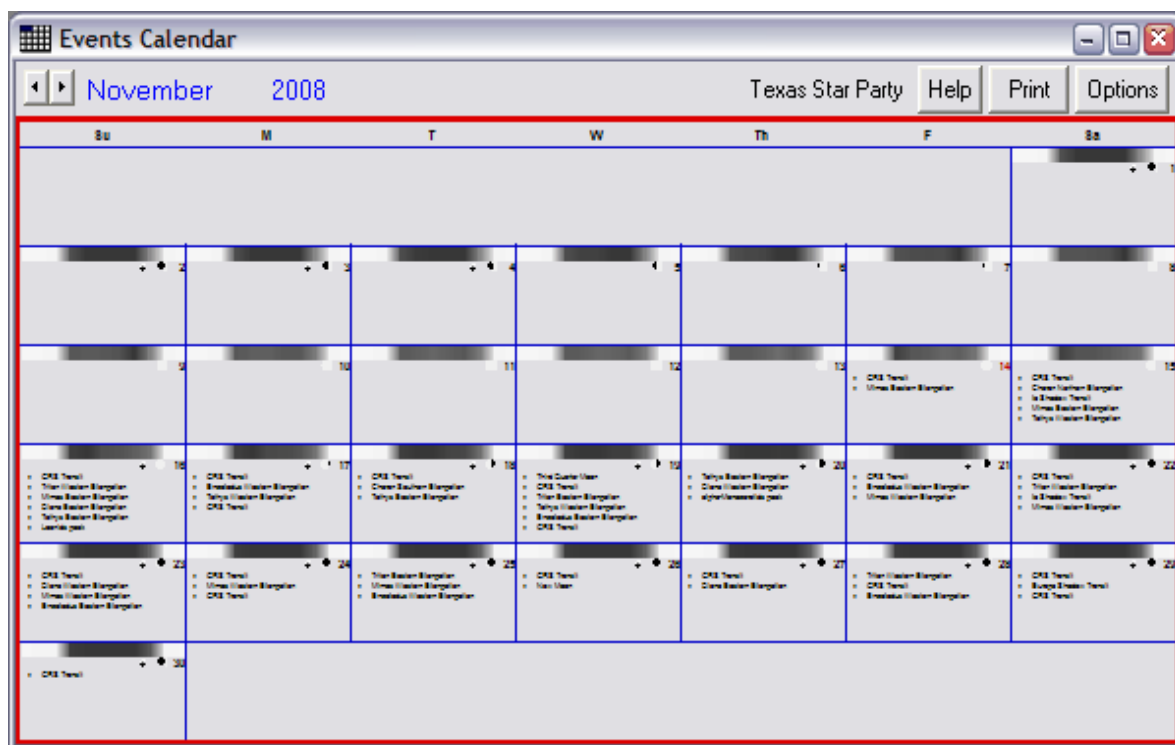


Events will be computed for the number of calendar months indicated into the future. If you wish, you may have events automatically deleted from the event list as they occur (or after an appropriate waiting period).

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The Events Calendar

This calendar provides a handy way to keep track of upcoming events and to plan the month's observations.



Month/Year

The current month will be displayed by default. To select another year click on the year hypertext (2008 above). To select another month, either click on the month hypertext or click one of the arrow buttons to move ahead/back by one month.

Location

The location is inherited from the Nightly Planner or Real Time tool.

Calendar

Note that these are calendar nights rather than calendar days. Each night begins at noon and end at noon the next day. The date is that of the evening portion of the night. As an example, the 12th above is the night of the 12/13th.

Each night has it's own little *NightBar* to give you an idea of when the dark portion of each night will fall. As on the other NightBars, noon is on the left and right with midnight at the center.

The *moon phase* appears just to the left of the day number. The events computed for that night are listed in the space below.

A telescope icon appears in those nights that are good for observing. You may customize the display of the icon via the options button.

Open a Night in the Nightly Events Planner

Double-click on a night to open it in the [Nightly Events Planner](#).

Options

Click this button to define when the good nights to observe telescope icon will appear.

Print

Click this button to print the calendar.

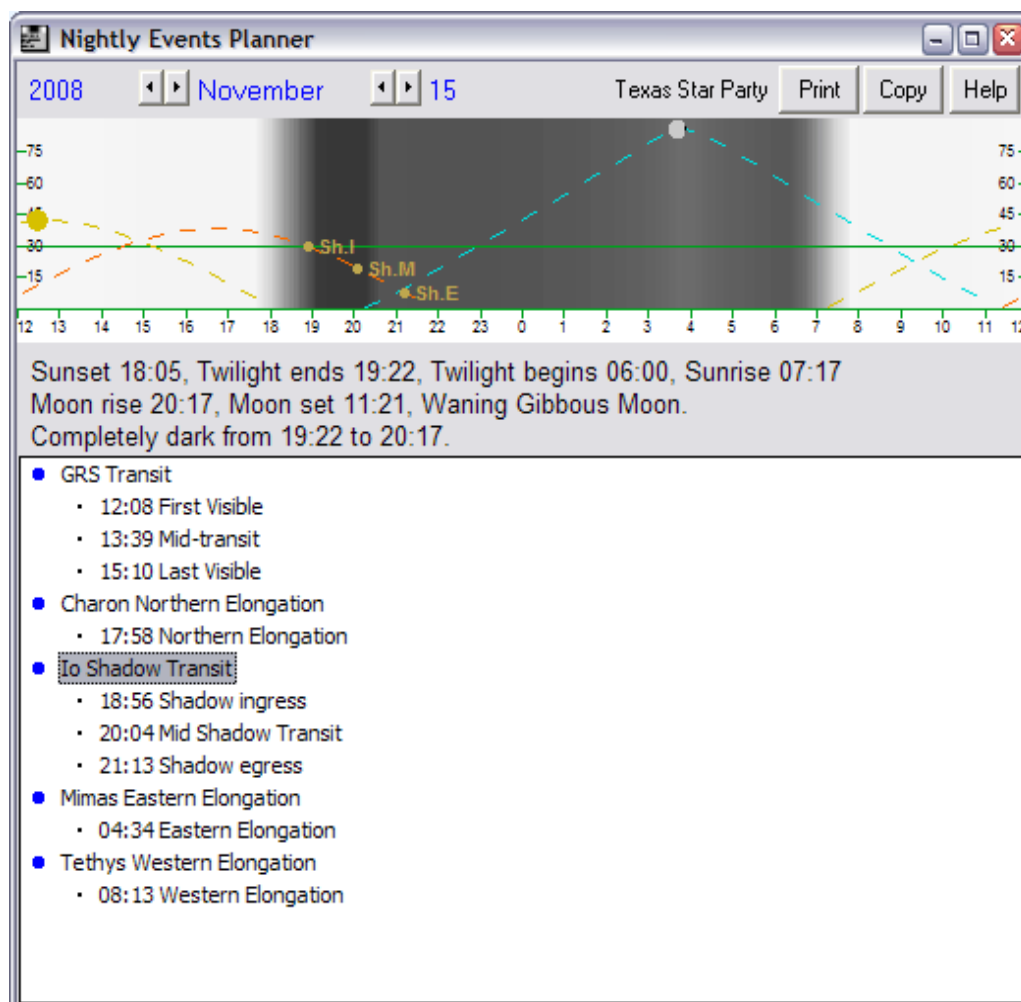
Why are there no events on my calendar?

This tool displays events that are computed via the Current Events tool. You must first generate the events using that tool. Also note that the current events tool generates events for the near future only.

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The Nightly Events Planner

This tool displays the NightBar for a given night, a summary of the night, and lists the events that have been computed via the *Current Eventstool*.



Night

The night defaults from the Nightly Planner or Real Time tool.

To change the year click on the year hypertext (2008 above). To change the month either click on the month hypertext or click the arrow buttons to move ahead/back by a month. To change the date either click on the day hypertext or click the arrow buttons to move ahead/back by one day.

Important: this planner is for a *Night* - a period of time that starts at noon and ends at noon. The date indicated is the date of evening. E.g. the 12th is the night of 12/13.

Location

The observing location is inherited from the Nightly Planner or Real Time tool.

NightBar

As for the Nightly Planner and Real Time tools the altitude of the Sun (yellow line) and Moon (green line) are drawn on the NightBar as a function of time. The darkness of the sky is drawn in the background.

Event List

Each event is listed in a tree indicated with a blue dot. The circumstances of each event are listed below it. Click on an event or circumstance to see it plotted on the NightBar. The red dashed line indicates the altitude of the object associated with the event. The circumstances of the event are indicated by yellow dots (and labeled).

In the example above a shadow transit of Jupiter's moon Io is selected. The red dashed line indicates the altitude of Jupiter. The ingress (or start) of the shadow transit occurs just as twilight ends (indicated by the label Sh. I on the altitude line). Mid-transit occurs after 8 PM (marked by Sh. M). The transit ends (egress) after moonrise and with Jupiter low in the sky (Sh. E). As you can see, this feature takes the guesswork out of knowing what the visibility of an event will be like.

You can also select a single circumstance (such as Transit ingress) to see it plotted on the NightBar.

Why are there no events on my planner?

This tool displays events that are computed via the Current Events tool. You must first generate the events using that tool. Note that the current events tool generates events for the near future only.

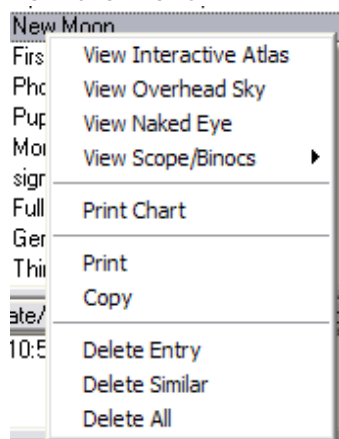
Click Print to print the summary and event list, or Copy to copy it to the clipboard (Paste it into your favorite word processor).

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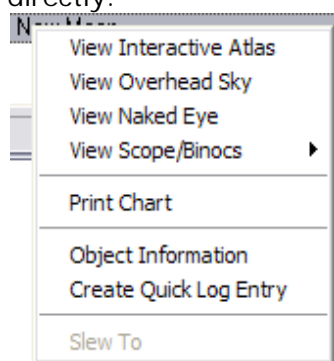
Making Charts for Events

SkyTools can automatically create a chart for an event, creating object trails and traces as appropriate. For instance, a chart for a solar eclipse will show the position of the moon at each contact.

To create a chart for an entire event, right-click on an event and select the appropriate chart from the menu.



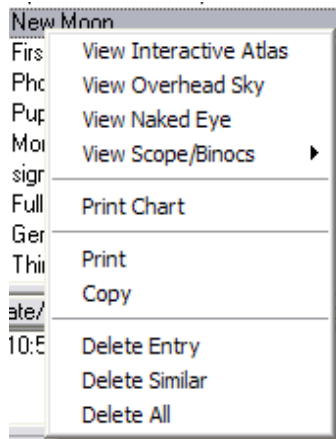
To create a chart for a particular event circumstance (e.g. for mid-shadow transit of Io) select the event in the event list (left window) then right-click on the circumstance in the bottom window. Choose the appropriate on-screen chart from the menu, or select Print to print a chart directly.



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Deleting Events

To clear the entire event list click the **Clear** button. Alternately, right-click on any event and select **Delete All** from the menu.



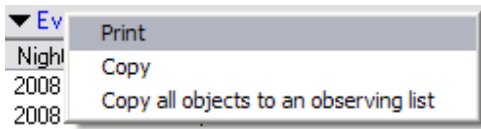
To delete a single event right-click on it and select **Delete Entry** from the menu.

To remove unwanted clutter right-click on an event and select **Delete Similar**. This will delete the event and all those like it. For instance, if you select a solar eclipse, all solar eclipses will be deleted from the list.

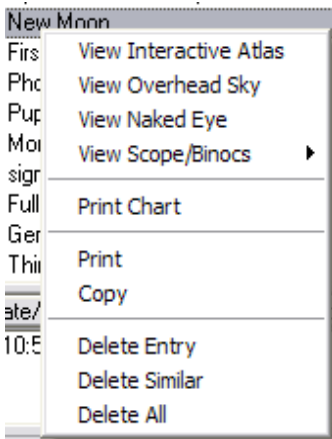
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Printing Events

To print the entire event list, click the *Events* menu and select Print.



To print the circumstances of a single event, right-click on the event and select Print from the menu.

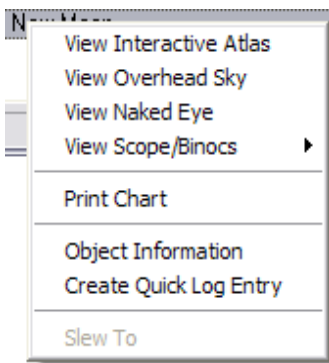


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Creating a Log Entry for an Event

Each event breaks down into one or more circumstances. E.g. a solar eclipse breaks down into first contact, second contact, mi-eclipse, etc. These circumstances are listed in the bottom window.

To create a log entry for one of these circumstances, right-click on it and select **Create Log Entry** from the menu.

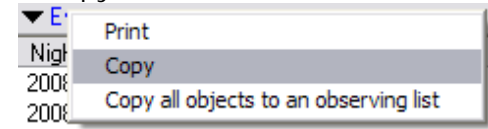


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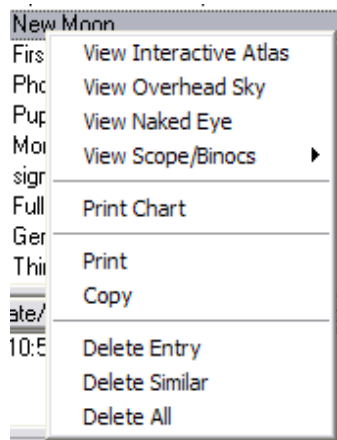
Copying Events to the Clipboard

Events can be copied to the clipboard for pasting into any word processing program. Tabular data is tab-delimited. Many word processing programs can create tables from this tabular data (see the *Help* for your word processing program).

To copy the entire event list, click the *Events* menu and select *Copy*.



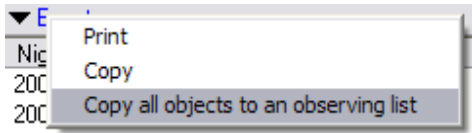
To copy the circumstances of a single event, right-click on the event and select *Copy* from the menu.



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Copy All Objects to an Observing List

To create an observing list containing every object in the event list click the *Events* menu and select *Copy all objects to an observing list*.



You will be prompted to select the observing list to add the objects to.

Every unique object in the event list will be places in the new observing list.

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Special Events

Overview

Astronomical events are interesting happenings in the sky that occur at a specific moment in time, or over a finite period of time. The Special Events tool is for investigating astronomical events that occurred in the past or distant future as seen from the specified location. For investigating events that will occur in the near future use the Current Events tool.

Types of Events

SkyTools can search for events of the following types:

- Appulses - when two objects pass closely in the sky
- Occultations - when one object blocks our view of another
- Transits - when one object appears to pass across the face of another
- Solar Eclipses - when the moon passes in front of the sun
- Lunar Eclipses - when the moon passes through the shadow of the earth
- Lunar phases - such as new, first quarter, full, etc.
- Meteor showers - the peak time of the shower
- Planetary phenomena such as oppositions, conjunctions and greatest elongations
- Jupiter satellite events such as transits, occultations, eclipses, and shadow transits
- Elongations of planetary satellites - the time when they are farthest from the planet
- Jupiter Great Red Spot transits - the period of time the GRS is visible

Event List

Events are computed for a period of time from a starting date. Each event is listed in the window on the left side of the dialog. If an event is selected from the list its circumstances are displayed in the window at the bottom of the dialog. For instance, a solar eclipse may be listed on the left as an event on a certain date. If you select the solar eclipse the times of each contact are listed at the bottom. These contact times, *circumstances*, divide the event into specific moments in time.

The list of events can be printed or copied to the clipboard via the Events menu.

Each event can be plotted on a chart via a right-click on the event. Similarly, a specific circumstance can be plotted on a chart via a right-click on the circumstance. Other functions can be accessed similarly, such as creating a log entry for an event.

Additional Topics

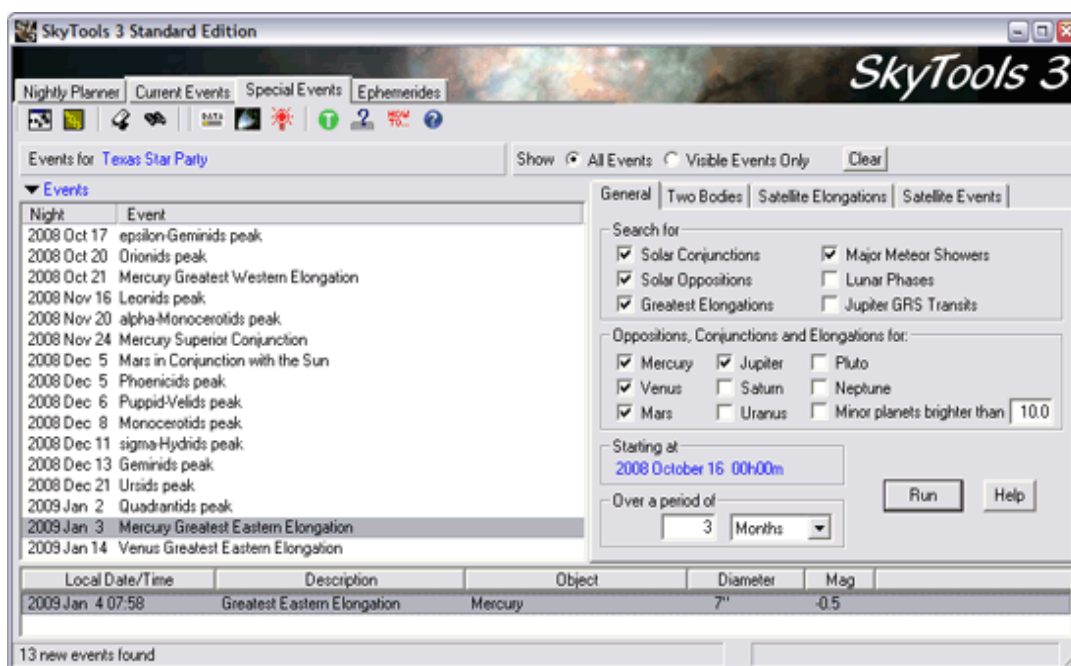
[The Special Events Tool](#)

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The Special Events Tool

The Special Events function is very similar to the Current Events function except that it can be used for any range of dates, making it appropriate for historical astronomical events or extended searches for future astronomical events. Unlike Current Events, these events are *not*

available on the Event Calendar or Nightly Events Planner.



To create a list of events, select the appropriate tab, make your selections, and click **Compute**.

A summary of each of the events discovered is listed in the left window. This event list is always in time order. Select an entry to see its details (also called circumstances) listed in the bottom window. Click one of the column headings in the bottom window to sort the circumstance list in the appropriate order for that column.

To limit the display of events reported to only those that are visible from the selected location select the *Visible Events Only* radio button. Note that this selection does not affect what is reported when you run a search: it only affects what is displayed. To see all of the events reported select the *All Events* radio button.

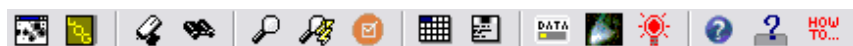
To clear the event list click **Clear**.

All of the event searches have in common a range of dates:

- To set the starting date for the search click on the hypertext date under the *Starting at* property and enter the date you want.
- To set the period of time to search over, enter a number under the *Over a period of* property. Select a unit for this number via the pull-down menu to the right. The choices of units are *years*, *months*, *weeks* and *day*.

The Tool Bar

This is where you click to start the various tools, configure the program, and start the help system. None of these tool buttons is directly related to the Special Events tool.



- The Interactive Chart Tool is the old fashioned, direct way to make charts. Click here to open the last chart viewed.
- The Observing Log Browser button starts the observing log browser. Use this when you want to browse log entries by category or to perform a filtered search of your log entries.

- Use Add/Modify Scope or Add/Modify Binoculars to enter the information for the telescope(s) and binoculars you observe with. Once defined, custom simulations charts will be created for the instruments you enter here.
- The Designation Search Tool is used to add objects to observing lists by name or designation.
- The Database Power Search Tool is used to search the SkyTools databases for objects to add to your observing lists.
- The Nightly Observing List Generator is used to create special observing lists for a specific night, telescope, and observing location.
- The Events Calendar displays a monthly event calendar with events that have been discovered via the *Current Events* tool.
- The Nightly Events Planner displays the events discovered by the *Current Events* tool for a single night.
- The Data Manager is the tool used to backup/restore/Sync user data, import/share user data, and manage your data such as object notes, images, web links, plottable images, and supplemental databases.
- The SkyTools Preferences button is used to set global preferences, view your serial number and version information, register your copy of SkyTools, send instant feedback to Skyhound, and to change the database install level.
- Click on the Night Vision button to toggle the red night vision mode on and off. This mode changes all windows on your desktop to shades of red and blanks the desktop background (including icons). The original settings are restored when the program exits.
- Help Contents brings up the contents of this help system.
- The Tab Help button takes you directly to the help for the current selected tab.
- The Help System How To... button brings up the handy How To... help part of the help system. Use this to quickly find out how to do specific operations.

Event Controls

[General Tab](#)

[Two Bodies Tab](#)

[Satellite Elongations Tab](#)

[Satellite Events Tab](#)

Additional Functions

[Making Charts for Events](#)

[Deleting Events](#)

[Printing Events](#)

[Copying Events to the Clipboard](#)

[Copy All Objects to an Observing List](#)

[Creating a Log Entry for an Event](#)

General Tab

This tab includes searches for lunar phases, major meteor showers, Great Red Spot of Jupiter transits, and planetary phenomena such as oppositions and solar conjunctions.

The screenshot shows the 'General' tab selected in the SkyTools 3 software. The interface includes several sections for configuring a search:

- Search for:** A group box containing six checkboxes:
 - ☒ Solar Conjunctions
 - ☒ Solar Oppositions
 - ☒ Greatest Elongations
 - ☒ Major Meteor Showers
 - ☒ Lunar Phases
 - ☐ Jupiter GRS Transits
- Oppositions, Conjunctions and Elongations for:** A group box containing checkboxes for various celestial bodies and a magnitude limit:
 - ☐ Mercury
 - ☐ Venus
 - ☐ Mars
 - ☐ Jupiter
 - ☒ Saturn
 - ☐ Uranus
 - ☐ Pluto
 - ☐ Neptune
 - ☐ Minor planets brighter than
- Starting at:** A text field containing the date and time [2008 November 3 00h00m](#).
- Over a period of:** A text field containing the number followed by a dropdown menu set to 'Years'.
- Buttons:** 'Compute' and 'Help' buttons are located at the bottom right of the search area.

Search for

Select the types of search from:

- Solar Conjunctions - when an object is in conjunction with the Sun. This occurs when the object comes closest to the Sun as seen from the Earth. Select the objects to include in the search below. Does not apply to minor planets.
- Solar Oppositions - when an object is in the opposite direction of the Sun as seen from the Earth. This is the best time to observe objects that lie farther away from the Sun than the Earth (Venus and Mercury never have oppositions). Select the objects to include in the search below.
- Greatest Elongations - when an object that orbits closer to the Sun than the Earth appears to be at its greatest distance from the Sun. Greatest elongations can occur to the west or the east of the Sun and are labeled as such. This option is only really useful for Venus and Mercury and represents the best dates to observe them. Select the objects to include in the search below. Does not apply to minor planets.
- Major Meteor Showers - when a major meteor show reaches its peak. This option is independent of the objects selected.
- Lunar Phases - when the phases of the moon (first quarter, full, etc.) occur. This option is independent of the objects selected.
- Jupiter GRS Transits - when the Great Red Spot of Jupiter transits across the face of the planet.

Oppositions, Conjunctions and Elongations for:

These are the object to include in searches for solar conjunctions, solar oppositions, and greatest elongations. Choices include primary solar system objects and minor planets brighter than a specific magnitude limit. The latter is useful for listing the times when a minor planet comes to opposition; opposition is when an outer planet or minor planet is best observed.

Starting at

Select a start date/time by clicking on the date/time hypertext.

Over a period of

Enter the duration of your search. Select the appropriate units for the duration by clicking on the hypertext menu.

Once your selections have been made, clickCompute.

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Two Bodies Tab

This tab allows you to search for eclipses, occultations, transits and appulses between any two objects.

Search for

Select the type of search you wish to make:

- Solar Eclipses - when the Moon passes in front of the Sun, blocking some of its light as seen from the location selected.
- Lunar Eclipses - when the Earth passes between the Sun and Moon, blocking some of the Sun's illumination of the Moon.
- Occultations - when a larger object passes in front of a smaller one, completely blocking it from view.
- Transits - when a smaller object passes in front of a larger one. In this case we see the smaller object silhouetted on the larger one.
- Appulses - when two bodies come closest together in the sky as seen from a particular location on earth. Enter a minimum separation (in degrees). Only those appulses that bring the two objects within this minimum separation will be reported.

Between

This selection applies to appulses only. Choose the two objects you wish to search for appulses between. Click on the hypertext name of each object in turn and select an object from the Object Requestor.

Starting at

Select a start date/time by clicking on the date/time hypertext.

Over a period of

Enter the duration of your search. Select the appropriate units for the duration by clicking on the hypertext menu.

Acceptable Viewing Conditions

The top pull-down menu selects the minimum altitude of the object to be considered observable. Choices include:

- Above or Below Horizon - this is the null choice (all events are passed regardless of their altitude).

- Above Perfect Horizon Only - will only report those events that occur above the perfect horizon (this is the horizon the observer would see if there were no mountains, buildings, trees or other obstructions in the way).
- Above Obstructed Horizon Only - will only report those events that occur above the obstructed horizon as seen from the location selected. Note that an obstructed horizon must be defined for this location or this selection will return the same results to *Above Perfect Horizon Only*.
- Above 2X (Airmass) only - will only report those events that occur above two airmass (about 30 degrees above the horizon). This is generally the minimum altitude for a good view.
- Near Maximum Altitude - will only report those events that occur when the object is within 2/3 of its maximum altitude. Use this filter for far southern objects (or far northern objects for southern-hemisphere observers) that never rise above two airmass.
- Above 2X & Near Max Alt - will only report events that occur when the object is both above two Airmass and within 2/3 of its maximum altitude.
- Above 2X or Near Max Alt - will only report events that occur when the object is above two Airmass *or* within 2/3 of its maximum altitude.

The second pull-down menu selects the minimum sky darkness to be considered observable. Choices include:

- Day or Night - this is the null condition. All events will be passed regardless of how bright the sky is.
- Twilight/Moonlight OK - will only report events that occur in twilight or complete darkness. Events that occur in broad daylight are excluded.
- Complete Darkness Only - will only report events that occur in complete darkness.

Report Only If - allows you to select a range of times. Events must occur, and meet the other criteria, in this time range to be reported. For instance, if you go to be at 1:00 AM you could set the *Visible Before* time to 1:00 AM to exclude all events that occur after that time.

- Visible After - this field will be ignored unless it is checked. If checked, enter a time to the right. Only events that occur after this time will be reported. By after, we mean that any event that occurs between the time selected here and the time selected under *Visible Before* will be reported. If *Visible Before* is not set then any event that occurs between the time selected here and noon the next day will be reported.
- Visible Before -- this field will be ignored unless it is checked. If checked, enter a time to the right. Only events that occur before this time will be reported. By before, we mean any event that occurs between the time selected under *Visible After* and the time selected here will be reported. If *Visible After* is not set then any event that occurs between noon that day and the time selected here will be reported.

Once your selections have been made, click Compute.

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Satellite Elongations Tab

Use this tab to search for times when planetary satellites are at maximum elongation (farthest from the planet).

Satellites (or moons) that orbit other planets often orbit such that they spend some of their time close to the parent planet and some of their time farther away. In many cases these satellites are best viewed when they are farthest from the planet. These occasions are called elongations.

This function can be particularly useful for observing the moons of Mars, the inner satellites of Saturn. For those looking for a challenge try tiny Amalthea, or the distant moons Himalia and Phoebe. For those looking for a *real* challenge, there is also Pluto's moon, Charon.

For these satellites

Select the satellites that you wish to compute elongations for.

Starting at

Select a start date/time by clicking on the date/time hypertext.

Over a period of

Enter the duration of your search. Select the appropriate units for the duration by clicking on the hypertext menu.

Acceptable Viewing Conditions

The top pull-down menu selects the minimum altitude of the object to be considered observable. Choices include:

- Above or Below Horizon - this is the null choice (all events are passed regardless of their altitude).
- Above Perfect Horizon Only - will only report those events that occur above the perfect horizon (this is the horizon the observer would see if there were no mountains, buildings, trees or other obstructions in the way).
- Above Obstructed Horizon Only - will only report those events that occur above the obstructed horizon as seen from the location selected. Note that an obstructed horizon must be defined for this location or this selection will return the same results to *Above Perfect Horizon Only*.
- Above 2X (Airmass) only - will only report those events that occur above two

airmass (about 30 degrees above the horizon). This is generally the minimum altitude for a good view.

- Near Maximum Altitude - will only report those events that occur when the object is within 2/3 of its maximum altitude. Use this filter for far southern objects (or far northern objects for southern-hemisphere observers) that never rise above two airmass.
- Above 2X & Near Max Alt - will only report events that occur when the object is both above two Airmass and within 2/3 of its maximum altitude.
- Above 2X or Near Max Alt - will only report events that occur when the object is above two Airmass *or* within 2/3 of its maximum altitude.

The second pull-down menu selects the minimum sky darkness to be considered observable.

Choices include:

- Day or Night - this is the null condition. All events will be passed regardless of how bright the sky is.
- Twilight/Moonlight OK - will only report events that occur in twilight or complete darkness. Events that occur in broad daylight are excluded.
- Complete Darkness Only - will only report events that occur in complete darkness.

Report Only If - allows you to select a range of times. Events must occur, and meet the other criteria, in this time range to be reported. For instance, if you go to be at 1:00 AM you could set the *Visible Before* time to 1:00 AM to exclude all events that occur after that time.

- Visible After - this field will be ignored unless it is checked. If checked, enter a time to the right. Only events that occur after this time will be reported. By after, we mean that any event that occurs between the time selected here and the time selected under *Visible Before* will be reported. If *Visible Before* is not set then any event that occurs between the time selected here and noon the next day will be reported.
- Visible Before -- this field will be ignored unless it is checked. If checked, enter a time to the right. Only events that occur before this time will be reported. By before, we mean any event that occurs between the time selected under *Visible After* and the time selected here will be reported. If *Visible After* is not set then any event that occurs between noon that day and the time selected here will be reported.

Once your selections have been made, click **Compute**.

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Satellite Events Tab

Use this tab to search for events involving Jupiter's satellites, such as transits, eclipses, occultations, and shadow transits.

The screenshot shows the 'Satellite Events' tab in the SkyTools 3 software. The interface includes several sections:

- Events:** A group box containing four checkboxes: 'Transit' (unchecked), 'Shadow Transit' (checked), 'Eclipse' (unchecked), and 'Occultation' (unchecked).
- For these satellites of Jupiter:** A group box containing four checkboxes: 'Io' (checked), 'Europa' (checked), 'Ganymede' (checked), and 'Callisto' (checked).
- Acceptable viewing conditions:** Two pull-down menus. The first is set to 'Above or Below Horizon' and the second to 'Day or Night'.
- Report only if:** Two checkboxes, 'Visible After' and 'Visible Before', each followed by a time input field. 'Visible After' is set to '18h00' and 'Visible Before' is set to '06h00'.
- Starting at:** A text field displaying '2008 November 3 00h00m' in blue, indicating it is a clickable hyperlink.
- Over a period of:** A text field with the number '1' and a pull-down menu set to 'Years'.
- Buttons:** 'Compute' and 'Help' buttons are located at the bottom right.

Jupiter's satellites (moons) often peek in and out of Jupiter's shadow, cross in front of the giant planet, and cast their shadow on it. These events can be dramatic in the telescope. This tab allows you to list the times these events will occur.

Events

Select the types of events to search for. Types of events include:

- Transit - when a satellite passes in front of Jupiter and can be seen silhouetted upon it.
- Shadow Transit - when a satellite casts its shadow on Jupiter.
- Eclipse - when a satellite passes behind the limb of Jupiter.
- Occultation - when a satellite passes into Jupiter's shadow.

These events often occur in stages. Ingress refers to the time the event begins. Egress refers to the time the event ends.

For these satellites of Jupiter

Select the satellites to include in the search.

Starting at

Select a start date/time by clicking on the date/time hypertext.

Over a period of

Enter the duration of your search. Select the appropriate units for the duration by clicking on the hypertext menu.

Acceptable Viewing Conditions

The top pull-down menu selects the minimum altitude of the object to be considered observable. Choices include:

- Above or Below Horizon - this is the null choice (all events are passed regardless of their altitude).
- Above Perfect Horizon Only - will only report those events that occur above the

perfect horizon (this is the horizon the observer would see if there were no mountains, buildings, trees or other obstructions in the way).

- Above Obstructed Horizon Only - will only report those events that occur above the obstructed horizon as seen from the location selected. Note that an obstructed horizon must be defined for this location or this selection will return the same results to *Above Perfect Horizon Only*.
- Above 2X (Airmass) only - will only report those events that occur above two airmass (about 30 degrees above the horizon). This is generally the minimum altitude for a good view.
- Near Maximum Altitude - will only report those events that occur when the object is within 2/3 of its maximum altitude. Use this filter for far southern objects (or far northern objects for southern-hemisphere observers) that never rise above two airmass.
- Above 2X & Near Max Alt - will only report events that occur when the object is both above two Airmass and within 2/3 of its maximum altitude.
- Above 2X or Near Max Alt - will only report events that occur when the object is above two Airmass *or* within 2/3 of its maximum altitude.

The second pull-down menu selects the minimum sky darkness to be considered observable.

Choices include:

- Day or Night - this is the null condition. All events will be passed regardless of how bright the sky is.
- Twilight/Moonlight OK - will only report events that occur in twilight or complete darkness. Events that occur in broad daylight are excluded.
- Complete Darkness Only - will only report events that occur in complete darkness.

Report Only If - allows you to select a range of times. Events must occur, and meet the other criteria, in this time range to be reported. For instance, if you go to be at 1:00 AM you could set the *Visible Before* time to 1:00 AM to exclude all events that occur after that time.

- Visible After - this field will be ignored unless it is checked. If checked, enter a time to the right. Only events that occur after this time will be reported. By after, we mean that any event that occurs between the time selected here and the time selected under *Visible Before* will be reported. If *Visible Before* is not set then any event that occurs between the time selected here and noon the next day will be reported.
- Visible Before -- this field will be ignored unless it is checked. If checked, enter a time to the right. Only events that occur before this time will be reported. By before, we mean any event that occurs between the time selected under *Visible After* and the time selected here will be reported. If *Visible After* is not set then any event that occurs between noon that day and the time selected here will be reported.

Once your selections have been made, click **Compute**.

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Ephemerides

Overview

An ephemeris is a list of positions and other data generated for a moving astronomical object at regular intervals. SkyTools can generate a traditional position ephemeris, an innovative nightly optimum viewing time ephemeris, and long period binary star orbit ephemeris.

To generate an ephemeris, make your selections via the [controls](#) and click Compute. The resulting ephemeris is listed in the [results](#).

The ephemeris results can be sorted, printed, copied to the clipboard for pasting into other applications, viewed in a chart, or displayed as thumbnails. The Ephemeris menu has options that apply to the entire ephemeris. Right-click on an entry in the ephemeris results to see a menu for options with respect to that moment in time.

Position Ephemeris

A position ephemeris lists the position and other data at regular intervals for a solar system object such as a planet or comet. When this ephemeris is plotted on a chart, the object is trailed, indicating its path over the duration of the ephemeris. When viewed in the thumbnail viewer the object is displayed in a separate thumbnail at each ephemeris position.

Nightly Optimum Viewing Ephemeris

SkyTools can compute the optimum time to visually observe an object on a nightly basis. Many factors are considered in this computation, including the altitude of the object, the brightness of the sky, and the brightness of the object. Each line in this ephemeris is a different night. Data is displayed for the object at the optimum time computed for that night. If the object is not deemed to be visually detectable on that night, no result is displayed, thus there can be gaps in the ephemeris.

Although useful for any solar system object, this ephemeris can be particularly useful for comets because they tend to hug the horizon and/or pass close to the sun. The best time to observe the comet can move from sunset to sunrise or vice versa. With this ephemeris the best nights to observe a comet can become clear as well as the best time to observe on each night. By sorting the ephemeris on the *visibility* or *visual difficulty* columns the best nights to observe the comet will be placed at the top.

When this ephemeris is plotted on a chart the object is traced; the position of the object is indicated for each night over the duration of the ephemeris. When viewed in the thumbnail viewer the object is displayed in a separate thumbnail at each (nightly) ephemeris position.

Observing tip: if you are going to be away from your computer for a period of time, such as a trip or vacation, but want to keep tabs on a comet while you are gone, printing a comet ephemeris on a chart. Enable the trace labels so the date/time is indicated for each position plotted on the chart. Take the chart with you and refer to it each night you wish to observe. The comet will be plotted at the best time to view it each night and the best time will be indicated.

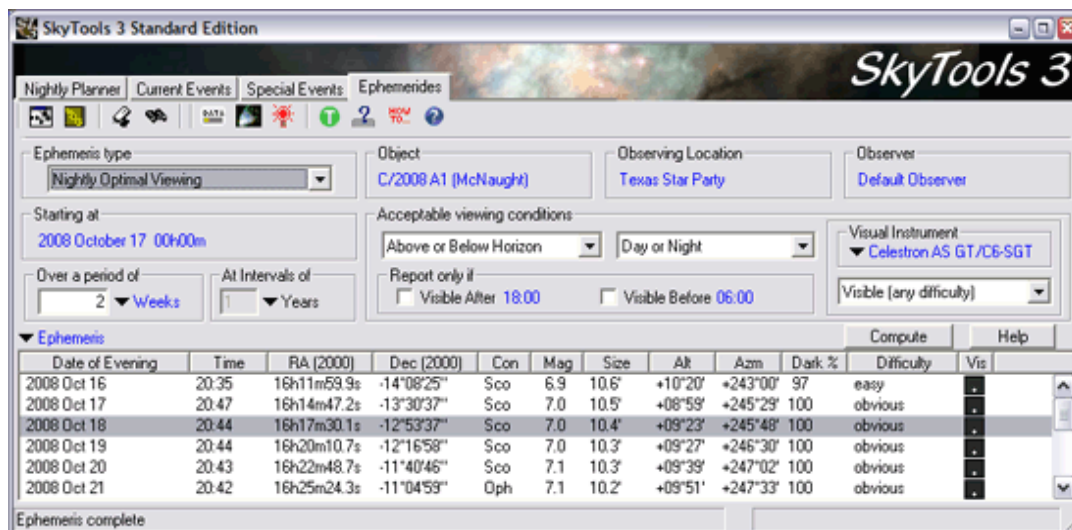
Long Period Binary Ephemeris

The ephemeris plots the apparent separation and position angle for a long period binary star pair. It can be useful for seeing if a pair is closing or widening and for determining when the best years will be to observe it. When plotted on a chart the position of the component star is trailed with respect to the primary, creating an arc of motion over the duration of the ephemeris. When viewed in the thumbnail viewer the stars are displayed relative to one another in a separate thumbnail at each ephemeris position.

[Using The Ephemeris Tool](#)

The Ephemerides Tool

This tool generates three types of ephemerides: simple positions, nightly optimum viewing times, and binary star orbit positions.



The Tool Bar

This is where you click to start the various tools, configure the program, and start the help system. None of these tools is directly related to the Ephemerides tool.



- The Interactive Chart Tool is the old fashioned, direct way to make charts. Click [here](#) to open the last chart viewed.
- The Observing Log Browser button starts the observing log browser. Use this when you want to browse log entries by category or to perform a filtered search of your log entries.
- Use Add/Modify Scope or Add/Modify Binoculars to enter the information for the telescope(s) and binoculars you observe with. Once defined, custom simulations charts will be created for the instruments you enter here.
- The Designation Search Tool is used to add objects to observing lists by name or designation.
- The Database Power Search Tool is used to search the SkyTools databases for objects to add to your observing lists.
- The Nightly Observing List Generator is used to create special observing lists for a specific night, telescope, and observing location.
- The Events Calendar displays a monthly event calendar with events that have been discovered via the *Current Events* tool.
- The Nightly Events Planner displays the events discovered by the *Current Events* tool for a single night.
- The Data Manager is the tool used to backup/restore/Sync user data, import/share user data, and manage your data such as object notes, images, web links, plottable images, and supplemental databases.
- The SkyTools Preferences button is used to set global preferences, view your serial

number and version information, register your copy of SkyTools, send instant feedback to Skyhound, and to change the database install level.

- Click on the Night Vision button to toggle the red night vision mode on and off. This mode changes all windows on your desktop to shades of red and blanks the desktop background (including icons). The original settings are restored when the program exits.
- Help Contents brings up the contents of this help system.
- The Tab Help button takes you directly to the help for the current selected tab.
- The Help System How To... button brings up the handy How To... help part of the help system. Use this to quickly find out how to do specific operations.

Primary Topics

[Ephemeris Controls](#)

[Ephemeris Results](#)

Additional Topics

[Sort the Ephemeris](#)

[View/Print a Chart for the Ephemeris](#)

[Print an Ephemeris](#)

[Copy an Ephemeris to the Clipboard](#)

[Create a Log Entry for an Ephemeris Entry](#)

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Controls

Make your selections here to create a custom ephemeris. Once your selections have been made click Compute to generate the ephemeris.

Ephemeris Type

Select the type of ephemeris to generate. A position ephemeris lists data for the object at regular intervals. An nightly optimum viewing ephemeris lists data at the optimum time to observe daily, and a Binary Star orbit ephemeris lists data for a long period double star pair at regular intervals.

Object

Next click on the [hypertext](#) under the Object heading and select an object via the Object Requestor. For position and nightly optimum view ephemerides this should be a moving object such as a planet, minor planet, or comet.

For a binary star orbit ephemeris the object must be a long-period binary star pair with orbit. On the Object Requestor dialog select a component star marked with Orbit from the Double-star Pair pull-down menu.

Observing Location

Select a location by clicking on the [hypertext](#) under the Observing Location heading. Nightly Optimal Viewing and Binary Star Orbit ephemerides must be generated for a particular location on Earth. The Position ephemeris can optionally be generated for the center of the Earth (Geocentric).

Observer

Select an observer via the [hypertext](#) under the Observer heading. The observer is used in conjunction with the Visual Instrument and visual difficulty filter.

Starting Date/Time

Select a starting date and time for the ephemeris by clicking on the [hypertext](#) under the Starting at heading.

Period and Interval

Enter the duration of the ephemeris under the Over a period of heading. Select the appropriate units for the duration from the menu to the right.

Enter the interval of time at which to list each line of data in the ephemeris under the At Intervals of heading. Select the appropriate units for the interval from the menu to the right. The Nightly Optimum Viewing ephemeris has a fixed interval of one day.

Acceptable viewing conditions

Select a set of minimum visibility criteria:

The left pull-down menu selects the minimum altitude of the object to be considered observable.

Choices are:

- Above or Below Horizon - this is the null choice (all data points are passed regardless of their altitude).
- Above Horizon Only - will only list those data points that occur above the horizon. If an obstructed horizon is enabled for the observing location the obstructed horizon will be used. Otherwise the perfect horizon is used.
- Above 2X (Airmass) only - will only list those data points that occur above two airmass (about 30 degrees above the horizon). This is generally the minimum altitude for a good view.
- Near Maximum Altitude - will only list those data points that occur when the object is within 2/3 of its maximum altitude. Use this filter for far southern objects (or far northern objects for southern-hemisphere observers) that never rise above two airmass.
- Above 2X & Near Max Alt - will only list data points that occur when the object is both above two Airmass and within 2/3 of its maximum altitude.
- Above 2X or Near Max Alt - will only list data points that occur when the object is both above two Airmass and within 2/3 of its maximum altitude.

The right pull-down menu selects the minimum sky darkness to be considered observable. Choices are:

- Day or Night - this is the null condition. All data points will be listed regardless of how bright the sky is.
- Twilight/Moonlight OK - will only list data points that occur in twilight or complete darkness. Events that occur in broad daylight are excluded.
- Complete Darkness Only - will only list data points that occur in complete darkness.

Report Only If - allows you to select a range of times. Data points must meet the visibility criteria in this time range to be listed. For instance, if you go to bed at 1:00 AM you could set the Visible Before time to 1:00 AM to exclude all data points that occur after that time.

Visible After - this field will be ignored unless it is checked. If checked, enter a time to the right. Only data points that meet the visibility criteria after this time will be listed. By after, we mean that any data point that occurs between the time selected here and the time selected under Visible Before will be listed. If Visible Before is not set then any data point that occurs between the time selected here and noon the next day will be reported.

Visible Before -- this field will be ignored unless it is checked. If checked, enter a time to the right. Only data points that meet the visibility criteria before this time will be reported. By before, we mean any data point that occurs between the time selected under Visible After and the time selected here will be listed. If Visible After is not set then any data point that occurs between noon that day and the time selected here will be listed.

Visual Instrument and Difficulty Filter

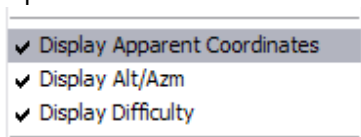
Select an instrument via the menu. Select a minimum visual detection difficulty level. Choices are:

- Ignore Difficulty - this is the null condition. All data points will be listed regardless of visual difficulty.
- Visible (any difficulty) - the object must be deemed visible at any level of difficulty to the selected observer in the selected instrument to be listed.
- Obvious - the object must be rated as obvious to the selected observer in the

selected instrument to be listed.

- Easy - the object must be rated as easy or obvious to the selected observer in the selected instrument to be listed.
- Detectable - the object must be rated as at least detectable to the selected observer in the selected instrument to be listed.
- Challenging - the object must be rated as challenging (or easier) to the selected observer in the selected instrument to be listed.
- Very Challenging - the object must be rated as very challenging (or easier) to the selected observer in the selected instrument to be listed. This selection is functionally equivalent to Visible (at any difficulty).

Optional Columns



Some columns are optional and can be enabled/disabled via the Ephemeris hypertext menu. If Display Apparent coordinates is enabled apparent coordinates will be listed rather than J2000 coordinates. If Display Alt/Az is enabled altitude and azimuth columns will be displayed. If Display Difficulty is enabled the visual difficulty column will be displayed.

[Ephemeris Results](#)

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Results

The ephemeris is displayed in the listbox at the bottom of the window.

Position Ephemeris

This is the classic ephemeris: a list of positions for a moving object at a specific time interval. The columns displayed depend on the type object.

Local Date/Time	RA (Ap)	Dec (Ap)	Con	Rs	Re	Elon	Size	Mag	Tail %	Difficulty	Vis
2008 Oct 1 19:00	15h23m44.5s	-24°23'35"	Lib	1.07	1.50	46	11.8'	6.5	33%	not visible	
2008 Oct 1 20:00	15h23m54.0s	-24°21'45"	Lib	1.07	1.50	46	11.8'	6.5	33%	easy	
2008 Oct 1 21:00	15h24m03.5s	-24°19'56"	Lib	1.07	1.50	46	11.8'	6.5	33%	not visible	

Columns and their meanings:

- Local Date/Time -- the date and time for the data point.
- RA/Dec (J2000) -- Right Ascension and Declination referred to the J2000 equinox.
- RA/De (Ap) -- Right Ascension and Declination referred to the equinox of the current date.
- Con -- the constellation the object is currently in.
- Difficulty -- the estimated visual detection difficulty for the selected observer with the selected instrument.
- Vis -- an icon that indicates the general visibility of the object. The shade indicates how dark the sky is. The altitude of the small dot indicates the altitude of the object above the horizon. The zenith is at the top and the horizon is at the bottom.
- Alt -- the altitude of the object above the horizon in degrees.
- Azm -- the azimuth of the object.
- Rs -- the distance of the object from the sun in AU.
- Re -- the distance of the object from the earth in AU.
- Elon -- the elongation from the sun in degrees. The is the angular distance from the sun to the object. It is difficult to observe most objects with small elongations because they are close to the sun
- Size --the angular size of the object.
- Mag -- the magnitude of the object.
- Tail % --the tail foreshortening percentage (for comets only). This indicates the orientation of the comet's tail as seen from the earth. If 100% we see the tail broadside. If 0% the tail is either pointed directly toward or away from the earth.

Note: if generated for a specific location on Earth, the date is the date of evening - times that are AM are actually for the next day.

Nightly Optimum Viewing Ephemeris

This is a unique and extraordinarily useful ephemeris that lists the optimum time to observe an object nightly.

Date of Evening	Time	RA (Ap)	Dec (Ap)	Con	Mag	Size	Alt	Azm	Dark %	Difficulty	Vis
2008 Oct 2	19:59	15h27m39.5s	-23°38'18"	Lib	6.5	11.7'	+05°10'	+237°24'	98	easy	
2008 Oct 3	19:53	15h31m19.0s	-22°55'18"	Lib	6.6	11.6'	+06°03'	+237°10'	95	easy	
2008 Oct 4	19:50	15h34m53.9s	-22°12'33"	Lib	6.6	11.5'	+06°40'	+237°18'	92	easy	
2008 Oct 5	19:47	15h38m24.0s	-21°30'10"	Lib	6.6	11.5'	+07°11'	+237°29'	90	detectable	
2008 Oct 6	19:44	15h41m49.5s	-20°48'08"	Lib	6.6	11.4'	+07°41'	+237°44'	87	detectable	

Columns and their meanings:

- Date of Evening -- This is the date for the evening at the start of the night. Times that are AM are technically for the next day.
- Time -- the local optimum time to observe the object on this night. Remember, the date is for the evening at the start of the night; times that are AM are technically for the next day.
- RA/Dec (J2000) -- Right Ascension and Declination referred to the J2000 equinox.
- RA/De (Ap) -- Right Ascension and Declination referred to the equinox of the current date.
- Con -- the constellation the object is currently in.
- Mag -- the magnitude of the object.
- Size -- the angular size of the object.
- Alt -- the altitude of the object above the horizon in degrees.
- Azm -- the azimuth of the object.
- Dark % -- an indication of how dark the sky is. Broad daylight is 0%. The darkest that it gets at this observing location is listed as 100%.
- Difficulty -- the estimated visual detection difficulty for the selected observer with the selected instrument.
- Vis -- an icon that indicates the general visibility of the object. The shade indicates how dark the sky is. The altitude of the small dot indicates the altitude of the object above the horizon. The zenith is at the top and the horizon is at the bottom.

Binary Star Orbit Ephemeris

This ephemeris lists the position angle (PA -- in degrees) and separation (Sep -- in arc seconds) between the component stars in a long period binary system.

Date	Position Angle °	Separation "
2008 Oct 1	133.1	5.54
2009 Oct 1	131.9	5.69
2010 Oct 1	130.8	5.83
2011 Oct 1	129.7	5.96
2012 Oct 1	128.6	6.08

For simplicity sake astronomers consider the brightest star (A) of the pair to be fixed in space with the fainter star (B) orbiting around it. The position angle is the angular direction from star A to star B, measured towards the east from north. The separation is the angular distance between them.

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Sort the Ephemeris

Click one of the column headings to sort the ephemeris in the appropriate order for that column.

For example, clicking the Mag column heading will sort the ephemeris in magnitude order with the brightest at the top.

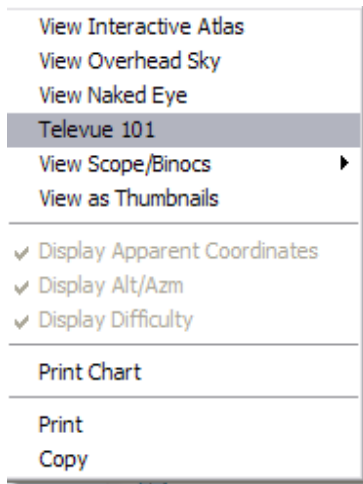
Clicking the Vis column heading (if appropriate for the type of ephemeris) will sort the ephemeris in order of best visibility, with the best visibility at the top.

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View/Print a Chart for an Ephemeris Entry

View/Print a chart for the entire ephemeris

SkyTools can automatically create a chart for an ephemeris, creating object trails for a position ephemeris, an object trace for an optimum view ephemeris, and an orbit trail for a binary star orbit ephemeris.



To create a chart for an entire ephemeris, click the Ephemeris menu and select View... to display the chart on the screen.

Select Print Chart to send it directly to the printer.

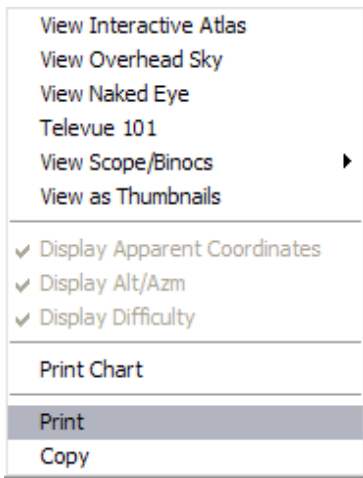
View/Print a chart for an ephemeris entry

To view a chart for an entry in the Ephemeris, targeted on the object and at the time listed, right-click on the ephemeris entry. Select a chart toView..., or Print Chart to print a chart directly.

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Print an Ephemeris

To print the entire ephemeris, click the Ephemeris menu and select Print.



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Copy an Ephemeris to the Clipboard

Ephemerides can be copied to the clipboard for pasting into any word processing program. Tabular data is tab-delimited. Many word processing programs can create tables from this tabular data (see the *Help* for your word processing program).

To copy the entire ephemeris, click the Ephemeris menu and select Copy.

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Create a Log Entry for an Ephemeris Entry

To create a log entry for one point on the ephemeris, right-click on the entry and select Create Log Entry from the menu.

-o-

Observing Logs

MORE: add tips for printing logs for observing awards!

The powerful logging functions of SkyTools allow you to record your impressions and find them quickly in the future. Log entries are primarily object based, which keeps them readily available whenever an object is at hand.

There are three logging tools: theLog Dialog, Log Browser, and New Log Defaults dialog.

Log Dialog

This is where you record/view your individual observations. This dialog lists all of the log entries for a particular object.

Log Browser

This is where you go to look for and manage your log entries. This dialog is where comments are attached to everything from nights to instruments. Log entries can be printed, copied to the clipboard and exported from this dialog as well.

New Log Defaults

This dialog serves two purposes: to allow the efficient entry of multiple log entries, and to create defaults for new log entries so you don't have to enter the same information over and over.

SkyTools supports three types of descriptive entries:

Object Logs

These are the traditional log entries tied to an object. The object must be in the SkyTools database (or the user's supplemental database). This type of log entry requires a date and time, observer, location, and instrument. Observing conditions are also usually noted. These logs are accessed via a tab on the *Log Dialog*.

Comments

Each of the object logs is categorized by *object class*, the *night of the observation*, *observer*, *location*, *instrument* and *constellation*. Log entries can be listed by category. For instance, the class category lists all of the classes of objects that have been observed (open clusters, comets, etc.). The night category lists each of the nights that observations were made on. The observer category lists each of the observers who have recorded log entries, etc.

Each of the items in these categories can have comments associated with them. The comment for an observer might be a brief bio. The comment for a location might include directions to it or a description of the level of light pollution. Perhaps most useful, each night of observation can have a comment associated with it. This comment might describe memorable things that occurred on that night. These comments are accessed via the appropriate tab on the Log Browser.

Miscellaneous Logs

These logs are completely free form and consist of a title and text. Use these logs any way you wish, for describing a meteor shower, atmospheric phenomenon, satellite passes -- anything that doesn't fit into the more strict observing log entry format. These logs are accessed via a tab on the Log Browser.

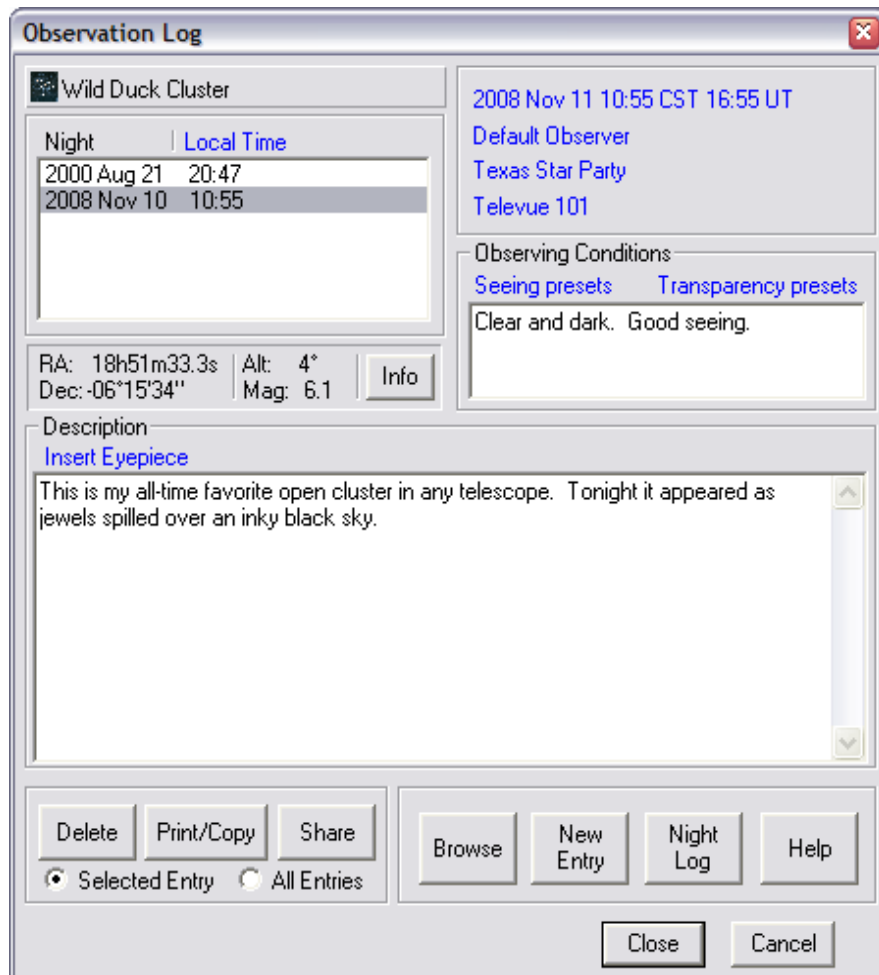
[The Observation Log Dialog](#)
[Browsing/Searching the Log Database](#)
[Print/Copy Log Entries](#)
[Exporting Log Entries Dialog](#)
[Importing Log Entries](#)

[The New Log Defaults Dialog](#)

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The Observation Log Dialog

This dialog is where you create, view and edit log entries for astronomical objects.



This dialog refers to a single object: the listbox in the upper left lists each of the log entries that have been recorded for this object, organized primarily by the night each was observed on (first column). The second column is selectable by clicking on the blue hypertext column heading. This column can list the local time, observer, location, or instrument used for each observation.

The details of the observation selected in this listbox appear in the rest of the dialog.

Basic Information

In the upper right are the date/time, observer, location, and instrument in hypertext. Click to edit.

Observing Conditions

This is where observing conditions are recorded. You are free to record anything you wish here, although typically what is recorded is the seeing and transparency.

Two configurable presets are provided, labeled [Seeing presets](#) and [Transparency presets](#). Click on one of these and choose *Configure*. This will bring up the *Configure menu Presets*

dialog. The basic idea here is to create a list of items to select from when you click on the preset hypertext. For instance, you could enter "*excellent transparency*" for the first entry, "*good transparency*" for the second, and "*poor transparency*" for the third. When the Transparency preset hypertext is clicked you will be shown these three choices in the menu. Choosing one will copy its text (e.g. "good transparency") to the observing conditions window.

Configure Menu Presets Dialog -- This dialog allows you to enter any number of preset items. To enter a new preset item click the *Add New* button. An item will be added to the list called *New Item*. This will appear both in the listbox and in the top edit window. To change *New Item* to your own text simply edit the text in the top window. You may change the text of any item by selecting it in the list and similarly editing the item in the top edit window. To change the order of the list first select an item. Clicking the up arrow will move this item up the list; clicking the down arrow will move it down. Clicking *Delete* will delete the selected item from the list.

Description

This is where you describe your observation. You may type (or paste) anything you wish into this window and it may be of any length. Right-click in it to see a pop-up menu that allows you to *undo* your last edit, *cut*, *copy*, *paste*, *delete* or *select all*.

Insert Eyepiece -- This preset applies to visual observations made with telescopes and is used to automatically insert the relevant information regarding your eyepiece/telescope combination. Click on it and select *Configure*. Here you can choose what you wish to be copied into the descriptive window when you select a particular eyepiece. Choices include the name of the eyepiece, focal length, effective magnification, and effective field of view. For instance, you could configure the preset to automatically enter *TeleVue Panoptic 22mm, 65x, 54'* when you select this eyepiece from the preset menu.

Adding a New Log Entry

Click the New Entry button. This will bring up the *New Log Defaults* dialog.

Viewing the Night Comments Associated With This Entry

Click the Night Log button to bring up the Log Browser Dialog showing the comments that were entered (if any) for the night the observation was made on.

Deleting Log Entries

To delete a single log entry, first select it from the list in the upper left. Choose the *Selected Entry* radio button and click the *Delete* button. To delete all of the log entries associated with this object select the *All Entries* radio button and click *Delete*.

Sharing Log Entries

Log entries can be shared with other SkyTools users via a SkyTools .stx file. The sharing of log entries from this dialog is limited to entries for this object. You may choose to share a single entry or all of the entries for the object. To share logs for more than one object use the *Log Browser*.

To share a single log entry, first select the entry in the listbox. Choose the *Selected Entry* radio button and click the *Share* button.

To share all of the log entries associated with this object select the *All Entries* radio button and click *Share*.

Use the *Import Shared Data* tab of the *Data Manager* to read shared .stx files.

Printing and Copying Log Entries

Log entries may be printed or copied to the Windows clipboard for pasting into a text editor. The print/copy of log entries from this dialog is limited to entries for this object. You may choose to print/copy a single entry or all of the entries for the object. To print/copy logs for more than one object use the *Log Browser*.

To print/copy a single log entry first select the entry in the listbox. Choose the **Selected Entry** radio button and click the **Print/Copy** button. To print/copy all of the log entries associated with this object select the **All Entries** radio button and click **Print/Copy**.

Once clicked, the *Print/Copy Observing Log* dialog will start. To copy the log entries to the clipboard click the **Copy** button. For printing you may choose the printer, enter the print margins (in inches), and select the font. Once you have made these selections click **Print**.

For more information see [SkyTools Observing Logs](#)

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The Log Browser

[Class Tab](#)

[Night Tab](#)

[Observer Tab](#)

[Location Tab](#)

[Instrument Tab](#)

[Search Tab](#)

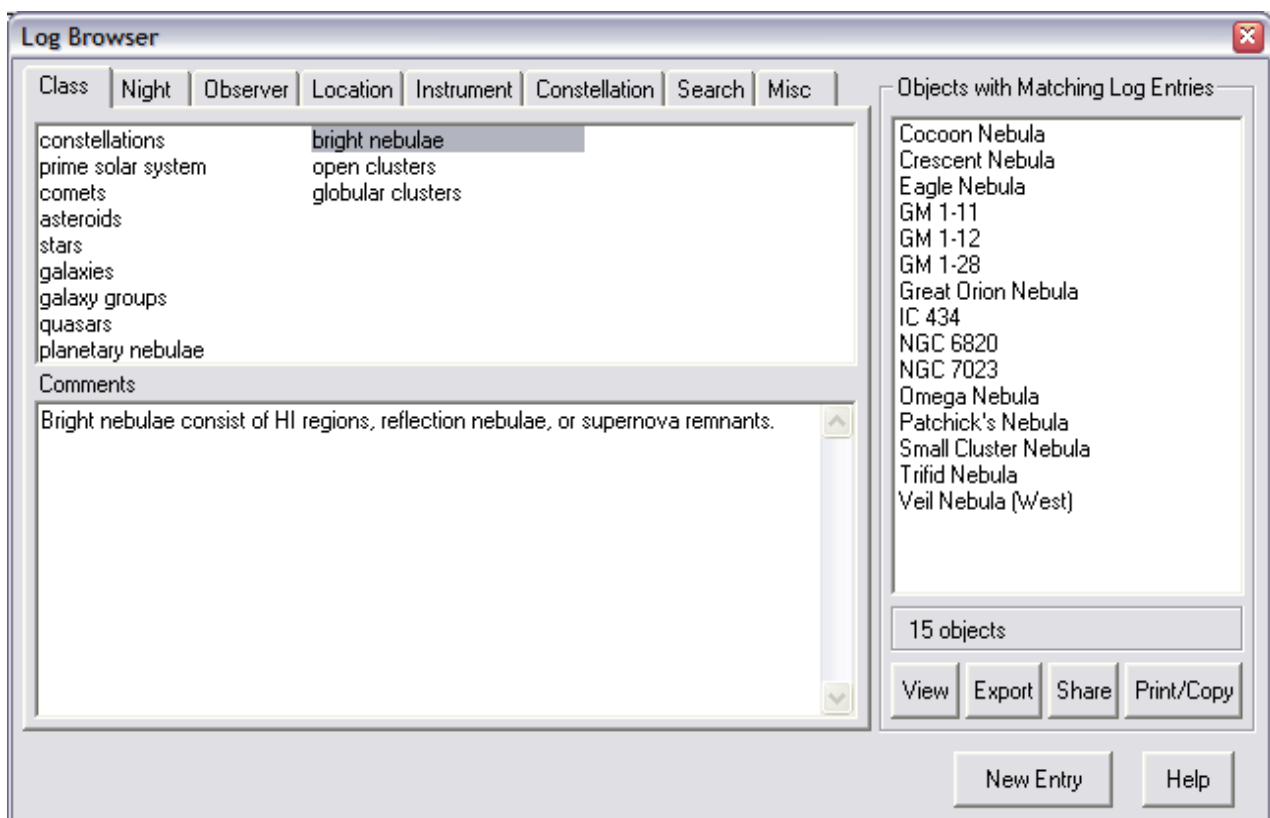
[Misc. Tab](#)

[Constellation Tab](#)

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Class Tab

This tab of the Log Browser lists log entries by object class.



When this tab is selected each of the object classes that have been observed will be listed in the top listbox. Selecting an object class will list all of the objects that have been logged of this type in the listbox on the right.

For instance, to see all of the open clusters that have been logged select *open clusters* from the list (if no open clusters have been logged this item will not appear).

Select a Log Entry

To see the log entry for each individual object double-click on it in the list on the right or select it and click *View*. Doing so will bring up the Observing Log Dialog, listing all of the observations for that object.

Comments

Each class of objects can have comments associated with it. To enter comments for a class, select a class and type your comment into the Commentswindow.

Export

Click to export log entries to a file.

Share

Click to share log entries with other SkyTools users via a SkyTools .stx file.

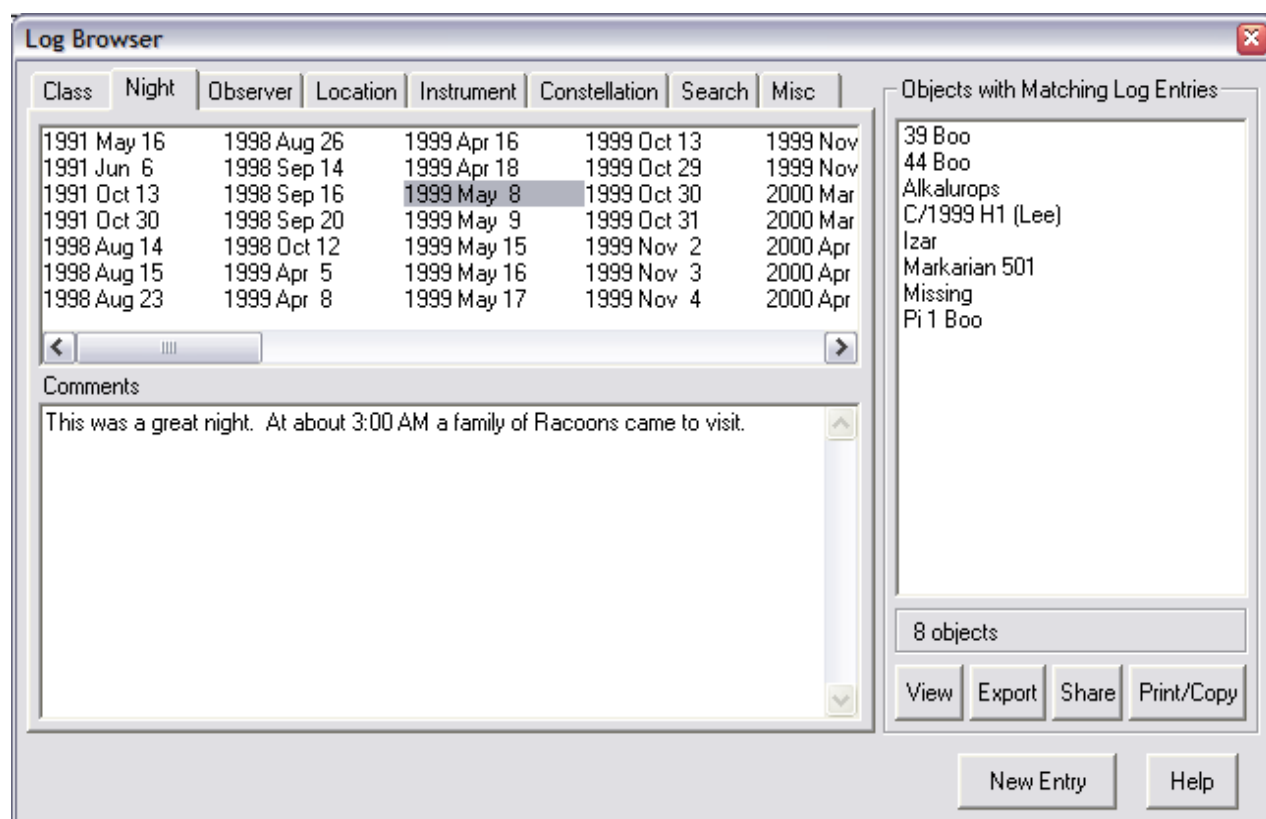
Print/Copy

Click to print log entries or copy them to the windows clipboard for pasting into other applications.

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Night Tab

This tab of the Log Browser lists log entries by night.



When this tab is selected the nights on which observations have been recorded will be listed in the top listbox.

Selecting a night will list all of the objects that were logged on that night in listbox on the right.

Select a Log Entry

To see the log entry for each individual object double click on the object name in the list on the right. Doing so will bring up the Observing Log Dialog, listing all of the observations for that object.

Definition of a "Night"

The SkyTools definition of a night is a 24-hour period starting at noon and ending at noon, to keep the date from changing in the middle of your observations. The date of the evening portion of the night is used to refer to the night as a whole.

For instance, an object observed on the night of the 12th at 11 PM was observed on the same date. An object observed after midnight, say at 2 AM on the same *night* (the 12th), corresponds to the date of the 13th.

It may help to think of the night of the 12th as the night of the 12th/13th.

Comments

Each night can have comments associated with it. To enter comments for a night, select the night and type your comment into the window.

Export

Click to export log entries to a file.

Share

Click to share log entries with other SkyTools users via a SkyTools .stx file.

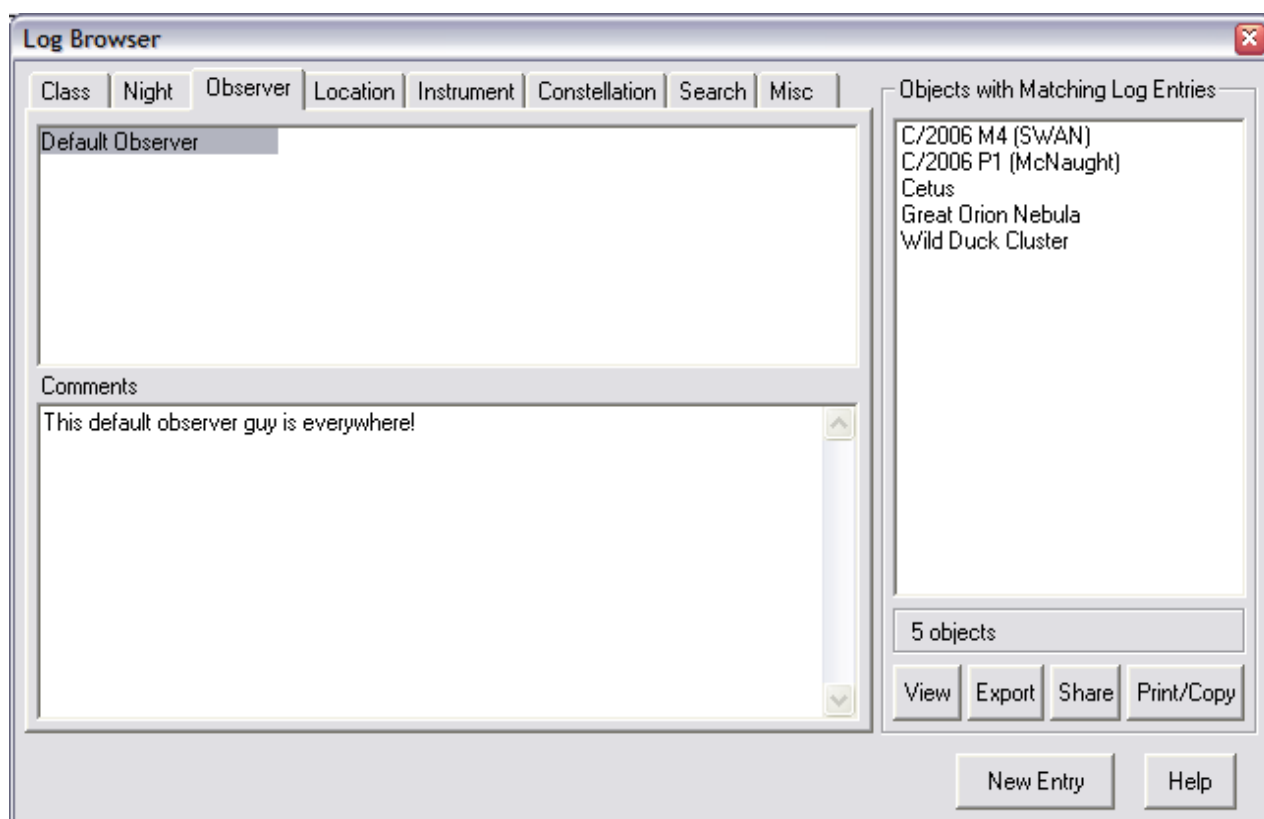
Print/Copy

Click to print log entries or copy them to the windows clipboard for pasting into other applications.

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Observer Tab

This tab of the Log Browser lists log entries by observer.



When this tab is selected each of the observers that have logged observations will be listed in the top listbox.

Selecting an observer will list all of the objects that have been logged by this person in the listbox on the right.

Select a Log Entry

To see the log entry for an individual object double-click on it in the list on the right or select the object and click View. This will bring up the Observing Log Dialog, listing all of the observations for that object.

Comments

Each observer can have comments associated with him/her. To enter comments for an observer, select him/her and type your comment into the bottom window.

Export

Click to export log entries to a file.

Share

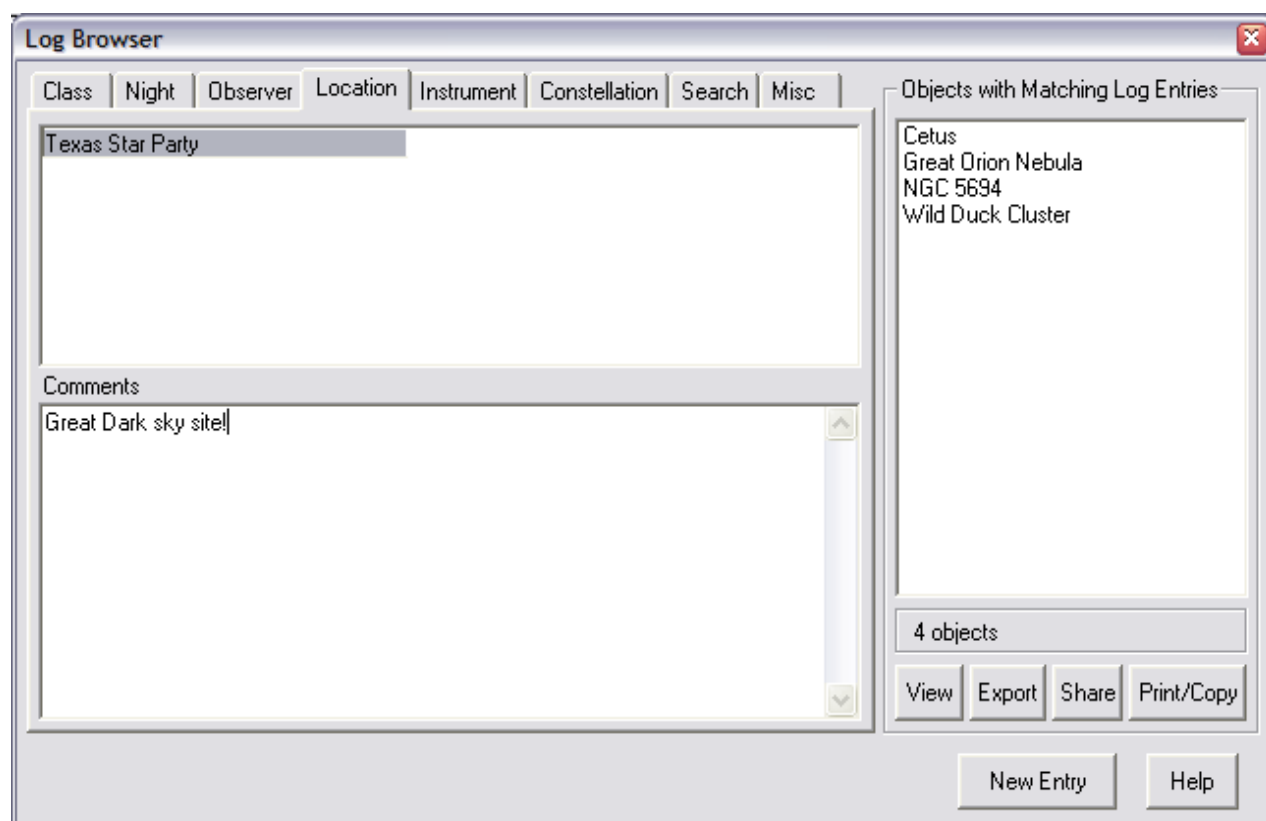
Click to share log entries with other SkyTools users via a SkyTools .stx file.

Print/Copy

Click to print log entries or copy them to the windows clipboard for pasting into other applications.

Location Tab

This tab of the Log Browser lists log entries by location.



When this tab is selected each of the locations where observations have been logged will be listed in the top listbox.

Selecting a location will list all of the objects that have been logged from that spot in the listbox on the right.

Select a Log Entry

To see the log entry for an individual object double-click on it in the list on the right or select it and click View. Doing so will bring up the Observing Log Dialog, listing all of the observations for that object.

Comments

Each location can have comments associated with it. To enter a comment for a location, select it and type your comment into the bottom window.

Export

Click to export log entries to a file.

Share

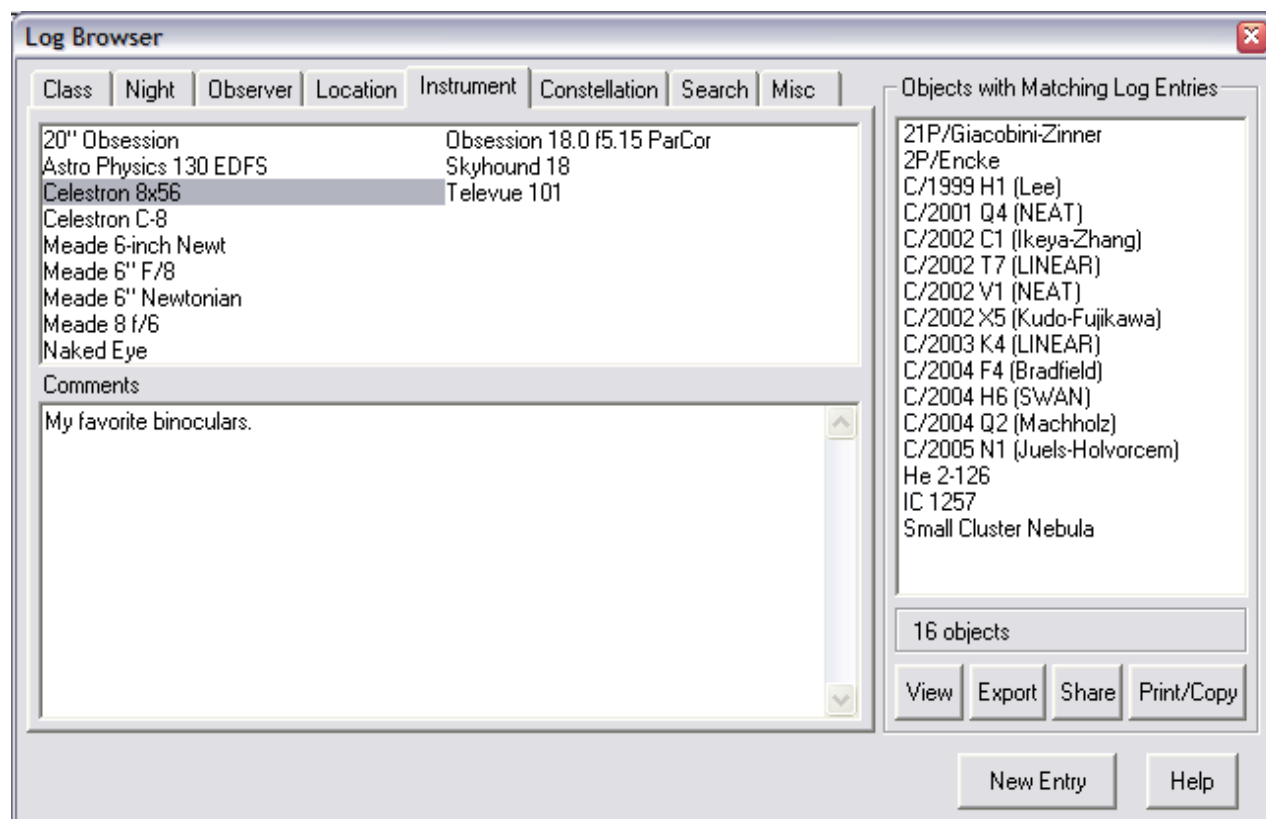
Click to share log entries with other SkyTools users via a SkyTools .stx file.

Print/Copy

Click to print log entries or copy them to the windows clipboard for pasting into other applications.

Instrument Tab

This tab of the Log Browser lists log entries by instrument. An instrument can be the naked eye, binoculars, or a telescope.



When this tab is selected each of the instruments that have been used will be listed in the top listbox.

Selecting an instrument will list all of the objects that have been logged with it in the listbox on the right.

Select a Log Entry

To see the log entry for an individual object double-click on it in the list on the right or select the object and click View. This will bring up the Observing Log Dialog, listing all of the observations for that object.

Comments

Each instrument can have comments associated with it. To enter comments for an instrument, select it and type your comment into the bottom window.

Export

Click to export log entries to a file.

Share

Click to share log entries with other SkyTools users via a SkyTools .stx file.

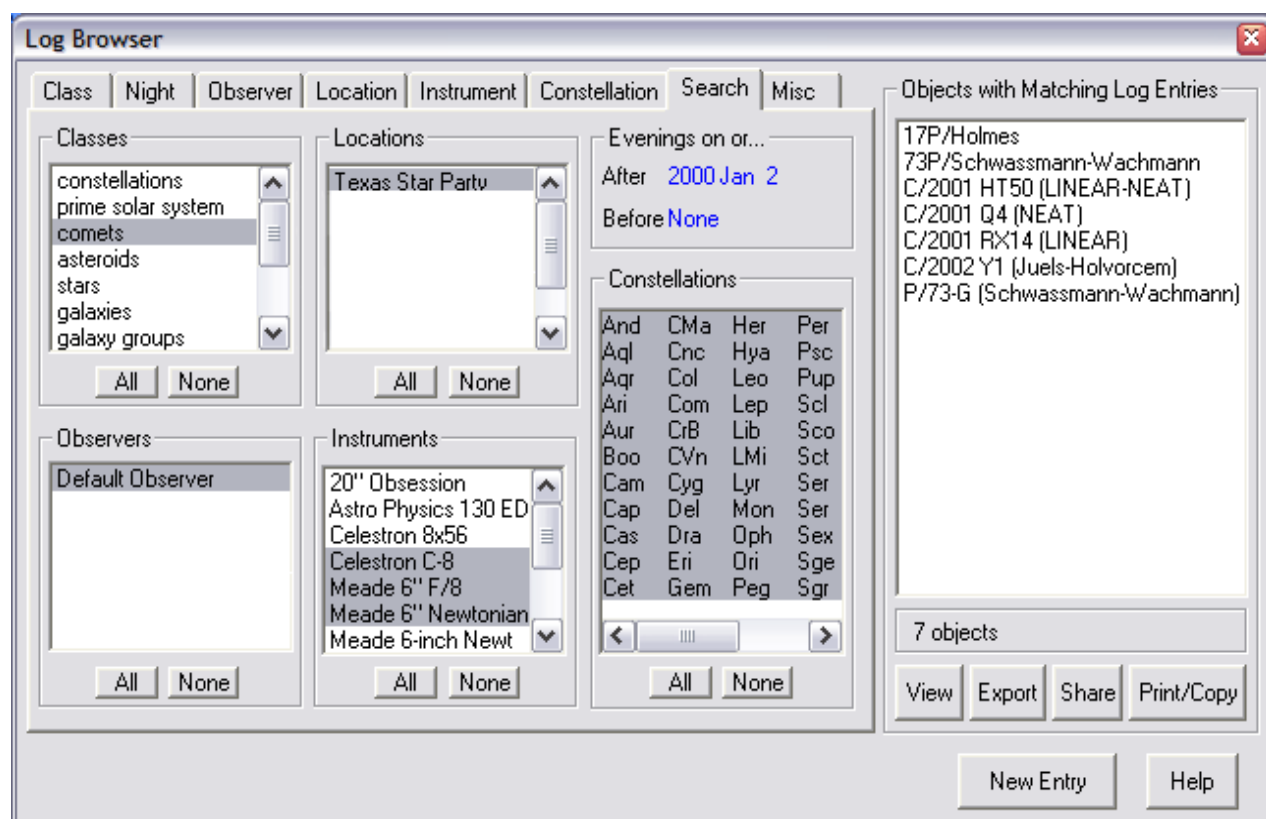
Print/Copy

Click to print log entries or copy them to the windows clipboard for pasting into other applications.

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Search Tab

Select this tab to perform a filtered search of the log database.



Only those objects that have log entries that meet all of the search criteria will be listed in the listbox on the right. To view a list of all objects logged, select everything in each list. To narrow the listing selectively, remove items from some of the lists. For instance, if you select only one constellation, only those objects that appear in that constellation will be listed on the right.

Make Selections

Make object class, observer, location, instrument and constellation selections by clicking on each item you wish to include. To select all choices click the **All** button. To de-select all choices click the **None** button.

Enter a Date Range

Click on the [hypertext](#) in the **Evenings on or...** property to set a range of dates (between *Before* and *After*). You may leave one or both selections set to *None*.

Select a Log Entry

To see the log entry for an individual object double-click on it in the list on the right or select the object and click **View**. This will bring up the **Observing Log Dialog**, listing all of the observations for that object.

Export

Click to export log entries to a file.

Share

Click to share log entries with other SkyTools users via a SkyTools .stx file.

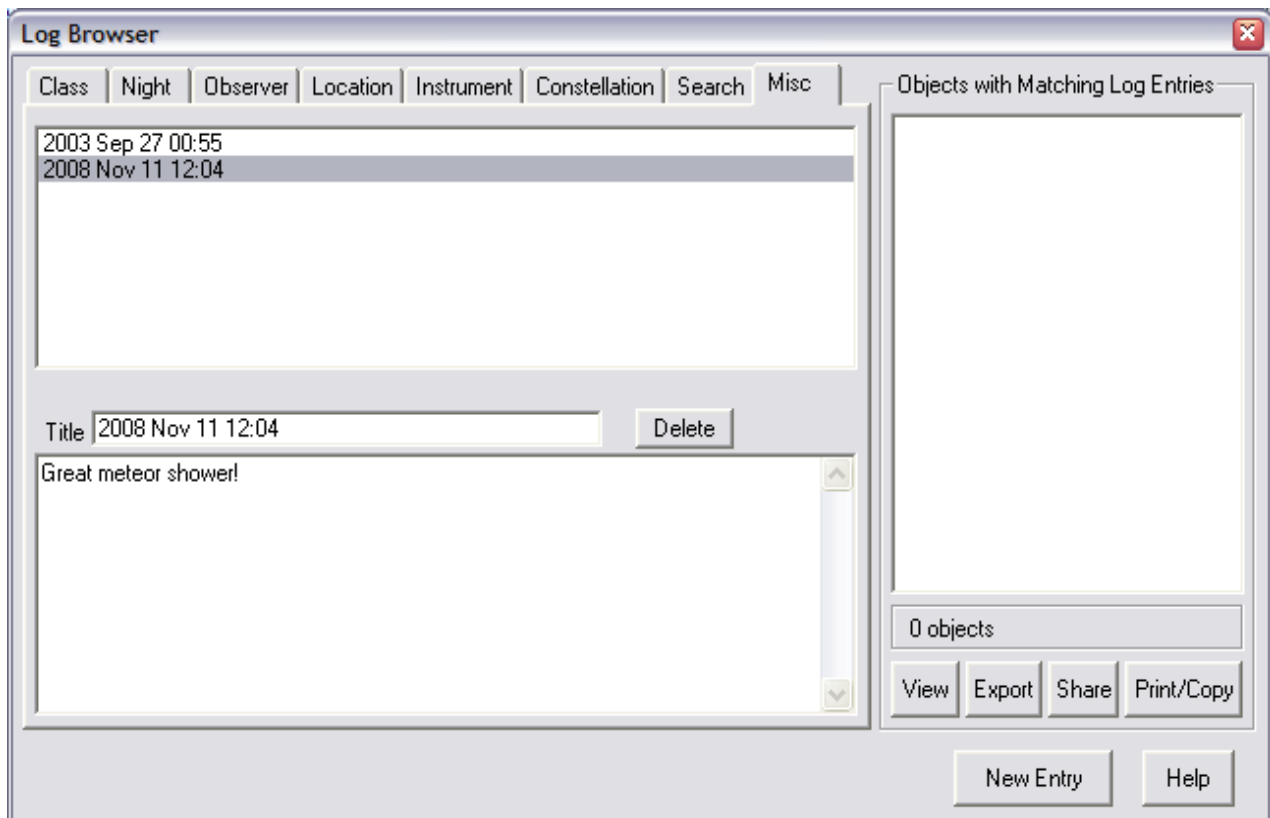
Print/Copy

Click to print log entries or copy them to the windows clipboard for pasting into other applications.

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Misc Tab

This tab allows you to create, view and edit miscellaneous log entries. These are free-form entries that are not connected to specific objects, dates, locations, etc.



Miscellaneous log entries can include meteor showers, earth orbiting satellites, fireballs, etc. -- anything not tied to a specific object in the database.

Create an Entry

To create a new miscellaneous log entry click the **New Entry** button. A new entry will be created. The default title is the current date and time. You may edit this title as you wish simply by typing into the title window.

Enter the descriptive text into the lower edit window.

View Entry

To view another miscellaneous entry click on its title in the list.

Edit Entry

To edit the selected entry/title simply type into the appropriate window.

Delete Entry

To delete an entry select it from the list and click **Delete**.

Share

Click to share entries with other SkyTools users via a SkyTools .stx file.

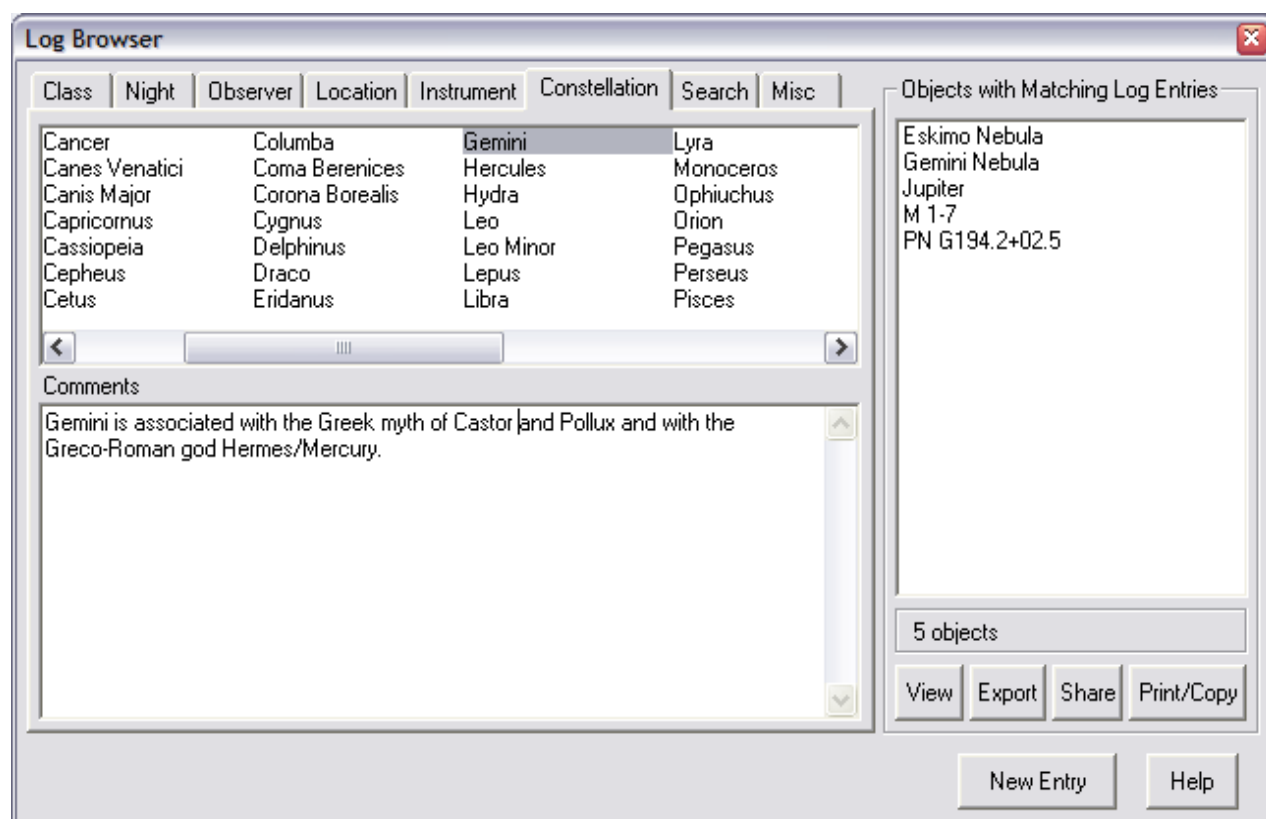
Print/Copy

Click to print entries or copy them to the windows clipboard for pasting into other applications.

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Constellation Tab

This tab of the Log Browser lists log entries by constellation.



When this tab is selected each of the constellations in which observations have been logged will be listed in the top listbox.

Selecting a constellation will list all of the objects that have been logged by within it in the listbox on the right.

Select a Log Entry

To see the log entry for an individual object double-click on it in the list on the right or select the object and click View. This will bring up the Observing Log Dialog, listing all of the observations for that object.

Comments

Each constellation can have comments associated with it. To enter comments for a constellation, select it and type your comment into the bottom window.

Export

Click to export log entries to a file.

Share

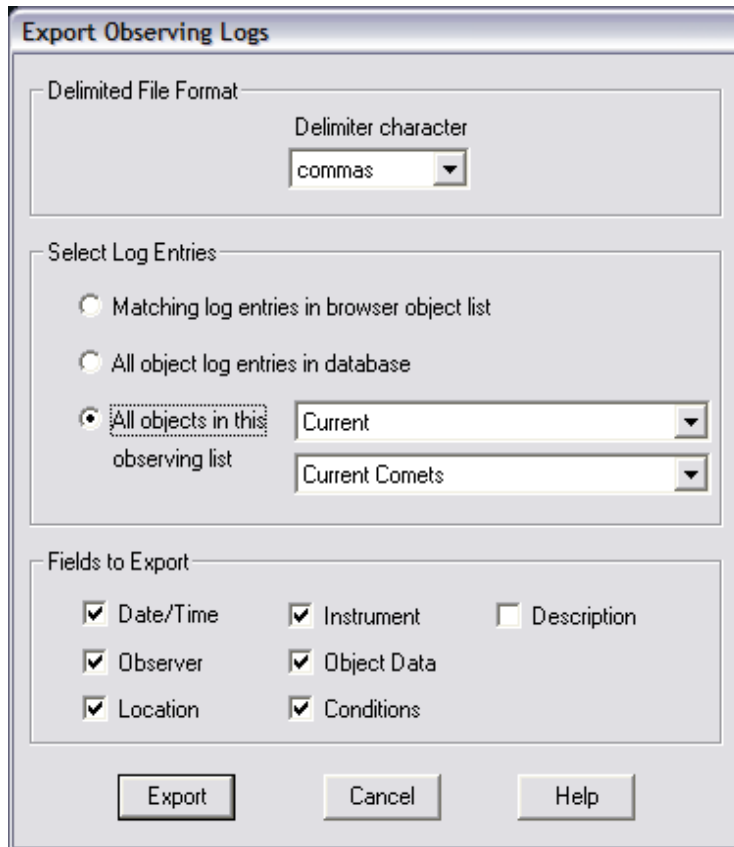
Click to share log entries with other SkyTools users via a SkyTools .stx file.

Print/Copy

Click to print log entries or copy them to the windows clipboard for pasting into other applications.

The Export Observing Logs Dialog

This dialog is used to export log entries to a file in delimited format. These files can be read by other programs such as spreadsheets.



Delimited File Format

Choose a delimiter character from the list. The delimiter character separates the fields in the output file. Each log entry is exported to a single line of the file.

Select Log Entries

Choose which logs to export by selecting a radio button:

- Matching log entries in browser list - will export the log entries for all of the objects that appear in the results list on the right in the *Log Browser* Dialog. If the results are from the Search tab of the Log Browser only those log entries that match all of the search parameters will be written. This option is not available if the Misc tab is selected on the Log Browser.
- All object log entries in database - this option will export every object log entry in the database, despite the selections made in the *Log Browser*.
- All objects in the observing list -- this option will export the log entries for each object in the selected observing list (and group).

Fields to Export

Choose what data export:

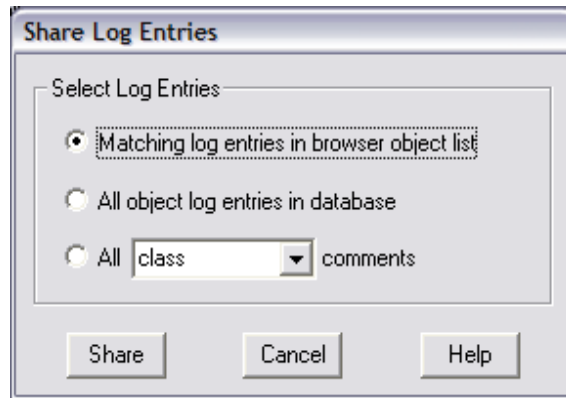
- Date/Time -- the date and time are written to a single column in SkyTools format.
- Observer -- the name of the observer is written
- Location -- the name of the observing location is written

- Instrument -- the name of the instrument (telescope/binoculars/naked eye) is written
- Object Data -- includes the separate columns for the type of object, constellation, RA, Dec, magnitude, and altitude (degrees)
- Conditions -- includes the sky conditions text from the log entry in a single column, stripped of line breaks.
- Description -- includes the descriptive text for the log entry in a single column, stripped of line breaks.

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The Share Log Entries Dialog

This dialog is used to share log entries with other SkyTools users by writing them to a SkyTools .stx file.



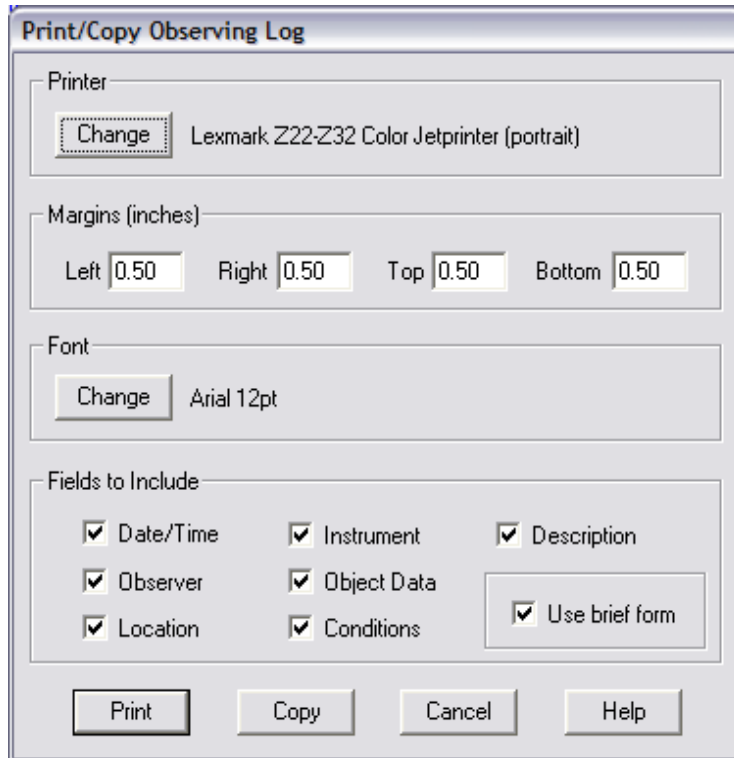
Choose which logs you wish to share by selecting a radio button:

- Matching log entries in browser list - will share the log entries for all of the objects that appear in the list on the right in the *Log Browser* Dialog. If the results are from the Search tab of the Log Browser only those log entries that match all of the search parameters will be shared. This option is not available if the Misc tab is selected on the Log Browser.
- All object log entries in database - this option will share every object log entry in the database, despite the selections made in the *Log Browser*.
- All ... comments - this option will share all comments of the selected type (class comments, night comments, observer comments etc.). Select the type of comments you wish to share from the pull-down menu.
- Click the Share button to start.

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The Print/Copy Observing Log Dialog

This dialog is used to print logs for a single object or to copy them to the windows clipboard.



Printer

Select the printer and paper orientation. The name of the printer and the current paper orientation are displayed. To change the printer or paper orientation, click the **Change** button. The Printer Setup dialog will appear.

Margins

Use this property to set the page margins in inches.

Font

Use this property to change the base font size and style. Click the **Change** button to modify the font.

Fields to Include

Choose what data print/copy:

- Date/Time -- the date and time are written to a single column in SkyTools format.
- Observer -- the name of the observer is written
- Location -- the name of the observing location is written
- Instrument -- the name of the instrument (telescope/binoculars/naked eye) is written
- Object Data -- includes the separate columns for the type of object, constellation, RA, Dec, magnitude, and altitude (degrees)
- Conditions -- includes the sky conditions text from the log entry in a single column, stripped of line breaks.
- Description -- includes the descriptive text for the log entry in a single column, stripped of line breaks.

Brief Form

Check this to use the short form of output. This form includes the same information, but uses much less space.

Click Print to print the log entries.

Click the Copy button to copy the log entries to the clipboard for pasting into a text editor (none of the other options apply).

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The Print/Copy Observing Logs Dialog

This dialog is used to print multiple observing logs or to copy them to the windows clipboard.

Printer

Select the printer and paper orientation. The name of the printer and the current paper orientation are displayed. To change the printer or paper orientation, click the **Change** button. The Printer Setup dialog will appear.

Margins

Use this property to set the page margins in inches.

Font

Use this property to change the base font size and style. Click the **Change** button to modify the font.

Select Log Entries

Choose which logs you wish to share by selecting a radio button:

- Matching log entries in browser list -- will share the log entries for all of the

objects that appear in the list on the right in the *Log Browser* Dialog. If the results are from the Search tab of the Log Browser only those log entries that match all of the search parameters will be shared. This option is not available if the Misc tab is selected on the Log Browser.

- All object log entries in database -- this option will share every object log entry in the database, despite the selections made in the *Log Browser*.
- All ... comments -- this option will share all comments of the selected type (class comments, night comments, observer comments etc.). Select the type of comments you wish to share from the pull-down menu.
- All objects in the observing list -- this option will export the log entries for each object in the selected observing list (and group).

Fields to Include

Choose what data print/copy:

- Date/Time -- the date and time are written to a single column in SkyTools format.
- Observer -- the name of the observer is written
- Location -- the name of the observing location is written
- Instrument -- the name of the instrument (telescope/binoculars/naked eye) is written
- Object Data -- includes the separate columns for the type of object, constellation, RA, Dec, magnitude, and altitude (degrees)
- Conditions -- includes the sky conditions text from the log entry in a single column, stripped of line breaks.
- Description -- includes the descriptive text for the log entry in a single column, stripped of line breaks.

Brief Form

Check this to use the short form of output. This form includes the same information, but uses much less space.

Click Print to print the log entries.

Click the Copy button to copy the log entries to the clipboard for pasting into a text editor (none of the other options apply).

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The New Log Defaults Dialog

There are many selections to be input for each log entry, yet in many cases these selections remain the same. For instance, what if you only used one telescope? To remove the tedium of entering your telescope for each new log entry you may use this dialog to set your telescope as the default.



The defaults entered into this dialog are automatically applied when you select *Create New Log Entry* from various SkyTools menus. If you want to be prompted for an item each time, set the default to *Ask*. Otherwise, select the value you wish to appear each time you create a new log. For the *Night* and *Time* fields you can also have them default to the current night/time. This can be useful if you are making your log entries in the field.

It may be useful to enter the observing conditions into the observing conditions edit window if entering several log entries from the same night. Anything typed into the observing conditions edit window will automatically appear in the observing conditions window for the new log entry.

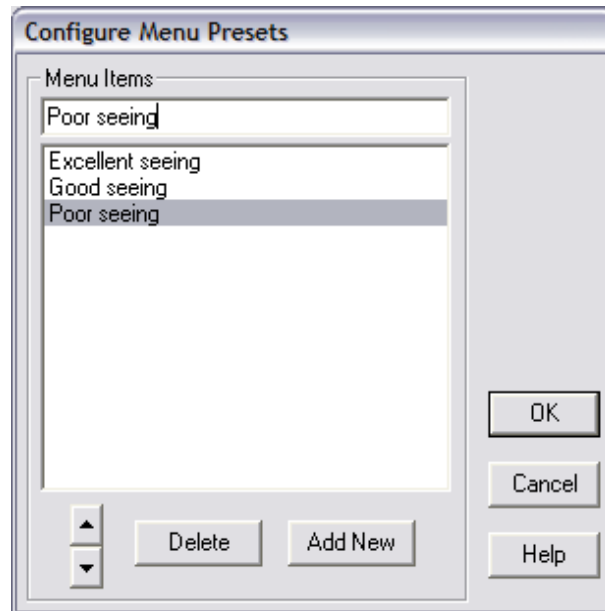
To create a new log entry immediately, using the defaults currently selected, click the *Create Log Entry* button.

Note that the selections made here will not be remembered after you close the dialog unless you click the *Save Defaults* button.

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The Configure Menu Presets Dialog

This dialog allows you to configure a custom menu as a shortcut method for entering seeing and transparency descriptions.



You may enter any number of preset items. These items can be anything you want them to be.

Add New Item

To enter a new preset item click the **Add New** button. An item will be added to the list called *New Item*. This will appear both in the listbox and in the top edit window. To change *New Item* to your own text simply edit the text in the top window.

Edit Item

You may change the text of any item by selecting it in the list and editing the item in the top edit window.

Change Order

To change the order select an item. Click the up arrow to move this item up the list; click the down arrow to move it down.

Delete Item

Clicking **Delete** will delete the selected item from the list.

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Real Time Observing

The Real Time tool is analogous to the Nightly Planner tool, but is designed to help you choose appropriate objects to observe at the moment. This tool is used for observation planning but with everything geared to work in real time. Unlike the Nightly Planner the date and time used for all functions are obtained directly from your computer clock. In addition, Real Time provides an interface to a wide variety of telescope mounts.

Support is provided for most telescopes via the ASCOM platform. ASCOM is provided by the ASCOM Initiative, a third party. In addition to ASCOM supported telescopes, SkyTools directly supports the Argo Navis and Sky Commander Digital Setting Circles (or DSCs). DSCs are commonly referred to as *Pushto* systems because the observer typically pushes the telescope to the target.

Standard displays include the RA/Dec and Alt/Az of the telescope, Hour Angle, Airmass, and current local/UT/sidereal times.

The telescope can be targeted at any object in your observing list, any object you can point at on a chart, or for that matter any object in the database. Keyboard shortcuts are provided for all basic functions, both on the planner and the charts.

A natural sounding voice keeps you informed of what your telescope is doing, indicating such events as "telescope slew complete". You may select one of three voices from the *SkyTools Preferences* dialog.

The current location of the telescope is indicated on the charts via a moving indicator and the telescope can be controlled directly from the chart. Watch as your telescope cursor moves across the naked eye view and into the finder view, finally centering on the object in the eyepiece view. Or for Pushto systems, similarly guide the telescope to your target. If you see an object nearby, simply point the cursor at it and with a press of the key your telescope will slew (or be ready to be pushed) to it.

Unlike the Nightly Planner, when you open a chart, start a log entry, or view object information, the time is always current.

Observing Modes

Real Time has three modes of operation: simple, visual, and imaging. The simple mode is provided as a generic means of displaying and filtering observing lists. It is a good choice for large lists on slow computers because it is faster. The visual mode is the mode of choice for visual observers. The imaging mode is the mode of choice for planning imaging sessions.

The Telescope Control Menu

This is where you configure your telescope, connect to it etc.

The Observing List Menu

Don't miss the blue menu button (with diamond) on the left side of the dialog. This menu provides a wide variety of services. See the [Real Time Tool](#) page for more detailed information.

Observing List Groups

It is easy to accumulate large numbers of observing lists, so we have provided a means of organizing them into groups. For instance, you may want to put all of your double star lists into double star group. To select an observing list, first select the group, then select the list from those in that group.

Selecting Inputs

Information such as the observing location, observer, and telescope is input via the hypertext items across the top of the dialog. Click on the hypertext to make a selection. The current

selection is displayed in the hypertext.

Launching from an Object

Perhaps the very heart of soul of SkyTools is the ability to access any feature of the program via a right-click on an object in the observing list. This is how you display charts, create log entries, view object information, etc. for any object in the list.

The NightBar

The NightBar is the graphic at the top of the window. This graphic can tell you at a glance when it will be dark and when an object is high in the sky. In Imaging mode the NightBar plots the quality of the imaging opportunity for an object throughout the night.

More Information

[Real Time Tool](#) (detailed information)

[Setting up ASCOM for use with GOTO Telescopes](#)

[Using a GOTO Telescope](#)

[Using a Pushto Telescope](#)

[Configuring Real Time Refresh Rates](#)

[Configuring the Argo Navis](#)

[Configuring the Sky Commander](#)

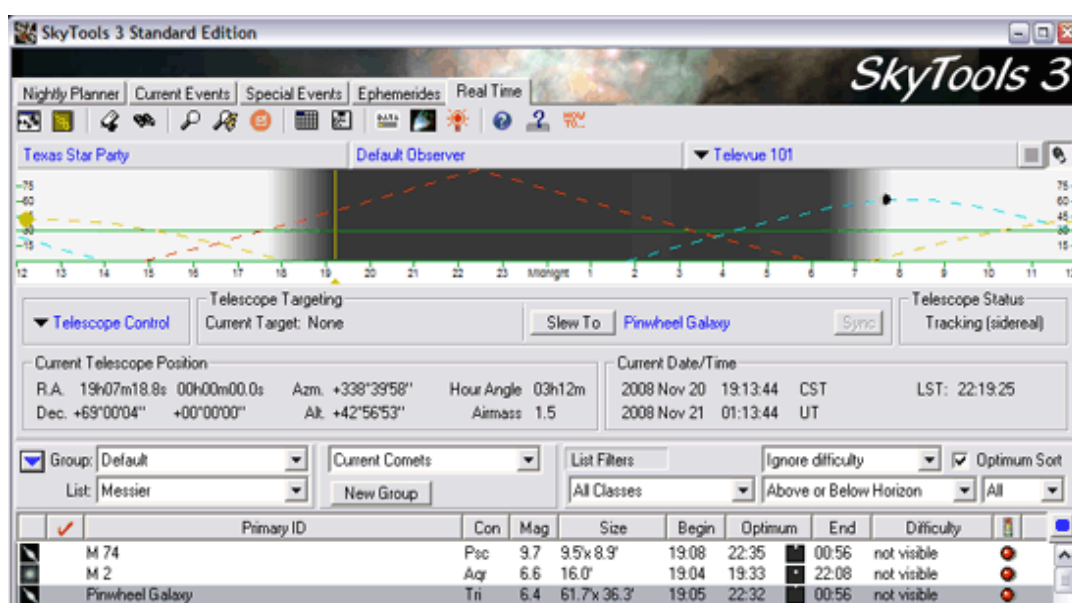
[Configuring the Pushto Indicators](#)

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Real Time Tool

The Real Time tab is analogous to the Nightly Planner tab, but is designed to help you choose appropriate objects to observe at the moment. Unlike the Nightly Planner the date and time used for all functions are obtained directly from your computer clock. In addition, Real Time provides an interface to a wide variety of telescope mounts.

Support is provided for most telescopes via the ASCOM platform. ASCOM is provided by the ASCOM Initiative, a third party. In addition to ASCOM supported telescopes, SkyTools directly supports the Argo Navis and Sky Commander Digital Setting Circles (or DSCs). DSCs are commonly referred to as *Pushto* systems because the observer typically pushes the telescope to the target.

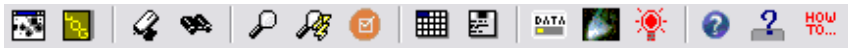


Modes of Operation

This tool has three modes of operation: simple, visual, and imaging. The simple mode is provided as a generic means of displaying and filtering observing lists. It is a good choice for large lists on slow computers because it is faster. The visual mode is the mode of choice for visual observers. It adds the visual detection difficulty filter and visual detection difficulty columns to the list. It also adds double star-pair splittability columns. The imaging mode is the mode of choice for planning imaging sessions.

The Tool Bar

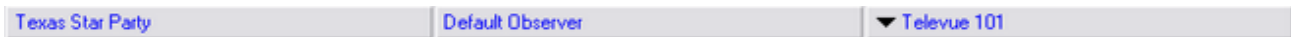
This is where you click to start the various tools, configure the program, and start the help system. Some of these tools are directly related to the observing lists used by Real Time: The Designation Search, Database Power Search, and Nightly Observing List tools are all used to create observing lists for use in Real Time.



- The Interactive Chart Tool is the old fashioned, direct way to make charts. Click [here](#) to open the last chart viewed.
- The Observing Log Browser button starts the observing log browser. Use this when you want to browse log entries by category or to perform a filtered search of your log entries.
- Use Add/Modify Scope or Add/Modify Binoculars to enter the information for the telescope(s) and binoculars you observe with. Once defined, custom simulations charts will be created for the instruments you enter here.
- The Designation Search Tool is used to add objects to an observing list by name or designation.
- The Database Power Search Tool is used to search the SkyTools databases for objects to add to your observing lists.
- The Nightly Observing List Generator is used to create special observing lists for a specific night, telescope, and observing location.
- The Events Calendar displays a monthly event calendar with events that have been discovered via the *Current Events* tool.
- The Nightly Events Planner displays the events discovered by the *Current Events* tool for a single night.
- The Data Manager is the tool used to backup/restore/Sync user data, import/share user data, and manage your data such as object notes, images, web links, plottable images, and supplemental databases.
- The SkyTools Preferences button is used to set global preferences, view your serial number and version information, register your copy of SkyTools, send instant feedback to Skyhound, and to change the database install level.
- Click on the Night Vision button to toggle the red night vision mode on and off. This mode changes all windows on your desktop to shades of red and blanks the desktop background (including icons). The original settings are restored when the program exits.
- Help Contents brings up the contents of this help system.
- The Tab Help button takes you directly to the help for the current selected tab.
- The Help System How To... button brings up the handy How To... help part of the help system. Use this to quickly find out how to do specific operations.

Observing Location, Observer, and Telescope Hypertext

These settings are drawn in hypertext, to indicate that you can click on them.



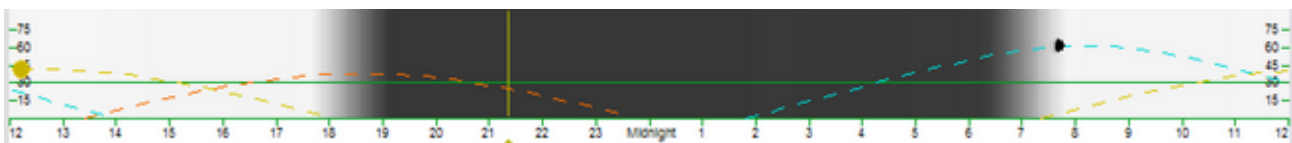
The observing location represents the location of the telescope. The NightBar and the data in the observing list will depend on these settings. Click on a selection to change or customize it.

In visual mode the name of the observer indicates the person who will be doing the observing and the telescope indicates which telescope the observer will be using. Click the observer to customize it for yourself. Set up your telescope and binoculars via the tool buttons at the top of the window; once they are defined you can select them by clicking the hypertext. The diamond next to a telescope hypertext selection indicates a menu. The visual limiting magnitude and the visual difficulty for each object is computed based on all of this information taken together. The more carefully you set things up, the more accurate the results. Take particular care in defining the local light pollution by setting a reasonable limiting magnitude/sky brightness for your observing location.

In Imaging mode there are additional selections for the camera, filter, and binning. Cameras and filters must set up for each telescope via the Add/Modify Telescopes dialog. Once your cameras are defined click the camera hypertext to select the camera to use with the selected telescope.

The NightBar

This window speaks volumes about the night selected. The NightBar displays how dark the sky will be as a function of local time (labeled across the bottom). The effects of moonlight and twilight are accurately represented. The vertical yellow line indicates the current time.

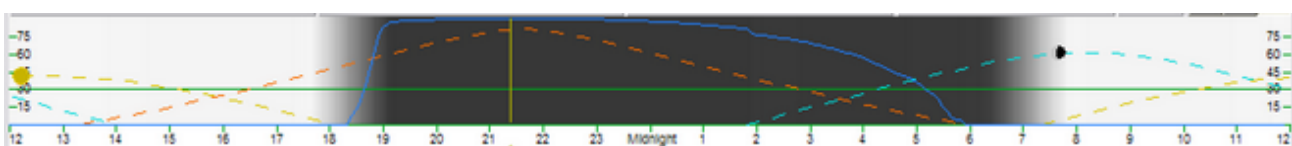


Also represented are lines that display the altitudes of objects vs. time. The horizon is at the bottom of the NightBar and the zenith is at the top. The green horizontal line represents Two Airmass, which is approximately 30 degrees above the horizon. It is always preferable to view objects when they are above this line. The yellow line represents the altitude of the sun, the light blue is the moon, and the red line represents the object currently selected in the observing list, in this case a galaxy. The red line for the object will turn to a darker shade of red if it passes below the local obstructed horizon. An obstructed horizon is defined and enabled/disabled for each location via the location dialog (click on the location hypertext).

According to the NightBar above then, the sun sets at approximately 17:55, with twilight ending at about 19:10. The moon rises at about 2:35. The period of time from the end of twilight to when the moon rises represents the dark period. The galaxy (red line) is best viewed just after twilight ends. It sets behind the obstructed horizon at around 20:50. Thus, the optimum observing window for the galaxy is between 19:00 and 20:50.

The NightBar in Imaging Mode

In imaging mode a blue line represents the relative imaging quality for the selected object.



The relative imaging quality is the quality of an exposure compared to a similar exposure under optimum conditions (from the same location). The prime imaging time for this object is when

this line is near the top of the NightBar. The higher the line, the better the opportunity. The primary factors that affect the imaging quality include the brightness of the sky, the Seeing selection for the location, the altitude of the object, and the choice of filter.

Power Tip: Right-click on the NightBar to make an overhead sky or naked eye chart for the time corresponding to the point where you clicked. To see what the overhead sky would look like at sunset, for instance, right click near 18:00 hours and select *View Overhead Sky Chart*.

The Real Time Control Panel

This area displays the current telescope status and is used to control a connected telescope.

The screenshot shows the Telescope Control Panel with the following sections:

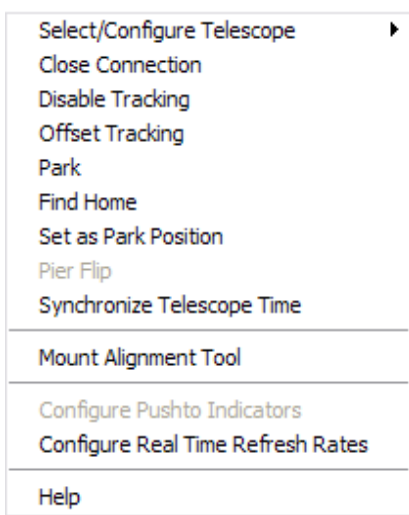
- Telescope Control:** Includes a dropdown menu (currently showing 'Telescope Control'), 'Telescope Targeting' (Current Target: None), a 'Slew To' button (set to M 15), and a 'Sync' button.
- Telescope Status:** Includes a 'Tracking (sidereal)' checkbox.
- Current Telescope Position:**

R.A.	20h37m24.0s	00h00m00.0s	Azm.	+348°48'05"	Hour Angle	01h22m
Dec.	+68°58'55"	+00°00'00"	Alt.	+49°49'08"	Airmass	1.3
- Current Date/Time:**

2008 Nov 20	18:53:45	CST	LST: 21:59:22
2008 Nov 21	00:53:45	UT	

Telescope Control Menu

This menu is primarily used to communicate with a connected telescope. It also offers access to telescope related functions, such as the Alignment Tool.



Menu Options:

- Select/Configure Telescope -select this item to configure your telescope for use with SkyTools.
- Connect to Telescope/Close Connection -select to connect/disconnect the telescope.
- Enable/Disable Tracking - select to turn sidereal tracking on/off.
- Offset Tracking -select to configure offset tracking. Offset tracking directs the telescope to follow slowly moving objects such as comets or minor planets.
- Park/Unpack - select to send the telescope to the park position or to unlock it from the parked position if already parked.
- Find Home - select to send the telescope to its built-in home position.
- Set as Park Position - select to set the current position of the telescope as the park position.

- Pier Flip - select to view the side of pier that a German Equatorial is currently on and to command a flip to the other side.
- Synchronize Telescope Time - select to open a dialog that allows you to synchronize the time between your telescope mount and computer.
- Mount Alignment Tool - select to open the telescope mount alignment tool dialog.
- Configure Pushto Indicators - select to configure the indicators that help the Pushto telescope user push the telescope to the target.
- Configure Real Time Refresh Rates - select to change how often various parts of the program are automatically updated.

Grayed items are either unsupported by the telescope driver or unavailable because the telescope is not connected.

Telescope Targeting

This Current Target indicates the object/position that the telescope is ready to be targeted at, either via a Slew or Push.

Click Slew or Push to target the telescope at the object/position indicated. Click on an object in the observing list to select it here, or click on the hypertext to select an object/position via the Object Requestor.

Click the Sync button (or press the space bar) to synchronize your telescopes position to the position of the current telescope target.

Telescope Status

This indicates one of: Not connected, Connected, Tracking (*rate*), Parked. Where *rate* can be: sidereal, lunar, solar, King, or offset. Offset indicates that offset tracking is enabled.

Current Telescope Position

Where the telescope is currently pointing. R.A./Dec. are the equatorial coordinates. The numbers to the immediate right of these are the current offsets from the target object, in R.A., and Dec. The coordinates relative to the local horizon are labeled Azm. (azimuth) and Alt. (altitude). The Hour Angle and Airmass are also displayed.

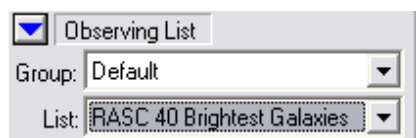
Current Date/Time

The local date and time are listed first, with the corresponding UT date/time below. The Local Sidereal Time (LST) is indicated to the right.

The local date/time are taken from your computer, converted to UT, then converted back to the time zone of the current location (which should be set to the location of the telescope). This may seem convoluted, but it allows for the use of a remote telescope. If you have problems with an inconsistent local time make sure that SkyTools and the computer are both set to the same time zone and using the same daylight saving status.

Observing List Controls

This is where you select the observing list you wish to display. First select an observing list group and then a list from that group. Use the blue menu button to configure the observing list display and to perform basic operations on the selected observing list.

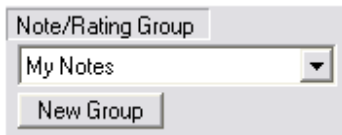


Menu options:

- Refresh List - will display the objects in the list that meet the filter criteria. This is usually only required if you have *Auto Refresh* (below) unchecked.
- Auto Refresh - if checked the objects in the current list will always be displayed. If you change your date, location, or a filter setting, the list will be automatically updated. Turn this off if you want to manually control when the list is updated.
- Auto Sort - if checked the list will be re-sorted each time it is refreshed or displayed. The sorting is controlled by clicking on a column heading. For instance, if you sort on the *Vis* (visibility) column the most visible object will be placed at the top of the list. As time passes a different object may become better visible and it will replace the first at the top.
- Reset Filters - will reset all observing filter selections to the null state (where every objects is displayed).
- New Observing List Group - click to create a new observing list group. Observing list groups are used to organize your observing lists.
- New Observing List - select to create a new observing list.
- View/Edit Title and Description -- allows you to change the observing list name, view or change its description, or assign it to a different group.
- Delete observing list - will delete the currently selected observing list.
- Print/Copy -- will print or copy to the clipboard the list as displayed.
- Configure Columns -- starts the Configure Display Columns dialog. Use this dialog to select the data you want displayed in the columns of the observing list. This dialog can also be started via the blue button to the right of the right-most list column. Column configurations are stored in schemes. Each observing list can have a unique scheme attached to it. Each observing mode has its own set of unique schemes.
- Read objects from file - select to read object designations from an external file. The objects are placed into an observing list of your choice.
- View list a thumbnails - will open the *Thumbnail Viewer* with each object in the observing list displayed as separate thumbnail.
- Transfer Observing List to Telescope -- will upload the objects that have red check marks to the Sky Commander or Argo Navis. The unit must be connected. The objects are uploaded in the same order they currently appear in the list. For the Sky Commander the objects begin as "special object" 00, through "special object" 58. These special object IDs can be displayed in the *Upload Number* column of the observing list. It can be useful to print the observing list once it has been uploaded in order to cross reference each object to the Sky Commander special object ID in the field. Note that the coordinates uploaded for moving objects such as planets or comets are for the *optimum time* computed for each object. A similar function is available on the *Real Time* tab. Use that function to upload coordinates applicable for the current time.
- Update Current Lists from Web -- will download the contents of three special observing lists: *current comets*, *current minor planets* and *current novae*. The contents of these lists are updated with the latest comets brighter than 15th magnitude, interesting minor planets (usually near-earth flybys) and recent novae/supernovae. In order for this feature to work, your computer must be connected to the Internet.

Notes/Ratings Group

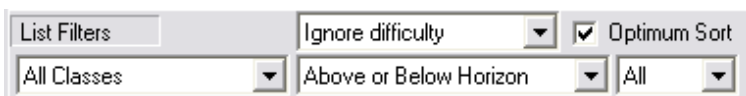
This where you select the active Notes/Ratings group.



The 5-star ratings displayed in the ratings column of the observing list are taken from the active group only, as are the flyup "headlines" displayed when you pass your cursor over an object. Also, when you open an object information dialog from a right-click on the observing list the Notes tab of the dialog will default to the active group.

Observing List Display Filters

These settings filter objects out of the observing list. The main purpose of Real Time is to take a large list and trim it down to only those objects most appropriately observed right now.



The filters all work in concert; only those objects which meet *all* of these criteria taken together are displayed in the list. Arbitrary time limits may also be applied (see below). Only those objects that meet all the criteria within the selected time limits will be displayed.

The exact selection of filters depends on the observing mode selection.
Available in all modes:

- Object Class - limits the objects displayed to the Object Class chosen here.
- Constellation - limits the objects displayed to the Constellation selected.
- Object Altitude - select the Minimum Altitude an object must attain in order to be displayed.
 - Above or Below Horizon will display all objects, regardless of altitude.
 - Above Perfect Horizon Only will limit the objects displayed to those that are currently above the horizon, as well as meet the other two criteria.
 - Above Obstructed Horizon Only will limit the objects displayed to those that are above the obstructed horizon, if defined, as well as meet the other two criteria. If no obstructed horizon is defined this filter is identical to Above Perfect Horizon Only.
 - Above 2 Airmass Only limits the display to those objects that are above an altitude of about 30 degrees, making them ideal targets. You should always observe objects above this altitude, if possible.
 - Near Maximum Altitude will limit the objects displayed to those that are within 33% of their maximum altitude. This is useful to catch objects that never rise above 2 airmass. The final selection is
 - Above 2X & Near Max Alt combines the previous two. In order to be listed the object must be above 2 airmass and within 33% of its maximum altitude.
 - Above 2X or Near Max Alt lists objects that are above 2 airmass *or* within 33% of its maximum altitude.

Available in Visual Mode only:

- Visual Detection Difficulty - limits the objects displayed based on visual difficulty
 - Ignore Difficulty - will display all objects regardless of their difficulty
 - Visible (any difficulty) - the object must be deemed visible at any level of

difficulty to the selected observer in the selected instrument to be listed.

- Obvious - the object must be rated as obvious to the selected observer in the selected instrument to be listed.
- Easy - the object must be rated as easy or obvious to the selected observer in the selected instrument to be listed.
- Detectable - the object must be rated as at least detectable to the selected observer in the selected instrument to be listed.
- Challenging - the object must be rated as challenging (or easier) to the selected observer in the selected instrument to be listed.
- Very Challenging - the object must be rated as very challenging (or easier) to the selected observer in the selected instrument to be listed. This selection is functionally equivalent to Visible (at any difficulty).

Available in Imaging Mode only:

- Quality of Opportunity - the object must receive this minimum quality opportunity grade to be listed.
 - Any Quality
 - D - Poor or better
 - C - Acceptable or better
 - B - Very good or better
 - A - excellent only
- Total Signal to Noise (SNR) - the observing total SNR available during the observing window must be at least this value for the object to be listed.
 - Any SNR - will display all objects regardless of the SNR
 - Detectable - will display objects with an SNR of at least 3
 - Fair detection - will display objects with an SNR of at least 7
 - Confident detection - will display objects with an SNR of at least 10
 - Good detection - will display objects with an SNR of at least 15
 - Low quality photometry - will display objects with an SNR of at least 25
 - Quality photometry - will display objects with an SNR of at least 100

In visual mode you may see objects that list dashed lines instead of optimum viewing times, particularly when you have selected *Twilight/Moonlight OK* and the moon is up. When the optimum times are computed under these conditions it is possible for SkyTools to decide that the object is not in fact visible. In these cases no optimum times can be computed and these times are replaced by dashes.

Using the Observing List

The observing list is where you pick objects to observe. Only objects that meet the minimum filter criteria are displayed, one object per line.

Your observing list refreshes periodically with current information, such as altitude and azimuth, and becomes a tool that tells you which objects are best observed *right now*. Or alternately, it can tell you which objects are closest to where the telescope is currently pointing.

Select an object to see it plotted on the NightBar (red dashed line).

Right-click on any object to access a variety of functions related to the object, including making charts, creating log entries, setting ratings and observation status, etc.

		Primary ID	Alternate ID	Con	RA 2000	Dec 2000	Mag	Size	SBr	(B-V)
	*****	NGC 4945	ESO 219 24	Cen	13h05m26.2s	-49°28'15"	9.3	20.4'x 4.3'	22.3	
	*****	Centaurus A	NGC 5128	Cen	13h25m27.7s	-43°01'07"	7.8	27.5'x 18.2'	22.7	1.00
✓	*****	NGC 1291	MCG -7-7-8	Eri	03h17m18.6s	-41°06'29"	9.5	9.1'x 6.6'	22.1	0.93
	*****	NGC 55	MCG -7-1-13	Scl	00h15m08.4s	-39°13'13"	8.5	30.2'x 3.4'	21.7	0.55
	*****	NGC 300	MCG -6-3-5	Scl	00h54m53.5s	-37°41'05"	8.8	20.0'x 12.3'	22.9	0.59

Click on any of the column heading buttons to sort the display ordered by the values in that column. It is particularly useful to sort lists by optimum viewing time (visual mode). In Imaging mode check Optimum Sort to sort the objects best observed on this night to the top in the general order to observe them.

To view an object with a log entry icon simply click on the icon.

To change the 5-star rating for an object right-click on the rating icon. Select the icon with the number of stars you want. Note that all changes are saved in the active notes/rating group.

To change the observation status of an objects right-click in the observation status column. Select the status you want from the popup menu. You can also use one of the keyboard shortcuts with the object selected: F5=observed, F6=reobserve, F7=not yet observed, F8=no value.

Left-click on an object in the list to highlight (select) it. Right-click on the highlighted object to see this pop-up menu:

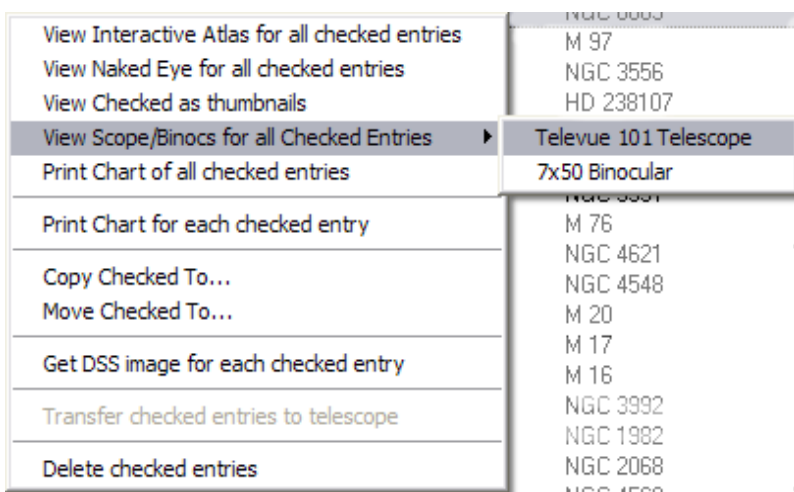
Object Info	i
View Interactive Atlas	a
View Overhead Sky	o
View Naked Eye	n
Televue 101	t
View Scope/Binocs	
Center in Current Chart	c
Print Chart	p
Slew Scope to	F3
Slew Scope to and Center in Chart	F4
Create Quick Log Entry	l
Create Log Entry(s)	m
Get DSS image	d
Copy To...	
Move To...	
Delete Entry	Delete

Each selection operates on the highlighted object in the list. If a time is required for the operation, such as when opening a chart, the current time is always used.

- Object Info will bring up the *Object Information* window that displays the detailed database information available for the object.
- Exposure Calculator will open the exposure calculator for the object.
- View Interactive Atlas -- will open the *Interactive Atlas* with the object as the target.
- View Overhead Sky -- will open the *Overhead Sky Chart* with the object as the target.
- View Naked Eye -- will open the *Naked Eye Chart* with the object as the target.

- "*selected telescope*" -- will open the simulation chart for the telescope/binoculars that are selected at the top of the dialog.
- View Scope/Binocs -- will open a menu containing all of the telescope/binoculars defined. Select one to view the currently selected object in the telescope/binoculars chosen.
- Center in Current Chart - center this object as the chart target if a chart is open.
- Print Chart -- will start the *Print Chart* dialog, targeted at the highlighted object, as seen from the selected observing location, at the current time.
- Slew Scope to / Push Scope to - (real time add-on only) will target the telescope at the selected object.
- Slew/Push Scope to and Center in Chart - (real time add-on only) will target the telescope at the selected object and make it the target of the currently open chart.
- Create Quick Log Entry - creates a log entry for the highlighted object with similar defaults.
- Create Log Entries starts the *New Log Defaults* dialog.
- Get DSS image to downloads a DSS image centered on the object.
- Copy To... copies or moves the selected object to another observing list.
- Move To... copies or moves the selected object to another observing list.
- Delete Entry deletes the selected object from the observing list

Click in the column under the Multiple Selection Check to select multiple objects. Right click in the check mark column to see this pop-up menu:



Note that none of the items will be active unless there are checked entries in the list.

- Select View (or Print) ... of all Checked Entries to automatically create a chart that plots all of the checked entries on a single chart, each indicated with individual target cross hairs. The selected object will be the primary chart target if checked.
- Use Print Chart for each checked entry to automatically print a separate chart for each of the checked entries. This can be very useful when printing star hopping charts to take into the field.
- Select Delete checked entries to delete them all.
- Select Copy To... or Move To... to copy or move the checked objects to another observing list.

- o Transfer checked entries to telescope works similarly to the *Observing Lists* menu (see Observing List Controls above) selection except that only those objects that are checked are transferred.

Keyboard shortcuts

Observing Priority - the observing priority of the object highlighted in the observing list can be set by pressing the 1, 2, 3, or 4 keys. Press 1 to set the priority to high, 2 to set it to normal, 3 to set it to low, and 4 to reset it to "no value."

Observing Status - the observation status can be set for the object highlighted in the observing list: F5 sets it to Observed, F6 sets it to Re-Observe, F7 sets it to Not Yet Observed, and F8 resets it to "no value."

Tips

A great way to set up Real Time is to select Visual mode, check optimum sort, and to set up the display to show only those objects that have not been marked Observed. To do this, right-click on the Observation Priority column heading and select *set all objects to--> not yet observed*. From the same menu select *Show only objects that need observation*. The best-placed objects will be listed at the top. Choose one of these objects to observe. To boost the position of any object that you don't want to miss, set it to a higher priority (which will move it up the list). As you observe each object, set its status to *Observed*. As you do they will be hidden from view.

Observing List Columns

The individual observing list columns can be turned on or off, resized and rearranged. Some have right-click options (see below). Each observing list has a different column scheme associated with it for each observing mode.

To view or change the column scheme click the blue button to the right of the far-right column.

By attaching a column scheme to each list you can have one set of columns for double star lists and another set of columns for deep sky objects, etc. Column schemes record the columns which are enabled, their widths, and their position.

To change a column width simply drag the edge of a column heading. To move a column left-click on a column heading and drag it to the desired location. The column scheme currently selected for the observing list will be modified to reflect the changes you make in column size or location.

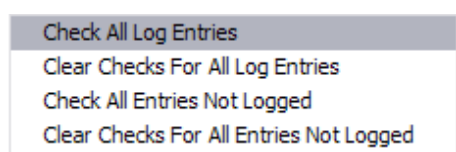
The column choices depends on the observing mode selection:

[Simple Mode Observing List Columns](#)

[Visual Mode Observing List Columns](#)

[Imaging Mode Observing List Columns](#)

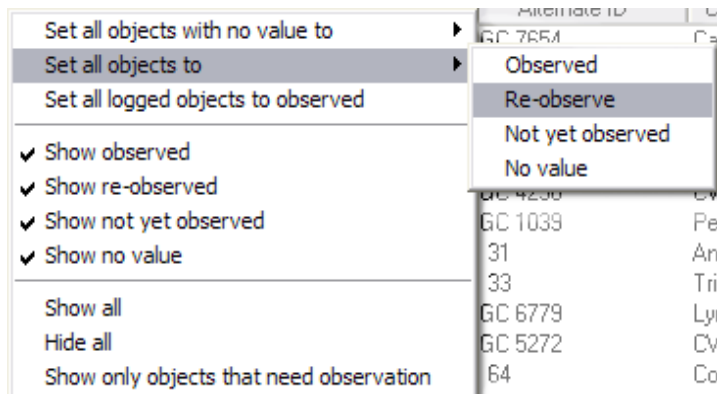
Right-click on the Observing Log column header to see the column options. Place/remove check marks according to the log status of each object via this popup menu:



This is useful if you want to print charts for only those objects that have log entries, or better

yet, those that don't. You can also choose to hide all logged or unlogged objects by checking them.

Right-click on the Observation Status column header to see the column options. The observation status is one of: *observed*, *re-observe*, *not yet observed* or *no value*. Use this menu to set the status of all objects in the list globally or to hide objects of a particular status.



- Set all objects with no value to... - replace the status of any objects with a status of *no value* with the status selected.
- Set all objects to... - set all objects in the observing list to the selected status.
- Set all logged objects to observed - set the status of every object in the observing list with a log entry to *observed*
- Show... - display only those log entries with the checked status. For example, to hide all objects with a status of *observed*, clear the check next to *Show observed*
- Show all -check all of the Show... items above.
- Hide all - clear the check for all of the Show... items above.
- Show only objects that need observation -clear the checks for *Show observed* and *Show no value*.

More Information

[Setting up ASCOM for use with GOTO Telescopes](#)

[Using a GOTO Telescope](#)

[Using a Pushto Telescope](#)

[Configuring Real Time Refresh Rates](#)

[Configuring the Sky Commander](#)

[Configuring the Pushto Indicators](#)

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GOTO Telescopes

Control of a wide variety of GOTO telescopes is supported via the ASCOM platform. The ASCOM initiative provides the drivers for these telescopes. Skyhound has no direct control over these drivers. In order to interface with an ASCOM supported telescope you must have the freely available ASCOM platform installed on your computer.



To get started download and install the ASCOM Platform from:

<http://www.ascom-standards.org/Downloads/Index.htm>

Next download the driver package for your telescope from here:

<http://www.ascom-standards.org/Downloads/ScopeDrivers.htm>

Configuring Your Telescope

Once ASCOM is installed and your telescope is connected select the **Real Time** tab. Choose *Select/Configure Telescope* and then *ASCOM Supported Telescope* from the *Telescope Control* menu.

Select a driver from the listing that supports your telescope. Click the **Properties** button to set the communications protocols and other parameters. See your telescope manual for details.

Note: you may need an optional cable to connect your telescope controller to the computer. If you don't already have one, contact your controller manufacturer to purchase this cable.

Connecting to Your Telescope

Once your telescope has been configured, connect to it via the **Connect to Telescope** selection of the *Telescope Control* menu. Once a connection has been successfully established you are ready to use SkyTools to control your telescope.

You may need to enable tracking or unpark the telescope before you can slew for the first time. These operations are found on the *Telescope Control* menu.

Slewing to a Target

There are a variety of ways to have SkyTools point your telescope at a target:

- Select an object in the observing list. The primary designation of the object will appear next to the **Slew To** button. Click this button to slew your telescope to this target.
- Select an object in the observing list. Press **F3** to slew your telescope to this object.
- Select an object in the observing list. Press **F4** to slew your telescope to this object and position the object at the center of the currently open chart. If no chart is currently open this operation is exactly the same as pressing **F3** above.
- Right-click on an object in the observing list. Select *Slew Scope to or Slew Scope to and Center in Chart* from the popup menu. The latter selection is only available if a chart is open. This selection will slew the telescope to the object and position it at the center of the currently open chart.
- Click on the name of the target object immediately to the right of the **Slew To** button. The Object Requestor will appear. Select any object from the database (or a position in the sky - see the **Help** on this dialog). Click **Ok**. Click the **Slew To** button to slew your telescope to this object.
- View a chart on the screen. Press **F2**. This will slew the telescope to the chart target (the object or position at the center of the chart). This option is also available from

the popup menu that appears when you right-click in a chart view.

- View a chart on the screen. Position the mouse cursor over the object (or position) that you wish to slew your telescope to. Press **F3**. This option is also available from the popup menu that appears when you right-click in a chart view.
- View a chart on the screen. Position the mouse cursor over the object (or position) that you wish to slew your telescope to. Press **F4**. The telescope will slew to this object/position and this location will be positioned at the center of the chart. This option is also available from the popup menu that appears when you right-click in a chart view.

Synchronizing the Telescope Position

Small telescope pointing errors can begin to add up, particularly as you slew the telescope from one side of the sky to another. The telescope thinks it is pointing at M57, but when you look through the eyepiece it is not exactly centered. The synchronization command tells the telescope to update its position. It is a good idea to synchronize the telescope position often.

To synchronize the telescope, first center the object in the eyepiece. Verify that the target object indicated on the Real Time tool is the object centered in the eyepiece. Then do one of the following:

- Click the Sync button.
- Press the space bar on the keyboard.
- Right-click in a chart view and select the *Sync Telescope* item.

In addition to this basic approach to synchronization there is another, more advanced, option. Open a chart on the screen targeted at the same object you are slewing to. Once the telescope slew has completed look into the eyepiece. Note the approximate position in the sky where the telescope is pointing. Move the cursor to this position on the chart, right click, and select *Sync telescope to cursor*.

Finding the Current Telescope Position

Where is my telescope pointed now? To answer this question open any chart, right click in a view, and select *Center Chart at Scope Position* from the popup menu.

This will position the chart such that the position in the sky where the telescope is currently pointing will be the chart target (centered in most views).

Other Telescope Controls

Certain telescopes support various other functions. These functions appear on the Telescope Control menu of the Real Time tool. Any function not supported either by your telescope or the ASCOM driver will be grayed-out and disabled.

Closing the Telescope Connection

Disconnect your telescope via the *Close Connection* selection of the Telescope Control menu. Exiting the program will automatically disconnect you from the telescope.

Related Topics

[The Real Time Tool](#)

[Using a PushTo Telescope](#)

[Configuring Real Time Refresh Rates](#)

[Configuring the Sky Commander](#)

[Configuring the PushTo Indicators](#)

[Setting Up ASCOM for GOTO Telescopes](#)

Setting up ASCOM for GOTO Telescopes

Control of a wide variety of GOTO telescopes is supported via the ASCOM platform. The ASCOM initiative provides the drivers for these telescopes. Skyhound has no control over these drivers. Questions related to driver issues should be directed to ASCOM. In order to interface with an ASCOM supported telescope you must have the freely available ASCOM platform installed on your computer.

To get started download and install the ASCOM Platform from:

<http://www.ascom-standards.org/Downloads/Index.htm>

Next download the driver package for your telescope from here:

<http://www.ascom-standards.org/Downloads/ScopeDrivers.htm>

ASCOM support:

<http://www.ascom-standards.org/Support/Index.htm>

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Pushto Telescopes (or DSCs)

Telescopes fitted for use with Digital Settings Circles are supported via the SkyTools Pushto interface. The Argo Navis and Sky Commander units are supported directly. Tangent-based DSCs are supported via ASCOM via the Orion Intelliscope driver. These include the Celestron Advanced Astromaster, David Chandler Co. Deep Space Navigator, Discovery Digital Setting Circles, Grecner Navigator, JMI NGCMAX, Lumicon Sky Vector, Mountain Instruments Star Pilot, Orion Intelliscope, Orion Sky Wizard 3, and TeleVue Sky Tour, as well as BBox, Ouranos, MicroGuider III and V, and other similar units.

Note: you may need an optional serial cable to connect your unit to the computer. If you don't already have one, contact your controller manufacturer to purchase this cable.

Configuring Your Telescope

Select the Real Time tab. For the Sky Commander select *Configure Sky Commander* from the *Telescope Control* menu. For the Argo Navis select *Configure Argo Navis*. Select *Configure ASCOM Telescope* for other units and choose the Orion Intelliscope Mounts driver.

Select the appropriate computer serial (COM) port--the one you have plugged the unit in to. Select an appropriate Baud rate (see the device manual for details).

Connecting to Your Telescope

Once your telescope has been configured connect to it via the *Connect to Telescope* selection of the *Telescope Control* menu. Once a connection has been successfully established you are free to use SkyTools to target your telescope.

Pushing to a Target

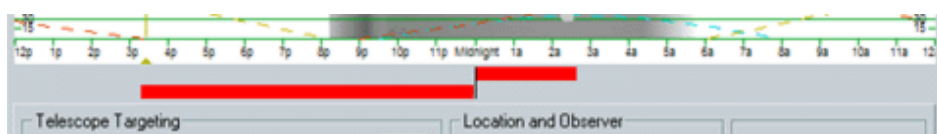
There are a variety of ways in which SkyTools can help point your telescope at a target. First you need to select a target object. The DSC unit will then operate as if this target was selected manually via the controller.

Ways of selecting a target:

- Select an object in the observing list. The primary designation of the object will appear next to the Push To button. Click this button to make this object the telescope target.
- Select an object in the observing list. Press F3 to make this object the telescope target.
- Select an object in the observing list. Press F4 to make this object the telescope target and position the object at the center of the currently open chart. If no chart is currently open this operation is exactly the same as pressing F3 above.
- Right-click on an object in the observing list. Select *Push Scope to or Push Scope to and Center in Chart* from the popup menu. The latter selection is only available if a chart is open. This selection will make this object the telescope target and position it at the center of the currently open chart.
- Click on the name of the target object immediately to the right of the Push To button. The Object Requestor will appear. Select any object from the database (or a position in the sky - see the Help on this dialog). Click Ok. Click the Push To button to make this object the telescope target.
- View a chart on the screen. Press F2. This will make this the current chart target (the object or position at the center of the chart) the telescope target. This option is also available from the popup menu that appears when you right-click in a chart view.
- View a chart on the screen. Position the mouse cursor over the object (or position)

- that you wish to make this object the telescope target. Press **F3**. This option is also available from the popup menu that appears when you right-click in a chart view.
- View a chart on the screen. Position the mouse cursor over the object (or position) that you wish to make the telescope target. Press **F4**. The object will become the telescope target and this location will be positioned at the center of the chart. This option is also available from the popup menu that appears when you right-click in a chart view.
 - In addition to the usual method of pushing your telescope to the target object using the DSC itself, SkyTools provides a set of *Pushto Indicators*. These indicators appear as a set of red bars immediately below the SkyTools *NightBar* on the Real Time tool.

The top bar indicates the offset from the target in either Right Ascension or Azimuth (depending on your selection - see below). The bottom bar indicates the offset in either Declination or Altitude.



Push the telescope until both indicators read zero (center position). The telescope should now be pointing at the target object.

In addition to the Pushto Indicator the current offsets from the target are displayed to the right of the position of the telescope:

Current Telescope Position					
R.A.	23h44m23.6s	00h00m00.1s	Azm.	00h00m00.1s	Hour Angle 12h34m
Dec.	-88d46m23.9s	00d00m00.1s	Alt.	00h00m00.1s	Airmass 2.6

Again, these offsets will be in either RA/Dec or Alt/Az depending on how you have the Pushto Indicators configured. Push the telescope until both values read zero (or close to it). The telescope should now be pointing at the target object.

Configuring The Pushto Indicators

Select the *Configure Pushto Indicators* item from the *Telescope Control* menu. This will open the [Configure Pushto Indicators](#) dialog.

For best results the sensitivity of the Pushto Indicators should be adjusted to match the pointing accuracy of your telescope. The sensitivity (in arc seconds) should be set to the distance from the target that is considered to be "as good as zero." For instance, if you set the sensitivity to be 60" (one arc minute) the indicators will read zero once the telescope is within one arc minute of the target object. If this parameter is set too small you will have difficulty zeroing the indicators.

The resolution of the Sky Commander encoders is 5.4' (324"). Therefore, a value near to 324" makes an appropriate setting for the pointing accuracy parameter.

If your telescope is mounted equatorially select the *RA/Dec* coordinate mode. If your telescope has a Dob or other Alt/Az mount select the *Alt/Az* coordinate mode. This selection determines the coordinate system used by the Pushto indicators and the numerical offset display.

If you wish to use the full screen version of the Pushto indicators check *Automatically display full screen Pushto Indicators when a Pushto target is initiated*. If checked, when you select a Pushto target object the full screen indicators will automatically appear.

If you wish the full screen indicators to disappear once they are zeroed check *Automatically Close the full screen indicates when they reach zero*

Pushing to a Target Via a Chart

As an alternative to the Pushto Indicators or coordinate offsets the various SkyTools charts can be used to push your telescope to the target location. First connect to your telescope via Real Time. There are two kinds of charts that can be used for this:

Telescope Simulation Chart - this is the telescope simulation chart customized for your telescope. Once you enter your telescope information a special chart is created for it. This chart can display up to three views: naked eye, finder, and eyepiece. Using the Zoom buttons you may adjust the overall field of view for each of these views to taste.

Start by targeting the simulation chart at your target object. Move your telescope to the general area of the sky drawn in the naked eye view. You should see the telescope position indicator move into view. Continue to move your telescope such that the telescope position indicator moves toward the target object. *Note that in the naked eye view the target object may not be centered vertically in the view* As you approach the target object the telescope position indicator will appear in the finder view. Now turn your attention to the view. In a similar manner as before move the telescope such that telescope position indicator approaches the target object (center of the finder view).

As you approach the target object closely the telescope position indicator will appear in the eyepiece view. Center the indicator in this view and your telescope should now be pointing at the target object.

Context Viewer - this is a special window attached to the Interactive Atlas. Once you enter your telescope information the context viewer can display a simulated eyepiece view.

Start by opening the Interactive Atlas. Your current telescope position will be displayed on the Atlas as a blinking cross hair. Click the Context Viewer button on the tool bar to start the Context Viewer. Select your telescope and eyepiece for use in the viewer. An eyepiece FOV circle will now appear on the Atlas indicating the position and field of view of the telescope. Depress the button on the Context Viewer to lock the Viewer to the telescope. Zoom the Atlas out to a comfortable level. Simply move the telescope to a target on the atlas. As you do the Context Viewer will track your view in the telescope.

What if you don't know where your telescope is currently pointing? Right click on the chart and select *Center Chart at Scope Position* from the popup menu. This will position the chart such that the position in the sky where the telescope is currently pointing will be the chart target (centered in most views).

Related Topics

[The Real Time Tool](#)

[Using a GOTO Telescope](#)

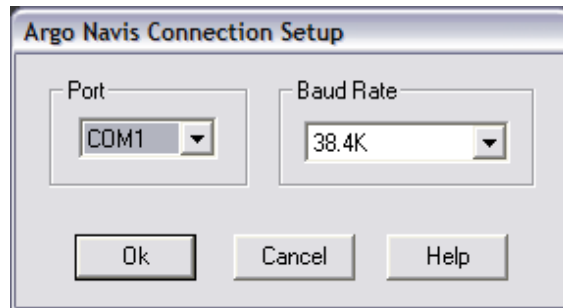
[Configuring Real Time Refresh Rates](#)

[Configuring the Sky Commander](#)

[Configuring the Pushto Indicators](#)

Configure the Argo Navis

This dialog is used to configure a telescope equipped with an Argo Navis DSC for use with SkyTools.



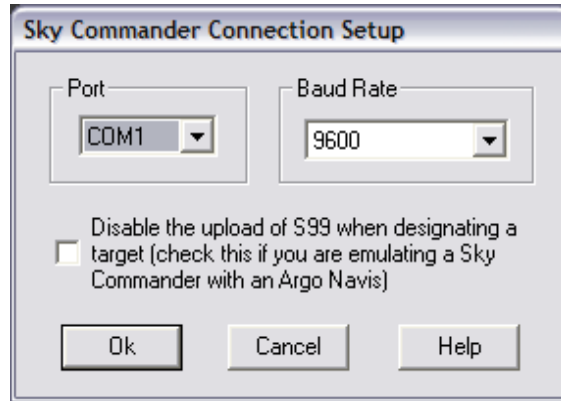
Select the Com port via which that the Argo Navis is connected to the computer.

Select the Baud rate that the Argo Navis is configured for.

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Configure the Sky Commander

This dialog is used to configure a telescope equipped with a Sky Commander DSC for use with SkyTools.



Select the appropriate computer serial (COM) port--the one you have plugged the Sky Commander in to.

Select an appropriate Baud rate (see the Sky Commander manual for details).

Argo Navis users in Sky Commander Emulation mode - check the bottom box to disable the upload of coordinates to the Sky Commander special object 99. If enabled you may experience unpredictable results when you select a target to Push to.

Sky Commander users should leave the box unchecked.

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Configure a Pushto Telescope (DSC) via ASCOM

Telescopes equipped with Digital Setting Circles (DSC's) are now handled by ASCOM drivers. Exceptions are the Sky Commander and Argo Navis which are supported directly by SkyTools.

The ASCOM supported DSCs are typically equipped with a Tangent-Instruments-based device such as the Intelliscope. These are compatible with the Celestron Advanced Astromaster, David Chandler Co. Deep Space Navigator, Discovery Digital Setting Circles, Greiner Navigator, JMI NGCMAX, Lumicon Sky Vector, Mountain Instruments Star Pilot, Orion Sky Wizard 3, and TeleVue Sky Tour, as well as BBox, Ouranos, MicroGuider III and V, and other similar units.

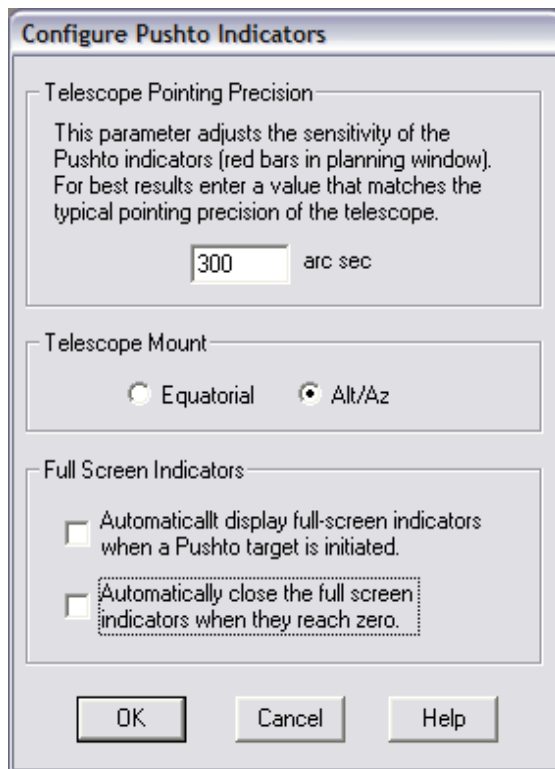
From the Telescope Control Menu on Real Time choose *Select/Configure Telescope* and choose *ASCOM supported Telescope*.

Select Orion Intelliscope Mounts for your driver. Click Properties to configure your telescope connection.

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Configure Pushto Indicators

This dialog is used to configure the SkyTools Pushto indicators. These indicators help the user push the telescope to a target.



Telescope Pointing Precision

For best results the sensitivity of the Pushto Indicators should be adjusted to match the pointing precision of your telescope. The sensitivity (in arc seconds) should be set to the distance from the target that is considered to be "as good as zero." For instance, if you set the sensitivity to be 60" (one arc minute) the indicators will read zero once the telescope is within one arc minute of the target object.

One way to compute this value is to use the resolution of your encoders. For example, if your encoder resolution is 8192 steps, each step in RA will represent 2.6' ($360 \times 60 / 8192 = 2.6' 156''$). For these encoders a value near 156 should be entered.

If you find it difficult to zero the indicators try entering a larger value.

Telescope Mount

If your telescope is mounted equatorially select the Equatorial coordinate mode. If your telescope is uses a Dob or other Alt/Az mount select the Alt/Az coordinate mode.

The above selection determines the coordinate system used by the Pushto indicators and the numerical offset display.

Full Screen Indicators

In addition to the Pushto Indicators on the SkyTools Real Time tool you may display much larger indicators that fill the entire screen. If enabled, the full screen indicators will appear automatically when you initiate a Pushto by selecting a telescope target.

Check the top box if you wish to enable the full screen indicators.

Check the bottom box if you wish the full screen indicators window to close automatically

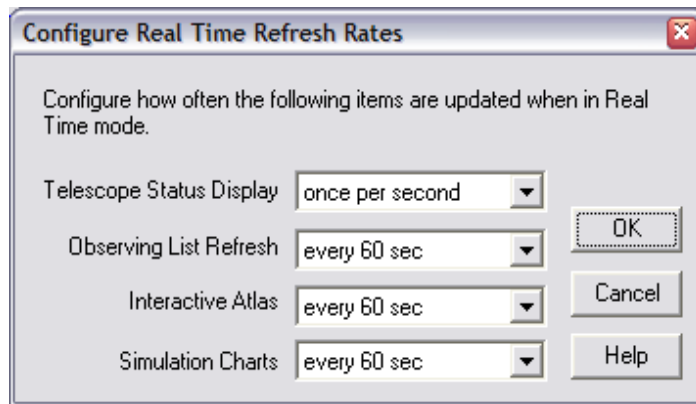
once they reach zero.

To close the full screen Pushto indicators window press Esc.

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Configure Real Time Refresh Rates

This dialog is used to set how often various displays are refreshed.



- **Telescope Status Display** - controls how often the position of the telescope is polled. This rate affects the update of the position on Real Time tool and the telescope position indicator on the charts. A quick refresh rate will allow smoother display of telescope movement, but may bog the computer down, possibly even causing communications time outs. *Note: according to the manual, the Sky Commander should be set to no quicker than "once per second".*
- **Observing List Refresh** - controls how often the observing list is refreshed with current information. Note that observing list refreshes will only occur automatically if Auto Refresh is checked in the *Observing Lists* menu. Large observing lists may take a long time to refresh and are very computationally intensive, so set this rate appropriately.
- **Interactive Atlas** - controls how often the Interactive Atlas chart and Context Viewer is updated in real time mode. Note that unless you are zoomed in on a moving object such as a planet, comet, or minor planet, you won't see any changes between refreshes on the atlas.
- **Simulation Charts** - controls how often the various simulation charts are updated in real time mode. The Overhead Sky, Naked Eye, Telescope and Binocular and binocular charts are simulation charts. These charts display with respect to the observer's local horizon. Changes over a few minutes are typically noticeable, even if not zoomed in on a moving object.

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Data Manager

The Data Manager dialog is used to manage the majority of the user data. Basic functions include backup/restore/Sync and data sharing/import. If connected to the Internet, SkyTools can download and import user data directly from the web.

There are eight types of user data overall:

- Notes associated with objects
- Web links associated with objects
- Images associated with objects
- Plottable Images
- Observing Lists
- Observing Logs
- Chart Preference Schemes
- General Preferences
- Supplemental Databases

All but the observing logs are managed via the Data Manager.

Data Associated with Objects

These include user-entered notes and ratings, web links, and images. This information is viewed, edited and input via the Object Information window. Any object in the SkyTools database (including objects in the supplemental databases) can have these types of information associated with it.

Groups

The notes, web links, and images are organized into groups. A group brings together the associated data of each type under a single theme. For instance, you could have a notes group called "My notes" that holds only the notes and ratings you created. Or you could have an image group with images of all the Messier objects in it.

Object Notes

These consist of a headline field, a 5-star rating, and a descriptive text field. The headline is limited to 64 characters. The descriptive text field is unlimited in length. The headline text is displayed via a tooltip when you pass the mouse cursor over each object in the Nightly Planner or Real Time tools. Notes (and ratings) are organized into groups.

Object Web Links

These consist of two fields: a title and a URL/FTP address. The title describes the item on the web (a page, image, etc.) being linked to. The URL is the actual link. When "Viewed" your web browser opens automatically the URL indicated. A valid URL must begin with <http://> or <https://>.

Object Images

These consist of two fields as well: a title and a path to the image file. The image file is not copied to the SkyTools user folder. If the target image file is moved or deleted the path to it will be broken and you will no longer be able to view it. When "Viewed" the SkyTools Image Viewer opens, displaying the image. This viewer allows various image processing functions (such as brightness/contrast adjustment, etc.) but does not alter the original image.

If you wish to keep all of your SkyTools data together we recommend copying images that you wish to associate with objects to the SkyTools "user/images" folder before associating them. Images that have been backed-up and restored will automatically be moved to this folder.

Supported image file formats: JPEG, GIF, TIFF, FITS, BMP

Exporting a Group with an Observing List

When an observing list is exported a group of notes/ratings, web links, images, or plottable images can be exported along with it. When imported new groups will be created with the same name as the observing list. This feature could be used to share your own images of all the Messier objects, ratings for your favorite observing list, or DSS images plottable in the chart backgrounds for the entire Herschel 400.

Observing Lists

Observing lists are lists of astronomical objects that you wish to observe. In many ways they form the backbone of the user data. Each object in a list may have user data associated with it. As an organizational tool this observing lists can be quite useful. Associated data such as notes/ratings, web links, and images can be grouped together and shared along with an observing list. For instance, you could create a list of your favorite objects called "favorites" along with "favorites" groups for notes/ratings, web links, and plottable images. DSS images could be downloaded and place into your "favorites" images group. Your 5-star ratings could be placed into the "favorites" notes group. Links to web pages with information about each object could be places into a "favorites" image group. You could even create a supplemental deep sky object for a newly discovered planetary nebula and add it to your list plus DSS images, a rating and web links. Now you can easily share all this information via your observing list so that other SkyTools users can have access to all the information you have assembled.

Plottable Images

These are images that have been prepared for display in the background of the various SkyTools charts. In order to display these images properly SkyTools needs to know the position of the image center, the map projection used to generate it (if any), how large it is on the sky, and the amount of arbitrary rotation (if any). This information can be entered manually (if known).

Digital Sky Survey (DSS) Images that are downloadable by SkyTools already have these parameters set and are automatically registered in the Plottable Image database.

Plottable images can be viewed using the SkyTools image viewer. As with all images this viewer does not alter the actual image data. The parameters of any processing applied to the image are saved in the plottable image database, rather than as a modification of the image data. Each time the image is displayed by SkyTools, either in the viewer or in a chart background, the processing is automatically reapplied. For example, if you invert the image data in the viewer such that it contains black stars on a white background, and increase the contrast, this is how the image will be displayed in the chart background.

Plottable images can also be associated with objects (see Object Images above). DSS images downloaded by SkyTools with a specified target object are automatically added to both databases.

Supplemental Databases

The SkyTools supplemental databases include comets, minor planets, stellar (star-like) objects, deep sky objects, and Skymarks (simple positions in the sky).

The supplemental databases add objects to SkyTools that are not already in the main database. In particular, recently discovered comets, minor planets, and novae/supernovae are stored here.

The Supplemental Databases are managed via the Data Manager.

Sharing Supplemental Data

If you share an observing list with supplemental database objects in it the supplemental data is shared along with the list. If the supplemental database object is not already present on the computer importing the list, it will be added to the local database.

Introductory Topics

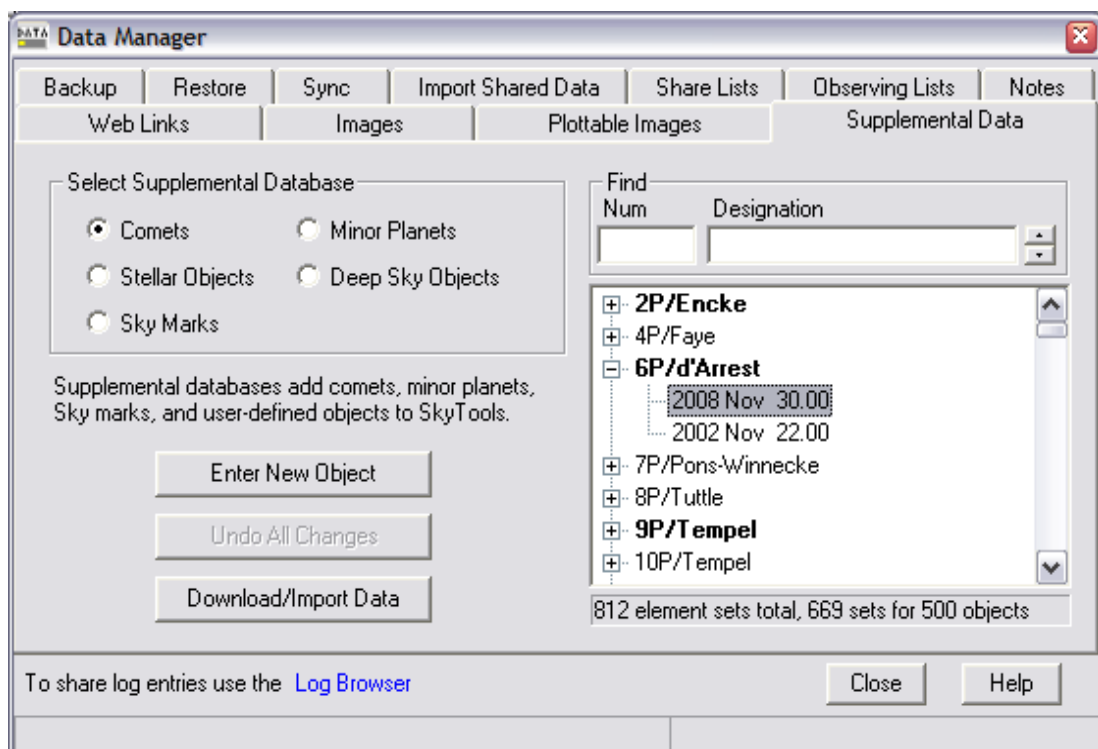
Plottable Images

[Observing Lists](#)
[Observing Logs](#)
[Chart Preference Schemes](#)
[General Preferences](#)
[Supplemental Databases](#)

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Data Manager: Supplemental Data

This tab is used to manage your supplemental databases. Supplemental databases add new data to the SkyTools databases.



There are five types of supplemental data:

- Comets
- Minor Planets
- Stellar Objects
- Deep Sky Objects
- SkyMarks

For a description of the data types see the [Supplemental Data Overview](#).

Select Supplemental Database

Select the supplemental database you wish to view. The objects in the database will be listed on the right. If you create a new object it will be created for the supplemental database selected.

Enter New Object

Click this button to create a new supplemental database object *for the database selected*.

Download/Import Data

Click this button to download supplemental data from the web or read it from a file.

Undo All Changes

All changes made since this tab was selected can be reversed by clicking the button. Note that once you close the Data Manager or change Data Manager tabs changes will be made permanent and this button will no longer undo them.

Browsing/Finding an Object

If large numbers of objects are listed they may be displayed in pages. In this case it will say something like "812 elements sets total, 669 sets for 500 objects." The last number (500 objects) indicates how many objects are displayed in each page. To see the next page of 500 objects click the down arrow at the top right of the listbox. To see a previous page click the up arrow.

Minor planets and comets may have more than one set of osculating attached to it, covering different periods of time. This is why the total number of elements sets may exceed the number of objects.

Click the "+" to see the sets of elements for each object.

To quickly find an object enter the first part of its designation into the Designation field and press enter. If the designation isn't matched perfectly, the first object that matches the letters entered will be displayed. Similarly, a Minor planet or period comet number may be entered in the Num field.

Why Are Some Entries in bold Font?

These are being used and cannot be deleted. SkyTools often uses the osculating orbital elements or position data from the supplemental database in observing lists, to create ephemerides, compute when events will occur, and to define the target object for observing log entries. The supplemental object entries that are shown with a bold font are currently being used for one or more of these purposes by SkyTools. These entries cannot be deleted until they are no-longer being used.

Editing an Object

To edit an objects data first find it in the list and then double-click on it. Comets and minor planets may be defined by more than one set of osculating elements. Click the "+" next to the object name to see the list of element sets. Double-click on the element set you wish to edit.

Deleting an Object or Element Set

Right-click on an object or element set and select *Delete Object* or *Delete element set*. Note that objects in bold font are being used by the program in some way, in a log entry or observing list, etc. These cannot be deleted.

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Supplemental Data Overview

Although the SkyTools database is extensive, there are occasions when you may wish to add your own data to the program. The Supplemental Database Editor facilitates the addition of supplemental data for use with SkyTools. There are four categories of supplemental data that can be added :

- **Comet** Orbital Elements
- **Minor Planet** (Asteroid) Orbital Elements
- **Stellar Objects** such as Novae and Supernovae
- **Deep Sky objects**
- **Skymarks** (simple positions on the sky)

New comets, minor planets, novae and supernovae are discovered all the time. It is natural to wish to enter these newly discovered objects into SkyTools. We make available for download a set of "current" observing lists that contain current comets, minor planets, and nova/supernova. These observing lists import objects into your supplemental database.

Supplemental database objects behave exactly like any other object in SkyTools. They are generally available for use with all of the tools. Log entries can be created for them (except Skymarks). Notes/ratings, web links, and image links can be associated with them. They may be shared via shared data file (.stx) in an observing list.

Comets

The SkyTools database contains orbits for historical comets, but new comets are discovered all the time. Not only that, but the osculating orbital elements that describe the position of a comet are valid for a finite period of time. So most comets you will observe will be from the supplemental comet database. Osculating orbital elements can be obtained from various sources for entry into your supplemental comet database, but we already do most of the work for you via the "current comets" observing list. This observing list contains all comets brighter than 15th magnitude. The list can be downloaded readily via the "Update 'Current' lists from web" menu item on the Nightly Planner menu. The latest orbital elements, magnitude and size data are included with the list and automatically added to your supplemental database.

Minor Planets

SkyTools has a built-in database of orbital elements at 40-day intervals for the first 10,000 numbered minor planets. For casual observers this built-in database would be more than enough.

Interesting minor planets come to attention periodically, particularly when they pass close to the earth. We offer for download the "current minor planets" observing list which contains orbital elements for these interesting minor planets, along with a selection of brighter minor planets near opposition every month. The list can be downloaded readily via the "Update 'Current' lists from web" menu item on the Nightly Planner menu. The latest orbital elements and magnitude data are included with the list and automatically added to your supplemental database.

For those who wish to hunt down the latest discoveries, NEOs, or faint distant minor planets, there are a variety of sources of minor planet data available for download. See the [Supplemental Data Download](#) for more information.

Stellar Objects

Novae and supernovae are being discovered all of the time. The supplemental stellar database is used to add these "temporary" stars to the SkyTools database. We offer for download the "current novae" observing list which contains up to date data for these new stars. The list can be downloaded readily via the "Update 'Current' lists from web" menu item on the Nightly Planner menu.

You can easily add your own stars to the database as well.

Deep Sky Objects

The SkyTools deep sky databases is extensive, but from time to time newly discovered objects come to our attention. You can add these objects to the supplemental deep sky database.

Skymarks

Skymarks aren't objects per se, but simple positions on the sky. When you wish to mark a location on the sky

use a Skymark. Skymarks act like any other object with the exception that you can't make log entries for them. A Skymark can be created directly from a chart via the right-click menu.

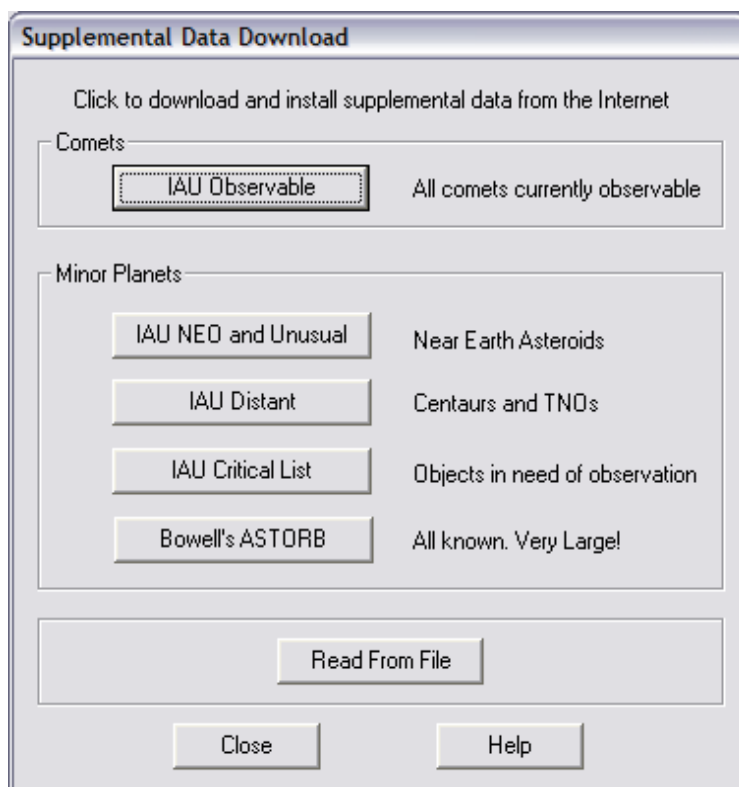
Osculating Orbital Elements

The position of a comet or minor planet is determined from a set of numbers called osculating orbital elements. The orbital elements describe the motion as if the object is the only object orbiting the sun. Because this isn't really true the orbital elements are only precise for a specific moment in time, called the Epoch of Osculation. The positions computed from the elements will no longer be accurate for times far away from the moment they were meant for. For this reason, more than one set of elements can be added for each object. SkyTools will always use the element set that is closest in time. The most recent orbital elements are readily available on the Internet in a form that is easily incorporated into SkyTools.

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Supplemental Data Download

This dialog is used to import supplemental data into SkyTools. It can read supplemental data files, but is primarily used to download supplemental data directly from various sources on the Internet.



Comets

The IAU keeps an up to date list of orbital elements for all currently observable comets. Click the IAU Observable button to download this list for addition to your supplemental comet database. Note that although the orbital data is always up to date, the magnitude parameters included with this data is often old and inaccurate, particularly for the fainter comets. No coma diameter or DC data is included with the download.

For these reasons *we do not advise downloading this data* unless you have a good reason to do so. The data downloaded with our "current comets" observing list is more extensive and up to date; downloading the IAU data will often replace your magnitude parameters with inaccurate ones. If you do download this data, perhaps because you wish to observe a faint comet not included with the "current comets" list, it is a good idea to download the "current" observing lists immediately afterward.

Minor Planets

Minor planet data can be downloaded from several sources. The minor planets in the IAU downloads, such as "NEO and Unusual" will be automatically placed into observing lists. For instance, downloading the "IAU Critical List" minor planets will create an observing list called "IAU Critical List Minor Planets" updated with the minor planets in the download. These lists are automatically created in the "Auto Generated Observing Lists" group. If you move a list to another group it will remain in the new location when updated.

Bowell's ASTORB file contains all known minor planets and is recommended for advanced users only. It is very large and may take some time to download and install. SkyTools will process the new minor planets after download to speed up their display on the charts, which may take as long as half an hour. Also, the large number of minor planets can slow the drawing

of charts dramatically if the display of supplemental minor planets is enabled.

Read From File

All forms of supplemental data can be read from a file in the SkyTools format. The IAU provides comets and minor planet data in this format (the most common of which are downloaded and installed directly via the buttons). Stellar and deep sky data can also be read from a file, although the file will typically have to be reformatted for SkyTools to read it.

Orbital elements for comets and minor planets can be found on the web at <http://cfa-www.harvard.edu/cfa/ps/Ephemerides/>

Look for *orbital elements in forms suitable for loading into popular planetarium-type programs*. You should find a link to a file designed to be read by the SkyTools Supplemental Database Editor.

File Formats

Comet File format

Minor Planet file format

Stellar file format

Deep Sky file format

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Comet File Format

The orbital elements for each comet are on a single line. The first character of the line must be 'C' to denote orbital elements in the comet format. On formatting the numerical data for the remaining columns it is important that the numbers start at the proper location. The numerical format of the numbers is not important.

Format:

col 1: 'C' character to denote a comet orbital element set
 col 3-43: Comet identifier, one of the following formats: (40 characters maximum)
 P/XXXX XXxx Name ex: P/1997 O1 Tilbrook Name=discoverer(s) id
 C/XXXX XXxx Name ex: C/1997 BA6 Spacewatch XXX XXxx=IAU designation
 D/XXXX XXxx Name
 nP/Name ex: 2P/Encke n=periodic number
 nnP/Name
 nnnP/Name ex: 103P/Hartley 2
 col 44-53: Epoch of osculation: YYYY MM DD (Y=year, M=month number, D= day number)
 col 55-68: Time of perihelion passage TT: YYYY MM DD.ddd
 col 70-79: q: XXX.dddddd (AU)
 col 81-90: e: XXX.dddddd
 col 92-98: w (argument of perihelion): XXX.ddd (degrees, J2000)
 col 100-106: Omega (longitude of ascending node): XXX.ddd (degrees, J2000)
 col 108-114: i (inclination): XXX.ddd (degrees, J2000)
 col 116-120: h (magnitude parameter, see comment below): XXX.d
 col 122-126: g (magnitude parameter, see comment below): XXX.d
 col 128-135: D (coma diameter, see comment below): X.dddddd (AU)
 col 137-146: Comment (usually the source of the elements): up to 10 characters

Magnitude parameter definition:

$$m1 = h + 5\log_{10}(\Delta) + 2.5\log_{10}(r)$$

where Delta=earth-comet distance, r=sun-comet distance in AU)

Coma diameter: we have found it to be very useful to estimate the apparent diameter of the coma based on the actual diameter in AU. In practice, we compute this value from a single observation using the formula:

$$\text{Coma Diameter} = \text{Apparent Diameter (radians)} * \Delta \text{ (AU)} \quad (\Delta \text{ is earth-comet distance})$$

We usually use a default value of 0.002000 AU.

C format code:

```
printf( "C %-40s %4d %2d %2d %4d %2d %6.3lf %10.6lf %10.6lf %7.3lf %7.3lf %7.3lf %5.1lf %5.1lf %8.6lf
%-10s\n", Name, Year, Emonth, Eday, Tyear, Tmonth, Tday, q, e, w, Omega, i, h, g, D, "MPC 123456");
```

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Minor Planet File Format

The orbital elements for each comet are on a single line. The first two characters of the line must be "MP" to denote orbital elements in the minor planet format. On formatting the numerical data for the remaining columns it is important that the numbers start at the proper location. The numerical format of the numbers is not important.

col 1-2: "MP" to denote a minor planet element set
 col 4-43: Minor Planet identifier, one of the following formats: (left justified, 40 characters maximum)
 (minor planet number) Name ex: (1) Ceres
 IAU designation ex: 1996 SZ4
 col 45-56: Epoch of osculation: YYYY MM DD.d (Y=year, M=month number, D=day number)
 col 58-64: M (mean anomaly at time of epoch, degrees): XXX.ddd
 col 66-75: a (semi major axis, AU): XXX.ddddddd
 col 77-84: e: XXX.ddddddd
 col 86-92: w (argument of perihelion, degrees, J2000): XXX.ddd
 col 94-100: Omega (Longitude of ascending node, degrees, J2000): XXX.ddd
 col 102-108: i (inclination, degrees, J2000): XXX.ddd
 col 110-114: H (magnitude parameter, see below)
 col 116-121: G (magnitude parameter, see below)
 col 123-132: Comment (usually the source of the elements): up to 10 characters

Magnitude parameter definition (Minor Planets):

Beta = minor planet phase angle (sun-minor planet-earth) in radians

Delta = earth-minor planet distance (AU)

r = sun-minor planet distance (AU)

$\text{Phi1} = \exp(-3.33 \text{pow}(\tan(\text{Beta}/2), 0.63));$

$\text{Phi2} = \exp(-1.87 \text{pow}(\tan(\text{Beta}/2), 1.22));$

$\text{Mag} = H + 5 \log_{10}(r * \text{Delta}) - 2.5 \log_{10}((1 - G) \text{Phi1} + G \text{Phi2});$

C format code:

```
printf("MP %-40s %4d %2d %4.1lf %7.3lf %10.6lf %8.6lf %7.3lf %7.3lf %7.3lf %5.1lf %6.2lf %-10s\n", name,
      Eyear, Emonth, Eday, M, a, e, w, Omega, i, H, G, "MPC 123456");
```

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Stellar File Format

The information for each object is on a single line. The first character on the line must be 'S' to denote the stellar data format. The entries starting at column 36 are delimited by a single space. Numbers may be entered as decimals, or in time format (HH:MM:SS.ss). Time format may be truncated at any point and may end in decimals.

Format:

Col 1: 'S'
Col 3-35: Object name (32 characters)

The remaining data starting at column 36 is delimited by a single space:

Col 36: Right Ascension (decimal hours or time format)
Declination (decimal degrees or time format (DD:MM:SS.ss))
Epoch of coordinate system (J2000, B1950, B1895 or any year+decimals)
Magnitude

Example Line:

S 1998 H1 04/21 16:03.55 -03:05.4 J2000 10.5

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Deep Sky File Format

The information for each object is on a single line. The first two characters on the line must be one of:

G - Galaxy
 GG - Galaxy Group
 Q - Quasar
 PN - Planetary Nebula
 NE - Duffuse Nebula
 DN - Dark Nebula
 OC - Open Cluster
 GC - Globular Cluster

to identify the type of deep sky object.

The entries starting at column 36 are delimited by a single space. Numbers may be entered as decimals or in time format (HH:MM:SS.ss). Time format may be truncated at any point and may end in decimals.

Format:

Col 1-2: Object type (two characters)

Col 3-36: Object name (32 characters)

The remaining data starting at column 36 is delimited by a single space:

Col 36: Right Ascension (decimal hours or time format)
 Declination (decimal degrees or time format (DD:MM:SS.ss))
 Epoch of coordinate system (J2000, B1950, B1895 or any year+decimals)
 Magnitude
 Semi-major axis (arc minutes)
 Semi-minor axis (arc minutes)
 Position Angle (degrees)

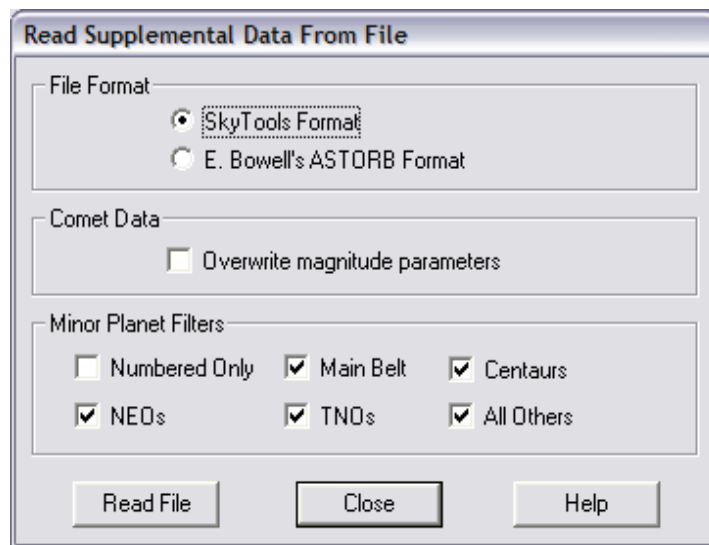
Example Line:

Q My Test Object 12:12:12.123 -10:10:10.1 J2000 9.61 10.5 12.5 250.2

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Read Supplemental Data from File

This dialog is used to read supplemental databases objects from a file.



File Format

Select the format of the file you wish to read.

Comet Data

Check the box if you want the new comet magnitude parameters to overwrite the existing ones.

Minor Planet Filters

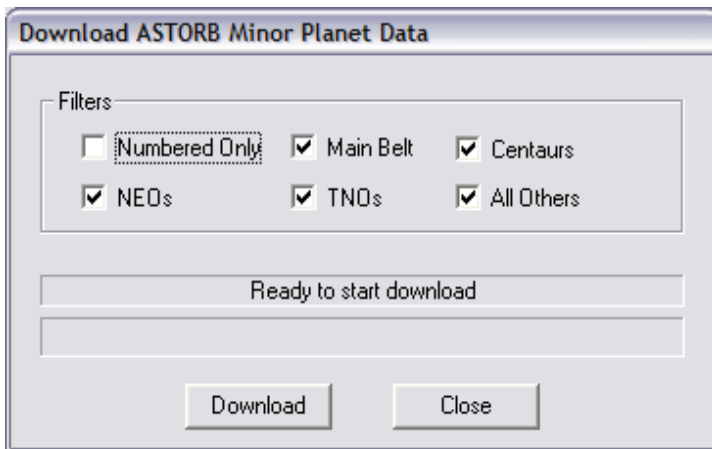
Select one or more sets of data to download. This database is very large, so it is a good idea to download only as much as you need.

- Numbered Only - this will limit the import to only those minor planets with numbers. This is a good way to obtain only the brighter, well known asteroids.
- NEOs - Near Earth Asteroids
- Main Belt -Main Belt Asteroids (between Mars and Jupiter)
- TNOs -Trans Neptunian Objects
- Centaurs -Centaurs
- All Others

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Download ASTORB Supplemental Minor Planets

This dialog is used to download supplemental minor planets from the ASTORB database.



Filters

Select one or more sets of data to download. This database is very large, so it is a good idea to download only as much as you need.

- Numbered Only - this will limit the import to only those minor planets with numbers. This is a good way to obtain only the brighter, well known asteroids.
- NEOs - Near Earth Asteroids
- Main Belt -Main Belt Asteroids (between Mars and Jupiter)
- TNOs -Trans Neptunian Objects
- Centaurs -Centaurs
- All Others

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Create/Edit Supplemental Comet Osculating Elements

This dialog is used to enter a new set of supplemental comet osculating elements or to edit an existing set.

Paste an Element Set

Osculating elements are typically provided in a standard MPEC format. These elements can be copied and pasted into the dialog. Copy the elements to the clipboard. Click Paste.

Note that some formats are not recognized, particularly those that include perturbations.

Example of elements that can be pasted into this dialog:

```
C/2008 R3 (LINEAR)
Epoch 2008 Nov. 30.0 TT = JDT 2454800.5
T 2008 Nov. 22.4827 TT
MPC
q 1.908860 (2000.0) P Q
n 0.0125948 Peri. 84.1510 +0.7256905 +0.0644837
a 18.295351 Node 270.5618 -0.3580429 +0.8855611
e 0.895664 Incl. 43.2376 +0.5875190 +0.4600254
P 78.3
```

From 238 observations 2008 Sept. 7-Oct. 19, mean residual 0".5.

Comet Name/Designation

Comets are named after their discoverer(s). If more than one person is credited for the discovery, the names are hyphenated (like Hale-Bopp). The discoverer name(s) appear in the top window under the *C comet Name/Designation* heading.

The IAU also designates comets based on their date of discovery. This designation has the form *Year W#*, where the year of discovery is listed followed by a letter designating the half month of discovery and the comet discovery number for that week. For instance, *1998 A1* designates the first comet discovered in the first half of January 1998.

Comets also have a letter prefix, depending on their status. A single-appearance comet which is not expected to return is designated with a C. Periodic comets (those which are in an orbit which brings them back periodically) are designated with the letter P. These comets are also given a periodic comet number, which is entered to the right of the P. Lastly, some comets have been lost and are designated with a D for disappeared.

Epoch of Osculation

The Epoch of Osculation describes the time at which the Keplerian orbital elements are valid. Elements are valid for several weeks about this date.

Magnitude

There are different formulae used to compute the magnitude of a comet. SkyTools uses the following formula, which is consistent with that used by the IAU:

$$m1 = h + 5\log_{10}(\Delta) + 2.5g\log_{10}(r)$$

Where:

$m1$ = Observed, integrated magnitude of comet coma

Δ = Earth-comet distance in AU

r = Sun-comet distance in AU

h = Absolute magnitude parameter (brightness at 1.0 AU from sun and from earth)

g = Multiplicative magnitude parameter

You will sometimes see magnitudes derived from this alternate formula:

$$m1 = H_0 + 5\log_{10}(\Delta) + n\log_{10}(r)$$

In this case the magnitude parameters are H_0 and n . Here's how to convert them to h and g used in SkyTools:

$$h = H_0$$

$$g = 0.4n$$

A note about comet magnitudes:

The observed magnitude of the comet represents the integrated brightness of the comet's coma as seen from Earth. This is normally obtained by comparing the comet's average surface brightness with that of defocused stars (matching the comet's size) of known brightness. Because comets have size (in contrast to stars which are pinpoints of light), a comet of a given brightness will appear less obvious than a star of the same brightness.

Time of Perihelion Passage

The Time of Perihelion Passage (T) describes the time of closest approach to the sun. This is when the comet or minor planet is intrinsically the brightest.

Coma Diameter

SkyTools uses the coma diameter to approximate the apparent size of a comet in the sky. The coma diameter may be computed from a single observation, preferably as close to the date you wish to observe the comet as possible.

It is particularly useful to compute the coma diameter based on an observation made by someone else before observing a comet for the first time. An source of recent comet observations can be found on the web at:

<http://www.cfa.harvard.edu/iau/icq/CometMags.html>

To compute the coma diameter press the **Calculate** button under the **Coma Diameter** heading.

Enter the date and time of the observation by clicking on the date shown. Note that the date/times entered are always UT (or GMT). The date and time are entered in SkyTools date format (year month day UT-time). The time is assumed to be UT.

Example: 1998 May 25 12:34

Next enter the apparent diameter of the comet and units (typically arc minutes).

The physical coma diameter will be displayed. Press **OK** to accept this value.

Note: the new coma diameter will be used only when SkyTools chooses this set of orbital elements. If you display the comet on a date closer to the epoch of osculation of another element set, the coma diameter from that set will be used instead. You may wish to simply copy the diameter computed to the other element sets.

Scale

These parameters define the size and shape of the orbit.

The eccentricity (e) defines how much the orbit deviates from a circle. A value of 0 indicates a perfectly circular orbit. Elliptical orbits have values between 0 and 1.0, and parabolic orbits have a value of 1.0. For recently discovered comets a value of 1.0 is usually adopted until enough observations have been obtained to make a better determination.

The perihelion distance (q) describes the size of the orbit by specifying the distance of the comet from the sun at perihelion (closest approach) in Astronomical Units.

Orientation

These parameters describe the orientation of the orbit in degrees as referred to the equinox given. They are the argument of perihelion (w), longitude of the ascending node (Ω), and inclination (i). The equinox is typically J2000.

Current Observations

The DC parameter is the Degree of Condensation. It describes how concentrated the light of the comet is toward the center. SkyTools uses this parameter to estimate the visual difficulty of the comet. DC values range from 0 (diffuse) to 1 (stellar). If you don't know the DC value select 4 as a typical value.

Source


Enter the source of the orbital elements.

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Create/Edit Supplemental Minor Planet Osculating Elements

This dialog is used to enter a new set of supplemental minor planet osculating elements or to edit an existing set.

Supplemental Minor Planet -- Osculating Eleme...



Minor Planet Name/Number
 Hermione No 121

Epoch of Osculation
 2008 8 22 00h00m00s TT
 Year Month Day Time (or JD)

Eccentricity
 e 0.135533

Time Reference (enter one)
 T 2002 8 16 17h13m13s TT
 Year Month Day Time (or JD)

Magnitude
 H 7.31
 G 0.15

Mean Anomaly 338.7398

Scale (enter one)
 a 3.444681 AU
 n
 q 2.977813 AU

Orientation
 Arg. of Perihelion 297.6564
 Longitude of Node 73.17876
 Inclination 7.59936
 Equinox J2000

Source: Bowell

Class: Outer Main Belt Object

Ok Paste Cancel Help

Paste an Element Set

Osculating elements are typically provided in a standard MPEC format. These elements can be copied and pasted into the dialog. Copy the elements to the clipboard. Click Paste.

Note that some formats are not recognized, particularly those that include perturbations.

Example of elements that can be pasted into this dialog:

```
2003 UB313
Epoch 2005 Aug. 18.0 TT = JDT 2453600.5      MPC
M 197.53790      (2000.0)      P      Q
n 0.00176902      Peri. 151.31153      -0.91258509      -0.02028701
a 67.7091000      Node 35.87500      -0.34877687      -0.48266077
e 0.4416129      Incl. 44.17700      +0.21340843      -0.87557240
P 557      H -1.1      G 0.15      U 5
```

Minor Planet Name/Number

On discovery minor planets are given provisional designations by the Minor Planet Center of the IAU. The standard designation consists of several parts, all of which are related to the date of discovery of the object: a 4-digit number indicating the year; a space; a letter to show the half-month; another letter to show the order within the half-month; and an optional number to indicate the number of times the second letter has been repeated in that half-month period.

Example: 1993 DA2

For these minor planets this is what is displayed under the Minor Planet Name/Number heading.

After a period of time minor planets are given a numerical designation, or minor planet number. Once designated, this number is displayed after MPN in the dialog. For bright or otherwise interesting minor planets a name can also be assigned. Once designated, the name replaces the provisional designation.

Epoch of Osculation

The Epoch of Osculation describes the time at which the Keplerian orbital elements are valid. Elements are valid for several weeks about this date.

Eccentricity

This describes the shape of the orbit. Values range from 0 for a circle, to between 0 and 1.0 for ellipses. A value of 1.0 specifies a parabolic orbit.

Time Reference

The Time of Perihelion Passage (T) describes the time of closest approach to the sun. This is when the minor planet is intrinsically the brightest.

The Mean Anomaly may be given instead of the Time of Perihelion Passage (T). This is a value in degrees.

Entering only one of these parameters is necessary; the other will be computed.

Magnitude

SkyTools uses the following formula to compute the apparent magnitude of a minor planet:

$$\text{Mag} = H + 5\log_{10}(r\Delta) - 2.5\log_{10}((1 - G)\Phi_1 + G\Phi_2)$$

Where:

Beta = minor planet phase angle (sun-minor planet-earth) in radians

Delta = earth-minor planet distance (AU)

r = sun-minor planet distance (AU)

H = additive magnitude parameter (or absolute magnitude)

G = multiplicative magnitude (or phase) parameter

And:

$\Phi_1 = \exp(-3.33\text{pow}(\tan(\text{Beta}/2), 0.63));$

$\Phi_2 = \exp(-1.87\text{pow}(\tan(\text{Beta}/2), 1.22));$

Scale

These parameters define the size of the orbit. You need enter only one of these values, the others will be computed.

The semi-major axis of the orbit (a) describes the size of the orbit by specifying the half-length of the longest dimension in Astronomical Units Alternately.

The perihelion distance (q) describes the size of the orbit by specifying the distance of the minor planet from the sun at perihelion (closest approach), also in Astronomical Units.

The mean daily motion parameter (n) is typically given in association with the Mean Anomaly, and represents the mean average motion of the minor planet about the orbit in degrees/day.

Orientation

These parameters describe the orientation of the orbit in degrees as referred to the equinox given. They are the argument of perihelion (w), longitude of the ascending node (Ω), and inclination (i). The equinox is typically J2000.

Source

Enter the source for the elements.

Class

The class is determined by SkyTools based on the osculating elements.

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Create/Edit Supplemental Stellar Object

This dialog is used to create a new supplemental stellar object or to edit an existing one.

Paste Coordinates

Coordinates can be pasted into this dialog in a variety of formats. The coordinates must be an Right Ascension (R.A.) and Declination (Dec.) pair, with R.A. first. The R.A. must be in hours, the Dec. in degrees. There must be at least one space or comma separating the two. Decimals or sexagesimals are recognized. Sexagesimals can be separated by colons or spaces.

Examples formats that can be pasted:

12:23:45.2 +09:10:16.1

12 23 45.2 +09 10 16.1

12 23 45.2 + 09 10 16.1

12.3958888 9.17113888

12 23 45.2, 9 12 16.1

12 23 45.2,9 12 16.1

Object Name

Enter a name string for the object.

Right Ascension

Enter a Right Ascension, measured in hours to the east of the vernal equinox. May be hours and decimals or in time format: HH:MM:SS.ss. Time format may be truncated at any point and may end in decimals.

Declination

Enter a Declination, measured in degrees from the celestial equator. May be degrees and decimals or in time format: +DD:MM:SS.ss. Time format may be truncated at any point and may end in decimals.

Coordinate Equinox

The equinox that the coordinates are referred to. Usually J2000. May also be B1950, B1850 or any year and decimal (E.g. 2009.6)

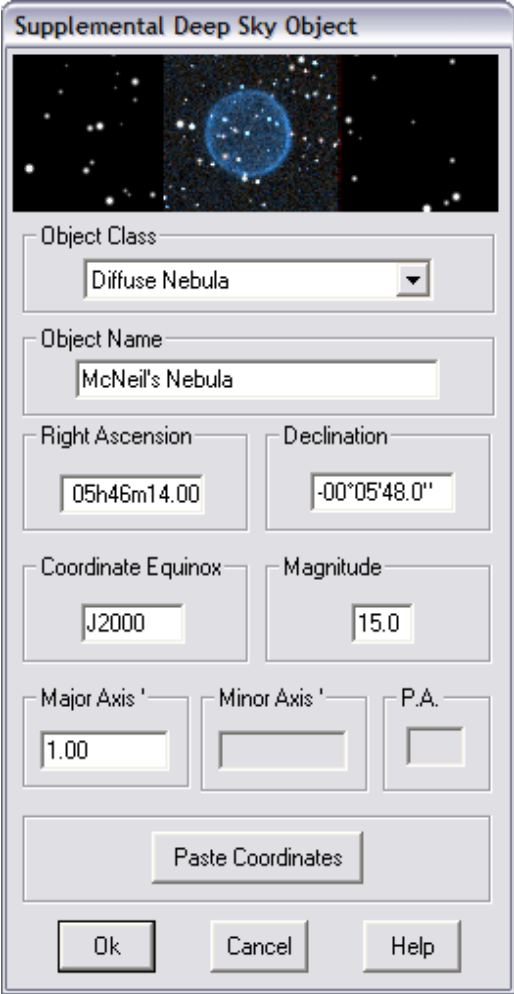
Magnitude

Enter the visual magnitude.

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Create/Edit Supplemental Deep Sky Object

This dialog is used to create a new supplemental deep sky object or to edit an existing one.



Paste Coordinates

Coordinates can be pasted into this dialog in a variety of formats. The coordinates must be an Right Ascension (R.A.) and Declination (Dec.) pair, with R.A. first. The R.A. must be in hours, the Dec. in degrees. There must be at least one space or comma separating the two. Decimals or sexagesimals are recognized. Sexagesimals can be separated by colons or spaces.

Examples formats that can be pasted:

12:23:45.2 +09:10:16.1

12 23 45.2 +09 10 16.1

12 23 45.2 + 09 10 16.1

12.3958888 9.17113888

12 23 45.2, 9 12 16.1

12 23 45.2,9 12 16.1

Object Class

Select a classification for the object. It is suggested that Asterisms be assigned as open clusters.

Object Name

Enter a name string for the object.

Right Ascension

Enter a Right Ascension, measured in hours to the east of the vernal equinox. May be hours and decimals or in time format: HH:MM:SS.ss. Time format may be truncated at any point and may end in decimals.

Declination

Enter a Declination, measured in degrees from the celestial equator. May be degrees and decimals or in time format: +DD:MM:SS.ss. Time format may be truncated at any point and may end in decimals.

Coordinate Equinox

The equinox that the coordinates are referred to. Usually J2000. May also be B1950, B1850 or any year and decimal (E.g. 2009.6)

Magnitude

Enter the visual magnitude.

Major/Minor Axes

These describe the size (in arc minutes) and shape of the object. A round object only requires a major axis; the minor axis may be left blank. Some objects are assumed to be round, such as clusters or planetary nebulae; the minor axis is disabled for these objects.

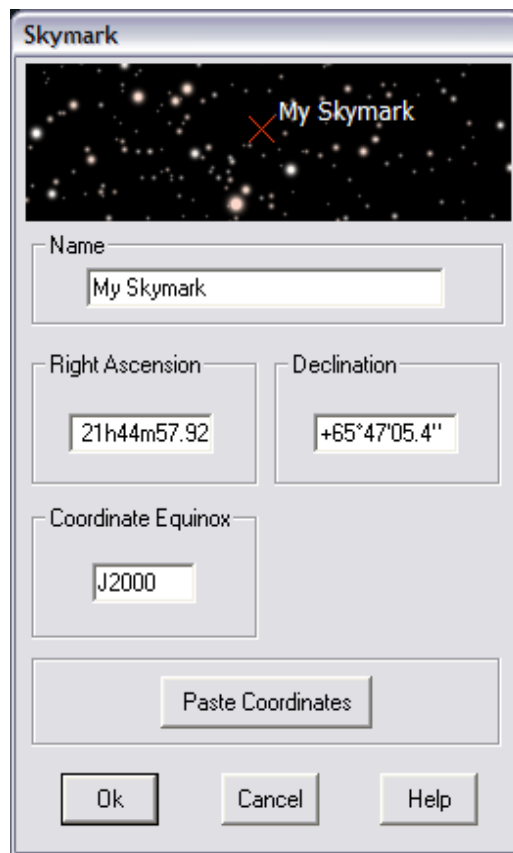
Position Angle (P.A.)

For objects with both a minor and major axis the position angle of the major axis may be entered (in degrees), measured relative to north and to the east on the sky. This is primarily for galaxies.

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Create/Edit Skymark

This dialog is used to create a Skymark or to edit an existing one.



Paste Coordinates

Coordinates can be pasted into this dialog in a variety of formats. The coordinates must be an Right Ascension (R.A.) and Declination (Dec.) pair, with R.A. first. The R.A. must be in hours, the Dec. in degrees. There must be a at least one space or comma separating the two. Decimals or sexagesimals are recognized. Sexagesimals can be separated by colons or spaces.

Examples formats that can be pasted:

12:23:45.2 +09:10:16.1

12 23 45.2 +09 10 16.1

12 23 45.2 + 09 10 16.1

12.3958888 9.17113888

12 23 45.2, 9 12 16.1

12 23 45.2,9 12 16.1

Name

Enter a name string for the object. The coordinates are used as a name for auto-generated Skymarks.

Right Ascension

Enter a Right Ascension, measured in hours to the east of the vernal equinox. May be hours and

decimals or in time format: HH:MM:SS.ss. Time format may be truncated at any point and may end in decimals.

Declination

Enter a Declination, measured in degrees from the celestial equator. May be degrees and decimals or in time format: +DD:MM:SS.ss. Time format may be truncated at any point and may end in decimals.

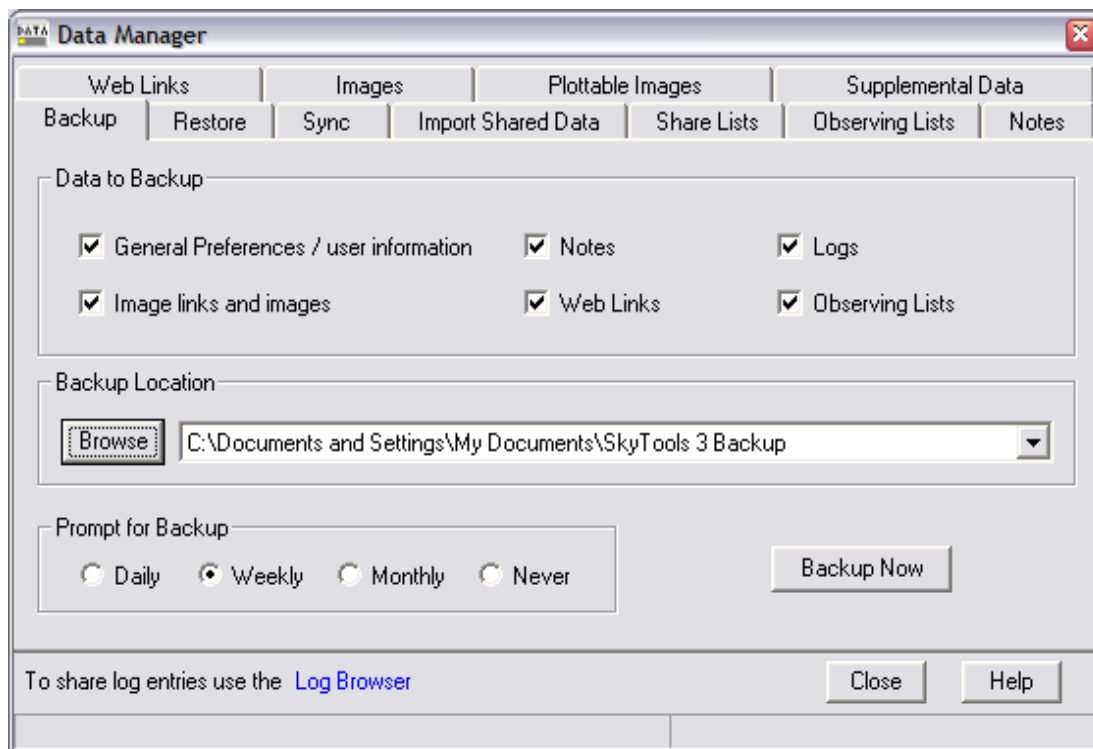
Coordinate Equinox

The equinox that the coordinates are referred to. Usually J2000. May also be B1950, B1850 or any year and decimal (E.g. 2009.6)

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Data Manager: Backup Tab

This tab is used to save your user data in a safe place in case of hard drive failure or if one or more of your databases become corrupted. Use the Restore tab to restore data that has been backed-up here.



Each time you back up a new folder will be created with your user data. The SkyTools version, date, and time are saved in the folder name.

Data to Backup

Select the type of data you wish to backup. It is recommended that all boxes be checked except under special circumstances.

Backup location

Select a destination folder for the backup files. The **Browse** allows you to navigate to any folder. It is best to select one folder for your backups and use it again and again.

Important: each backup is stored in a separate folder that will be created *within the folder you select*. In this way you can save as many backups as you wish to the same backup folder.

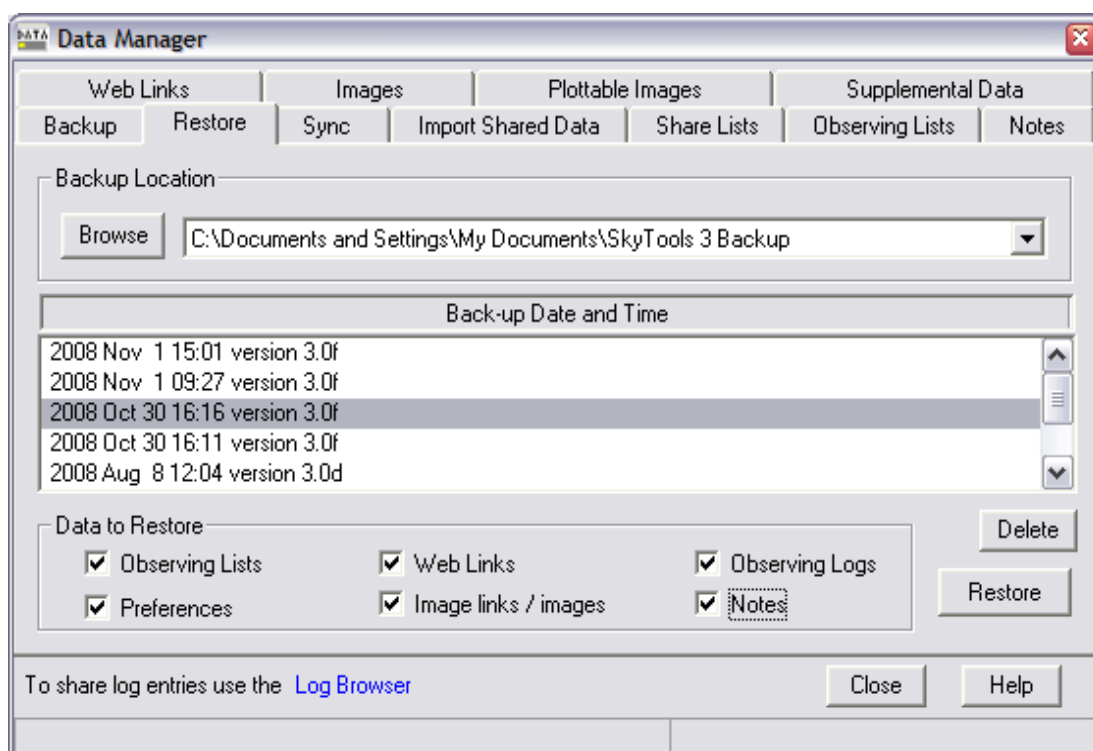
Prompt for Backup

This determines how often you will be prompted to backup your data. Each time you close SkyTools the date of the last backup is checked against the current date. If more time has elapsed than you have indicated you will be reminded that you are due for a backup and given the choice to backup your files before exiting.

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Data Manager: Restore Tab

This tab is used to restore files that were backed-up previously using the Backup tab.



Backup Location

Select the location of the top-level folder where you made your backups via the Backup tab or use the Browse button to browse to it.

The backups contained in the backup folder are displayed in the list. The date and time of each backup will be indicated, with the most recent at the top.

Important: the SkyTools backup files are saved in special folders with names like "SkyTools Backup...". *Do not browse to these folders!* You want to browse to the folder where the SkyTools backup folders are kept--one level above.

Delete a Backup

To delete a backup select it from the list then click Delete.

Data to Restore

When you select a backup the selections in this property may change. Only the check boxes for the types of data that were backed-up will be enabled. For example, if you backed up your observing logs the Observing Logs check box will be selectable. If the backup contained no log entries then the check box will be grayed and unresponsive.

Select from the enabled check boxes the data you would like to restore.

Click Restore to restore your data.

Notes:

Images that have been backed-up and restored will be restored to the user/images folder in all cases, no matter what their original location might have been.

Use this feature with caution! Any changes made to the data being restored since the

backup will be lost! To move data without worry of data loss use the Sync tab instead.

For example, if you do a backup of your observing logs on Friday, enter new logs over the weekend, then restore the backup on Monday, all of the logs you entered over the weekend will be lost.

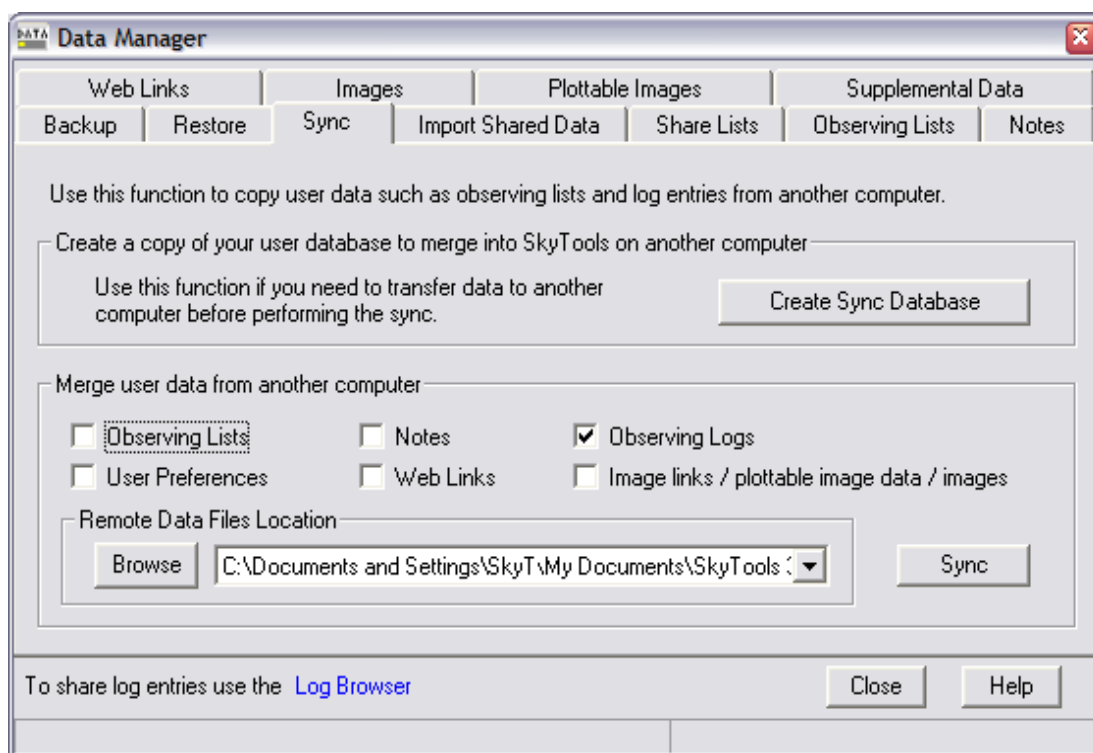
Database Corruption: If you experience a database corruption the backup and restore feature can often fix your corrupted database without loss of data. When a backup is created all of the pertinent information is saved for each item being backed-up. For instance, each log entry is saved with the location and instrument data needed to define it. When restored, the databases are rebuilt from scratch. Most corruptions involve an index file or other secondary database used by SkyTools to find the data quickly. By restoring your data these files are completely rebuilt from the data saved in the backup. Therefore, if you experience data corruption, try backing up your files and then restoring them. In many cases this will solve your problems without any loss of data or limit the loss to a few items only. If the corruption lingers then restore from a previous backup.

See also: [Backup tab](#)

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Data Manager: Sync Tab

The Sync tab is used to synchronize SkyTools user data between two computers. The main point of this is so we can easily move our observing preparations onto our laptop to take into the field, and then easily move the results, such as log entries, back to our desktop. SkyTools must be installed on both computers.



Two ways to Sync

There are two basic ways to Synchronize your data between two computers:

1. Synchronize directly to the SkyTools data. The SkyTools user data is stored in "My Documents\SkyTools 3". If this folder is available to another computer over a network simply browse to this location over the network.
2. Synchronize via a Sync Database that is created on one computer and transferred to another.

Which Computer?

Data is always transferred from a remote computer to the local one. When you run a Sync you run it on the computer where you want the merged data to appear. For example, if you wish to transfer your recent observing lists from your desktop to your laptop, you would run the Sync from the laptop. Similarly, if you wish to transfer the logs you made last night from your laptop back to your desktop computer, you would run the Sync from the desktop computer. Think of the Sync process always as bringing new data into the computer you are currently using.

Syncing Directly Between Two Computers Over a Local Network

This is the most common and simplest way to synchronize your SkyTools user data between two computers. In this method we will browse to the SkyTools user data on the remote computer and read directly from it.

1. Connect both computers to the network.
2. Make the SkyTools user database folder on the remote computer a shared folder so that it can be accessed via the network from another computer. The SkyTools user

data is found in "My Documents" and the folder is called "SkyTools 3." With Windows XP/Vista you can share this folder over a network via the Share tab of the *Properties* for the folder.

3. Start SkyTools on the computer you wish to transfer data to (remember, the Sync process always brings new data into the current computer).
4. Open the Sync tab on the Data Manager
5. Click the Browse button and browse to "My Network Places." Follow the tree to the folder you shared over the network on the other computer (My Documents\SkyTools 3). Select the "SkyTools 3" folder. Click Ok.
6. Check the box next to each type of data you wish to bring into the local computer. (See the topic below that explains each data type.)
7. Click Sync.

You may be prompted periodically to replace some of the local data if it differs. For instance, you may have added an eyepiece to a telescope. In this case you may be prompted whether or not to replace the telescope data on the local computer with the telescope data on the remote computer. Take care not to replace the newer version with an old one!

There is one hitch with transferring data over a network. SkyTools allows you to link objects to images. These images may reside anywhere on your computer. Unfortunately, it is difficult for the Sync process running on another computer to locate these images. In some cases the images may be in locations that have not been shared over the network, and thus inaccessible. If an image cannot be located you will be prompted to enter a path to the image location.

It is recommended that all images linked to SkyTools be kept in only a few locations on the computer so these locations can be shared and accessed in order to transfer the images during the Sync process. Note that all plottable images are already found in the user's "SkyTools 3" folder. Plottable images are those that can be displayed in the chart background, such as those downloaded from the DSS servers. These images may be Synced without difficulty.

Syncing Between Two Computers Using a Data Transfer via CDR Flash Drive, etc.
First make a Sync database on the computer you wish to transfer the data from. This database will be transferred to the second computer where the Sync function will be run to merge the data into it.

1. Start SkyTools on the computer you wish to transfer data from.
2. Open the Sync tab on the Data Manager
3. Click the Create Sync Database button
4. Click Browse and browse to a location where you wish to create the Sync database. Use a temporary folder, or a folder on a removable drive. Note that the database will consist of a group of folders, one for each type of data, so it is best to create the database in an empty folder.
5. Select the types of data to transfer. If Image Links or Plottable Images are to be transferred the database may be quite large because the images themselves will be copied to the database. For many of the types of data that are grouped together (notes, web links, image links, and plottable images) you may select a single group to export to the database. For instance, if you recently created a new Plottable Image group with several downloaded DSS images in it, and it is only this that you wish to transfer to the other computer, then select the new group via the Plottable Images pull down. If that's all you need to transfer then set everything else to "None."
6. Now transfer the data that you have created to the other computer, by writing it to a CDR, copying it to a flash drive, etc.
7. Start SkyTools on this second computer (the one you wish to merge data into) .

8. Open the Sync tab on the Data Manager
9. Click the Browse button and browse to the location of the database you created.
10. Check the box next to each type of data you wish to bring into the local computer. (See the topic below that explains each data type.)
11. Click Sync.

Syncing to Your SkyTools 2 Data

There are two ways to synchronize SkyTools 3 to your SkyTools 2 data. This is the preferred method to transfer your data after upgrading to SkyTools 3.

The following instructions assume that SkyTools 2 is installed on the same computer:

From the Sync tab of the Data Manager browse directly to your SkyTools 2 "user" folder. This folder is typically found at "C:\Program Files\CapellaSoft\SkyTools 2\user." Select the types of data you wish to import into SkyTools 3 and press the Sync button.

You may also Sync to a SkyTools 2 backup. From the Sync tab of the Data Manager browse to your main SkyTools 2 backup folder. Continue browsing to the backup you wish to synchronize to, e.g. "skytools backup 2007 Aug 28 1234." Select the types of data you wish to import into SkyTools 3 and press the Sync button.

Note: to successfully synchronize image links and plottable images from a SkyTools 2 backup you will need to copy all the images in the SkyTools 2 "user\images" folder into the "images" folder in the backup.

Data Types

You may select which data types to Sync:

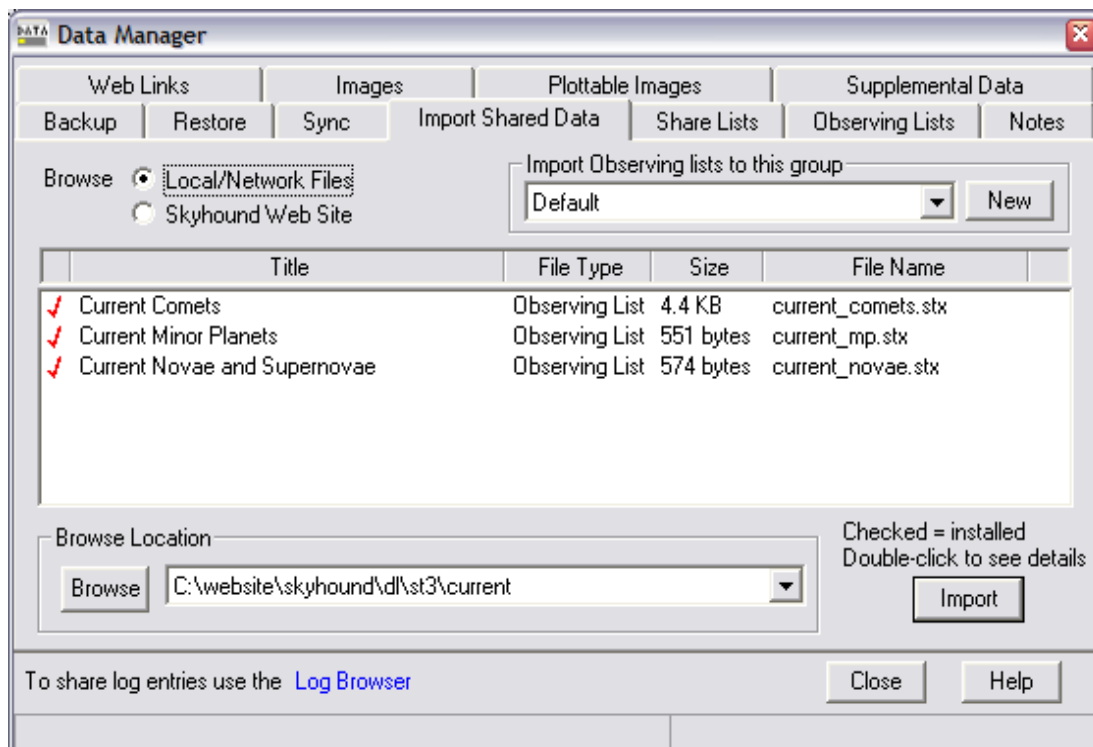
- User Preferences -- observing locations, telescopes, binoculars, custom eyepieces, custom cameras, custom filters, custom lenses, observers, charts and their settings, scenarios, and saved chart schemes
- Observing Logs -- object log entries, special log entries, and miscellaneous log entries
- Observing Lists -- lists of objects displayed on the Observing Lists and Real Time tabs of the planner
- Notes -- notes associated with objects via the Notes tab of the Object Information dialog
- Web Links -- links to web pages associated with objects via the Links tab of the Object Information dialog
- Image Links/plottable image data/images -- links to images associated with objects via the Images tab of the Object Information dialog, the images themselves, plottable Images and their corresponding data that makes them plottable on the charts

Limitations

- Event and ephemerides data is not transferred
- Your general selections, such as the current date/time, observing list column selection, and settings from the SkyTools Preferences dialog are not transferred

Data Manager: Import Shared Data Tab

This tab is used to import data that has been shared by other SkyTools users. SkyTools shared data (.stx) files can be read directly from a local or network drive or downloaded from the Skyhound web site repository.



Two Sources for Files

SkyTools .stx files can be imported in two ways:

- Files on a local or networked drive. Select Local/Network Files.
- File location on the Skyhound web site. Select Skyhound Web Site.

Browsing Files on a Local/Network Drive

Use the Browse button to browse to a folder that contains SkyTools shared data (.stx) files. Any files found in the folder selected will be listed immediately.

Files marked with a red check mark are already installed.

Double-click on a file to see information about it, including a description, size, and details of its contents.

Select one or more files to import and click Import.

Browsing Files on Skyhound.com

Select a location to browse. The files found in the folder selected will be listed. Depending on your connection speed it may take a few moments for the files to appear.

Files marked with a red check mark are already installed.

Double-click on a file to see information about it, including a description, size, and details of its contents.

Select one or more files to import and click Import.

Export File Types:

- Observing lists - an exported observing list (list of objects). Note that observing lists may also contain notes, images, web links and log entries. Notes, web links, images, and plottable images will be placed into groups with the same name as the observing list. Log entries will be added to your log database.
- Notes - a list of notes associated with one or more objects. A new group will be created for each file imported.
- Web Links - a list of web links associated with one or more objects. A new group will be created for each file imported.
- Images - a list of images associated with one or more objects. A new image group will be created for each file imported. A new plottable images group will be created for any plottable images included in the file.
- Log Entries - a list of observing log entries (exported via the Log Browser) for one or more objects. Logs entries will be added to your log database.
- Chart Preference Scheme - a single chart preference scheme (style, colors, fonts, etc). When imported this new scheme will appear in the Scheme list on the *Chart Preferences* dialog.

What happens when you import a newer file?

If the shared file contains an observing list the old observing list (of the same name -- all observing lists must have unique names) will be overwritten by the new one.

Notes, web links, log entries and images that already exist in a group of the same name on your computer will not be overwritten. Duplicate entries will not be created.

New notes will be appended to the notes that already exist in that group for that particular object. Notes with duplicate text will not be appended. If the object already has a headline, the old headline will be preserved.

All web links must have a unique link (URL/FTP). New links will be added to your database (regardless of the title), but only if they are simple URLs or FTP requests. Existing entries that have the same link (URL/FTP) will not be replaced.

All images must have a unique file name.

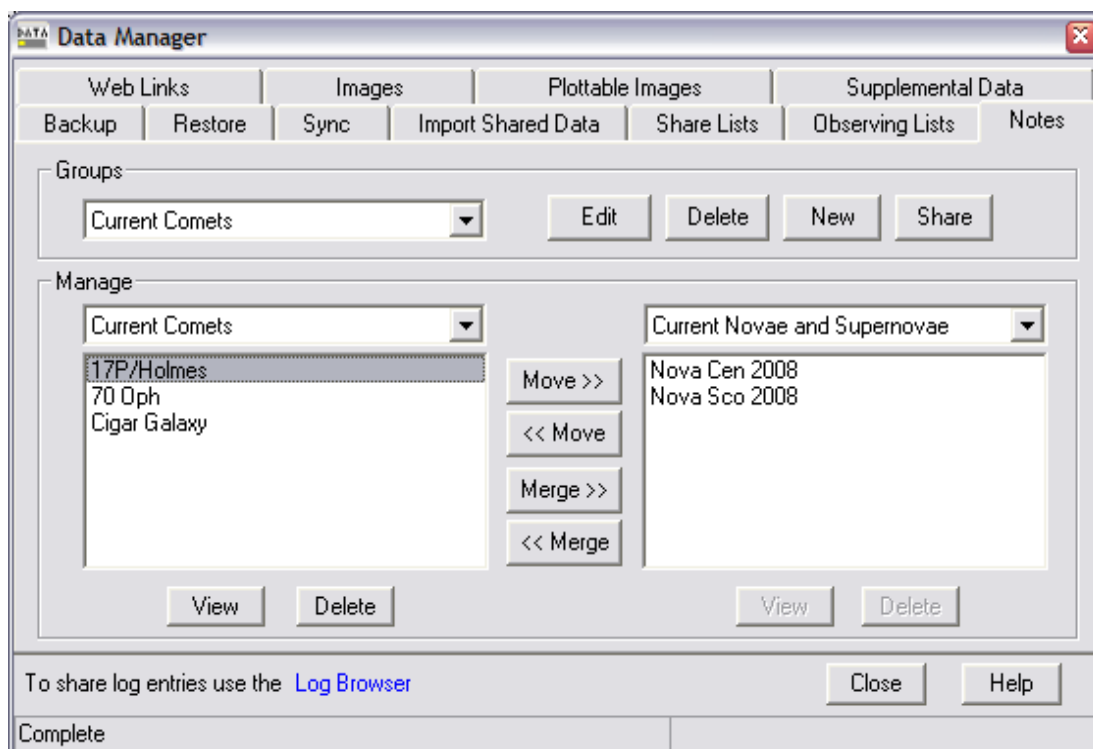
Imported images with new image file names will be added to your database (regardless of the title). Existing entries that have the same file name will not be replaced. Imported images will be placed in your user/images folder.

Log entries that differ in any way (text, location, date, observer, etc.) will be added to your database. Duplicate log entries will not be created.

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Data Manager: Notes Tab

Use this tab to manage your notes/ratings . Notes groups can be created or deleted from this dialog. Notes/ratings can be moved from one group to another.



Notes/ratings

Notes and ratings are created via the Notes tab of the Object Information window. A note consists of a text description that can be of any length, a short headline, and a 5-star rating. Each note is associated with a specific object.

Notes Groups

Notes/ratings are organized into groups. You can think of groups as folders where notes/ratings are kept. Grouping notes allows us to select which notes/ratings we want to be active on the Nightly Planner or Real Time tools. Only one group can be active at any given time. Groups of notes can also be easily shared with others as a SkyTools .stx file.

Click New to create a new group.

Click Delete to delete the selected group. Before a group can be deleted it must first be emptied of observing lists.

Click Edit to edit the currently selected group title.

Sharing Notes/Ratings

Notes/ratings are shared by group in one of two ways: a notes/ratings group can be shared via a SkyTools shared data (.stx) file by clicking Share.

A notes/rating group can also be shared along with an observing list ((see the [Share Lists](#) tab)).

Manage

To move notes/ratings from one group to another select the group that you wish to move from above one of the two listboxes. Notes are listed by the object they are associated with. Select one or more objects with notes associated to move.

Above the other listbox select the group you wish to move to. Click the appropriate Move button.

To delete a note, first select the group the note resides in at the top of one of the listboxes. Select the object that the note you wish to delete is associated with in the listing below it. Click Delete below.

View Note

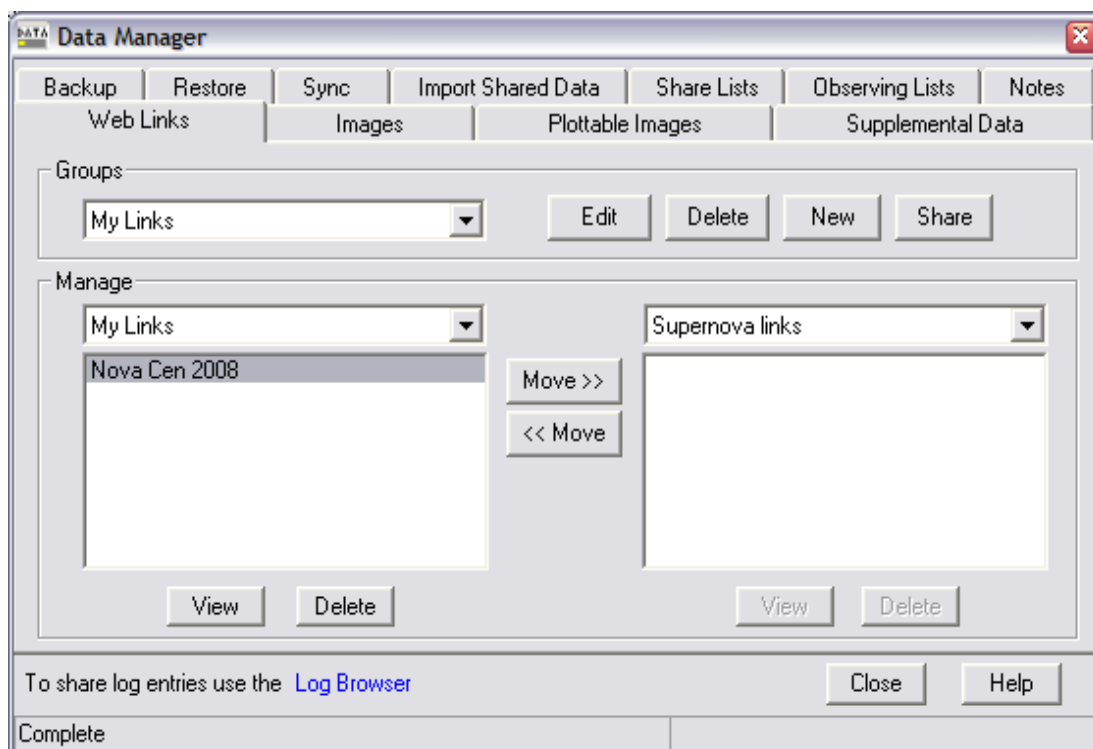
To view the note in the Object Information window, first select the group the note resides in at the top of one of the listboxes. Select the object associated with the note that you wish to view in the listing below it. Either click View or double-click on the list.

The Object Information window for the object will appear with the Notes tab selected. You may view or edit the note, headline and rating from this window.

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Data Manager: Web Links Tab

Use this tab to manage your web links . Web link groups can be created or deleted from this dialog. Web links can be moved from one group to another.



Web Links

Web links are created via the Links tab of the Object Information window. A web link consists of a URL to a page on the web and text description. Each web link is associated with a specific object.

Web Links Groups

Web links are organized into groups. You can think of groups as folders where web links are kept. Groups of web links can be easily shared with others as a SkyTools .stx file.

Click New to create a new group.

Click Delete to delete the selected group. Before a group can be deleted it must first be emptied of observing lists.

Click Edit to edit the currently selected group title.

Sharing Web links

Web links are shared by group in one of two ways: a web link group can be shared via a SkyTools shared data (.stx) file by clicking Share.

A web links group can also be shared along with an observing list (see the [Share Lists](#) tab)).

Manage

To move web links from one group to another select the group that you wish to move from above one of the two listboxes. Web links are listed by the object they are associated with. Select one or more objects that has links associated to move.

Above the other listbox select the group you wish to move to. Click the appropriate Move

button.

To delete a web link, first select the group the link resides in at the top of one of the listboxes. Select the object that the link you wish to delete is associated with in the listing below it. Click Delete below.

View Web link

To view the web link in the Object Information window, first select the group the link resides in at the top of one of the listboxes. Select the object associated with the link that you wish to view in the listing below it. Either click View or double-click on the list.

The Object Information window for the object will appear with the Links tab selected. You may view or edit the web link from this window.

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Data Manager: Images Tab

Use this tab to manage your image links. Image link groups can be created or deleted from this dialog. Image links can be moved from one group to another.

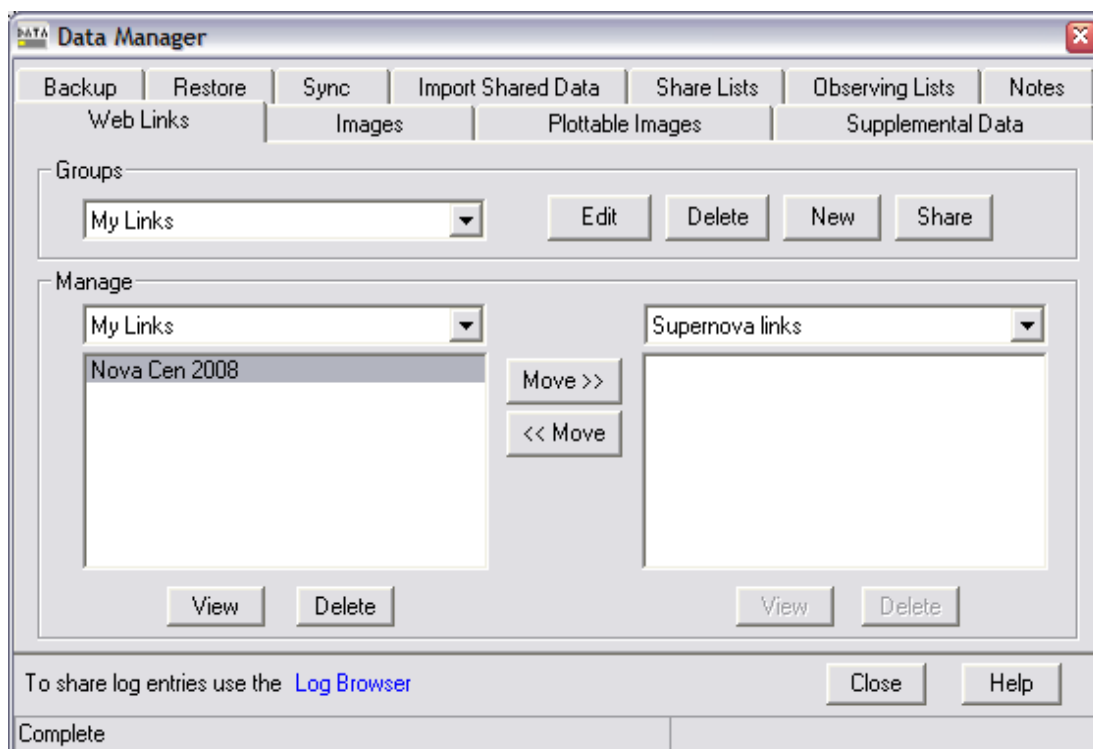


Image Links

Image links are created via the Images tab of the Object Information window. An image link consists of a path to an image file and a short title or description. The description is often the name of the image file. An image link associates an image with an object from the SkyTools database. This can be any image, including Plottable Images, which are also plottable on the chart backgrounds.

Image Links Groups

Image links are organized into groups. You can think of groups as folders where links are kept. Groups of image links can be easily shared with others as a SkyTools .stx file.

Click New to create a new group.

Click Delete to delete the selected group. Before a group can be deleted it must first be emptied of observing lists.

Click Edit to edit the currently selected group title.

Sharing Images/Links

Images and image links are shared by group in one of two ways: an image link group can be shared via a SkyTools shared data (.stx) file by clicking Share.

An image link group can also be shared along with an observing list ((see the [Share Lists](#) tab)).

Manage

To move image links from one group to another select the group that you wish to move from above one of the two listboxes. Image links are listed by the object they are associated with. Select one or more objects that has links associated to move.

Above the other listbox select the group you wish to move to. Click the appropriate Move button.

To delete an image link, first select the group the link resides in at the top of one of the listboxes. Select the object that the link you wish to delete is associated with in the listing below it. Click Delete below. Note that the actual image file is not deleted.

View Image link

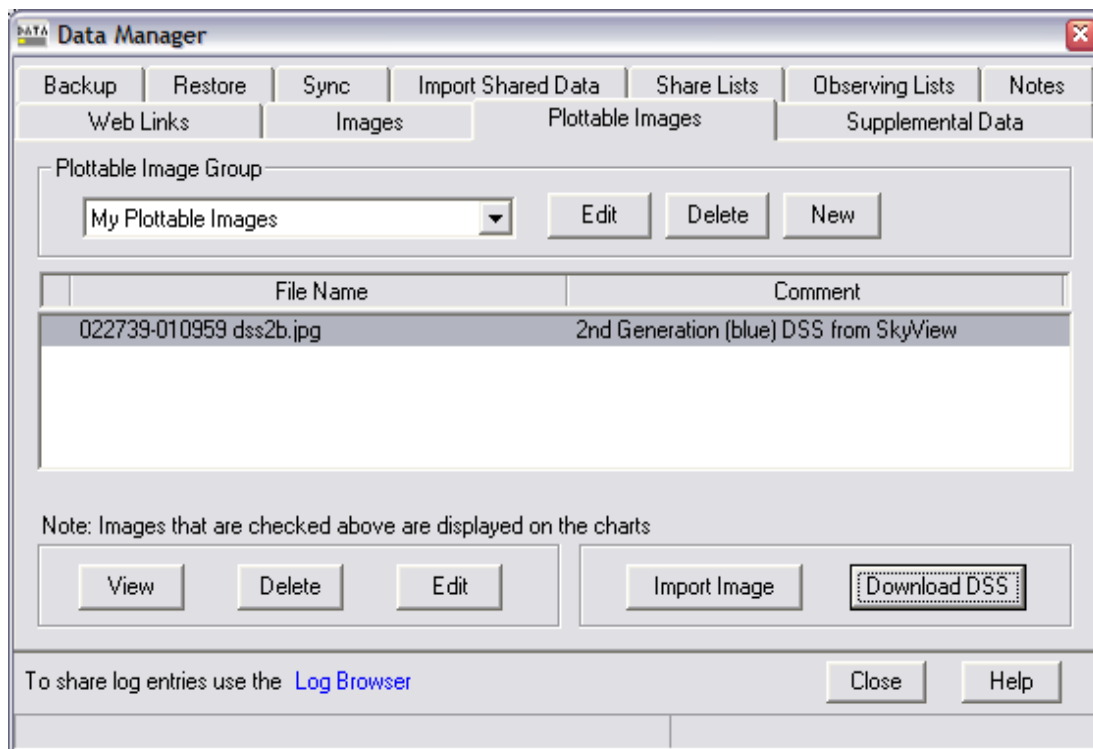
To view the image link in the Object Information window, first select the group the link resides in at the top of one of the listboxes. Select the object associated with the link that you wish to view in the listing below it. Either click View or double-click on the list.

The Object Information window for the object will appear with the Images tab selected. You may view or edit the image link from this window.

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Data Manager: Plottable Images Tab

Use this tab to manage your plottable images. Plottable images are images that can be plotted on the chart backgrounds. Plottable image groups can be created or deleted from this dialog. Plottable Images can be moved from one group to another.



Plottable Images

To make an image plottable data must be stored describing its position in the sky, size, and rotation angle. The plottable image database stores this information for each plottable image. Given enough information any image can be made plottable. but most plottable images are DSS images downloaded from within SkyTools. The plottable image data is automatically set for these images. Plottable images can also be linked to objects via Image Links, but this is not required.

Only one plottable image group is active for display in a chart view background at a time. The active plottable image group is selected via the View Controls for the chart.

Plottable Image Groups

Plottable images are organized into groups. You can think of groups as folders where plottable image data is kept. Groups of plottable images can be easily shared with others via a SkyTools .stx file. Only one plottable image group can be active for display in a chart background at a time. The active plottable image is set via the View Controls dialog for that chart view.

Click New to create a new group.

Click Delete to delete the selected group. Before a group can be deleted it must first be emptied of observing lists.

Click Edit to edit the currently selected group title.

Sharing Plottable Images

Plottable images are not shared directly. They are shared via object image group. The object images are images associated with specific objects. A plottable image can be associated

with an object like any other and shared in the same way. See the [Images](#) tab on the Data Manager for more info. When a plottable image is shared in this way the plottable image data is automatically shared along with it.

Similarly object images can be shared along with Observing Lists. (see the [Share Lists](#) tab).

Enable/Disable Display on Charts

For a plottable image to appear on a chart view background three conditions must be met: the correct plottable images group must be selected in the View Controls dialog, the display of plottable images must be selected, also in the View Controls dialog, and the image itself must be enabled for display.

To enable/disable a plottable image for display click the red check mark next to the image in the listbox. A red check box indicates that the image is enabled. Display may also be enabled/disabled for each plottable image via the Plottable Image Parameters dialog.

The display status of all images can be overridden from the View Controls dialog by selecting Always Plot Image Data.

View Image

To view the image in the Image Viewer either double-click on it or select it and click View.

Edit Plottable Image Parameters

Select a plottable image and click Edit to open the Plottable Image Parameters dialog. The plottable image data can be edited from this dialog.

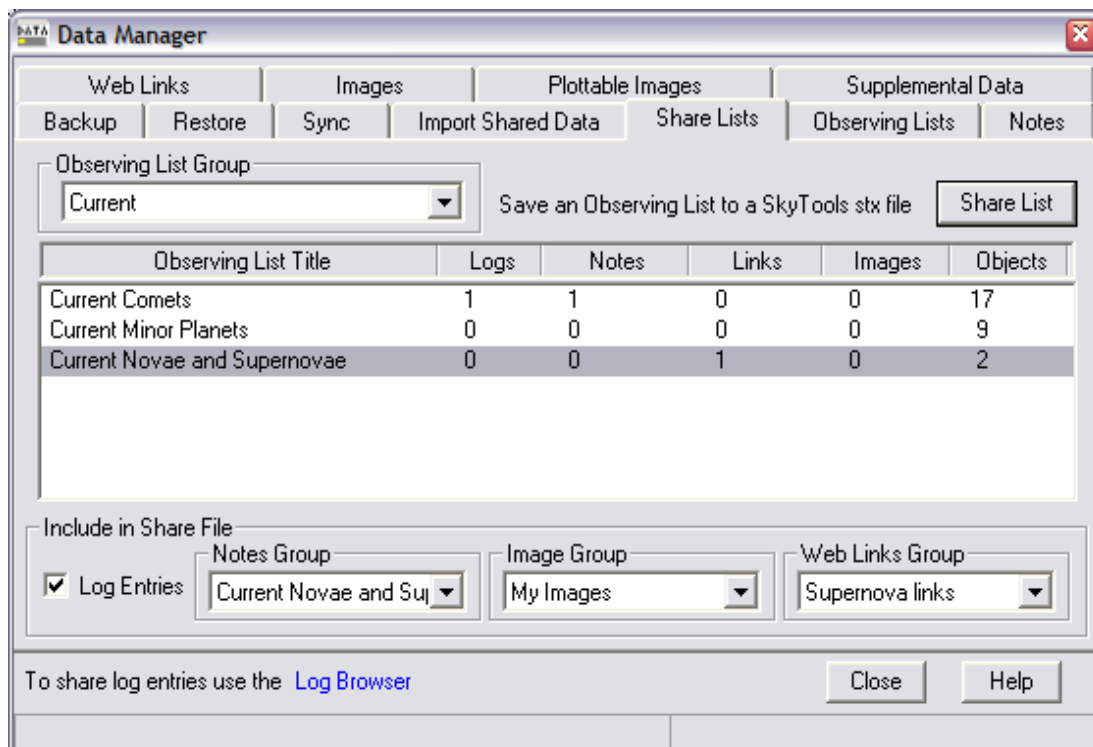
Move to Another Plottable Images Group

To switch a plottable image to another group, select the plottable you wish to move and click Edit. Select a different group on the Plottable Image Parameters dialog and click Ok.

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Data Manager: Share lists

This tab is used to share observing lists with other SkyTools users via SkyTools shared data (.stx) file. Various data associated with the objects in the list can optionally be exported along with the list.



Observing List Group

Select the observing list group to list in the table.

Observing List Table

The table lists the observing lists in the group selected. The total number of objects, objects with log entries, notes/ratings, web links, and image links are listed.

View/Edit Observing List Information

Double-click on an observing list to view or edit its title, group and description.

Include in Share File

Data associated with each object in the list can be shared along with the list itself.

Check the box next to Log Entries to share all log entries associated with the objects in the list.

Select a Notes Group to share notes/ratings associated with the objects in the list. Only those notes/ratings in the selected group will be shared.

Select an Image Group to share images associated with the objects in the list. Only those image links in the selected group will be shared. Any plottable images in the image group will be shared along with the data that makes them plottable in the chart backgrounds.

Select a Web Links Group to share web links associated with the objects in the list. Only those web links in the selected group will be shared.

Share List

Click the Share List button to save the selected list to a SkyTools .stx file. Only one list can be shared at a time.

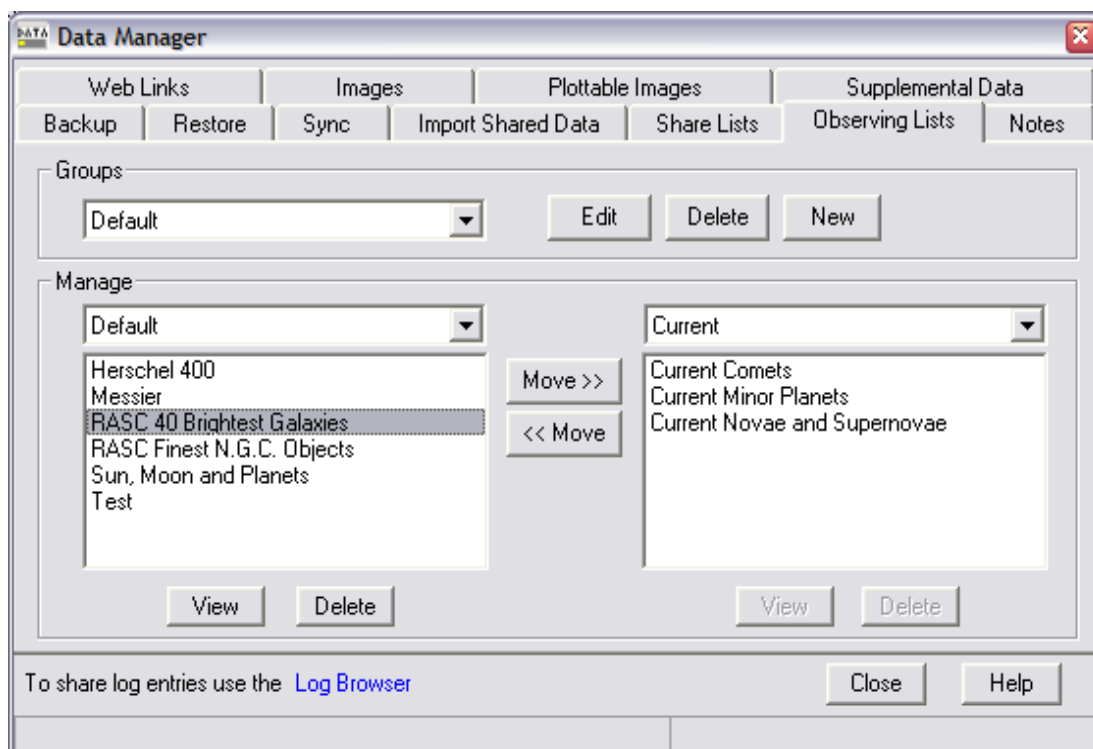
You will be prompted for a title and description. This title and description will appear when the .stx file is browsed via the Import Shared Data tab of the Data Manager. The default title and description is the title and description of the observing list.

You will also be prompted for a file name and path where the .stx file will be saved.

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Data Manager: Observing Lists Tab

Use this tab to manage your observing lists. Observing list groups can be created or deleted from this dialog, as can lists. Observing lists can be moved from one group to another.



Observing Lists

Observing lists are lists of objects that you wish to observe from the SkyTools database. These lists are displayed on the Nightly Planner and Real Time tools.

Observing List Groups

Observing lists are organized into groups. You can think of groups as folders where observing lists are kept. Grouping observing lists makes them easier to locate. Selecting an observing list throughout SkyTools involves selecting first a group and then a list within it.

Click New to create a new group.

Click Delete to delete the selected group. Before a group can be deleted it must first be emptied of observing lists.

Click Edit to edit the currently selected group title.

Manage

To move observing lists from one group to another select the group that you wish to move lists from above one of the two listboxes. Select one or more lists to move.

Above the other listbox select the group you wish to move lists to. Click the appropriate Move button.

To delete an observing list, first select the group the list resides in at the top of one of the listboxes. Select the list you wish to delete in the listing below it. Click Delete below.

View Observing List Information

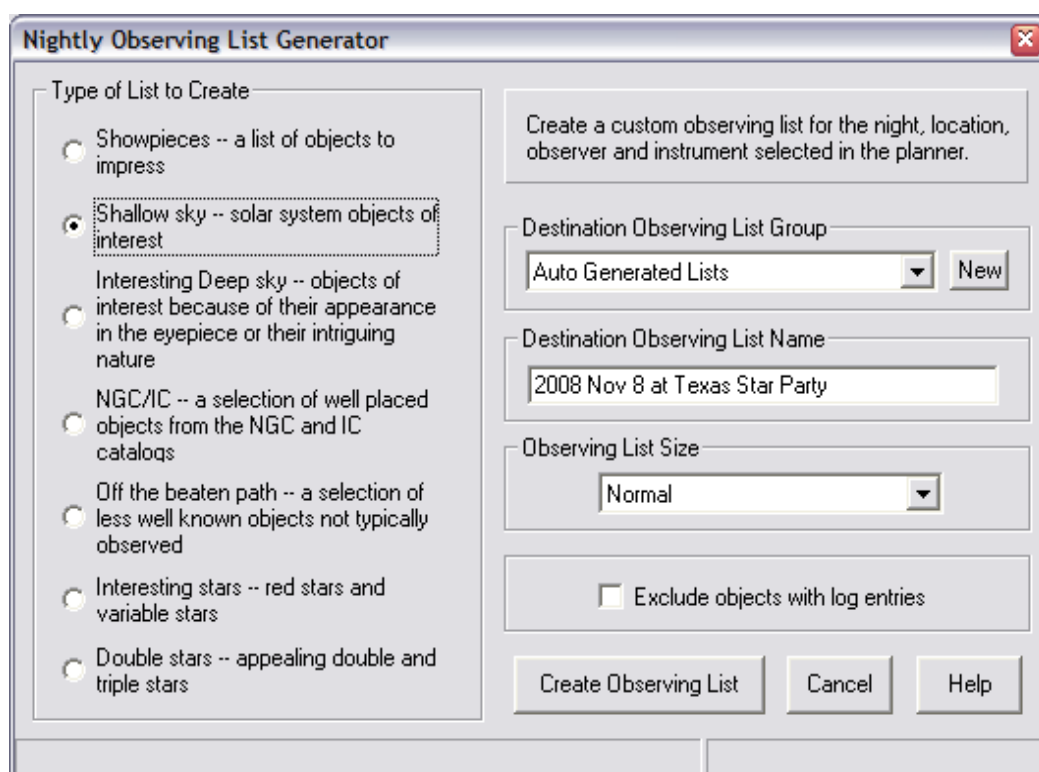
To view the title and description of an observing list, first select the group the list resides in at the top of one of the listboxes. Select the list you wish to view in the listing below it. Either click View or double-click on the list.

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Nightly Observing List Generator

The Nightly Observing List Generator auto-generates observing lists in conjunction with the Nightly Planner and Real Time tools. It inherits the selections in the Nightly Planner or Real Time tabs, depending on which one it was started from.

These auto-generated observing lists are valid for the specific night, location, telescope, and observer currently selected in the planner. This tool is primarily meant for generating lists for visual observing, as it considers the visual detectability in the telescope when choosing objects.



The arbitrary time limits on the Nightly Planner are also considered. To restrict the listing to only those objects that meet the criteria within a specific time frame, drag the red vertical lines on the NightBar to define the time frame. Any of these selections may be changed while the Nightly Observing List Generator open and it will be aware of the changes until you press the Create Observing List button.

Note that this tool works independently of the observing list filters on the planner.

Tips for Using this Tool

Perhaps the most useful auto-generated list is the *Showpieces* listing. It is a quick source of timely showpiece objects of all kinds for planning an impromptu star party for the neighbors or a club event.

Another favorite is the *Shallow Sky* listing. Among other things it looks for any fast-moving minor planets that may be visible that night.

Among other things, the *Interesting Stars* list looks for eclipsing variable stars with deep eclipses and only lists those that are predicted to be in eclipse that night.

The ability to prune a list to a small set of randomly selected objects provides an interesting twist. Every time you create an auto-generated list of NGC/IC objects it will give a unique set of targets for that night. It's like closing your eyes and putting your finger on an atlas to pick targets. Who knows what you will find... Yet with this tool you can also be assured that the

objects will be a reasonably good targets that are well placed and appropriate for the telescope.

Types of Auto-Generated Lists

There are seven types of automatically generated observing lists to choose from. Each list is customized for the telescope and observing conditions on a specific night, location, observer and instrument. Large-aperture instruments will naturally produce longer lists and take longer to complete the search.

Showpieces

These are objects chosen to be visually impressive, including the Moon and bright planets, bright comets, a selection of double stars and a selection of bright and interesting deep sky objects.

Shallow Sky

These are solar system objects of interest. This listing includes all the planets and dwarf planets, fast-moving asteroids, distant Trans Neptunian Objects (TNOs), and observable comets.

Interesting Deep Sky

These are deep sky objects chosen for their visually interesting appearance or their intriguing nature. Targets include impressive planetary nebulae, extragalactic nebulae (those that are found in other galaxies), very young or old open clusters, distant globular clusters, galaxy groups, Arp interacting galaxies, edge-on galaxies, local group galaxies, and very distant galaxies and quasars.

NGC/IC

These are a selection well-placed objects from the NGC and IC catalogs suitable for viewing.

Off the Beaten Path

These are a selection of deep sky objects suitable for viewing that do not appear in the Messier, NGC, or IC catalogs.

Interesting Stars

These include very red stars, nearby stars, eruptive variables stars with large amplitudes, and eclipsing binaries with large amplitudes that will be observable in eclipse on this night.

Double Stars

These include a selection of "nice" pairs of stars, nearly equal pairs, and triple star systems.

Other Selections

Select the observing list group in which you wish the auto-generated list to be placed when completed. A new group may be created via the New button. It is recommended that all auto-generated lists be placed in the Auto Generated observing list group.

The title of the auto-generated observing list is suggested for you based on the date and location on the main planner. You may customize the name of the list if you wish.

Check the box next to Exclude objects with log entries to list only objects that have not yet been logged.

Select the nominal size of the final observing list. Small will create a list of ten or more objects, Normal will list 25 or more, Large will list 150 or more, and Very Large will list all the results of the search. The NGC/IC and Off the Beaten Path searches typically produce the longest lists. When the list that is generated is larger than the nominal size selected, objects are deleted randomly. Thus, it is quite possible that two different searches with exactly the same input parameters will contain different objects.

Don't forget that a good way to make your observing list as relevant as possible it to set a time frame during which you expect to observe via the red vertical controls on the NightBar on the planner.

Using the Auto-Generated Lists

Upon completion the dialog will close and your auto-generated observing list will be automatically opened in the planner. If an observing list already exists with the same name, you will be prompted to overwrite it or to append the new objects to it. It is possible to append several auto-generated lists of objects to the same observing list in this manner.

When using the list in the planner it is important to keep in mind that the list is created for a specific night, location, and instrument. If you change any of these parameters the list may no longer be optimal. To see the specific details of the auto-generated list refer to the observing list description via the View/Edit List Title and Description menu item on the Observing List menu of the planner.

Technical Details

Here are the database search parameters used to create the auto-generated lists. Most of these searches can be reproduced using the Database Power Search.

Showpieces

A special database of objects is searched, looking for those that are above 2 airmass or near maximum altitude and are at least easily detectable in the selected instrument. All deep sky objects must be at maximum detectability at the optimum time to observe them and must be large enough to be resolvable. Double stars in the list must be at least easily split. Comets must be at least easily visible.

Shallow Sky

All searches are for objects that are above 2 airmass or near maximum altitude and are visible in the selected instrument (at any level of difficulty). Searches include planets and dwarf planets, Comets, and distant minor planets of the class Damocloid, Centaur, Scattered disk, Trans Neptunian, and Kuiper belt. Fast moving asteroids are returned that are moving more than 8 arc-seconds per minute across the sky.

Interesting Deep Sky

A special database of objects is searched for those that are above 2 airmass or near maximum altitude in complete darkness and are at least detectable in the selected instrument. All objects must be at maximum detectability at the optimum time to observe them and must be large enough to be resolvable. Next each deep sky database is searched in turn, each returning objects that meet certain criteria. Planetary nebulae must have surface brightness greater than 21 mag/arc-sec². Open clusters must be 1 million years old or younger or at least 4 billion years old. Globular clusters must be at least 150,000 light years distant. Nebulae must be outside of our galaxy. All galaxy groups are returned (that meet the visibility criteria). Galaxies must be either from the Arp catalog, are edge-on and highly elongated, or have a light travel time of at least 4.5 Gyr. Quasars must have a light travel time of at least 9 Gyr.

NGC/IC

All objects must be in the NGC or IC catalogs but not Messier. They must be above 2 airmass or near maximum altitude in complete darkness and must be at least detectable in the selected instrument. All objects must be at maximum detectability at the optimum time to observe them and must be large enough to be easily resolvable.

Off the Beaten Path

All objects considered must not appear in the Messier, NGC, or IC catalogs. They must be above 2 airmass or near maximum altitude in complete darkness and must be at least detectable in the selected instrument. All objects must be at maximum detectability at the optimum time to observe them and must be large enough to be resolvable. Object types returned are: open clusters, globular clusters, planetary nebulae, diffuse nebulae and galaxies.

Interesting Stars

A special database of interesting stars is searched for those that are above 2 airmass or near maximum altitude and are at least visible (at any difficulty) in the selected instrument. Next

the stellar database is searched for stars that meet certain criteria. Red stars must have a (B-V) color index greater than 5. Nearby stars must be within 10 light years. Eruptive variable stars must gain at least 6 magnitudes. Eclipsing variable stars must have a primary eclipse depth of at least 2 magnitudes and an primary eclipse must take place during the observable period for the star.

Double Stars

All pairs must be above two airmass and not in daylight. The first search for double star pairs looks for pairs that are brighter than 8th magnitude. The difference in magnitude between the stars must be less than or equal to 1.0. The minimum separation must be between twice the Dawes limit of the telescope or the seeing diameter, whichever is larger. The maximum separation must be less than 3 times the minimum separation. The pair must be rated as at least splittable for the instrument.

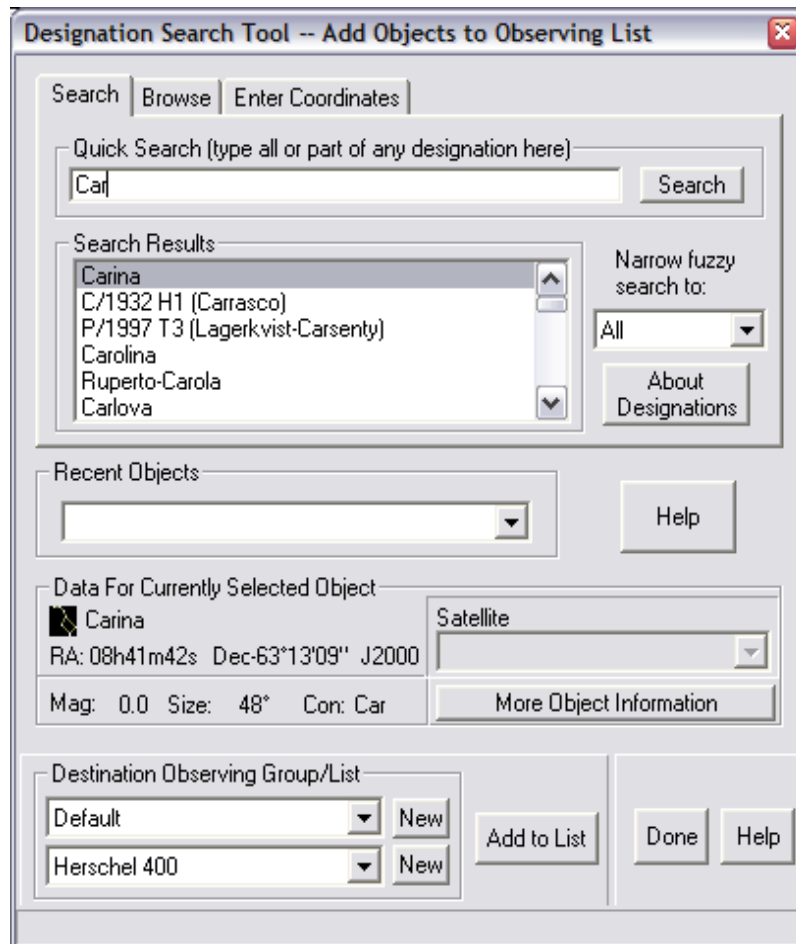
Next, pairs are found that are of equal brightness between 8th magnitude and the magnitude limit of the telescope minus 3.

Finally, triple stars are found that consist of at least two pairs that are brighter than the magnitude limit of the telescope minus 2. Both pairs must have stars within 1.0 magnitude of each other. The minimum separation is as in the first test, but the maximum separation may be as large as 6 times the minimum separation.

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Designation Search

This tool is used for adding objects to an observing list by name or designation. If you know the designation, the easiest thing to do is to enter it into the Quick Search box and click Search *or press the enter key*



Adding An Object to an Observing List

Select the object you wish to add to the observing list. Select the observing list you wish to add the objects to from the pull down (*Planets* above). Press the Add to List button to add it. A new observing list can be created by pressing the New button.

Object Requestor

See the Object Requestor help for information about using the object-finding portion of the dialog. You may get help on the Object Requestor from the upper help button on the dialog.

The current date and location are taken from the values in the observing list window. They are used only to compute the current information for the selected object.

See also:

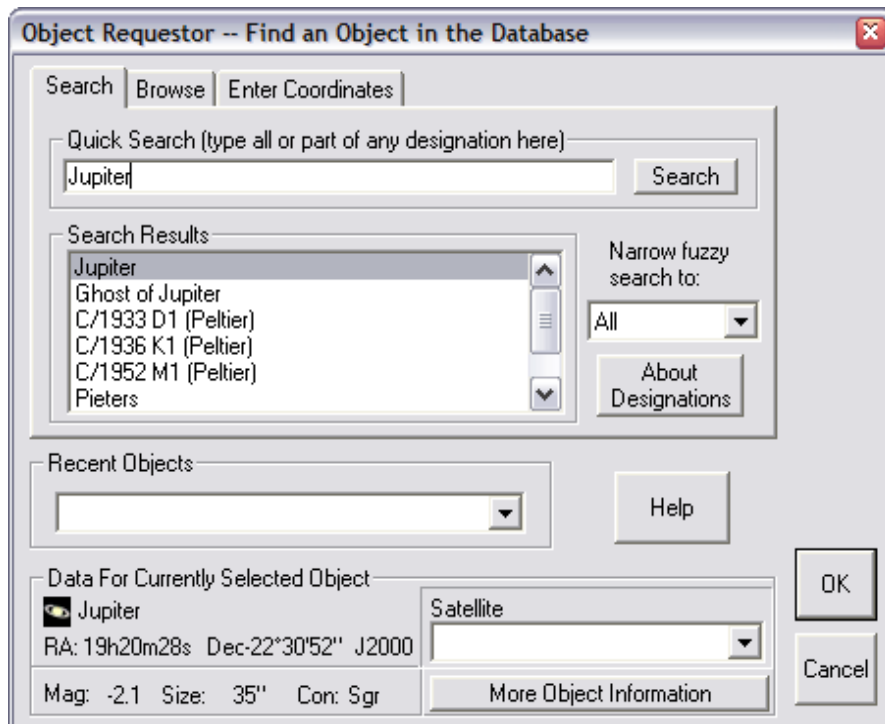
Object Requestor

Observation Planner: Observing Lists

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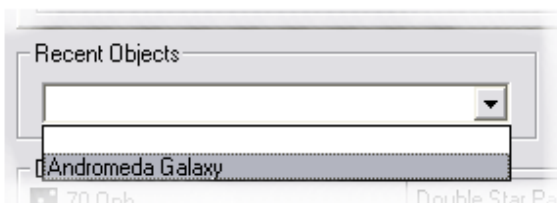
Object Requestor

It is through this dialog that you interact with the extensive SkyTools database. The purpose of this dialog is to look up objects by designation or to enter coordinates.



Recent Objects

This is a list of the objects that were recently selected. Simply choose an object from the list.



Data For Currently Selected Object

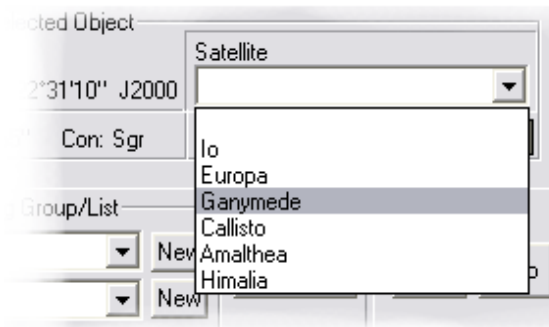
In addition to the display of basic data, some objects will activate the pull-down list. If the object is a planet its satellites will be listed. To target the satellite rather than the planet select it in the list. If the object is a star in a multiple star system, all of the component stars of that system will be listed. To target a specific component star select it from the list.

Selected Object Information

The information for the selected object appears here computed for the current date/time and location (these depend on the context within which this dialog appears). The current apparent position of the object, its magnitude, and the constellation it presently lies within are displayed. Press More Information to see more.

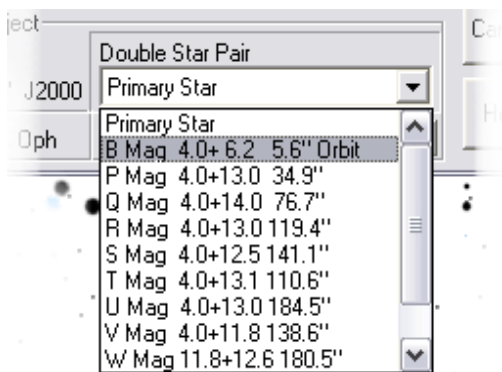
Satellite Selection

If the selected object is a planet with moons, you can select a specific moon via this pull-down



menu.

Double Star Pair Selection



If the selected object is a double or multiple star, you can specify a particular pair of stars by selecting the pair here. Multiple stars are labeled in pairs in magnitude order. The brightest star (or component) in the system is A. The second brightest component is B, and so on. The magnitudes of the two stars in the pair are listed, as well as the current separation between them in seconds of arc. If the pair makes a long-period binary with an orbit, LP is appended.

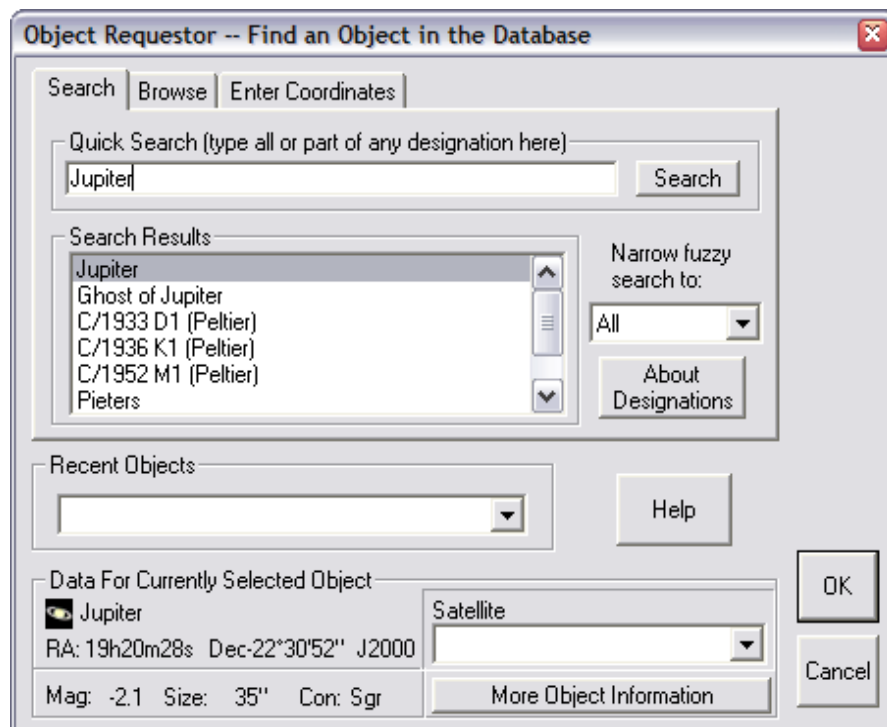
To select a particular component of a multiple star system, choose a pair such that the component you want appears as the second letter. For instance, to select star B, choose the "AB" pair. For star C, choose the AC pair, or perhaps the BC pair if appropriate.

If your aim is to plot the orbit of a long-period binary pair, choose a pair identified with Orbit. This indicates that an orbit exists for this pair of stars.

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Search Tab

The Search tab allows you to quickly find any object in any of the databases.



Type an astronomical designation into the Quick Search window. Either click the Search button or press enter.

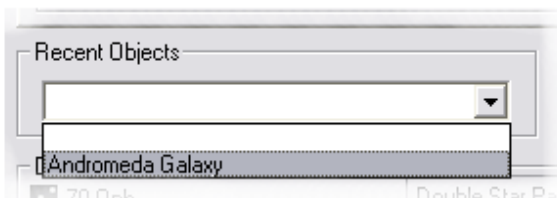
A fuzzy search is used for common names and most discovery designations. For catalog designations a closer match is required. Catalog designations are case insensitive and must be separated from the catalog number by a space (except in the case of Messier or NGC objects).

[Detailed account of designation formats](#) The About Designations button will take there as well.

Select the object from the Search Results list. The details for this object will appear in the bottom of the window.

Recent Objects

This is a list of the objects that were recently selected. Simply choose an object from the list.



Data For Currently Selected Object

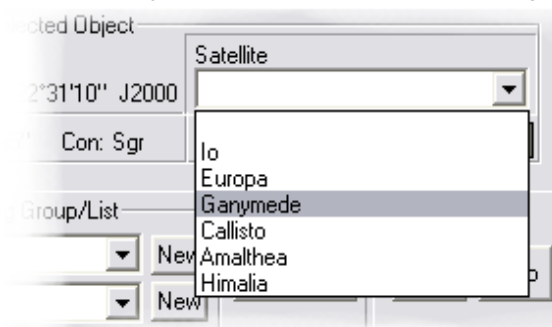
In addition to the display of basic data, some objects will activate the pull-down list. If the object is a planet its satellites will be listed. To target the satellite rather than the planet select it in the list. If the object is a star in a multiple star system, all of the component stars of that system will be listed. To target a specific component star select it from the list.

Selected Object Information

The information for the selected object appears here computed for the current date/time and location (these depend on the context within which this dialog appears). The current apparent position of the object, its magnitude, and the constellation it presently lies within are displayed. Press More Information to see more.

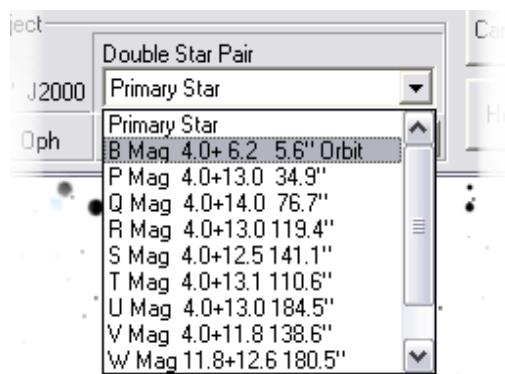
Satellite Selection

If the selected object is a planet with moons, you can select a specific moon via this pull-down



menu.

Double Star Pair Selection



If the selected object is a double or multiple star, you can specify a particular pair of stars by selecting the pair here. Multiple stars are labeled in pairs in magnitude order. The brightest star (or component) in the system is A. The second brightest component is B, and so on. The magnitudes of the two stars in the pair are listed, as well as the current separation between them in seconds of arc. If the pair makes a long-period binary with an orbit, LP is appended.

To select a particular component of a multiple star system, choose a pair such that the component you want appears as the second letter. For instance, to select star B choose the "AB" pair. For star C, choose the AC pair, or perhaps the BC pair if appropriate.

If your aim is to plot the orbit of a long-period binary pair, choose a pair identified with Orbit. This indicates that an orbit exists for this pair of stars.

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Enter Coordinates Tab

The Enter Coordinates tab is where you enter a set of equatorial coordinates into SkyTools.

The screenshot shows the 'Object Requestor -- Find an Object in the Database' dialog box with the 'Enter Coordinates' tab selected. The dialog has three tabs: 'Search', 'Browse', and 'Enter Coordinates'. The 'Enter Coordinates' tab contains the following elements:

- RA Input Format:** Two radio buttons, 'Hours' (selected) and 'Degrees'.
- Coordinates:** Two text input fields. The 'RA' field contains '12 12 43' and the 'Dec' field contains '-16.2356'.
- Equinox:** A text input field containing 'J2000'.
- Buttons:** 'Accept' and 'Paste' buttons are located to the right of the Equinox field.
- Recent Objects:** A list box with a dropdown arrow, currently empty.
- Help:** A button located to the right of the Recent Objects list.
- Data For Currently Selected Object:** A section at the bottom left showing a red 'X' icon, the coordinates '12h12m43.0s -16°14'08"', and the text 'RA: 12h12m43s Dec: 16°14'08" J2000'. Below this are labels for 'Mag:', 'Size:', and 'Con:'.
- Satellite:** A dropdown menu.
- More Object Information:** A button below the Satellite dropdown.
- OK and Cancel:** Buttons located on the far right of the dialog.

Enter the Right Ascension (R.A.), Declination (Dec), and coordinate equinox into the windows and press the Accept button. J2000 will be assumed for the coordinate equinox if you leave it blank.

A temporary Skymark will be created with the coordinates you have entered. Its name will be the coordinates themselves. The name and coordinates of the Skymark are displayed at the bottom of the window. If you are selecting a chart target the chart will be targeted at your coordinates and no permanent Skymark will be created. If you are adding your coordinates to an observing list the Skymark will be created in the Skymark database and added to the list.

RA Input Format

If you wish to enter the Right Ascension in degrees rather than hours select the Degrees radio button.

Coordinate Input Formats

Coordinates can be entered as decimals or in sexagesimal form. Sexagesimal form means hours, minutes, and seconds or degrees, arc-minutes, arc-seconds. These values may be separated by either colons or spaces.

Examples:

12 34 45.1

12:34:45.1

12.579194444

Equinox

Specify the equinox of the coordinates. Most coordinates are equinox J2000. You may leave this field blank to default to J2000. Other standard epochs recognized are: B1950, B1900, and B1875. You may also enter any year and decimals, E.g. 1923.56.

Paste

Coordinates may be pasted from the clipboard. A variety of common formats is recognized. It is expected that R.A. be first, followed by Dec. Select the coordinates in another window and copy them to the clipboard. Click Paste.

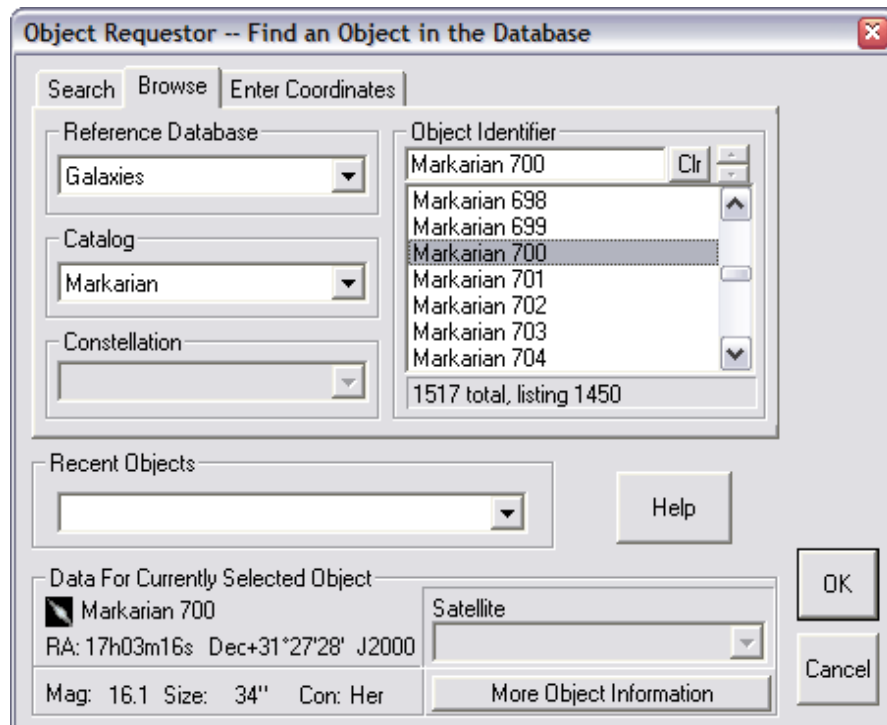
Recent Objects

This is a list of the objects (and coordinates) that were recently selected. Simply choose an object from the list.

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Browse Designations Tab

The Browse tab allows you to browse most objects designations by object class and catalog.



Reference Database

Select the class of objects you want to browse.

Catalog

Select the catalog to browse.

Constellation

This pull-down menu is only used for designations that require the specification of a constellation, such as Bayer, Flamsteed and Variable star designations. Otherwise it will be disabled.

Object Identifier

Once your selections have been made on the left a list of object identifiers will appear. Scroll down the list to the object you are looking for and select it.

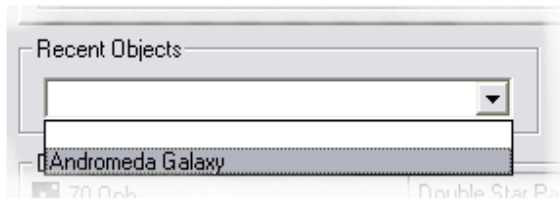
Some catalogs are very long and will not fit in the list all at once. In these cases a limited "page" of objects is displayed. If paged, the status line at the bottom will display something like "345678 total, listing 500." To see the objects on the next page click the down arrow button in the upper right. To see the previous page click the up arrow button.

A page can be searched for a specific number or string by typing the number or string into the field at the top. As an example, if Arp galaxies are listed you can enter 42 into the field and press enter. Arp 42 will be selected in the list.

You can also narrow down the search to entries that start with the designation/number specified. For instance, if the open cluster database and NGC catalog are selected, entering 7142 will list NGC open clusters starting at NGC 7142.

Recent Objects

This is a list of the objects that were recently selected. Simply choose an object from the list.



Data For Currently Selected Object

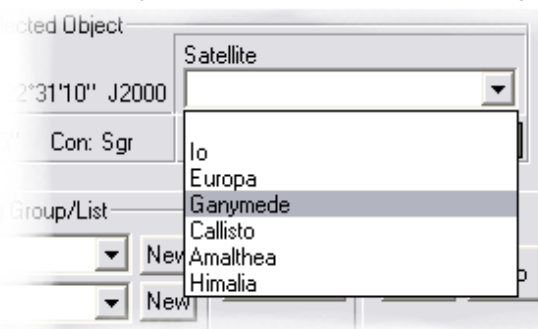
In addition to the display of basic data, some objects will activate the pull-down list. If the object is a planet its satellites will be listed. To target the satellite rather than the planet select it in the list. If the object is a star in a multiple star system, all of the component stars of that system will be listed. To target a specific component star select it from the list.

Selected Object Information

The information for the selected object appears here computed for the current date/time and location (these depend on the context within which this dialog appears). The current apparent position of the object, its magnitude, and the constellation it presently lies within are displayed. Press More Information to see more.

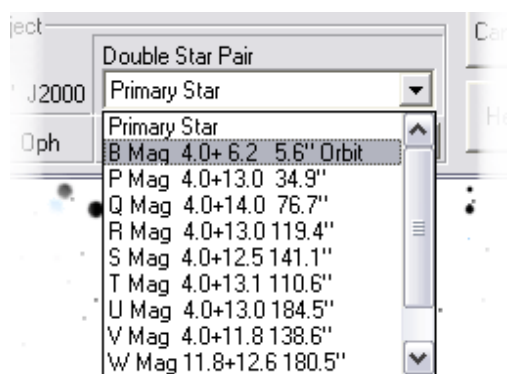
Satellite Selection

If the selected object is a planet with moons, you can select a specific moon via this pull-down



menu.

Double Star Pair Selection



If the selected object is a double or multiple star, you can specify a particular pair of stars by selecting the pair here. Multiple stars are labeled in pairs in magnitude order. The brightest star (or component) in the system is A. The second brightest component is B, and so on. The magnitudes of the two stars in the pair are listed, as well as the current separation between them in seconds of arc. If the pair makes a long-period binary with an orbit, LP is appended.

To select a particular component of a multiple star system, choose a pair such that the component you want appears as the second letter. For instance, to select star B, choose the "AB" pair. For star C, choose the AC pair, or perhaps the BC pair if appropriate.

If your aim is to plot the orbit of a long-period binary pair, choose a pair identified with Orbit.

This indicates that an orbit exists for this pair of stars.

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Database Power Search

The Database Power Search Tool is used to search perform filtered searches of the SkyTools databases. The search results are added to an observing list for use in the Nightly Planner or Real Time tools.

Related Information

Database Power Search Tool

Stars Tab

Galactic Deep Sky Tab

Extragalactic Tab

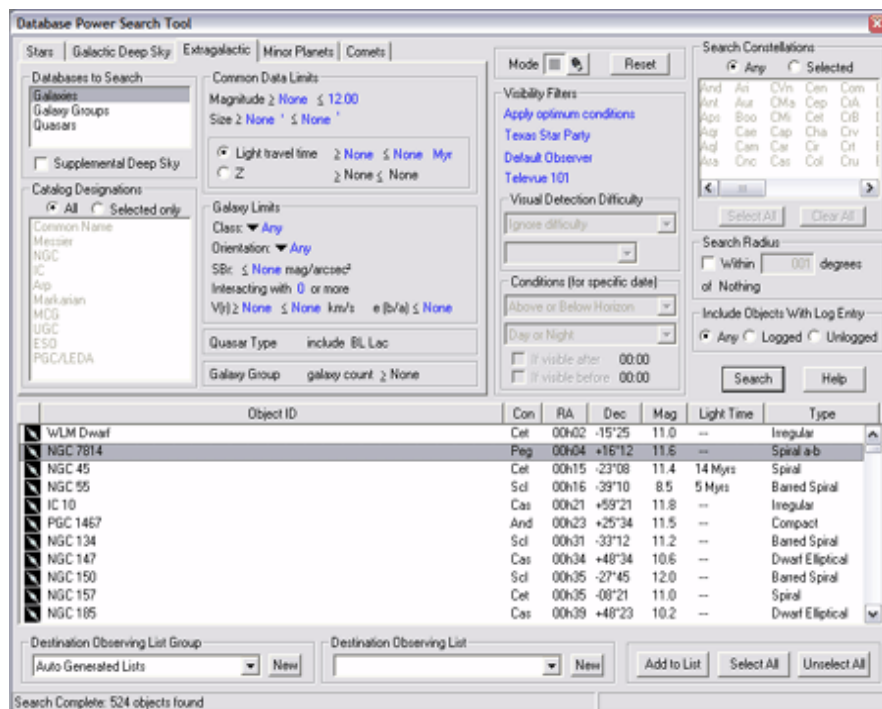
Minor Planets Tab

Comets Tab

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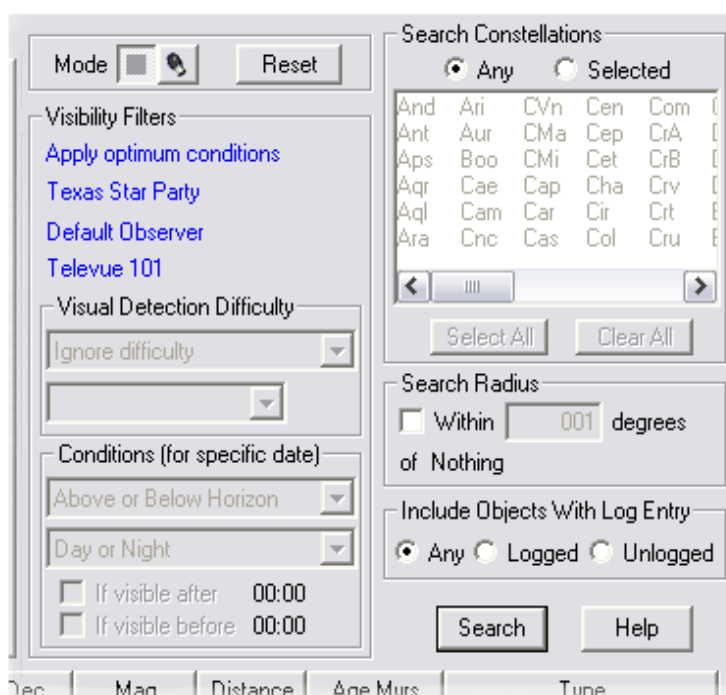
Database Power Search Tool

The Database Power Search tool creates custom observing lists via a filtered search of the SkyTools databases.



The general filters are found on the top right side of the dialog. These filters apply to all searches. The tabs on the left allow searching of specific data types. The bottom lists the search results, from which you may copy all or part of the objects listed to an observing list. This page documents the general search filters that can be used with any search. Note that each search tab has its own help section.

General Search Filters



Two Modes of Operation

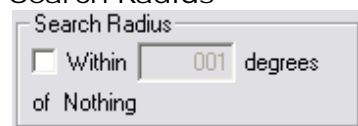
As with the Nightly Planner tool there is a mode selection: simple, and visual. Visual mode enables the visual detection difficulty filters and visual difficulty column in the listing of the results. Visual observers should take advantage of this mode.

Press the Reset button to reset all filters to their defaults.

Search Constellations

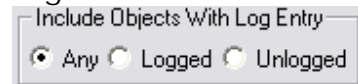
Select one or more constellations within which to search. Only those objects that are in the constellations selected will be displayed. Select any to disable this filter.

Search Radius



To search for objects within a fixed radius of a particular position in the sky, check the **Within** check box. Type in a numerical search radius. Click on the hypertext units (*degrees* above) until it displays the desired units for your search radius. Click on the hypertext position (or object name -- *"Nothing"* above) to select a position around which to search. It can either be an object or a fixed position. If a position has not yet been selected it will be labeled *Nothing*.

Log Status



To filter the search based on whether or not the object has been logged, select either **Logged** or **Unlogged**. **Logged** will only report those objects with log entries. **Unlogged** will only report those object without log entries.

Visibility Filters

You can limit the search results to objects that meet your minimum visibility criteria. These criteria work just like the observing list filters and are applied for the date, location, observer, and instrument specified.

Select an evening, observing location, observer, and instrument by clicking on the hypertext labels at the top.

Select a date, observing location, observer, and instrument. As an alternative to a specific date *Apply optimum conditions* may be selected from the date menu. When *apply optimum conditions* is chosen the Conditions filter does not apply and is disabled. The *apply optimum conditions* selection will apply the visual difficulty filter under optimum conditions for the location, observer, and instrument selected.

Visual Detection Difficulty -- this filter passes only those objects that meet the selected visual detection difficulty criteria. This filter is available in Visual mode only.

Select Visible only to pass all objects that are detectable at all (from obvious to very challenging). Or select a specific difficulty level (obvious, easy, detectable, difficult, challenging, very challenging).

An additional modifier can be selected (below) consisting of: only, and less difficult, or and more difficult.

For example, a selection of easy and less difficult will pass objects deemed to be easy or obvious. A selection of obvious and more difficult will pass all objects with a valid rating, from obvious to very challenging, not listing those determined to be "not detectable" or with insufficient data to make a detectability estimate.

If a specific night is selected this filter applies to the best conditions for that night; if *apply optimum conditions* is selected this filter applies to the best conditions (year round) for this location and observer.

Conditions (for specific date) -- these filters apply only to a specific date and are primarily provided as an alternative to the Visual Detection Difficulty filter. These will be more useful for imaging targets, for instance.

Search Results

	Object ID	Con	RA	Dec	Mag	Distance	Age Myrs	Type
	Little Dumbbell	Per	01h43	+51°37'	10.1	2400 ly	---	Irregular disk
	Owl Nebula	UMa	11h15	+54°58'	11.0	2000 ly	---	Irregular disk
	Ring Nebula	Lyr	18h54	+33°03'	9.4	2600 ly	---	Ring structure
	Dumbbell	Vul	20h00	+22°45'	7.3	1100 ly	---	Irregular disk
	Crab Nebula	Tau	05h35	+22°01'	8.4	---	---	Supernova Remnant
	Great Orion Nebula	Ori	05h36	-05°22'	4.0	---	---	Diffuse Nebula
	M 43	Ori	05h36	-05°15'	9.0	---	---	Diffuse Nebula
	M 78	Ori	05h47	+00°05'	8.0	---	---	Reflection Nebula
	Trifid Nebula	Sgr	18h03	-22°59'	6.3	---	---	Diffuse Nebula
	Lagoon Nebula	Sgr	18h05	-24°23'	5.0	---	---	Diffuse Nebula
	Eagle Nebula	Ser	18h19	-13°49'	6.0	---	---	Diffuse Nebula

Destination Observing List Group: Auto Generated Lists New
Destination Observing List: New
Add to List Select All Unselect All

Once your search criteria are set, click on the Search button. The results of the search are displayed in the list box.

You can click on a column header to sort the list by the values in that column.

Click on the objects you wish to add to the observing list. The highlighted objects will be added. To highlight all the objects in the search results list, click the Select All button.

Select the Destination Observing List Group that contains the observing list you wish to add objects to. Select the Destination observing list. To create a new observing list group click the New button to the right of the group selection. To create a new observing list within the group selected, click on the New button to the right of the list selection.

Click the Add to List button to add the selected objects to the specified observing list.

Specialized Search Tabs

Stars Tab

Galactic Deep Sky Tab

Extragalactic Tab

Minor Planets Tab

Comets Tab

See also:

Database Power Search (overview)

Nightly Planner

Database Power Search: Stars Tab

This tab is used to search the stellar databases.

The screenshot shows the 'Stars' tab in the SkyTools 3 Database Power Search interface. The interface is divided into several sections:

- Navigation Tabs:** Stars (selected), Galactic Deep Sky, Extragalactic, Minor Planets, Comets.
- Databases to Search:**
 - ☒ Multiple Stars Only
 - ☒ Variable Stars Only
 - ☐ Supplemental Only
- Include Catalog Designations:**
 - ☐ All
 - ☒ Select
 - List of designations: Bayer, Flamsteed, Variable, HR, HD (selected), SAO, PPM, HIP, BD.
- Reference Data Limits:**
 - Color ≥ 2.00 \leq None
 - Distance ≤ 100 ly
 - Proper Motion ≥ 1.0000 "/yr
 - $|V(r)| \geq$ None km/s
 - Coord. Quality \leq High
- Multiple Star Limits:**
 - ☐ Separation \geq None \leq None arc sec
 - ☐ Magnitude Difference \leq None
 - ☒ Limited by seeing
 - Period \geq None \leq None yr ☐ w/ Orbit Only
- Variable Star Class/Limits:**
 - Class: Pulsating
 - Limit: M
 - Period \geq None \leq None days
 - Amplitude \geq None mag
- Other Options:**
 - V Magnitude \geq None \leq None
 - ☐ UBV photometry only

Databases to search

Select Multiple Stars Only or Variable Stars Only (or the two in combination) to search via the multiple star and/or variable star limits. Select Supplemental Only to search the supplemental database. When any of these choices are selected only a subset of the reference database limits will apply.

Include Catalog Designations

Optionally select one or more catalog designations. Only stars with these designations will be returned. For example, selecting HD will only return stars with an HD catalog designation.

V Magnitude

Select a range in V magnitudes. Note that the range is mathematical. For example, V magnitude $\geq 10 \leq 12$ will return stars between 10 and 12 magnitude inclusive.

Check UBV photometry only to return stars with V magnitudes determined from accurate UBV photometry only.

Reference Database Limits

These limits are applied to all databases.

- Color limits -- these are based on the (B-V) color indices. Many stars have a (B-V) color index, but very few have spectral classes, which is why (B-V) is used here. Use large values (>2) to find red stars only. Use negative values to find blue stars.
- Distance -- select a minimum Distance in light years. Note that only the nearby stars have known distances. Use this filter to limit the search to nearby stars only.
- Minimum proper motion -- use this filter to limit the search to stars with large proper motions only. The magnitude of the proper motion vector is used. Units are in arc-seconds per year ("/yr).
- Minimum radial velocity (Vr) magnitude. -- units are in km/sec. Note that radial

velocities are negative when approaching and positive when moving away. This filter is applied to the absolute value of the radial velocity (the sign is ignored).

- Minimum acceptable coordinates quality -- click the hypertext to select the minimum acceptable coordinate quality (Any, very high (< 10 mas), high (< 50 mas), medium (< 150 mas), low (< 255 mas), very low (> 255 mas)). The quality is tied to the standard error reported in the source of the coordinates in milli-arc-seconds (1 mas = 1/1000th of an arc second).

Multiple Star Limits

These limits are applied only when the Multiple Stars database is selected.

- Separation/Magnitude difference or splittability -- to enter specific limits for the separation and magnitude difference of the pair of stars select the top radio button. To limit via the visual splittability rating select the bottom radio button.
 - Enter a separation range in arc seconds and/or a maximum magnitude difference.
 - Select a splittability rating by clicking the hypertext. Choose from (Any, limited by seeing, not splittable, very challenging split, challenging split, difficult split, splittable, easily split, obvious split). Some of these selections have an additional modifier of: only, and easier, or and more difficult. For example, selecting splittable and easier will return all pairs that are rated as splittable, easily split, and obvious split. A selection of obvious split and more difficult will pass all objects with a valid rating, from obvious split to very challenging split, not listing those determined to be "not detectable", not splittable, limited by seeing or with insufficient data to make an estimate. Note that limited by seeing means that the telescope can theoretically split the pair, but the seeing quality you have selected for the observing location will not allow for the split.
- Select a range of orbital periods -- this applies to long period binary stars with orbits only. The orbital period limits are specified in years.
- Check the w/Orbit Only box to return only systems with long period binary stars that meet the other criteria.

Variable Star Class/Limits

These limits are applied only when Variable Stars Only is selected.

- Limit the search to a specific class of variable stars via the left pull down. Further limit to a variable star subclass via the right pull down. For instance, if *Eruptive* and *UV* are selected, only variable stars of the UV Ceti type will be returned. for Mira type variable stars, select *Pulsating* and *M*.
- Select a period range -- this applies to periodic variable stars only. The units are days.
- Select a minimum amplitude -- pass only those variable stars with a greater magnitude range than that selected. For instance, if 1.0 is selected, only those stars that vary by a magnitude or more will be listed.

If the eclipsing binary star class is selected and the date is set to a specific night, an additional selection will appear. Check the box next to *eclipse this night* to limit the results to only those eclipsing variables that will have an observable minimum on the night selected.

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Database Power Search: Galactic Deep Sky Tab

This tab is used to search the databases for objects within our own galaxy.

The screenshot shows the 'Galactic Deep Sky' tab selected. The interface is divided into several sections:

- Databases to Search:** A list box containing 'Planetary Nebulae', 'Diffuse Nebulae', 'Dark Nebulae', 'Open Clusters' (highlighted), and 'Globular Clusters'. Below it is a checkbox for 'Supplemental Deep Sky' which is unchecked.
- Catalog Designations:** Radio buttons for 'All' and 'Selected only' (selected). Below is a list box with 'Common Name', 'Messier', 'NGC' (highlighted), 'IC', 'Alessi', 'Alessi-Teutsch', 'Antalova', and 'Barkhatova'.
- Common Data Limits:** Fields for 'Magnitude' (≥ None ≤ 12.00), 'Size' (≥ None ' ≤ None '), and 'Distance' (≥ None ≤ None ly).
- Planetary Nebulae Limits:** Fields for 'SBr' (≤ None mag/arcsec²) and 'Morphology' (▼ Any).
- Diffuse Nebulae:** Field for 'Type' (▼ Any type).
- Dark Nebulae:** Fields for 'Opacity' (≥ None) and 'Any type' (▼ Any type).
- Open Clusters:** Fields for 'Age' (≥ None ≤ None Million years).

Databases to search

Select one or more of the object type databases to search. At least one selection must be made. Check the box next to Supplemental Deep Sky to include objects of the types selected from the supplemental database.

Include Catalog Designations

Optionally select one or more catalog designations. Only objects with these designations will be returned. For example, selecting NGC will only return objects with an NGC catalog designation.

Common Data Limits

These selections apply to all data types.

- Magnitude -- select a range in magnitudes. Note that the range is mathematical. For example, magnitude $\geq 10 \leq 12$ will return objects between 10 and 12 magnitude inclusive. Magnitude limits do not apply to dark nebulae.
- Size -- select a range in object diameters. Click on the units hypertext to change units: (") is arc seconds, (') is arc minutes, or degrees.
- Distance -- select a range of distance in light years.

Planetary Nebulae Limits

These selections apply to planetary nebula only.

- SBr -- select a minimum surface brightness.
- Morphology -- click the hypertext to limit the search to a specific morphological type (Any, Stellar appearance, Smooth disk, Irregular disk, Ring structure, Irregular form). Note that some nebulae may be a combination of types.

Diffuse Nebulae Limits

These selections apply to diffuse nebulae only.

- Type -- click the hypertext to limit the search to a specific type of nebulae onlyAny

type, All Galactic Diffuse Nebulae, Supernova Remnants, Nebulae in the LMC (Large Magellanic Cloud), Nebulae in the SMC (Small Magellanic Cloud), Extragalactic nebulae (nebulae in other galaxies other than the LMC/SMC), Reflection nebulae, H II regions.

Dark Nebulae Limits

These selections apply to diffuse nebula only.

- o Opacity -- Select a minimum opacity (1-6, with 6 being the darkest).
- o Type -- select a specific type of dark nebula (Any type, globules only, Exclude globules)

Open Cluster Limits

These selections apply to diffuse nebula only.

- o Age -- select a range in ages in millions of years (Myrs).

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Database Power Search: Extragalactic Tab

This tab is used to search the databases for objects outside of our own galaxy.

The screenshot shows the 'Extragalactic' tab selected. The 'Databases to Search' section has 'Galaxies', 'Galaxy Groups', and 'Quasars' listed. The 'Supplemental Deep Sky' checkbox is unchecked. The 'Catalog Designations' section has 'All' selected. The 'Common Data Limits' section shows 'Magnitude' and 'Size' both set to 'None' with range indicators. The 'Light travel time' radio button is selected, with 'None' and 'Myr' as range options. The 'Z' radio button is unselected. The 'Galaxy Limits' section shows 'Class' and 'Orientation' both set to 'Any'. 'SBr' is set to 'None mag/arcsec²'. 'Interacting with' is set to '0 or more'. 'V(r)' is set to 'None' km/s. 'e(b/a)' is set to 'None'. The 'Quasar Type' section has 'include BL Lac' checked. The 'Galaxy Group' section has 'galaxy count' set to 'None'.

Databases to search

Select one or more object type databases to search. At least one must be selected.

Include Catalog Designations

Optionally select one or more catalog designations. Only objects with these designations will be returned. For example, selecting NGC will only return objects with a NGC catalog designation.

Common Data Limits

These selections apply to all data types.

- Magnitude -- select a range in magnitudes. Note that the range is mathematical. For example, magnitude $\geq 10 \leq 12$ will return objects between 10 and 12 magnitude inclusive. Note that the magnitude limits do not apply to the dark nebulae.
- Size -- select a range in object diameters. Click on the units hypertext to change units (" = arc seconds, ' = arc minutes, or degrees)
- Light Travel Time / Z -- select a range in distances via light travel time or redshift (Z).
 - Enter a range in light travel time in years. The light travel time is how long it takes the light from the object to reach us. For relatively nearby objects this is equivalent to light years. For distant objects this is the cosmological light travel time.
 - Enter a range in redshift (Z).

Galaxy Limits

These selections apply to galaxies only.

- Class -- click the hypertext to limit the search to a specific class of galaxy only.

- Orientation -- click the hypertext to limit the search to a specific range of orientations only (face on, edge on, etc.)
- SBr -- select a minimum surface brightness.
- Interacting with n or more -- click the hypertext to select the minimum number of interacting galaxies required for the galaxy to be returned. Select 1 to return all interacting galaxies.
- Radial velocities (Vr) -- select a range in km/sec. Note that radial velocities are negative when approaching and positive when moving away.
- Minimum size ratio or $e(b/a)$ (how elongated the galaxy appears). Here, a is the semi-major axis of the galaxy and b is the semi-minor axis. Enter a value between 0 and 1. A small value of $e(b/a)$ indicates a very elongated galaxy. A value of 1.0 indicates a perfectly round galaxy.

Quasar Limits

These selections apply to quasars only.

- Quasar Type -- click the hypertext to include/exclude BL Lac objects.

Galaxy Group Limits

These selections apply to galaxy groups only.

- Galaxy Count -- Select a minimum number of galaxies in the group. For example, if 2 is selected, only galaxy groups with two or more galaxies will be returned

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Database Power Search: Minor Planets Tab

This tab is used to search the Minor Planet databases.

A specific date must be selected because these are moving objects.

The parameters that depend on the date are: magnitude, distance, visual detection difficulty, conditions and search radius. If these filters are not used the date does not figure into the result. Note however that the Mag, Distance, Difficulty and Con/Sep columns listed in the results are computed for the selected date regardless.

Databases to Search

Select the Primary database to search the database shipped with SkyTools. This database includes the first 10,000 numbered minor planets. Select the Supplemental database to search the database downloaded via the Supplemental Database Editor.

Orbit Class

Select All to include all orbit classifications. Choose Select to include only those classes checked. These classifications are determined from the orbital elements of the minor planet. Inferior Objects are asteroids that have orbits within the orbit of the earth. Superior objects have orbits beyond the orbit of the earth, but not beyond Saturn. Distant objects are found in the outer solar system.

Specific Night Only

These filters apply at midnight of the night chosen.

- Select a magnitude range. Note that the range is mathematical. For example, $\text{Mag} \geq 10 \leq 12$ will return minor planets between 10 and 12 magnitude inclusive.
- Enter a minimum distance in Astronomical Units (AU).
- Enter the minimum motion in arc-seconds per minute. This filter is useful for finding fast-moving asteroids that are passing close to the earth.

Orbit Limits

Filter directly by orbital characteristics. Enter a range of values or a single value for an upper or lower limit.

- Inclination (i, or tilt) of the orbit with respect to the plane of the solar system.
- Period (P) of the orbit. Click to on the units to change them (days or years).
- Eccentricity (e) of the orbit. For circular orbits e is zero. For elliptical orbits e is less than 1.0. An e of 1.0 is a parabolic orbit. An e greater than 1.0 is hyperbolic (and will not return--it is not a closed orbit). The latter does not apply to asteroids.
- Aphelion distance (Ap) is the farthest from the Sun that the asteroid reaches in its orbit.
- Perihelion distance (q) is the closest to the Sun that the asteroid will approach in its orbit.

The first column of the search results indicates the source of the orbital elements P for Primary database, S for Supplemental database.

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Database Power Search: Comets Tab

This tab is used to search the comet databases.

A specific date must be selected because these are moving objects. Apply optimum conditions does not apply.

The parameters that depend on the date are: magnitude, distance, elongation, visual detection difficulty, conditions and search radius. If these filters are not used the date does not figure into the result. However the Mag, Distance, Elong, Difficulty and Con/Sep columns listed in the results are computed for the selected date regardless.

Databases to search

Select the Historical database to search the database shipped with SkyTools. This database includes all cataloged comets prior to 2003. Select the Supplemental database to search the current comets databases downloaded via the Supplemental Database Editor.

Orbit Type

Select All to include all orbit types. Choose Periodic comets to include only those comets that are denoted with a "P" in their designation. Choose Non-periodic comets to include only those comets that are denoted with a "C" in their designation. Some periodic comets have poorly defined orbits and are considered lost. These are denoted with a "D" in their designations. To include lost periodic comets check the box next to include lost comets.

Specific Night Only

These filters apply at midnight on the night chosen. Enter a magnitude range, minimum distance in Astronomical Units, or minimum elongation from the Sun. Elongation is the angular separation between the Sun and Comet. Note that comets with small elongations are difficult to observe because of their proximity to the Sun.

Perihelion Limits

Filter by date of perihelion passage. This is the date on which a comet passes closest to the Sun. Use this filter to find historical comets near their brightest. This occurs once for a non-periodic comet, and once per orbit for the periodic comets. Select a date and a search period (in days). Comets that have a perihelion within the search period of the date entered will be listed.

Periodic Comet Orbit Limits

Filter directly by orbital characteristics for periodic comets only. Enter a range or a single value to act as an upper/lower limit.

- Period (P) of the orbit. Click to on the units to change them (days or years).
- Aphelion distance (Ap) is the farthest from the Sun that the comet reaches in its orbit.

General Orbit Limits

Filter directly by orbital characteristics. Enter a range or a single value to act as an upper/lower limit.

- Inclination (i, or tilt) of the orbit with respect to the plane of the solar system.
- Eccentricity (e) of the orbit. For circular orbits e is zero. For elliptical orbits e is less than 1.0. An e of 1.0 is a parabolic orbit. An e greater than 1.0 is hyperbolic (and will not return--it is not a closed orbit).
- Perihelion distance (q) is the closest to the Sun that the asteroid will approach in its orbit.

The first column of the search results indicates the source of the orbital elements H is for Historical database, S is for Supplemental database.

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Exposure Calculator

This tool is designed for planning an imaging campaign for a specific object. The calculator opens similarly to the Object Information window. You don't open the tool and then pick an object; rather the tool is opened via a right-click on an object in some other part of the program, such as an observing list or chart.

The capabilities of the calculator conform to the type of object. Separate calculators are provided for deep sky and stellar objects, the Moon and planets, the Sun, and double stars.

The Basic Calculations

Optimum Sub-Exposure Time

This is the estimated best exposure time to use for a single image that will be later stacked with others to create a final image. The calculation is based on how long an exposure is required to overwhelm the readout noise of the detector by the sky background for long exposure CCD cameras. A similar approach is used with regard to thermal noise for digital cameras. In general, for a dark site the algorithm will suggest very long exposures. As the sky becomes brighter, shorter exposures will be suggested.

Signal to Noise Ratio (SNR)

The SNR is a measure of the quality of the final image. It represents a sort of contrast between the signal you receive from the object and the various noise sources. The larger the SNR, the less visible the noise is. A minimum SNR is also required to detect a signal against the noise background.

In general, the higher the SNR, the more pleasing results. There are two basic ways to increase SNR: increase the exposure time for a single image, or stack multiple images together.

Exposure Time(s) Required to Obtain a Target SNR

This calculation turns the SNR calculation around. Given a target SNR, how many exposures are required at a specific sub-exposure time are necessary to reach the target SNR?

Effective Resolution

The effective resolution is a measure of how much detail can be recorded in your image, given the current conditions. The Nyquist Theorem states that the resolution of a CCD camera must be twice the smallest detail that can be recorded with minimum error. So in order to record detail of 2 arc seconds, you need a resolution of 1 arc second for each pixel in the camera.

In addition to the physical resolution of the camera, the resolution of the telescope optics and the atmosphere are also considered. Which factor dominates will depend on the telescope, camera, and seeing conditions.

For a given telescope and camera combination the variable factor is the seeing conditions you select. In some cases the seeing will make little difference, but in most it will be the limiting factor. The seeing not only depends on your seeing selection, but it also depends on the altitude of the object and the filter (if any) being used.

Size on Image

This is a relatively straight-forward calculation of how many pixels the object will cover on the detector. If the object is too large to fit, the number of separate image frames required to contain it is reported instead. If this is the case it will say something like "2 x 4 frames." This means that you would need to mosaic together two images in one direction and for in the other, for a total of eight images, in order to fully capture the object.

Rotational Smear

When imaging the sun, moon, and planets the technique of stacking large numbers of very short images is often used. But as these images are taken the object will rotate. The time period you can expect to expose over without rotational smear appearing in your images is calculated based on the current effective resolution, image scale, and rotational speed of the object.

Using the Calculator

Ultimately the possibilities are endless for this tool. It is meant for exploration, for providing answers to "what if?" scenarios such as, "what if I wait until a dark night?" or, "what if I start earlier tonight", or "what if I used a

filter?" or "what if the moon comes up?" or "what if I wait for a night of better seeing?"

Exposure Opportunities Table

This table breaks the night into blocks of time (or windows) based on overall quality and similar optimum sub-exposure times. The optimum imaging window displayed in an observing list on the Nightly Planner or Real Time tools is the prime window on this night based on this same data.

The exposure opportunities available on this night for the object depends on the filter/lens and binning selections. So the first thing to experiment with is to try changing these things to see how they affect the windows. For instance, one filter may have a much shorter window than another. You can use this information to determine the order in which you want to obtain images in different filters.

For faint objects you may need to stack a large number of images in order to obtain a reasonable SNR, or even for minimal detection. The total SNR available over each window is indicated. Experiment with using different windows together by selecting more than one as a block. Note how this affects the total SNR or exposure time calculated by the SNR and Exposure time calculators. This can be useful for answering questions such as, "should I keep exposing after the moon comes up?" If there is a reasonable increase in SNR with that period of time included then the answer is yes.

Signal to Noise Ratio (SNR) Calculator

Use this calculator to explore various combinations of sub-exposure times and exposures. For instance, you could compare to a darker night, or even a darker site to see how much time you could save by waiting or traveling.

Exposure Time for Target SNR Calculator

If you have a target SNR in mind, use this calculator to experiment with different windows, nights, locations, conditions, etc. For instance, you could image in moonlight for several hours, or wait until a darker night when only a half hour would be required.

Effective Resolution

The effective resolution can be experimented with in similar ways. How much effect does the altitude of the object have? How much effect does the seeing have?

Related Information:

[The Exposure Calculator Tool](#)

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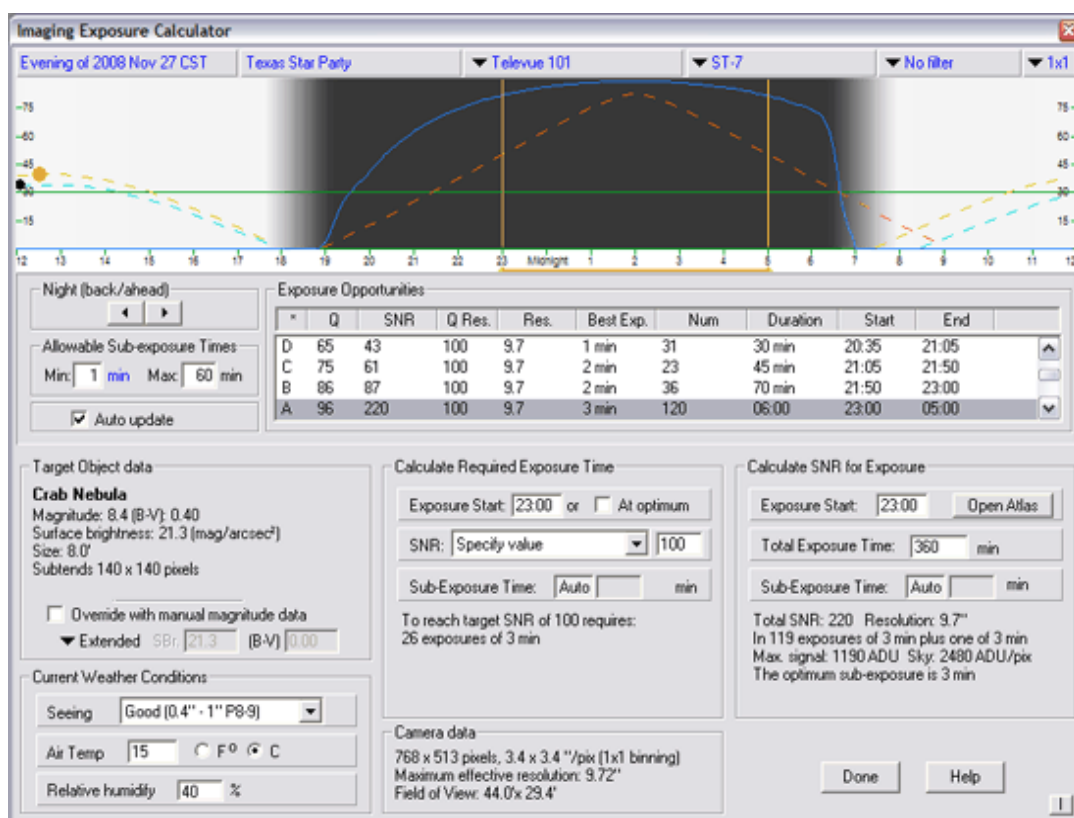
The Exposure Calculator Tool

This tool is designed for planning an imaging campaign for a specific object. The calculator opens similarly to the Object Information window. You don't open the tool and then pick an object; rather the tool is opened via a right-click on an object in some other part of the program, such as an observing list or chart.

The Exposure Calculator does a lot more than calculate an exposure time.

There are several versions of the calculator, depending on the type of object. Separate calculators are provided for deep sky and stellar objects, the Moon and planets, the Sun, and double stars.

The Deep Sky and Stellar Imaging Calculator



Night (back/ahead)

These buttons will move the date forward or ahead by one day.

Allowable Sub-exposure Times

Enter minimum and maximum sub-exposure times. Sometimes the conditions suggest an exposure time for a single sub-exposure that is impractically long or short. The calculator will not suggest exposure times outside of the range specified here.

Auto Update

When checked, this will cause the times used by the *Exposure time* and *SNR* calculators (see below) to be reset to reflect any changes to the *Exposure Opportunities* listing (such as when the camera or weather parameters are changed). Remove the check to keep the start times constant.

Exposure Opportunities

SkyTools breaks the night into a set of blocks (or windows) in time. Each window is defined by its *relative imaging quality (Q)*. The value of Q for each window is represented both as a percentage and as a letter grade. The optimum imaging opportunity window indicated in the Nightly Planner or Real Time observing lists is the night's prime window. This table lists all of the windows and their details.

When you open the calculator the exposure opportunity windows that make up the optimum imaging window are pre-selected. You may select any block manually by clicking on it. More than one block may be selected by clicking the first block, followed by a click while holding the shift key down on the last block. The blocks must be contiguous.

Exposure Opportunities									
*	Q	SNR	Q Res.	Res.	Best Exp.	Num	Duration	Start	End
A	96	220	100	9.7	3 min	120	06:00	23:00	05:00

The columns and their meanings:

- **Quality letter grade (*)**- "A" is excellent, "B" is very good, "C" is acceptable, "D" is poor and "F" is very poor. This letter grade simply summarizes the value of Q.
- **Relative Imaging Quality (Q)**- represents the overall quality of the exposure window as compared to perfect conditions for this location. The exposure quality is based on SNR. A value

- of 100% means that this window on this night represents the very best opportunity to image this object. A lower value indicates how much degradation there is due to interference of moonlight/twilight, the altitude of the object, and the weather conditions.
- **Signal to Noise Ratio (SNR)** - represents the approximate total SNR for images obtained over the duration of the window.
- **Relative Resolution Quality (Q Res.)** - represents the quality of the effective resolution over the exposure window as compared to perfect conditions for this location. A value of 100% means that this window on this night represents the very best opportunity to image this object in terms of resolution. A lower value indicates how much degradation there is due to the altitude of the object and the seeing conditions. Note that this value depends greatly on the seeing conditions that you specify.
- **Mean Effective Resolution (Res.)** - represents the mean effective resolution of images obtained during this window (in arc seconds). The better the resolution, the more detail can be captured. Note that this value depends greatly on the seeing conditions that you specify.
- **Optimum Sub-Exposure Time (Best Exp.)** - this is the exposure time recommended for a single image that will be stacked with others. It is based on the sky brightness or thermal noise, whichever is larger. If this number is too large or too small for practical reasons it can be limited via the *Allowable Sub-Exposure* times field.
- **Number of exposures available at the optimum sub-exposure time (Num)** this is the number of exposures obtained at the suggested optimum sub-exposure time that will fit into the window. In practice additional time is necessary between exposures, so this is an upper limit.
- **Duration** - the duration of the window.
- **Start** - the time the window starts.
- **End** - the time the window ends.

The NightBar

As on the planning tool the NightBar has a blue *relative imaging quality* line. In addition, two vertical yellow lines indicate the start and end of the currently selected exposure. These lines indicate the start time and duration displayed in the *SNR calculator* (right side of the dialog) and the start time used by the *Exposure Calculator* (center).

You can drag these lines on the Nightbar to change these times.

The SNR Calculator

This tool estimates the Signal to Noise Ratio (SNR) that can be obtained by exposing during the time selected. The start time and duration of the selected exposure window is automatically entered into the SNR calculator. The total SNR, effective resolution, optimum exposure time for each sub-exposure (and various other information) is displayed for the time period selected.

You may enter the start and duration values manually, change them by *dragging the yellow lines* on the NightBar, or by selecting one or more exposure windows in the exposure opportunities table.

The **Sub-exposure Time** can be entered manually if the **Auto** button is not depressed. When the **Auto** button is depressed the optimum exposure time for each sub-exposure computed by the program is used in the calculation.

The Exposure Calculator

This tool estimates the exposure necessary to reach a given Signal to Noise Ratio (SNR). This may be for a single exposure time or multiple sub-exposures, such as "100 exposures of 2 min." The start time and duration of the selected exposure window is automatically entered into the calculator.

You may enter the start and duration values manually, change them by *dragging the yellow lines* on the NightBar, or by selecting one or more exposure windows in the exposure opportunities table.

The target SNR can be entered manually by choosing *Specify Value* in the pull down menu. Alternately you can select an appropriate standard value from the pull down menu.

The **Sub-exposure Time** can be entered manually if the **Auto** button is not depressed. When the **Auto** button is depressed the optimum exposure time for each sub-exposure computed by the program is used in the calculation.

Target Object data

The target object information used by the calculator is displayed in this area.

The exposure calculations depend on the V magnitude and (B-V) color index for stellar target objects. For extended objects the calculations depend on the *mean surface brightness* (SBr) and (B-V). In cases where the mean SBr is not known SkyTools may estimate it from the integrated V magnitude and the size of the object.

For star clusters the approximate magnitude of a faint star within the cluster is computed from the integrated magnitude of the cluster. It is this magnitude that is used for the calculations. You will see this indicated as "Exposing for stars down to X mag."

For dark nebulae an approximate star limit is selected that is intended to allow the dark nebula to become apparent against the background stars.

The user should be aware that the (B-V) color index is often only a general approximation for many types of objects. The color index affects the apparent sensitivity of your imaging device over various filters.

Given the often poor nature of the data available for many objects the user may wish to **override with manual magnitude data** by clicking the check box. When this box is checked the values you enter are used by the calculator instead.

Make a selection on the hypertext menu:

- **Enter stellar magnitude**— type the magnitude and (B-V) on the right. The calculations will be performed as a stellar object.
- **Enter extended surface brightness**— type the mean surface brightness and (B-V) on the right. The calculations will be performed as an extended object.
- **Bright Nebulosity** – presets the mean surface brightness to that typical of a bright nebula. The calculations will be performed as an extended object.
- **Faint Nebulosity** – presets the mean surface brightness to that of a typical faint nebula. The calculations will be performed as an extended object.
- **Very Faint Nebulosity**— presets the mean surface brightness to that of a typical very faint nebula. The calculations will be performed as an extended object.
- **Sky Background** - presets the mean surface brightness to that of the estimated sky brightness at zenith for this location. The calculations will be performed as an extended object.

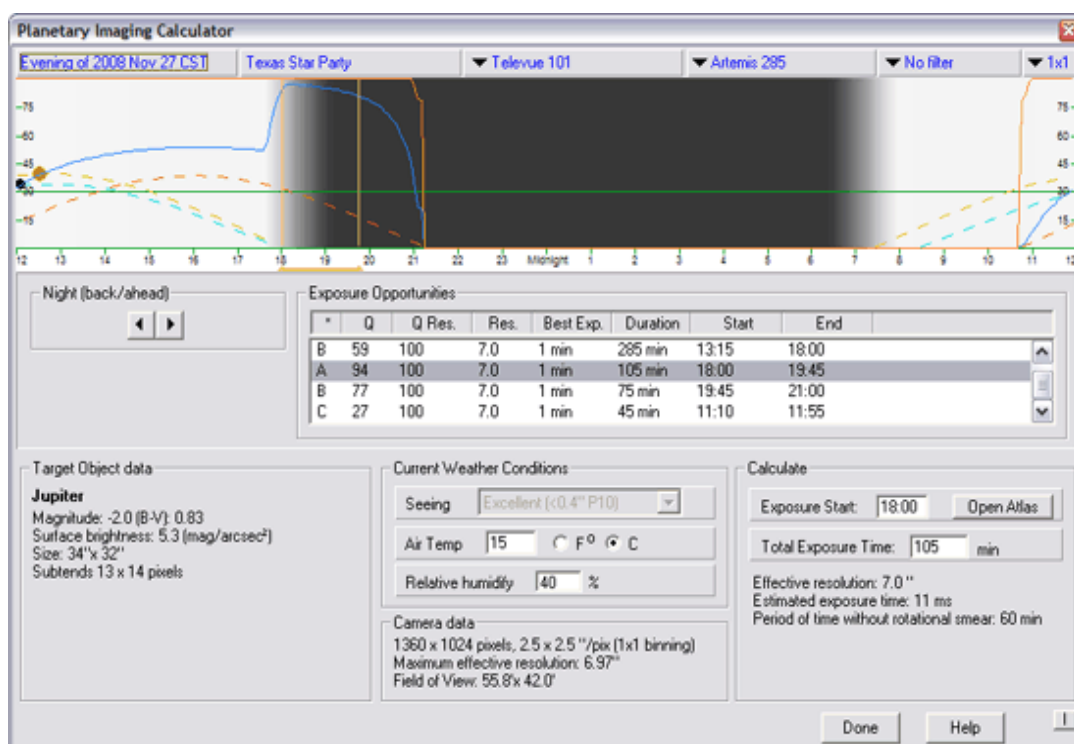
Current Weather Conditions

The weather data used by the calculator is displayed in this area. Changes made here are saved with the selected location and the planner may update to take into account new values. The seeing selected can greatly affect the effective resolution. The temperature and humidity affect atmospheric extinction as the object approaches the horizon.

Camera Data

The basic data for the selected camera is displayed in this area.

The Lunar and Planetary Imaging Calculator



Night (back/ahead)

These buttons will move the date forward or ahead by one day.

Exposure Opportunities

SkyTools breaks the night into a set of blocks (or windows) in time. Each window is defined by its *relative imaging quality* (Q). The value of Q for each window is represented both as a percentage and as a letter grade. The optimum imaging opportunity window indicated in the Nightly Planner or Real Time observing lists is the night's prime window. This table lists all of the windows and their details.

When you open the calculator the exposure opportunity windows that make up the optimum imaging window are pre-selected. You may select any block manually by clicking on it. More than one block may be selected by clicking the first block, followed by a click while holding the shift key down on the last block. The blocks must be contiguous.

Exposure Opportunities							
*	Q	Q Res.	Res.	Best Exp.	Duration	Start	End
B	59	100	7.0	1 min	285 min	13:15	18:00
A	94	100	7.0	1 min	105 min	18:00	19:45
B	77	100	7.0	1 min	75 min	19:45	21:00
C	27	100	7.0	1 min	45 min	11:10	11:55

The columns and their meanings:

- **Quality letter grade (*)**- "A" is excellent, "B" is very good, "C" is acceptable, "D" is poor and "F" is very poor. This letter grade simply summarizes the value of Q.
- **Relative Imaging Quality (Q)**- represents the overall quality of the exposure window as compared to perfect conditions for this location. The exposure quality is based on SNR. A value of 100% means that this window on this night represents the very best opportunity to image this object. A lower value indicates how much degradation there is due to interference of moonlight/twilight, the altitude of the object, and the weather conditions.
- **Relative Resolution Quality (Q Res.)** - represents the quality of the effective resolution over the exposure window as compared to perfect conditions for this location. A value of 100% means that this window on this night represents the very best opportunity to image this object in terms of resolution. A lower value indicates how much degradation there is due to the altitude of the object and the seeing conditions. Note that this value depends greatly on the seeing conditions that you specify.
- **Mean Effective Resolution (Res.)** - represents the mean effective resolution of images obtained during this window (in arc seconds). The better the resolution, the more detail can be captured.

- Note that this value depends greatly on the seeing conditions that you specify.
- **Optimum Sub-Exposure Time (Best Exp).** - this is the exposure time recommended for a single image that will be stacked with others. It is based on the sky brightness or thermal noise, whichever is larger. If this number is too large or too small for practical reasons it can be limited via the *Allowable Sub-Exposure* times field.
- **Duration** - the duration of the window.
- **Start** - the time the window starts.
- **End** - the time the window ends.

The NightBar

As on the planning tool the NightBar has a blue *relative imaging quality* line. Similarly, an orange line indicates the relative effective resolution quality.

In addition, two vertical yellow lines indicate the start and end of the currently selected exposure. These lines indicate the start time and duration displayed in the *Calculator* (right side of the dialog).

You can drag these lines on the Nightbar to change the times.

The Calculator

This tool estimates the effective resolution that can be obtained by exposing during the time selected. The start time and duration of the selected exposure window is automatically entered into the calculator. The total effective resolution, estimated exposure time, and total period of time without rotational smear appearing is displayed for the time period selected.

You may enter the start and duration values manually, change them by *dragging the yellow lines* on the NightBar, or by selecting one or more exposure windows in the exposure opportunities table.

Target Object data

The current information for the target object is displayed in this area.

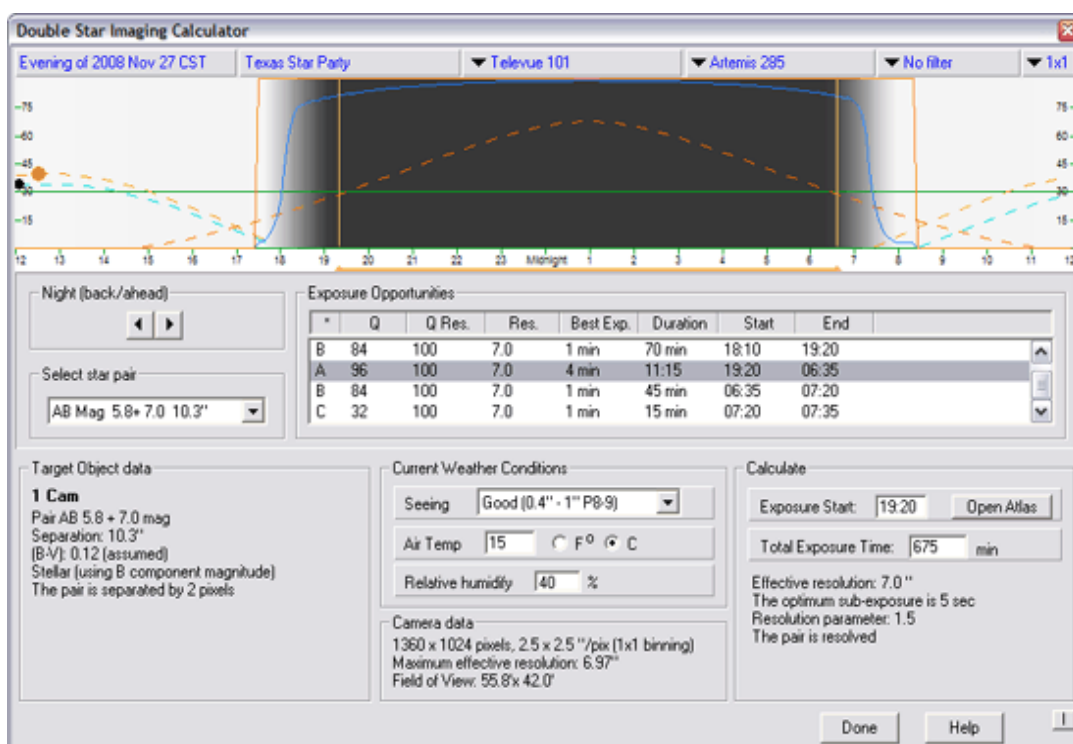
Current Weather Conditions

The weather data used by the calculator is displayed in this area. Changes made here are saved with the selected location and the planner may update to take into account new values. For lunar/planetary imaging the seeing is fixed at "Excellent" on the assumption that the exposures are short and the final image will contain only the sharper images.

Camera Data

The basic data for the selected camera is displayed in this area.

The Double Star Imaging Calculator



Night (back/ahead)

These buttons will move the date forward or ahead by one day.

Select star pair

Each pair in the double star system is listed here. Chose the pair that you want to image. The calculation will be made for this pair of stars.

Exposure Opportunities

SkyTools breaks the night into a set of blocks (or windows) in time. Each window is defined by its *relative imaging quality* (Q). The value of Q for each window is represented both as a percentage and as a letter grade. The optimum imaging opportunity window indicated in the Nightly Planner or Real Time observing lists is the night's prime window. This table lists all of the windows and their details.

When you open the calculator the exposure opportunity windows that make up the optimum imaging window are pre-selected. You may select any block manually by clicking on it. More than one block may be selected by clicking the first block, followed by a click while holding the shift key down on the last block. The blocks must be contiguous.

Exposure Opportunities							
*	Q	Q Res.	Res.	Best Exp.	Duration	Start	End
B	84	100	7.0	1 min	70 min	18:10	19:20
A	96	100	7.0	4 min	11:15	19:20	06:35

The columns and their meanings:

- **Quality letter grade (*)**- "A" is excellent, "B" is very good, "C" is acceptable, "D" is poor and "F" is very poor. This letter grade simply summarizes the value of Q.
- **Relative Imaging Quality (Q)**- represents the overall quality of the exposure window as compared to perfect conditions for this location. The exposure quality is based on SNR. A value of 100% means that this window on this night represents the very best opportunity to image this object. A lower value indicates how much degradation there is due to interference of moonlight/twilight, the altitude of the object, and the weather conditions.
- **Relative Resolution Quality (Q Res.)** - represents the quality of the effective resolution over the exposure window as compared to perfect conditions for this location. A value of 100% means that this window on this night represents the very best opportunity to image this object in terms of resolution. A lower value indicates how much degradation there is due to the altitude of the object

and the seeing conditions. Note that this value depends greatly on the seeing conditions that you specify.

- **Mean Effective Resolution (Res.)** - represents the mean effective resolution of images obtained during this window (in arc seconds). The better the resolution, the more detail can be captured. Note that this value depends greatly on the seeing conditions that you specify.
- **Optimum Sub-Exposure Time (Best Exp.)** - this is the exposure time recommended for a single image that will be stacked with others. It is based on the sky brightness or thermal noise, whichever is larger. If this number is too large or too small for practical reasons it can be limited via the *Allowable Sub-Exposure* times field.
- **Number of exposures available at the optimum sub-exposure time (Num)** - this is the number of exposures obtained at the suggested optimum sub-exposure time that will fit into the window. In practice additional time is necessary between exposures, so this is an upper limit.
- **Duration** - the duration of the window.
- **Start** - the time the window starts.
- **End** - the time the window ends.

The NightBar

As on the planning tool the NightBar has a blue *relative imaging quality* line. Similarly, an orange line indicates the relative effective resolution quality.

In addition, two vertical yellow lines indicate the start and end of the currently selected exposure. These lines indicate the start time and duration displayed in the *Calculator* (right side of the dialog).

You can drag these lines on the Nightbar to change the times.

The Calculator

This tool estimates the effective resolution that can be obtained by exposing during the time selected. The start time and duration of the selected exposure window is automatically entered into the calculator. The total effective resolution, estimated sub-exposure time, the resolution parameter and resolution status. The resolution parameter is an indication of how well split the pair is given the current effective resolution. A value of one indicates that the pair is just barely resolved. A value less than one is unresolved. Larger values indicate well resolved pairs.

You may enter the start and duration values manually, change them by *dragging the yellow lines* on the NightBar, or by selecting one or more exposure windows in the exposure opportunities table.

Target Object data

The current information for the target object is displayed in this area.

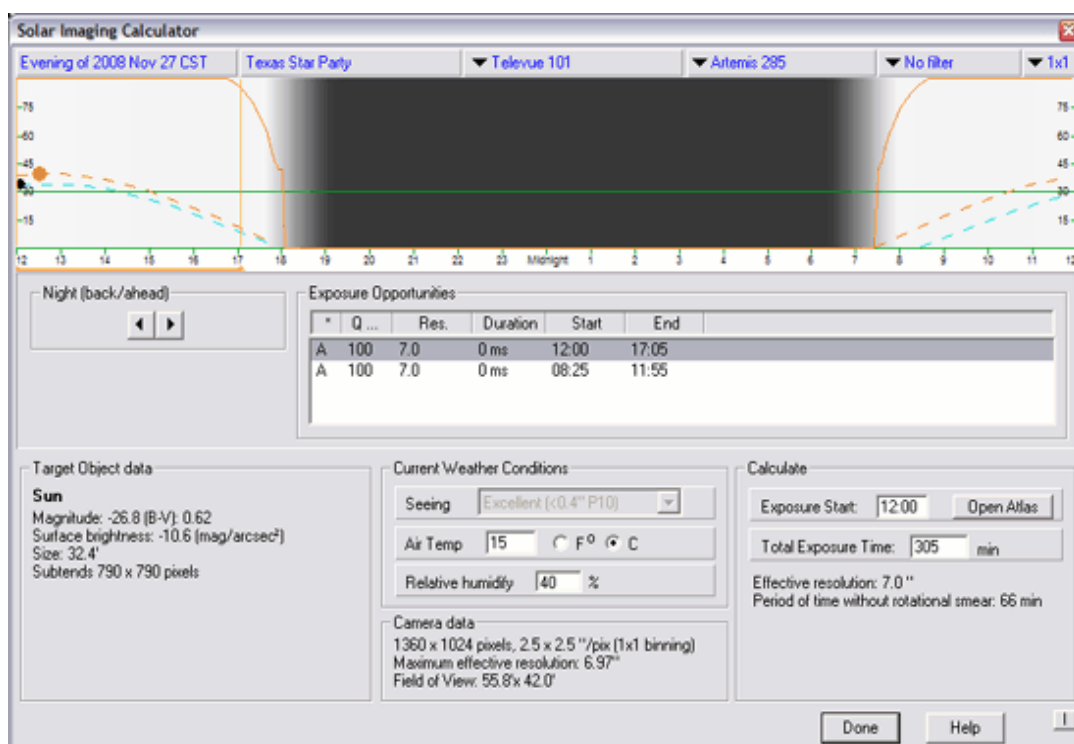
Current Weather Conditions

The weather data used by the calculator is displayed in this area. The seeing selected can greatly affect the effective resolution. The temperature and humidity affect atmospheric extinction as the object approaches the horizon. Changes made here are saved with the selected location and the planner may update to take into account new values.

Camera Data

The basic data for the selected camera is displayed in this area.

The Solar Imaging Calculator



Night (back/ahead)

These buttons will move the date forward or ahead by one day.

Exposure Opportunities

SkyTools breaks the "night" into a set of blocks (or windows) in time. Each window is defined by its *relative imaging quality* (Q). The value of Q for each window is represented both as a percentage and as a letter grade. The optimum imaging opportunity window indicated in the Nightly Planner or Real Time observing lists is the night's prime window. This table lists all of the windows and their details.

When you open the calculator the exposure opportunity windows that make up the optimum imaging window are pre-selected. You may select any block manually by clicking on it. More than one block may be selected by clicking the first block, followed by a click while holding the shift key down on the last block. The blocks must be contiguous.

The columns and their meanings:

- **Quality letter grade (*)**- "A" is excellent, "B" is very good, "C" is acceptable, "D" is poor and "F" is very poor. This letter grade simply summarizes the value of Q.
- **Relative Resolution Quality (Q Res.)** - represents the quality of the effective resolution over the exposure window as compared to perfect conditions for this location. A value of 100% means that this window on this night represents the very best opportunity to image this object in terms of resolution. A lower value indicates how much degradation there is due to the altitude of the object and the seeing conditions. Note that this value depends greatly on the seeing conditions that you specify.
- **Mean Effective Resolution (Res.)** - represents the mean effective resolution of images obtained during this window (in arc seconds). The better the resolution, the more detail can be captured. Note that this value depends greatly on the seeing conditions that you specify.
- **Duration** - the duration of the window.
- **Start** - the time the window starts.
- **End** - the time the window ends.

The NightBar

An orange line indicates the relative effective resolution quality.

In addition, two vertical yellow lines indicate the start and end of the currently selected exposure. These lines indicate the start time and duration displayed in the *Calculator* (right side of the dialog).

You can drag these lines on the Nightbar to change the times.

The Calculator

This tool estimates the effective resolution that can be obtained by exposing during the time selected. The start time and duration of the selected exposure window is automatically entered into the calculator. The total effective resolution, estimated exposure time, and total period of time without rotational smear appearing is displayed for the time period selected.

You may enter the start and duration values manually, change them by *dragging the yellow lines* on the NightBar, or by selecting one or more exposure windows in the exposure opportunities table.

Target Object data

The current information for the target object is displayed in this area.

Current Weather Conditions

The weather data used by the calculator is displayed in this area. Changes made here are saved with the selected location and the planner may update to take into account new values. For solar imaging the seeing is fixed at "Excellent" on the assumption that the exposures are short and the final image will contain only the sharper images.

Camera Data

The basic data for the selected camera is displayed in this area.

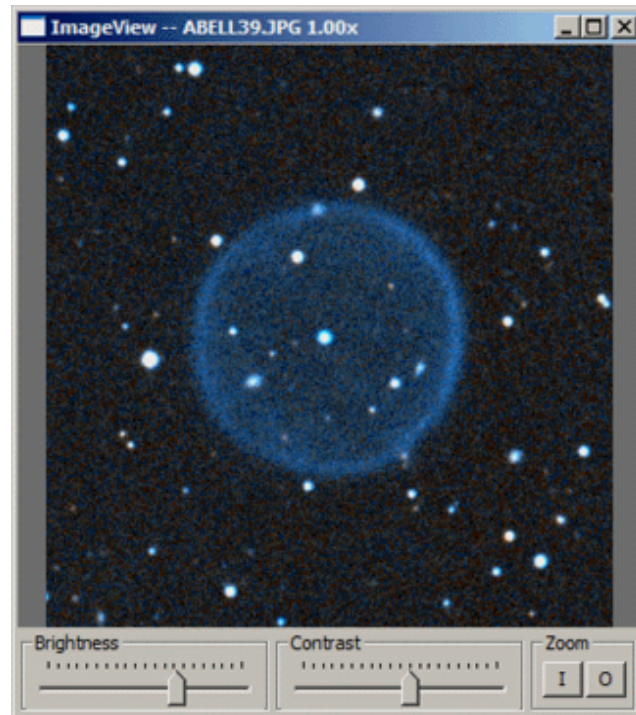
Related Topics

[Exposure Calculator](#) (overview)

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ImageView - the SkyTools Image Viewer

This tool is used to view and process images. This is a viewer only - it does not "save" changes or alter the image file in any way, although for *plottable* images the image processing selections are stored in the image database and reapplied whenever this image is displayed, either in the viewer or on a chart background.



Brightness slider - move to right to make image brighter

Contrast slider - move to the right to increase the contrast

Zoom In/Out - zooms the view in or out (pretty buttons coming later)

Right-click in window menu:

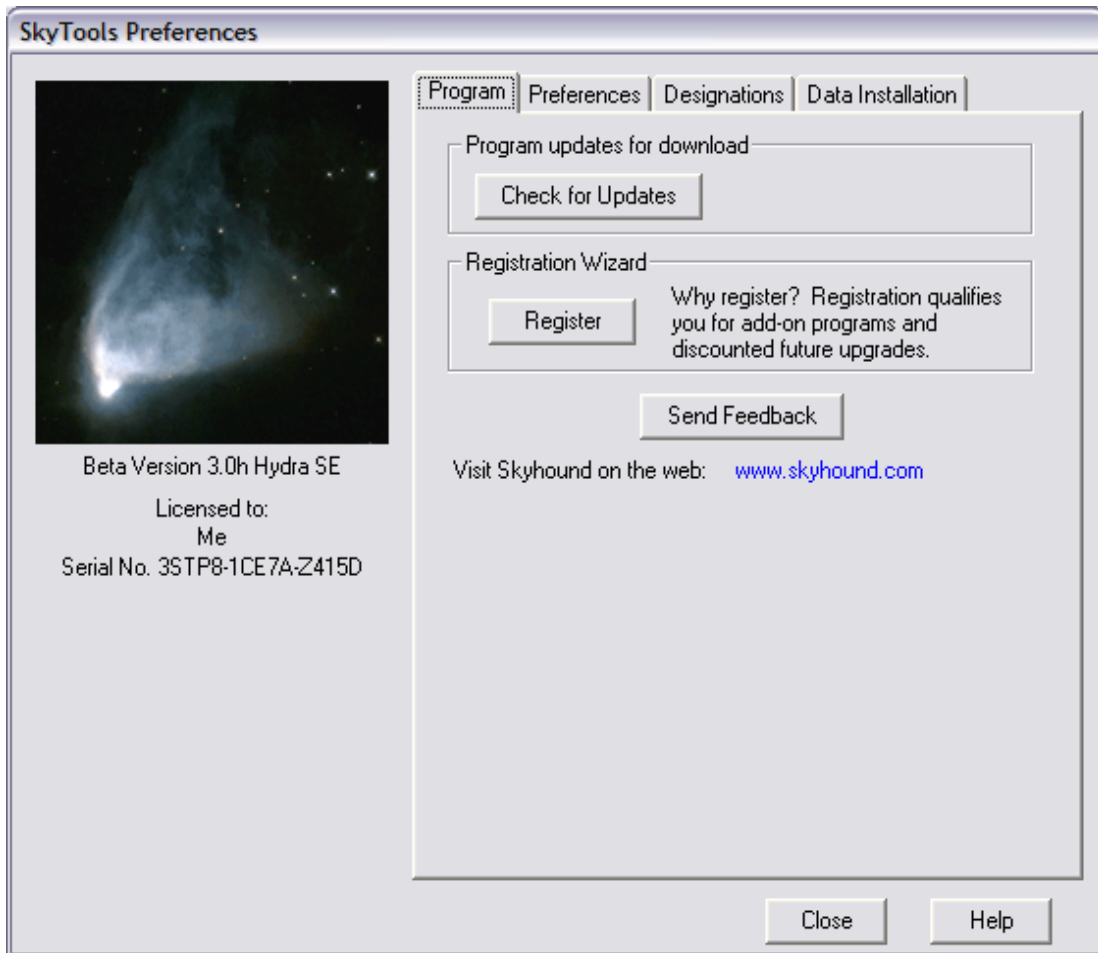
- Center Image at Cursor - when an image is zoomed-in such that you only see a portion of the image in the window, this function will place the position clicked on at the center of the window.
- Fit Window to Image - If the image fits on the screen the window will be resized around it such that the image will fill it completely (with not addition space around the edges).
- Fit Image to Window - Will resize the image such that it will fit entirely within the bounds of the window.
- Set to Actual Image Size - will display the image at its natural resolution (unzoomed).
- Flip Image - flips the image vertically
- Mirror Image - flips the image horizontally
- Invert Image Data - reverses the colors of the foreground and background. For image that have white stars on a black background the result is black stars on a white background.

- Filter Image Data - does nothing (will be removed)
- Reset Image to Defaults - resets the following: brightness, contrast, flipped, mirrored and Inverted status.
- Make Plottable - opens the *Import Plottable Imagedialog*.

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SkyTools Preferences

This dialog is used to set global preferences, install SkyTools add-ons, change data installation levels, communicate with Skyhound regarding Skytools.



The program edition and version, license information, and serial number are displayed on the left side of this dialog.

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SkyTools Preferences: Program Tab

This tab is where you communicate with Skyhound regarding SkyTools.



Check for Updates

Click this button to manually check for SkyTools updates at the Skyhound web site.

SkyTools will automatically check for updates when you start the program, so manually checking is not typically necessary.

If you are already using the latest version of SkyTools the message *No update necessary* will appear to the right of the button.

You must be connected to the Internet for this function to work.

If you do not have the latest version installed, you will see *Update to Version 3.x* appear as clickable hypertext. Click on the hypertext to open your web browser to the SkyTools update page.

Register SkyTools

Click to register your copy of SkyTools or to update your registration information.

Registration is a simple process that associates your name, address, and email address with the SkyTools serial number. You may register online or via postal mail.

Registration is required in order to purchase add-on programs for SkyTools or discounted upgrades. You may also choose to be notified, either by mail or email, of the availability of new upgrades and add-ons.

We are serious about your privacy. The information you provide will not be shared with any other party unless by court order.

Send Us Feedback

Click this button to send us a message about SkyTools. Feedback is sent to us as an email and can be used to report a bug, make suggestions, or just tell us what you think.

You must be connected to the Internet for this function to work.

Also feel free to email your questions about SkyTools to toinfo@skyhound.com.

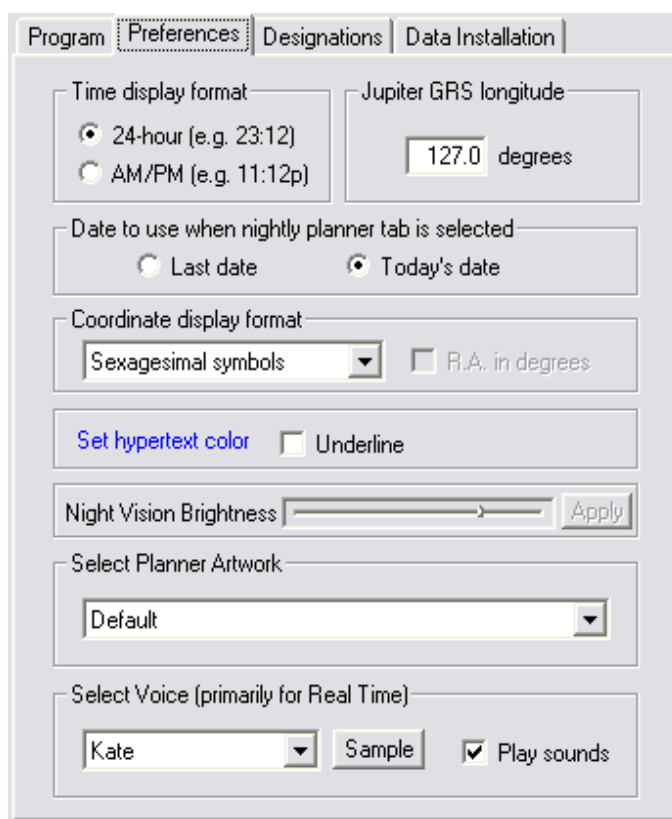
Reset to Defaults

Clicking this button will reset SkyTools to its default selections. Use this button only when you are having trouble with the program. This button will not erase your actual user data, such as telescopes, locations, or log entries. It will only reset your currently selections, such as your SkyTools preferences, the location used in the planner, etc.

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SkyTools Preferences: Preferences Tab

This tab is where you customize SkyTools to work as to your own liking.



Time Display Format

This property determines how SkyTools displays times. The choices are 24-hour format or AM/PM format.

- 24-hour time format times ranges from 0 to 24.
- AM/PM format times range from 0-12, with a appended to denote AM andp appended to denote PM

Jupiter GRS Longitude

The Great Red Spot of Jupiter varies in longitude with time. In order to accurately predict the location of the GRS SkyTools needs to know its current longitude.

Date to use when program starts

This property determines what date is used for Nightly Planner when you start SkyTools.

- If Last Date is selected the last date you were working with when you closed SkyTools will be restored.
- If Current Date is selected the current date will be used, based on your system clock. In that case, if SkyTools is started before 8AM, it will default to the previous night to avoid confusion during an observing session.

Coordinate Display Format

This property determines how SkyTools formats Right Ascension (R.A.) and Declination (Dec.) coordinates.

- Sexagesimals means to display R.A. in hours, minutes, and seconds and Dec. in

degrees, arcminutes, and arcseconds.

- Sexagesimal symbols will display symbols to denote hours, minutes, degrees, etc.
Example: 00h42m44.3s +41°16'07"
- Sexagesimal colons will separate each unit by colons, like on a clock. Example:
00:42:44.3 +41:16:07
- Sexagesimal spaces will separate each unit by spaces.
- Example: 00 42 44.3 +41 16 07
- Decimal will display R.A. in hours/degrees and decimals and Dec. in degrees and decimals. Example: 0.71231 +41.2687

Check the box next to R.A. in degrees if you wish to display R.A. in degrees instead of hours. This option is only available in conjunction with the Decimal selection.

Set Hypertext Color

You may set the color and format of the clickable hypertext links used throughout the program.

Check Underline to underline them. Click the Set hypertext color hypertext to pick a new hypertext color. Once chosen, *Set hypertext color* will preview the current color and underline selections.

Night Vision Brightness

The brightness of the red shading used in Night Vision mode can be varied using this slider.

If Night Vision mode is not engaged the Apply button will be disabled and changes won't be visible until the next time you enter Night Vision mode.

If Night Vision mode is engaged, click Apply to preview the change in brightness.

Select Planner Artwork

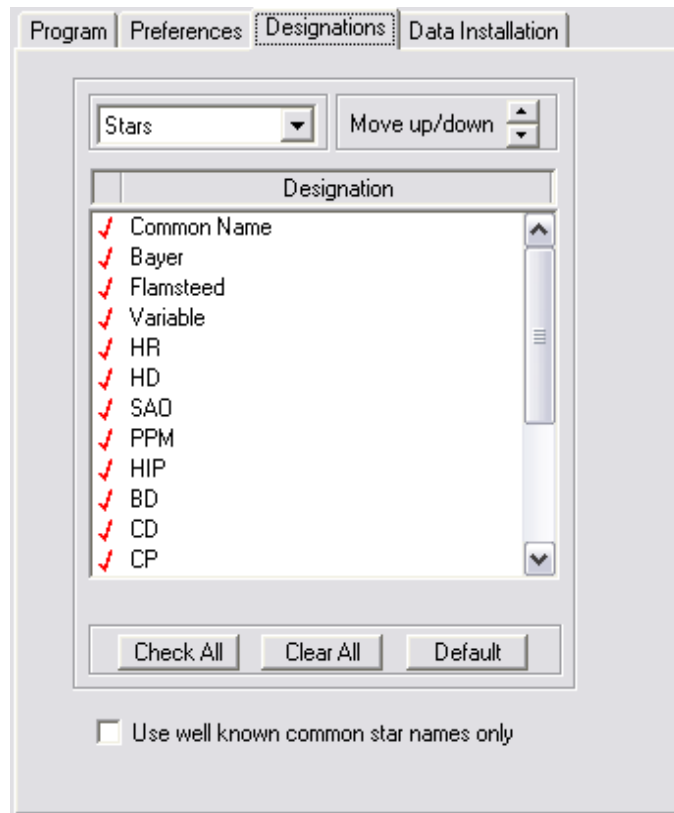
This property selects the artwork that is displayed across the top of the Planner.

Select Voice

This property selects the voice used by SkyTools when it speaks messages. With a few exceptions the spoken notifications are used in conjunction with Real Time and telescope control.

SkyTools Preferences: Designations Tab

This tab allows you to take control of how designations are used globally in the program



Designation Hierarchies

SkyTools divides astronomical objects into classes such as stars, galaxies, globular clusters, etc.. Each of these object type classes has its own catalog designation hierarchy. The most commonly used designations are at the top of this hierarchy, and the least common are at the bottom. In order to cut down on confusion SkyTools assigns a Primary Designation to each object. This is the highest designation available in the hierarchy and SkyTools will always refer to the object using this primary designation.

As an example, the Crab nebula is also known as M1, NGC 1952, Sh 2-244, and LBN 833. In the default hierarchy the common name is at the top, so "Crab Nebula" is the primary designation. If it didn't have a common name, then "M1" would be the primary designation. If no Messier, then the NGC is primary, etc.

Customizing the Designation Hierarchy

You can use this tab to customize the designation hierarchy for each type of object. First select an object class.

- Enable/disable the use of a designation by clicking in the red check mark column. A red check marks indicates that a designation is enabled.
- Move a designation higher or lower via the up/down buttons.

Disable a Designation

As an example, many people do not like common names. If you would prefer to see "M1" rather than "Crab Nebula" select *Diffuse Nebulae*. Click on the red check mark next to *Common Name* to disable it. Common names will no longer be considered as primary designations for any diffuse nebulae. Messier is now at the top of the list so all nebulae will use Messier numbers as

their primary designation if they have one.

Demote a Designation

Another option would be to move Common Names further down the hierarchy. Select *Common Name* in the list and click the move down button. This will move it below *Messier* in the hierarchy. Now all objects with Messier numbers will be referred to by their M number. But objects without Messier numbers with common names will display their common name as the primary designation.

Use well known common star names only

Check this box to use a subset of the common star names. This will limit the common star names to those that are well known only, such as Antares, Vega or Rigel.

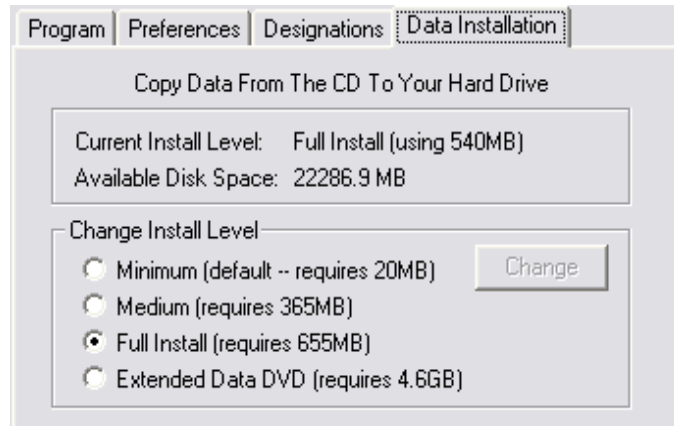
Chart Labels are Separate

The labels on the charts have their own separately defined designation hierarchy; the changes made here will not affect chart labels.

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SkyTools Preferences: Data Installation Tab

This tab is used to transfer all or part of the SkyTools database to your hard drive. It can also be used to reverse the process, deleting the transferred files.



When you first installed SkyTools you chose how much data to transfer from the media to your hard drive. This tab can be used to make a different choice.

There are four installation levels:

- Minimum: requires about 20 MB of hard disk space, depending on the size of your user files. The CD must be in the drive to use SkyTools. Because data is read from the CD the program will run more slowly.
- Medium: requires about 365 MB of hard disk space. The CD must be in the drive to use SkyTools. Many key files are copied to the hard drive, which improves performance.
- Full Install: requires about 655 MB of hard disk space. This level runs entirely from your hard drive. No CDROM is necessary to run SkyTools at this level.
- Extended Data DVD: requires 4.6 GB of hard disk space. The extended stellar data from the DVD is installed, adding stars to 21st magnitude. The extended data must be installed to be used by SkyTools.

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Observing with SkyTools

[Visual Observing](#)
[Imaging](#)

-0-

Visual Observing

[Star Hopping](#)

[Observing the Sun, Moon & Planets](#)

[Observing Comets](#)

[Observing Minor Planets](#)

[Observing Deep Sky Objects](#)

[Observing Double and Multiple Stars](#)

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Star Hopping

Nine Steps to Success in Finding Things in the Sky

The telescope star hopping chart is designed to make star hopping easy. When used on conjunction with an observing list, this can be a very powerful tool for successfully finding things in the sky.

Step 1: Define your telescope to be used with SkyTools. Click on the telescope icon on the tool bar at the top of the SkyTools planning window. Enter the information for your telescope and finding devices. The information regarding your finding devices is critical for use with the star-hopping chart. Don't forget to include the eyepieces you use with the telescope, and pay particular attention to setting the viewing orientations correctly.

A star-hopping chart will automatically be created for each telescope or binoculars you enter.

Step 2: Either download or create an observing list with the objects you want to observe. Display the list in the SkyTools planning window (Observing Lists tab selected) for the date and location you wish to observe from.

Step 3: Choose an object from the observing list and right click on it. Select Print Chart. Select the chart that was created for your telescope from the list on the print dialog and click Print. A star-hopping chart will be sent to the printer. This chart will be set to the optimum time to observe this object on the date specified.

Step 4: Take the chart out into the field at or near the optimum time. Use the naked-eye view to get your bearings in the sky.

Step 5: Note a bright star within the inset box in the naked eye view and point your telescope at it.

Step 6: Identify the star you have selected in the Finding Device view. This may take some getting used to if the finding device mirrors or inverts the view.

Step 7: Look at the finding device view of the chart. Note the apparent field of view of the finding device and the patterns of stars between the bright star you selected and the object you want to find. If properly configured and near the proper time, what you see in the finder should be very similar to what you see on the chart. If the chart says to go down and to the right about one field of view's worth, then that is what you should do at the telescope. Center the finding device as best as you can on the location shown at the center of the chart.

Step 9: Now look in the eyepiece. Try to match the star pattern in the eyepiece to the pattern drawn in the eyepiece view on the chart. Sometimes the orientation will be rotated, particularly near the pole or zenith.

Step 9: Now that you have oriented yourself by recognizing the star patterns, it should be

relatively simple to find the target object as drawn at the center of the eyepiece view, even if it is small or faint.

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Observing the Sun, Moon & Planets

SkyTools offers a wide range of capabilities to aid in the observation of planets and their moons.

Use the *Sun, Moon and Planets* observing list supplied and the Nightly Planner to determine if and when the object is best visible.

Plotting a daily optimum viewing ephemeris can also be quite useful to determine what dates the object is best visible.

A custom telescope finder chart can be essential for finding the more difficult planets such as Neptune or Pluto.

The Sun is drawn from the latest SOHO MDI Continuum image, if connected to the Internet. This image will display the current sunspot positions. Set up the current events tool to find the next solar eclipse in your area. SkyTools can automatically display the circumstances of the eclipse, showing the path of the moon as it passes.

The Moon is drawn realistically, showing craters and other features. You may want to turn the feature labels on in the View Controls Dialog. Set up the current events tool to find the next lunar eclipse visible in your area, or when the moon will occult a star or planet.

Mercury and Venus are drawn realistically as white spheres with phases like the moon. There really aren't any features that can be seen with modest instruments on either of these objects. Set up the current events tool to discover when the next times of greatest elongation are, and thus best time to observe these planets.

Mars is drawn realistically with features typically visible and polar caps. You may want to turn the feature labels on in the View Controls Dialog. The two moons, Phobos and Deimos, are also drawn. Try using the Trail Dialog to trail their full orbits. Set up the current events tool to find the times of greatest elongations for these tiny, difficult moons. These times will mark your best change to observe them.

Jupiter is drawn realistically with bands and the Great Red Spot. The detailed features vary with time, so the details may not exactly reflect what is seen. The four Galilean satellites are plotted, as well as their shadows when they pass in front of the planet. Two potentially observable satellites are also depicted: Amalthea, which orbits close to Jupiter, and Himalia, which orbits very far away. Try using the Trail Dialog to trail all or part of their orbits. Set up the current events tool to list Jupiter satellite events such as satellite transits, shadow, transits, eclipses and occultations. Use the satellite elongation events tool to find the times when Amalthea will be farthest from the planet.

Saturn is drawn realistically, showing the famous rings. The nine satellites visible in moderate instruments are also drawn (including distant Phoebe). Try using the Trail Dialog to trail all or part of their orbits.

Uranus is drawn realistically showing its current orientation (tilt). The four moons visible in moderate instruments are also drawn. Try using the Trail Dialog to trail all or part of their orbits.

Neptune is drawn realistically, showing its current orientation (tilt). Triton, the single moon visible in moderate instruments is also drawn. Try using the Trail Dialog to trail all or part of its orbit.

Pluto is drawn as a filled circle of the proper size. Its moon Charon is also drawn, although it is not visible in moderate instruments. This planet is faint and can be hard to find. A telescope finder chart can help.

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Observing Comets

The author of SkyTools is a avid observer of telescope comets, so SkyTools is well equipped for this task. It is relatively easy to find a bright comet like Hale-Bopp in the sky, but at any given time there are about a half-dozen faint telescopic comets visible, and they pose a much greater challenge.

If you enjoy hunting faint deep sky objects you may find chasing down faint telescopic comets to be equally rewarding.

First and foremost, you need to download the latest comet orbital elements. If your computer is connected to the Internet this is easy. Use the "Update 'current' observing lists" function from the Observing Lists menu. The comets brighter than 15th magnitude will be found in your *Current Comets* observing list, including the latest magnitude and coma diameter data derived from recent observations.

In addition, see the Comet Chasing page: <http://cometchasing.skyhound.com> for the most recent comet information.

Plotting a daily optimum viewing ephemeris can be quite useful to determine what dates the comet is best visible. This ephemeris can also be plotted, creating a unique chart that shows the daily position of the comet at the time when you would most likely observe it.

The Synopsis tab of the Object Information window gives a synopsis of the current and future visibility for any comet.

A custom telescope finder chart is essential for finding fainter comets. Note that comets can move from the plotted position in only a few hours, or sometimes even after a few minutes.

SkyTools draws the coma of a comet as a circle representing the visible diameter. If close enough to the sun to possibly have a tail, a line is drawn from the center of the coma in the direction the tail should appear. The length of the line corresponds to the degree of geometric foreshortening. If the tail is presented at right angles to the coma, the line is drawn with a length of 10 times the radius of the coma circle. If pointing directly toward or away from the comet, it is drawn with zero length.

Note that it isn't that common to see the tails of faint telescopic comets. Typically what you see is only a faint round smudge. Some have a bright, almost starlike center, and others are quite diffuse.

The magnitudes listed for comets are the integrated magnitude. This means that a 10th magnitude comet will not appear as bright as a 10th magnitude star. In fact, depending on the size of the comet and how diffuse it is, the faintest comet you can observe will be about 3 magnitudes less than the faintest star you can see. SkyTools takes this into account when drawing comets in custom finder or eyepiece charts. So if it doesn't show up on the chart, you probably can't see it.

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Observing Minor Planets

Also known as asteroids, minor planets look like stars in a telescope, except that they move over periods of hours, or in some cases minutes.

The SkyTools reference database contains accurate orbits for the brighter minor planets from 2008 through 2013. For other dates, you should obtain a set of orbital elements.

See the Supplemental Data tab of the Data Manager for minor planet downloads.

If your computer is connected to the Internet you can get a quick list of interesting minor planets (usually close flybys) by using the "Update 'current' observing lists" function from the Observing Lists menu.

Plotting a daily optimum viewing ephemeris for the minor planet can be quite useful to determine what dates the minor planet is best visible.

The Synopsis tab of the Object Information window gives a synopsis of the current and future visibility for any minor planet.

A telescope star-hopping chart is essential for finding the fainter ones.

SkyTools typically draws minor planets like stars on the charts. Use the Advanced tab of the View Controls to draw them as symbols.

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Observing Deep Sky Objects

The Nightly Planner is very useful for these objects. Select Visual mode and an appropriate set of columns. Either start with one of the lists supplied, or create your own with deep sky objects in it. Display the list for the evening and location from which you plan to observe. The *Optimum Viewing Times* can be very useful.

Deep sky objects are typically faint and difficult to see, so planning the best time to observe them will increase your success. You will want to observe them in complete darkness, and above two airmass, if possible.

Select an object from the list and see how it plots on the NightBar. How high does it get? When is it highest in the sky? Is it dark at that time? It is often useful to sort the observing list by optimum viewing time by clicking on the *Optimum* header button. Use the *Object Information window* to enter user information or to check the YearBar to determine the best months to observe it. The synopsis tab gives a good synopsis of the current and future visibility of just about any object.

It is also useful to create a telescope chart before going to look for a deep sky object. These charts can make finding objects easy and makes finding even the most difficult objects possible.

Downloading a DSS image can often aid in identifying small or faint objects.

Galaxies are drawn by SkyTools either as outlines or filled ovals. If known, the correct orientation and visible size is drawn. If the orientation is unknown the galaxy is drawn with the long dimension in the east/west direction.

Planetary nebulae are typically small and often faint. Use high magnifications for most planetaries--some appear stellar even at the highest magnifications. SkyTools draws planetary nebulae as a circle of the approximately correct size.

Quasars appear starlike in all instruments. The fun of finding a quasar is in knowing what you are looking at. SkyTools draws quasars like stars unless symbols are forced using the Advanced tab of the View Controls dialog.

Diffuse Nebulae are represented as an outline or a filled area if visible in modest telescopes. Otherwise they are drawn as a square symbol of the approximate size of the nebula. The latter nebulae are best photographed rather than observed visually.

Dark Nebulae are represented as diamonds of the approximate area as the dark nebula. Globules are drawn as small circles.

Open Clusters are the looser groupings of stars found primarily near the Milky Way. Often drawn as they appear, SkyTools also draws a dashed circle about the cluster of stars.

Globular Star Clusters are very compact clusters consisting of hundreds of thousands of stars. Unfortunately the very closely packed stars in globular clusters means that there is no catalog data for the stars near the center. For this reason the stars of globular clusters often disappear near the center of the cluster, leaving an unnatural, hollow appearance. SkyTools draws a circle around each globular cluster to identify it.

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Observing Double and Multiple Stars

SkyTools is unique in that it accurately displays the components of double and multiple stars. Even long period binary stars are properly drawn for the date using the orbit data.

To get an accurate idea of how a star system appears in your telescope, use the telescope chart. We recommend that you use the View Controls dialog to adjust the star dot size such that the stars don't overlap too much. Use the *Best Resolution* setting (selected as an eyepiece) to get an accurate picture of what you would see for close pairs.

Try using the *Trail Dialog* to plot the position of the component of a long-period binary star system.

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Imaging

[Deep Sky and Stellar Imaging](#)

[Lunar and Planetary Imaging](#)

[Double Star Imaging](#)

[Solar Imaging](#)

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Deep Sky and Stellar Imaging

The Nightly Planner is very useful for these objects. Either start with one of the lists supplied, or create your own with deep sky objects in it. Display the list for the evening and location from which you plan to observe. Select imaging mode and an appropriate column selection.

There are many rules of thumb when it comes to the key imaging session planning questions, such as: how large will the object appear on my image? How important is the altitude of the object? What is the effect of moonlight? What is the effect of traveling to a dark site? What is the best exposure time for each sub image? What will be the approximate SNR of my exposure? How many exposures will I need to reach a specific SNR?

Together, the Nightly Planner, Real Time, and the Exposure Calculator tools are designed to answer these and other questions.

Select an object from the list and see how it plots on the NightBar. The blue relative exposure quality line can take the guesswork out of planning. And for a detailed analysis for a single object, don't miss the exposure calculator, which is opened via a right-click on an object in the observing list.

The Context Viewer and Interactive Atlas can be used to plan your camera placement and to help verify the camera position from a short exposure.

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Lunar and Planetary Imaging

The Nightly Planner is very useful for these objects. Use the Sun, Moon, and Planets observing list. Display the list for the evening and location from which you plan to observe. Select imaging mode and an appropriate column selection.

There are many rules of thumb when it comes to the key imaging session planning questions, such as: how large will the planet appear on my image? How important is the altitude of the object? What is the effect of seeing? What is the optimum distance from the eyepiece to the image plane for eyepiece projection? What resolution can I expect? How long can I take images meant to be stacked together before rotational smearing becomes apparent?

Together, the Nightly Planner, Real Time, and the Exposure Calculator tools are designed to answer these and other questions.

Select an object from the list and see how it plots on the NightBar. The relative exposure quality and effective resolution lines can take the guesswork out of planning. And for a detailed analysis for a single object, don't miss the exposure calculator, which is opened via a right-click on an object in the observing list.

The Context Viewer and Interactive Atlas can be used to preview the image size and features that will be present.

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Double Star Imaging

The Nightly Planner is very useful for these objects. Either start with one of the lists supplied, or create your own with double stars in it. Display the list for the evening and location from which you plan to observe. Select imaging mode and an appropriate column selection.

There are many rules of thumb when it comes to the key imaging session planning questions, such as: how far apart will the stars be on the image? Are they resolvable? How important is the altitude of the object? What is the effect of seeing? What is the optimum distance from the eyepiece to the image plane for eyepiece projection? What resolution can I expect?

Together, the Nightly Planner, Real Time, and the Exposure Calculator tools are designed to answer these and other questions.

Select an object from the list and see how it plots on the NightBar. The relative exposure quality and effective resolution lines can take the guesswork out of planning. And for a detailed analysis for a single object, don't miss the exposure calculator, which is opened via a right-click on an object in the observing list.

The Context Viewer and Interactive Atlas can be used to help identify the field and to preview the image scale.

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Solar Imaging

The Nightly Planner (or in this case the Daily Planner) is also useful for the Sun. Use the Sun, Moon, and Planets observing list. Display the list for the date and location from which you plan to observe. Select imaging mode and an appropriate column selection.

There are many rules of thumb when it comes to the key imaging session planning questions, such as: how large will the sun appear on my image? How many images would I need to make a mosaic of the entire solar disc? How important is the altitude? What is the effect of seeing? What is the optimum distance from the eyepiece to the image plane for eyepiece projection? What resolution can I expect? How long can I take images meant to be stacked together before rotational smearing becomes apparent?

Together, the Nightly Planner, Real Time, and the Exposure Calculator tools are designed to answer these and other questions.

Select the sun from the list and see how it plots on the NightBar. The effective resolution line can take the guesswork out of planning. And for a detailed analysis, don't miss the exposure calculator, which is opened via a right-click on an object in the observing list.

The Context Viewer and Interactive Atlas can be used to preview the image size and with the latest SOHO image the sunspots that will be present.

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Advanced Topics

[Coordinate Systems](#)

[Map Projections](#)

[Technical Reference](#)

[Designation Formats](#)

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Visual Detection Difficulty Estimation

SkyTools estimates the visual detection difficulty of various objects, both stellar and diffuse. This is achieved through the use of sophisticated models of the sky, optical instruments, and the human eye.

Sky Background Model

The sky is modeled via a modified version of an algorithm by Bradley Schaefer. This model was first reproduced in the May 1998 issue of *Sky & Telescope*. We have modified this basic model in many ways. Light pollution is modeled as a function of the naked eye magnitude limit, or a measure of the sky surface brightness at the zenith. Observations from around the world have been used to calibrate light pollution of varying degree and color.

We also model the atmospheric extinction via a modified version of Schaefer's.

Stellar Limits

The stellar magnitude limits are the same employed in SkyTools 2, except that they are now used in conjunction with the improved sky brightness model.

For simulating what can be seen in telescopes, binoculars and magnifying finding devices, SkyTools uses the model created by Bradley Schaefer as published in the Publications of the Astronomical Society of the Pacific.

This model considers a wide variety of factors to predict the faintest star that can be seen in a given optical instrument. The factors used by SkyTools are:

- Sky brightness at zenith of the location
- Dilated pupil diameter of the observer
- Experience level of the observer
- The telescope: aperture; secondary obstruction; number of surfaces; cleanliness of the optics; assumes typical values for coatings.
- Magnification at the eyepiece
- Atmospheric extinction

Of these factors the sky brightness and aperture are the most critical. The level of experience of the observer also plays an important role, as does the magnification. Schaefer tested his model against 314 observations made by a variety of observers with a variety of instruments. When the experience level of the observer was taken into account (this was derived empirically) the model error was typically 0.5 magnitudes.

To estimate the detection difficulty we began with the faint limit predicted by the model and subsequently fit empirical estimates of difficulty to the results. This gave us a means of quantifying "easy", "obvious", etc.

Schaefer, B.E., Telescope Limiting Magnitudes, PASP, 1990, 102: 212.

Diffuse Objects

The visual detection difficulty of diffuse objects is an extension of Mel Bartels' algorithm that was in turn inspired by *Visual Astronomy of the Deep Sky*, Roger Clark, 1990.

In addition to modifying the basic model we calibrated it with respect to observations. Similarly to the stellar case, to estimate the detection difficulty we began with the faint limit predicted by the model and subsequently fit empirical estimates of difficulty to the results. This gave us a means of quantifying "easy", "obvious", etc.

Comets

Comets are treated as a special case because a comet can vary from nearly stellar to extremely diffuse. For comets we combine the stellar and detection contrast methods applying the observed degree of condensation (DC).

Limitations

The visual difficulty estimates generated by SkyTools are limited somewhat by the models employed. But much more critically they are limited by the accuracy of the object data. In particular, the detectability of diffuse objects depends greatly on the surface brightness of the object, for which accurate and consistent data seldom exists. This problem is so profound that by rights the estimates should work only very poorly. It is a wonder that they in fact work as well as they do, something that is only the result of a great deal of calibration and empirical testing.

It is important that the observer always keep in mind that these difficulties are estimates only. In some cases various effects will conspire to give a very poor result, such as SkyTools estimating an object to be very challenging when in fact it is easy. While in most cases the model has proven to be fairly close to reality, even then, estimating the actual limit of visibility is extremely difficult. So if SkyTools claims that an object is not detectable, keep in mind that it might well be. Conversely, not every object that SkyTools claims is very challenging will in actuality be detectable.

On balance, the estimate works fairly well as long as you take care to enter all of the important factors such as the sky brightness, telescope, and observer data. But in the end one must consider the detection difficulties listed for diffuse objects to be rough estimates only.

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Coordinate Systems

SkyTools uses several types of coordinate systems for drawing charts or displaying positions. These coordinate types differ in how they depict the sky in several basic ways.

Equatorial Coordinates	<p>Equatorial coordinates are attached to the earth in such a way that the celestial equator and poles are extensions of the earth's equator and poles into the sky.</p> <p>The two types of equatorial coordinates you will see in SkyTools are Equatorial J2000, which are astrometric coordinates referred to the standard equinox of J2000, and Apparent , which are referred to the equinox of date.</p> <p>Equatorial coordinates are measured in Right Ascension and Declination.</p>
Apparent Coordinates	<p>Because the coordinate systems are all attached to the earth in some way, and the axis of the earth precesses (or wobbles), consideration has to be given to the time for which the coordinate system is valid. This is called the coordinate system equinox.</p> <p>The coordinate system as derived from the orientation of earth's axis at the time of the observation is often called the equinox of date.</p> <p>Apparent coordinates are referred to this equinox of date.</p>
J2000 Coordinates	<p>It is possible to refer to the position of the earth's axis at some standard time that has been agreed upon. Such times are called standard equinoxes, and the most common standard equinox in current use is J2000, which are coordinates computed as if it were January 1st, 2000 AD.</p> <p>Past standard epochs have included B1950, B1900, and B1875.</p> <p>When entering coordinates into SkyTools you may always append one of these standard epoch identifiers, as appropriate. You may also enter a year and decimal (e.g. 1998.6) to specify an equinox of any date.</p>
Topocentric Coordinates	<p>These coordinates refer to a particular location on the earth, as opposed to geocentric coordinates that are as seen from the earth's</p>

	<p>center. Most coordinates published for use by observers at varying locations are geocentric.</p> <p>One big advantage of computer software is the computation of topocentric coordinates, customized for your observing location. Topocentric coordinates become important for objects that are near to the earth such as the moon or the close pass of an asteroid or comet.</p> <p>In general, the coordinate systems used or displayed by SkyTools are topocentric.</p>
Proper motion	<p>Proper motion is the apparent drift of stars across the sky as seen from the Sun due to their motion in the galaxy. Most stars have very small proper motions so they move very little, but some, such as Barnard's star, can move significantly over a period of only a few years. In these cases we must consider the point in time when the star's position was defined.</p> <p>The point in time when the coordinates are valid is called the coordinate epoch. If the epoch and if the proper motion of the star are known, one may compute the true location of the star at different points in time.</p>
Astrometric J2000	<p>The term Astrometric J2000 refers to coordinates that are referred to the standard equinox of J2000, but have been corrected for the position of the object as seen on another date.</p> <p>For instance, we might wish to compare the position of a star and a planet at a particular time. One way to do this would be to compute the apparent location for each object at that time. But it is often more useful to compare positions referred to a standard equinox, particularly J2000. To do this we could translate the apparent positions referred to the equinox of date to the standard equinox. Now we have J2000 positions that also reflect the location of the star and planet on another date. These are astrometric J2000 coordinates.</p> <p>SkyTools always displays astrometric J2000 coordinates, unless otherwise indicated.</p>
Horizon Coordinates	<p>Horizon coordinate measure positions in the</p>

	<p>overhead sky as seen from a particular location on the earth.</p> <p>These coordinates are measured in altitude and azimuth.</p> <p>Objects at the horizon have an altitude of 0 degrees, and those overhead (at the zenith) have an altitude of 90 degrees. Azimuth is measured eastward from the north.</p> <p>Horizon coordinates are used to draw all simulation charts.</p> <p>A Horizon Simulation includes the extinction of starlight near the horizon and does not display objects below the visible horizon.</p>
Ecliptical Coordinates	<p>Ecliptical coordinates are referred to the ecliptic rather than the celestial equator. The ecliptic is the path of the Sun in the sky.</p> <p>Ecliptic longitude is measured from the vernal equinox to the east and parallel to the ecliptic. Ecliptic latitude is much like declination, except it is measured from the ecliptic rather than the celestial equator.</p>
Galactic Coordinates	<p>Galactic coordinates are referred to the plane of our galaxy. These are not three-dimensional coordinates that consider the distance to the galactic center. Rather they are yet another coordinate system on the celestial sphere, only it is aligned with the galactic plane. These coordinates can be useful when displaying the entire Milky Way.</p>

Map Projections

The sky, like the earth, is spherical. In order to display it on a flat screen or piece of paper some form of mathematical transformation, or projection, must be applied. SkyTools applies several map projections, each with it's own strengths and weaknesses.

The Cylindrical projection is the simplest of the map projections. If you displayed the entire sky with this projection you would get a rectangular box with the equator across the middle and the north and south poles along the top and bottom. In this projection, the distortion is least near the equator and increases as you move toward each pole. This projection is used for the naked eye chart, with an imaginary equator running parallel to the horizon at altitudes of 30, 60 or 90 degrees. The distortion in this chart is zero across the horizontal center, and still small near the top and bottom. The horizon looks curved in this arrangement in order to keep the distortion of the star patterns to a minimum.

The Gnomonic projection is also known as a tangential projection. This projection has the quality that great circle arcs on the sky are depicted as straight lines on the chart. For this reason it is often used in meteorics. This projection is limited to a maximum extent of 90 degrees in SkyTools due to the distortions that appear at larger extents.

The Orthographic projection displays only half the celestial sphere at one time. At the widest possible view the sky looks like a round globe. The distortion is zero at the very center of the round map, and increases as you move toward the edge. Objects near the edge appear to be squashed.

The Stereographic projection is similar to the orthographic in that in its widest view we see a round map, but the distortion of shapes near the edges is much less. This is the best projection for the entire overhead sky and is used in the overhead sky chart.

The Aitoff All Sky projection is used to display the entire celestial sphere. This projection depicts the sky as a large ellipse.

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Technical Reference

A Discussion of Accuracy and Precision

People sometimes forget that accuracy and precision are not the same thing and that the difference can often be quite important. Precision refers to the exactness of a measuring device or to the number of decimal places given for a number. Accuracy refers to how well the final measurement reflects reality. Often a precise measure can be inaccurate due to the contribution of factors not related to the measuring device. For example, the precision of a device to measure the position of a star may be 0.1", but the interfering light from a nearby bright star may result in a measurement that is only accurate to 1". Similarly, the position of this star may be reported to 0.001", implying a very precise measurement--but the accuracy remains 1".

SkyTools strives for accuracy above precision. In all cases, the precision of the data in the SkyTools reference database is sufficient to reflect the accuracy of the measurements.

The Databases

The SkyTools data is split into three main databases: the reference database, supplemental database, and mapping database.

The reference database contains detailed information for each object. Not every star that can be displayed on the charts is in the reference database; only those stars with detailed data. Historical comets are included for years past. The first 10,000 numbered minor planets are included with orbital elements for many years into the future.

The supplemental databases contain objects that you add to the program. These include up to date comet information and a wider listing of minor planets.

The mapping database contains more objects but less detail. This is particularly true for stars.

Double Stars on the Charts

SkyTools is the only software that plots all the pairs in the double star database as they appear in the sky. Double stars are organized into double star systems, consisting of one or more star pairs. If a component star is cataloged in a star database, such as the UCAC or USNO-B1 the data from that catalog is merged with the double star pair data. This has resolved many mysteries in the double star catalogs caused by the motion of nearby stars. Often observations were made many decades ago and the stars have moved over that time, changing the apparent separation and position angle. With modern proper motion information SkyTools can now model this motion over time. The orbits of long period binary pairs are also merged into the database; similarly to the random motion between two unrelated but nearby stars, you may follow the motion of stars as they orbit one another.

The SkyTools Reference Database

Object Class	Number of Objects	Number of Catalog Designation Cross References
Constellations	89	1
Sun, Moon and Planets	11	1
Comets	1019 unique, with 1608 orbits	3
Minor Planets	10,000, with orbital elements at 40 day intervals	2

	for five years from August 2008	
Stars	> 18 million total	19
	2,650,990 in reference database	
	38,624 variable stars	
	26,205 suspected variables	
	72,089 multiple star systems with up to 20 components	
	1,406 long-period binaries with orbits	
Galaxies	1,098,254	10
Galaxy Groups	4,086	2
Quasars	12,543	3
Planetary Nebulae	2902	14
Diffuse Nebulae	811	10
Dark Nebulae	3,307	5
	193 globules	
Open Clusters	1672	53
Globular Clusters	193	7

Integrated Stellar Reference Database

The SkyTools stellar database is the first of its kind. Rather than layer many catalogs with often conflicting information, the best information available for each star is integrated into a single database entry. Remarkably, even double star component information is integrated into the database.

In all cases, care was taken to include the highest quality data available.

The reference database includes:

Accurate J2000 Positions from Hipparcos, Tycho, Tycho-II	Accurate J2000 Proper Motions from Hipparcos, Tycho-II, PPM	Accurate Parallaxes from Hipparcos catalog	Component PA and Separations from the Washington Double Star Catalog and CCDM
Visual Magnitudes from Hipparcos, Tycho, Tycho-II, or photometric catalogs	Variable Star Data from GCVS and NSV	B-V Color Indices from Hipparcos, Tycho-II, or photometric catalogs	Spectral Types from the MK Extension, Michigan HD, or SAO
Common Names, Bayer & Flamsteed designations, and notes from Bright Star Catalog	Radial Velocities from Wilson and Evans catalogs	UBVRI photometry of Landolt	DDO photometry of Mermilliod
Geneva photometry from Rufener	Stromgren uvby & HBeta photometry of Mermilliod	UBVRI Standard star photometry	Binary Star orbits revised by Hipparcos

Positions and Proper Motions from the USNO CCD Astrograph Catalog (UCAC)	Positions and magnitudes from the USNO-A2 catalog	Positions and proper motions from the USNO-B1.0 catalog
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Integrated Deep Sky Databases

The deep sky data is integrated in much the same manner as the stellar data. Galaxies are primarily from the Principal Galaxy Catalog, supplemented by cross reference data from the Merged Catalog of Galaxies.

Planetary Nebulae data are taken for a variety of sources, including the Strasbourg-ESO Catalogue of Galactic Planetary Nebulae, Supplement 1 to the SECGPN, and SIMBAD.

Open Cluster data are taken from the Catalogue of Open Cluster Data, 5th Edition with many positions from SIMBAD.

Globular Cluster data are from the Catalogue of Star Clusters and Associations, supplemental with new data from Brian Skiff.

Symbolic Diffuse Nebulae positions and sized are from a variety of professional catalogs, supplemented with values from the Saguaro Astronomy Club Database version 7.1. Visible Diffuse nebulae outlines were drawn from their appearance in the eyepiece and on the POSS plates.

Quasar data are from A" New Optical Catalog of Quasi-Stellar Objects" and includes some BL Lac objects.

Minor Planet Database

The minor planet database is derived from a subset of the work of Dr. Edward Bowell's astorb.dat database. The research and computing needed to generate astorb.dat were funded principally by NASA grant NAG5-4741, and in part by the Lowell Observatory endowment.

SkyTools will use the orbital elements appropriate for the time entered for accurate positions.

Historical Comet Database

Historical comet orbit data are excerpted from the Catalog of Cometary Orbits, and supplemental with data from various other sources.

Look Back Time Computation

For galaxies and quasars with significant redshifts the look back time is computed. This time assumes a Hubble constant of 71 km/sec/Mpc and Omega of 0.135 as derived from the WMAP result.

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Designation Formats

General Rules for Entering Designations:

- Designations are not case sensitive
- Common names are matched via a fuzzy search algorithm
- All catalog designations are in the form: catalog-identifier (space) catalog-ID. The catalog identifier is always separated from the catalog ID by a space, e.g. "HD 23456".

Reference points, such as "North Celestial Pole," and "Galactic Center" are also recognized.

For specific designation format by designation type, see:

[Reference Points](#)

[Constellations](#)

[Prime Solar System Bodies](#)

[Comets](#)

[Minor Planets](#)

[Stars](#)

[Galaxies](#)

[Galaxy Groups](#)

[Quasars](#)

[Planetary Nebulae](#)

[Diffuse Nebulae](#)

[Dark Nebulae](#)

[Open Clusters](#)

[Globular Clusters](#)

[SkyMarks](#)

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Reference Points

The recognized reference points are:

Full Name	Abbreviation
North Celestial Pole	NCP
South Celestial Pole	SCP
Zenith	Z
North Galactic Pole	NGP
South Galactic Pole	SGP
Galactic Center	

A fuzzy string search returns the full names that partially match. Abbreviations must be entered exactly.

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Constellations

Constellation names are treated in the quick search as common names; a fuzzy string search will return all constellations that roughly match. A partial name can be entered.

The standard three-letter constellation abbreviations are also recognized in addition to the formal constellation.

The genitive forms are used in conjunction with the Bayer and Flamsteed star designations.

Constellation	Abbr	Genitive Form
Andromeda	And	Andromedae
Antlia	Ant	Antliae
Apus	Aps	Apodis
Aquarius	Aqr	Aquarii
Aquila	Aql	Aquilae
Ara	Ara	Arae
Aries	Ari	Arietis
Auriga	Aur	Aurigae
Boötes	Boo	Boötis
Caelum	Cae	Caeli
Camelopardalis	Cam	Camelopardalis
Cancer	Cnc	Cancri
Canes Venatici	CVn	Canum Venaticorum
Canis Major	CMa	Canis Majoris
Canis Minor	CMi	Canis Minoris
Capricornus	Cap	Capricorni
Carina	Car	Carinae
Cassiopeia	Cas	Cassiopeae
Centaurus	Cen	Centauri
Cepheus	Cep	Cephei
Cetus	Cet	Ceti
Chamaeleon	Cha	Chamaeleontis
Circinus	Cir	Circini
Columba	Col	Columbae
Coma Berenices	Com	Comae Berenices
Corona Australis	CrA	Coronae Australis
Corona Borealis	CrB	Coronae Borealis
Corvus	Crv	Corvi
Crater	Crt	Crateris
Crux	Cru	Crucis
Cygnus	Cyg	Cygni
Delphinus	Del	Delphini
Dorado	Dor	Doradus
Draco	Dra	Draconis
Equuleus	Equ	Equulei
Eridanus	Eri	Eridani
Fornax	For	Fornacis

Gemini	Gem	Geminorum
Grus	Gru	Gruis
Hercules	Her	Herculis
Horologium	Hor	Horologii
Hydra	Hya	Hydrae
Hydrus	Hyi	Hydri
Indus	Ind	Indi
Lacerta	Lac	Lacertae
Leo	Leo	Leonis
Leo Minor	LMi	Leonis Minoris
Lepus	Lep	Leporis
Libra	Lib	Librae
Lupus	Lup	Lupi
Lynx	Lyn	Lyncis
Lyra	Lyr	Lyrae
Mensa	Men	Mensae
Microscopium	Mic	Microscopii
Monoceros	Mon	Monocerotis
Musca	Mus	Muscae
Norma	Nor	Normae
Octans	Oct	Octantis
Ophiuchus	Oph	Ophiuchi
Orion	Ori	Orionis
Pavo	Pav	Pavonis
Pegasus	Peg	Pegasi
Perseus	Per	Persei
Phoenix	Phe	Phoenicis
Pictor	Pic	Pictoris
Pisces	Psc	Piscium
Piscis Austrinus	PsA	Piscis Austrini
Puppis	Pup	Puppis
Pyxis	Pyx	Pyxidis
Reticulum	Ret	Reticuli
Sagitta	Sge	Sagittae
Sagittarius	Sgr	Sagittarii
Scorpius	Sco	Scorpii
Sculptor	Scl	Sculptoris
Scutum	Sct	Scuti
Serpens Caput	Ser	Serpentis
Serpens Cauda	Ser	Serpentis
Sextans	Sex	Sextantis
Taurus	Tau	Tauri
Telescopium	Tel	Telescopii
Triangulum	Tri	Trianguli
Triangulum Australe	TrA	Trianguli Australis
Tucana	Tuc	Tucanae
Ursa Major	UMa	Ursae Majoris

Ursa Minor	UMi	Ursae Minoris
Vela	Vel	Velorum
Virgo	Vir	Virginis
Volans	Vol	Volantis
Vulpecula	Vul	Vulpeculae

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Prime Solar System Bodies

Prime Solar System Bodies include the Sun, Moon, the eight recognized planets, and Pluto.

A fuzzy string search will return all rough matches. A partial name can be entered.

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Comets

Common Name

Enter all or part of the discoverer name(s). Note that in the case where there are two or more discoverers, the names are hyphenated. E.g. Hale-Bopp. A fuzzy string search is employed that will return all rough matches. A partial name can be entered.

Examples:

Hale-Bopp
Hale
Halley
Bopp

IAU Designation

The IAU designates first-time comets by a code that describes the date of discovery. The code consists of a year of discovery, followed a letter designating the two week-period of the year and the number of the discovery during this period. E.g "1998 A2" denotes the second comet discovered in the first two weeks of 1998.

Examples:

2006 W3
2007 W1
2005 L3

Periodic Number

Comets that are in orbits about the Sun such that they return periodically are given periodic comet numbers. The unique comet number is followed directly by the letter "P".

E.g. comet Halley can be referred to as "1P". Comet Kopf is known as "22P"

Full Designations are also recognized, with or without the quotes around the discoverer name.

Examples:

1P\Halley
C/2006 OF2 Broughton
C/2006 OF2 (Broughton)

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Minor Planets

Minor planets include the asteroids and Trans Neptunian Objects that are neither planets, dwarf planets, nor comets.

The brighter minor planets are given proper names and a unique number by the IAU. They are often named after people, but usually not the discoverer. The fainter or newly discovered asteroids are given a preliminary designation denoting the date of discovery.

Minor Planet Name

Enter all or part of the asteroid's name. Partial entries must start from the beginning of the word.

If the minor planet has a preliminary designation rather than a name, enter the full designation. The designation code consists of several parts, all of which are related to the date of discovery of the object: a 4-digit number indicating the year; a space; a letter to show the half-month; another letter to show the order within the half-month; and an optional number to indicate the number of times the second letter has been repeated in that half-month period.

E.g. "1996 KV1"

Minor Planet Number

If given a number by the IAU, enter "MPN" followed by a space and a number.

E.g. Ceres can be entered as "MPN 1"

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Stars

Common Star Names

Enter all or part of the common name. A fuzzy string search will return all common names that roughly match.

E.g. "Algol"

Bayer Designation

The Bayer designation lists stars by Greek letter in a particular constellation. Generally, the brightest star is Alpha, followed by Beta etc. In the cases where the star is a bright, widely separated double or multiple star, the individual components are numbered as superscripts to the Greek letter.

When entering these designations there are no Greek letters on your keyboard, so the Greek letter must be spelled out. The optional superscripts follow the Greek letter, separated by spaces. A three-letter constellation abbreviation typically concludes the designation string. The full genitive constellation name can also conclude the string.

E.g. "Gamma 1 And", "Gamma 1 Andromedea" or simply "Gamma And"

Here are the Greek letter correspondences:

α Alpha	η Eta	ν Nu	τ Tau
β Beta	θ Theta	ξ Xi	υ Upsilon
γ Gamma	ι Iota	ο Omicron	φ Phi
δ Delta	κ Kappa	π Pi	χ Chi
ε Epsilon	λ Lambda	ρ Rho	ψ Psi
ζ Zeta	μ Mu	σ Sigma	ω Omega

Flamsteed Designation

The Flamsteed designation lists stars by number in a particular constellation. Generally, these are the brighter stars numbered from west to east.

Enter the Flamsteed number followed by a space and either the constellation abbreviation or genitive constellation name.

E.g. "21 Ori" or "21 Orionis"

Variable Designation

Variable stars are designated by two systems. The first system devised used a letter for each variable in a particular constellation, starting with the letter "R". When they ran out of letters a double letter system was invented, starting with "RR", "RS", up to "ZZ". Eventually so many variable stars were discovered in some constellations that the letter system was abandoned in favor of a simple numeric designation, still attached to a particular constellation. Note: in some cases the Bayer designation is adopted as the official variable star designation.

Enter the letter variable star designations with the letter(s) followed by a space and the constellation abbreviation or the genitive constellation name.

E.g. "RR Lyr" or "RR Lyrae"

Numeric designations start with the letter "V" for variable followed by the number, a space and the constellation abbreviation.

E.g. "V471 Tau" or "V471 Tauri"

HR, HD, SAO, PPM, HIP, GC, ADS, Struve, NSV

These catalog designations all work the same way. Follow the catalog abbreviation (above) with a space and the catalog number.

HR	Yale Bright Star Catalog number
HD	Henry Draper Catalog
SAO	Smithsonian Astrophysical Observatory Catalog
PPM	Position and Proper Motion catalog
HIP	Hipparcos Catalog
GC	Boss General Catalog
ADS	Aitken Double Star Catalog
Struve	Struve Double Stars
NSV	The New Catalog of Suspected Variable Stars

E.g. "HR 110", "SAO 110314", "ADS 100"

BD, CD, CP

These designations refer to the catalog entries of the BD: Bonner Durchmusterung, CD: Cordoba Durchmusterung, and CP: Cape Photographic Durchmusterung

Specify the two letter catalog abbreviation followed by a space, + or -, the [declination](#) zone number, a space, and the star number in the zone.

e.g. "BD +00 1979" or "CP -22 10"

WDS Double Star ID

These are double star pairs from the Washington Double Star Catalog. A fuzzy string search will return all WDS designations that roughly match. Note that these designations refer to a specific pair of stars, which may be part of a larger multiple star system. The quick search will return the primary star of the multiple star system that the pair is part of.

Designations have two parts: a discoverer identifier followed by a number.

E.g. "BUP 31", "STF 102"

CCDM

These are double and multiple star systems in the Catalog of Components of Double and Multiple Stars. Specify the CCDM catalog identifier, followed by a two part ID related to the star's position in the sky. The two parts must be separated by either - or +.

e.g. "CCDM 0004+6026"

Tycho and GSC

The Tycho and Guide Star Catalogs (GSC) use an identical designation scheme. The designations for stars that are in both catalogs are always the same.

Specify either "GSC" for the Guide star catalog, or "Tycho" for the Tycho catalog, followed by a space and a two or three part zone number scheme. The first two numbers must be separated by a "-". The third number is for the Tycho catalog only and is usually "1", in which case it need not be specified.

E.g. "GSC 200-011", or "Tycho 200-011 1"

These are both the same star.

J Coordinate Format

This format is derived from the J2000 coordinates of the star and is used for very faint stars that have no other generally accepted catalog designation. This format is sometimes erroneously referred to as an "IAU Designation" because the format is defined by the IAU.

The format is: Jhhmmss.1+ddmmss

Where hh, mm, ss.1 are the J2000 RA in hours, minutes, and seconds plus one decimal. Similarly dd, mm, ss are Declination in degrees, minutes of arc, and seconds of arc. The Declination sign must be present. There are no spaces. When translating coordinates to this format the coordinates are never rounded up.

E.g: "J001945.7+732730" is a star at RA 00 19 45.786433 Dec. +73 27 30.01751

This format is often used for positions of point sources observed by satellites or large scale surveys such as 2MASS or SDSS.

In these cases the leading identifier (such as 2MASS or SDSS) is not included when entered into SkyTools. For some of these designations there is a space after the "J" or the "J" may be left off entirely. Additional precision may also be found. SkyTools expects the J, no spaces separating it from the numbers and the precision must be as defined above.

Example: "SDSS J 140228.22+632133.3" becomes "J140228.2+632133" in SkyTools.

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Galaxies

Common Name

Enter all or part of the common name. A fuzzy string search will return all common names that roughly match.

E.g. "Whirlpool"

Messier

Enter Messier numbers as an "M" followed by a space and the number. The space may be omitted.

E.g. "M 31" or "M31" or "m31"

NGC

For New General Catalog designations enter "NGC" followed by a space and the number. Because NGC designations are very common SkyTools is flexible in how they are formatted. The space may be omitted, "N" may be substituted for "NGC" or the NGC catalog identifier may be omitted completely. In some cases the number refers to more than one object. These separate objects are designated by an appended capital letter.

E.g. "NGC 3905" or "N 3905" or "n3905" or simply "3905"

E.g. "NGC 5266A"

IC

Enter "IC" followed by a space and the number. In some cases the number refers to more than one object. These separate objects are designated by an appended capital letter.

E.g. "IC 12" or "IC 960A"

MCG

Designations from the Merged Catalog of Galaxies are entered by following "MGC" with a space and a three part numerical designation. The first number can be preceded by a + or - sign. The other two numbers are separated by a "-". In some cases the designation refers to more than one object. In these cases a capital letter is appended.

E.g. "MCG 10-3-1", or "MCG 10-11-16B"

ESO

Designations from the European Southern Observatory catalog are entered by following "ESO" by a space and a two number designation. The two numbers are separated by a space. In some cases the designation refers to more than one object. In these cases a capital letter is appended.

E.g. "ESO 11 6", or "ESO 11 7A"

UGC

Designations from the Uppsala Galaxy Catalog are entered by following "UGC" by a space and the catalog number.

e.g. "UGC 300"

Markarian

Designations from the Markarian catalog are entered by following "Markarian" or "MKN" by a space and the catalog number.

E.g. "Markarian 100", or "MKN 1358"

Arp

Designations from the Arp catalog are entered by following "Arp" by a space and the catalog

number.

E.g. "Arp 336"

PGC/LEDA

Designations from the Principal Galaxy Catalog are entered by following "PGC" with a space and the catalog number. The largest PGC catalog number is PGC 73197. The PGC catalog numbers have been extended beyond PGC 73197 for the LEDA database, thus these numbers are separately identified with the LEDA identifier. The first entry with a LEDA identifier is thus LEDA 73198.

E.g. "PGC 2998", "LEDA 124006"

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Galaxy Groups

Common Name

Enter all or part of the common name. A fuzzy string search will return all common names that roughly match.

E.g. "Stephan's Quintet"

Abell Galaxy Cluster (ACO)

Designations from the Abell Galaxy Cluster catalog are entered by following ACO with a number.

E.g. "ACO 1"

Note that ACG was used in place of ACO in SkyTools 2.

Hickson (HCG)

Designations from the Hickson Compact Groups are entered by following Hickson or HCG by a number.

E.g. "Hickson 22" or "HCG 22"

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Quasars

Common Name

Enter all or part of the common name. A fuzzy string search will return all common names that roughly match.

E.g. "Twin Quasar"

Discoverer Designation

The quasar discoverer designations are typically the catalog number that the quasar is most commonly known as. These IDs are drawn from a variety of arcane catalogs. Enter all or part of the designation. Partial designations must start at the beginning of the first word.

E.g. "3C 273", or "WEE 93"

Hewitt-Burbidge QSO Designation

Enter QSO designations by following "Q" immediately with a two part numerical identifier. The two numbers are separated by a "-".

E.g. "Q0820+560"

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Planetary Nebulae

Common Name

Enter all or part of the common name. A fuzzy string search will return all common names that roughly match.

E.g. "Ring"

Messier

Enter Messier numbers as an "M" followed by a space and the number. The space may be omitted.

E.g. "M 27" or "M27" or "m27"

NGC

For New General Catalog designations enter "NGC" followed by a space and the number. Because NGC designations are very common SkyTools is flexible in how they are formatted. The space may be omitted, "N" may be substituted for "NGC" or the NGC catalog identifier may be omitted completely. In some cases the number refers to more than one object. These separate objects are designated by an appended capital letter.

E.g. "NGC 3905" or "N 3905" or "n3905" or simply "3905"

E.g. "NGC 5266A"

IC

Enter "IC" followed by a space and the number. In some cases the number refers to more than one object. These separate objects are designated by an appended capital letter.

E.g. "IC 12" or "IC 960A"

Abell, ARO

These designations are entered by following Abell or ARO by a number.

E.g. "Abell 39" or "ARO 10"

Minkowski, Henize, Haro, Kohoutek, ESO

These designations have similar forms. Enter M (Minkowski), He (Henize), H (Haro), K (Kohoutek), or ESO followed by two numbers separated by a dash.

E.g. "M 1-2" or He "2-1"

PN G

Enter these designations as "PN G" immediately followed by a two number designation. The numbers must be separated by either "+" or "-".

E.g. "PN G336.8-07.2"

PK

Perek and Kohoutek catalog designations are entered by following "PK" with a space and a two number designation. The second number must begin with a + or - and includes a decimal followed a single digit.

E.g. "PK 29-5.1"

Discovery Designations

These designations refer to the publication announcing their discovery. They often represent small obscure catalogs that are too numerous to include separately. They are free form and treated like common name strings. A fuzzy string search will return all designations that

roughly match.

E.g. "Wray 15-12", "Sh 2-68", "19W96"

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Diffuse Nebulae

Common Name

Enter all or part of the common name. A fuzzy string search will return all common names that roughly match.

E.g. "Eagle"

Messier

Enter Messier numbers as an "M" followed by a space and the number. The space may be omitted.

E.g. "M 27" or "M27" or "m27"

NGC

For New General Catalog designations enter "NGC" followed by a space and the number. Because NGC designations are very common SkyTools is flexible in how they are formatted. The space may be omitted, "N" may be substituted for "NGC" or the NGC catalog identifier may be omitted completely. In some cases the number refers to more than one object. These separate objects are designated by an appended capital letter.

E.g. "NGC 3905" or "N 3905" or "n3905" or simply "3905"

E.g. "NGC 5266A"

IC

Enter "IC" followed by a space and the number. In some cases the number refers to more than one object. These separate objects are designated by an appended capital letter.

E.g. "IC 12" or "IC 960A"

van den Bergh, Gum, RCW, Lynd's Bright Nebulae

These designations are entered by the abbreviation followed by a number. Enter vdB (van den Bergh), Gum, RCW, or LDN (Lynd's Bright Nebulae).

E.g. "vdB 1" or "LDN 4"

Sharpless

Enter these as "Sh" followed by two numbers, separated by a dash.

E.g. "Sh 2-16"

Other Designations

These are a grab bag of designations from many different catalogs. They are free form and treated like common name strings. A fuzzy string search will return all designations that roughly match.

E.g. "Dunlop 309"

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Dark Nebulae

Common Name

Enter all or part of the common name. A fuzzy string search will return all common names that roughly match.

e.g. "Coalsack"

Barnard

Enter these designations with a B followed by a single number.

E.g. "B 12"

Lynd Dark Nebulae

Enter these designations as LDN followed by a single number.

E.g. "LDN 536"

Southern Dark Cloud

Enter these as DC followed by two numbers separated by "+" or "-".

E.g. "DC 001.3-020.5"

Globule Designation

These are for globules only. They consist of a grab-bag of designations from various catalogs. A fuzzy string search will return all designations that roughly match.

E.g "BARNARD 90-2" and "NGC 1502-1"

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Open Clusters

Common Name

Enter all or part of the common name. A fuzzy string search will return all common names that roughly match.

e.g. "Wild Duck"

Messier

Enter Messier numbers as an "M" followed by a space and the number. The space may be omitted.

E.g. "M 11" or "M11" or "m11"

NGC

For New General Catalog designations enter "NGC" followed by a space and the number. Because NGC designations are very common SkyTools is flexible in how they are formatted. The space may be omitted, "N" may be substituted for "NGC" or the NGC catalog identifier may be omitted completely. In some cases the number refers to more than one object. These separate objects are designated by an appended capital letter.

E.g. "NGC 3905" or "N 3905" or "n3905" or simply "3905"

E.g. "NGC 5266A"

IC

Enter "IC" followed by a space and the number. In some cases the number refers to more than one object. These separate objects are designated by an appended capital letter.

E.g. "IC 12" or "IC 960A"

OCL

Open Cluster Designations are entered by following "OCL" with a space and a catalog number. In some cases the number includes a decimal and a single digit.

e.g. "OCL 552", or "OCL 553.1"

Berkely, Czernik, Dolidze, Collinder, Upgren, Tombaugh, Ruprecht, King, Stock, Trumpler, Markarian, Haffner, Hogg, Sher, Feinstein, Harvard, Lynga, Westerlund, Basel, Blanco, Barkhatova, Biurakan, Melotte, Pismis, Graff, Iskudarian, Stephenson, Roslund, van den Bergh-Hagen, Bochum, Dilidze-Dzimselejsvili, Antalova, Moffat, Havlen-Moffat, Frolov, van den Bergh, Mayer, Latysev, Graham, Aveni-Hunter, Loden, Gasdelen, Waterloo, Auner, Scuster, Danks, Muzzio, and Raab

Follow each of these designations with the above string, a space, and a number.

e.g. "Waterloo 6", or "Raab 10"

Other Designations

These are a grab bag of designations from many different catalogs. They are free form and treated like common name strings. A fuzzy string search will return all designations that roughly match.

E.g. "Skiff J0619+18.5"

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Globular Clusters

Common Name

Enter all or part of the common name. A fuzzy string search will return all common names that roughly match.

e.g. "Intergalactic Wanderer"

Messier

Enter Messier numbers as an "M" followed by a space and the number. The space may be omitted.

E.g. "M 12" or "M12" or "m12"

NGC

For New General Catalog designations enter "NGC" followed by a space and the number. Because NGC designations are very common SkyTools is flexible in how they are formatted. The space may be omitted, "N" may be substituted for "NGC" or the NGC catalog identifier may be omitted completely. In some cases the number refers to more than one object. These separate objects are designated by an appended capital letter.

E.g. "NGC 288" or "N 288" or "n288" or simply "288"
E.g. "NGC 5266A"

IC

Enter "IC" followed by a space and the number. In some cases the number refers to more than one object. These separate objects are designated by an appended capital letter.

E.g. "IC 2148" or "IC 2134A"

Palomar, Terzan

Enter these designations followed by a number.

E.g. "Palomar 12" or "Terzan 6"

Discovery Designations

These designations refer to the publication announcing their discovery. They often represent small obscure catalogs that are too numerous to include separately. Some refer to extragalactic globular clusters. These are of the form "galaxy name-number". Discovery designations are free form and treated like common name strings. A fuzzy string search will return all designations that roughly match.

E.g. "Ton 1", "Fornax-2"

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Skymarks

Enter all or part of the name. A fuzzy string search will return all names that roughly match.

E.g. "My Skymark"

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FAQ

How do use SkyTools without the CDROM in the drive?

Open the Configure SkyTools dialog from the tool bar on the main planning window. Select the Data Installation tab. Choose the Full install level and click Change.

Why do certain object types appear on the chart even after I specifically turned them off?

SkyTools assumes that you want to see the target object on the chart. For instance, if you have the deep sky objects turned off and select M 31 (a galaxy) as the target object SkyTools will temporarily override your settings and turn the deep sky objects back on.

Why do objects disappear from my charts?

If a class of objects isn't turned on in a chart view this setting is overridden when an object of this class is set as the target. If another target is chosen (or the view is panned) the objects of this type will be returned to their original status of not displayed.

What is the difference between a chart and a view?

In SkyTools parlance, a chart fits on the screen or a single piece of paper, and may be made up of more than one view. A view is a sub window of the chart that may have its own display characteristics, such as scale, orientation, types of objects displayed, coordinate grids, and labels. These characteristics are modified via the View Controls tool button on the chart tool bar.

Why are there no events listed in the Events Calendar?

The events listed in the Current Events calendar must first be generated via the Current Events tool (Current Events tab on main planner).

Why is the Nightly Event Planner always empty?

The events listed in the Nightly Planner must first be generated via the Current Events tool (Current Events tab on main planner).

How do I change the colors, fonts, or other characteristics of the charts?

The characteristics of the entire chart may be similarly controlled via clicking on the Chart Preferences button on the chart tool bar.

Why do the binocular or telescope finder charts sometimes appear blank?

This occurs when the target object is below the horizon.

Why don't more options seem to work in the motion trails dialog?

The options available depend on the type of object you have selected as a target for the chart. For instance, trailing the satellites of a planet doesn't make sense if you haven't targeted a planet.

What is the significance of the line, or tail, drawn for comets?

It is very difficult to predict the actual length of the visible tail of a comet, because each comet is different. The purpose of the line drawn by SkyTools is to indicate the approximate position of the ion tail as well as indicate how favorable the viewing geometry is to view it. If a comet is close enough to the sun to theoretically have a visible tail, a line is drawn from the comet's position in the direction opposite that of the sun. The length of this line indicates how much foreshortening is present due to our viewing angle. It will be drawn with a length equal to 10 times the diameter of the comet's visible coma (drawn as a circle) if we are seeing the tail at a right angle, and thus in it's full glory. Sometimes we see a comet such that the tail is pointed directly toward or away from us. In this case the line would have zero length, and wouldn't be drawn at all.

Why is it that when I plot a comet or asteroid on a chart, it sometimes doesn't show up?

The most likely reason for this is that the object isn't bright enough. Each view has a magnitude limit. For simulation charts, this magnitude limit is computed from the theoretical limit of the instrument and the naked-eye magnitude limit set for the observing location. In other words, SkyTools is saying that this object probably isn't visible. The Interactive Atlas has separate, adjustable, magnitude limits for each class of object.

Why do motion trails often appear as an undulating line, rather than straight?

This is due to the combined effects of parallax, aberration, and atmospheric refraction as seen from a particular location on earth.

Why does the same comet or minor planet sometimes get plotted twice on the chart?

There are two sources of data for comets and minor planets, the main SkyTools database and the supplemental database. In the map view controls dialog you can select to display comets and minor planets from either database or from both. When both databases are displayed, a comet or minor planet which appears in both will be plotted twice. The supplemental database is typically more appropriate for display if the object is new, or if a new, more accurate, orbit has been published. The main database is best for historical depictions of comets, or for when you do not need the highest accuracy presently available for minor planets.

The observing lists are nice, but what I want to do is find out what the best nights are to observe a given object. Can SkyTools do this?

Yes. Double-click on the object in the observing list to start the Object Information Window. Select the YearBar tab. The visibility of the object is plotted here for an entire year. Another possibility is to use a daily optimum viewing ephemeris (Ephemeris tab on main planner).

Select *Optimum Daily Viewing* as the ephemeris type, enter your object, a starting date and the period of time to cover. You can optionally choose to add filters at the right. Press *Compute*.

This will generate a list of optimum times to view your object on a daily basis. Click on the *V/s* heading to sort by optimum visibility. The best nights to observe this object will be sorted to the top of the list.

Why does it sometimes take so long to draw a chart?

Two likely reasons are using the complex natural sky background or plotting large numbers of supplemental minor planets. On slower computers you may want to select the simple natural sky background on the Chart Preferences dialog instead. As for minor planets it is possible to download large numbers of minor planets, particularly via Bowell's data. Large numbers of minor planets take a long time to draw. One solution is to turn off the display of supplemental minor planets via the View Controls for the chart.

Why do the optimum viewing times in the planner sometimes appear as dashed lines?

You may see objects that list dashed lines instead of optimum viewing times, particularly when you have selected *Twilight/Moonlight OK* and the moon is up. By this selection you have told SkyTools to display all objects that meet all the criteria under twilight or moonlight conditions. When the optimum times are computed under these conditions it is possible for SkyTools to decide that the object is not in fact visible. In these cases no optimum times can be computed and these times are replaced by dashes.

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How To...

[General Topics](#)

[Telescope Control](#)

[Real Time](#)

[Planning Tools and Observing Lists](#)

[Charts](#)

[Current Events Tool](#)

[Special Events Tool](#)

[Ephemerides Tool](#)

[Managing Data](#)

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General Topics

[Improve Performance on a slow computer](#)
[Change SkyTools global settings](#)
[Customize the catalog designations](#)
[Begin a 30-day trial of an add-on](#)
[Purchase an add-on](#)
[Unlock an add-on you have purchased](#)
[Change the Great Red Spot position](#)
[Create an Obstructed Horizon](#)
[Copy some or all data from the CDROM to the hard drive](#)
[Create an observing location from GPS](#)
[Update an observing location from GPS](#)
[Send feedback](#)
[Register SkyTools](#)
[Modify your SkyTools registration information](#)
[Check for program updates](#)

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Improve Performance on a Slow Computer

There are several steps you can take to speed up SkyTools on a slow computer:

Nightly Planner

The primary thing to do is to keep your observing lists short. Use the planner to create a filtered version of a long list: right-click on the check-mark column heading and select Check Displayed. Right-click in the check-mark column of the observing list and select "Copy checked to..." When the dialog comes up create a new (shorter) observing list to copy the filtered results to. Open this list in the planner to speed things up.

Another tip: when dealing with long lists use the simple mode. This mode does fewer calculations when the list is being refreshed.

Real Time

As with the Nightly Planner use a shorter list and/or simple mode. But in addition you should lengthen the time between list updates. Select *Configure Real Time Refresh Rates* from the Telescope Control menu. Set the observing list refresh to five minutes. It really doesn't need to refresh more often than that.

Interactive Atlas

Choose a solid color background for the chart. Avoid the bitmapped stars. If the planets take too long to draw remove the check next to "Render planets in high quality" on the Misc. tab of the chart preferences dialog. If you don't need them, in the View Controls disable the display of minor planets (both kinds). At the very least, be sure only one source of minor planets is being displayed at a time. Open the Magnitude Limits dialog and click the Default button, to be sure you aren't drawing too many stars. Check your magnitude slider for any that are way over to the right and move them back toward the middle. Pay particular attention to the magnitude slider for galaxies and if you must display them, minor planets.

Simulation Charts/Context Viewer

Avoid the use of the complex natural sky background. The simple natural sky background is much faster. Consider the suggestions above for the Interactive Atlas with regard to minor planets and high quality planet rendering.

Database Power Search

Avoid the use of Visual mode if possible. This mode applies computationally expensive visual difficulty calculations which can really bog it down. If you must use visual mode, then be sure to include other filter limits, such as hard magnitude and size limits. These filters are all tested before the expensive calculations so using them can really speed things up.

Current/Special Events

Limit the number of objects in the Appulse/Transits/Occulations list.

-0-

Change SkyTools Global Settings

Click the SkyTools Preferences button on the main planning window tool bar.

Select the *Preferences* tab. On this tab you can change various global preferences, from the current longitude of the Great Red Spot to the artwork at the top of the main window.

Select the *Designations* tab. On this tab you can customize the catalog designations to your liking.

-0-

Customize the Catalog Designations

Click the SkyTools Preferences button on the main planning window tool bar.

Select the Designations tab. Use this tab to customize the catalog designations used throughout the program.

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Begin a 30-day Trial of an Add-on

Click the SkyTools Preferences button on the main planning window tool bar. Select the *Add-on* tab.

Highlight the add-on you wish to unlock in the list. Click the Trial button. The trial period will last 30 days from the day you begin. The add-on will be fully functional during that period. After 30 days you must purchase the add-on to keep using it.

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Purchase an Add-on

Click the SkyTools Preferences button on the main planning window tool bar. Select the Add-on tab.

Click the Purchase button.

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Unlock an Add-on You Have Purchased

Click the SkyTools Preferences button on the main planning window tool bar. Select the *Add-on* tab.

Highlight the add-on you wish to unlock in the list. Click the Unlock button. You may have received one or two keys from Skyhound.

If you received two keys typekey1 exactly as it appears (but without quotes), into the dialog box. Type key2 in a similar manner. These keys are case sensitive, so be sure to use capital letters where indicated.

If you received a single key from Skyhound, type in key1 only. Leave key2 blank.

If correctly entered you will receive a message that your add-on has been successfully unlocked. You may unlock the add-on you purchased on as many computers as you wish, as long as each computer is used primarily by you. Please don't share your keys with anyone!

-0-

Change the Great Red Spot Position

Click the SkyTools Preferences button on the main planning window tool bar.

Select the *Preferences* tab. Enter the current longitude of Jupiter's Great Red Spot (GRS).

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Create an Obstructed Horizon

There are several methods for creating an obstructed horizon for an observing location. Click on the location hypertext to open the Observing Sites dialog. Select your location. Click the Create button in the *Obstructed Horizon* field. Refer to the Help button on this dialog for detailed instructions.

-0-

Copy Some or All Data from the CDROM to Your Hard Drive

Click the SkyTools Preferences button on the main planning window tool bar. Select the *Data Installation* tab.

Choose the installation level you want to change to and click *Change*. Note that you may also change the install level back to the default *Minimum* setting.

It may take some time to copy the data from the media.

When complete the new install level will be in force. If you chose the Maximum install level or Extended Data level the CDROM will no longer be necessary to run SkyTools.

-0-

Create an Observing Location from GPS

Open the Observing Sites dialog by clicking on the observing location hypertext anywhere it appears in the program

Click New

Click Manual/GPS entry

Click Get Position from GPS

The Get GPS Location dialog will appear. See the instructions on the dialogHelp button for its use.

When the dialog closes the longitude, latitude and elevation fields will be filled in. Enter a name for your new location and clickOk.

-0-

Update an Observing Location from GPS

Open the Observing Sites dialog by clicking on the observing location hypertext anywhere it appears in the program

Select the observing location you wish to update

Click the GPS button

The Get GPS Location dialog will appear. See the instructions on the dialog Help button for its use.

-0-

Send Feedback

Click the SkyTools Preferences button on the main planning window tool bar. Select the *Program* tab.

Click the Send Feedback button. Enter your name and the message you would like to send to us. The message text can be any length. Click the Send Feedback button on the *Feedback* dialog to send your message. You must be connected to the Internet to use this feature.

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Register SkyTools

Click the SkyTools Preferences button on the main planning window tool bar. Select the *Program* tab.

Click the Register button. You will be prompted for your name and contact information.

Click Register Online if you are connected to the Internet.

Click Register by mail if you wish to register by mail. This will print a registration page to be mailed to us. Our address is printed on the page.

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Modify your SkyTools Registration Information

Click the SkyTools Preferences button on the main planning window tool bar. Select the *Program* tab.

Click the Register button. The name and contact information you used to register will appear. Make any necessary changes.

Click Register Online if you are connected to the Internet.

Click Register by mail if you wish to register by mail. This will print a registration page to be mailed to us. Our address is printed on the page.

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Check for Program Updates

Click the SkyTools Preferences button on the main planning window tool bar.

SkyTools automatically checks for an update once per day so you do not typically need to do it manually.

To update manually, select the *Program* tab. If you are connected to the Internet, click the Check for Updates button.

If you already have the latest version of SkyTools installed you will see the message *No update necessary* appear to the right of the button.

If you do not have the latest version installed, you will see *Update to Version...* appear as clickable hypertext. Click on the hypertext to automatically download and update SkyTools. SkyTools will have to close during the update.

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Telescope Control

[Configure a Telescope](#)

-0-

Configure a Telescope

Select the Real Time tab on the SkyTools main planning window.

Click the Telescope Control hypertext menu and choose *Select/Configure Telescope -->*

- ASCOM Supported Telescope for the majority of telescopes including all GOTO mounts and simple DSCs.
- Argo Navis
- Sky Commander

Related Topics

[Real Time Tool](#)

[Setting up ASCOM for use with GOTO Telescopes](#)

[Using a GOTO Telescope](#)

[Using a Pushto Telescope](#)

[Configuring Real Time Refresh Rates](#)

[Configuring the Argo Navis](#)

[Configuring the Sky Commander](#)

[Configuring the Pushto Indicators](#)

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Real Time

[Change how often the screen and charts are updated](#)

-0-

Change how often screen and charts are updated

Select *Configure Real Time Refresh Rates* from the Telescope Control menu.


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Planning Tools and Observing Lists

[Create a New Observing List](#)
[Create an Observing List from a File](#)
[Add Objects by Designation to an Observing List](#)
[Enter Your Telescope Information](#)
[Enter Your Binocular Information](#)
[Change the Date/Night for the Current Observing List](#)
[Change the Observing Location for the Current Observing List](#)
[Change the Observer for the Current Observing List](#)
[Print an Observing List](#)
[Copy an Observing List to the Clipboard](#)
[Delete an Observing List](#)
[Edit/View the Observing List Title/Description](#)
[Configure the List Columns](#)
[Update the Current Comets, Minor Planets and Novae Observing Lists](#)
[Copy/Move Objects from One List to Another](#)
[Delete Objects from an Observing List](#)
[Sort the Observing List](#)
[Limit the Visibility of Objects in the List to a Set Time Period](#)
[See Object Information for an Object from the Observing List](#)
[Create a Log Entry for an Object from the Observing List](#)
[Create Multiple Log Entries for an Object from the Observing List](#)
[Get an Online DSS image for an Object from the Observing List](#)
[View a Chart for an Object from the Observing List](#)
[View a Chart for Multiple Entries in an Observing List](#)
[Print a Chart for an Object from the Observing List](#)
[Print Multiple Charts from an Observing List](#)
[View/Print a Chart from the NightBar](#)

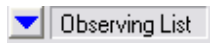
-o-

Create a New Observing List

 **Observing List** Click the Observing List menu on the Nightly Planner or Real Time tabs.
 Select *Create New ObservingList*.

-o-

Create an Observing List from a File



Click the Observing List menu on the Nightly Planner or Real Time tabs.
Select *Read Objects From File*

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Add Objects by Designation to an Observing List

From the SkyTools main window select the Nightly Planner tab. Click on the Designation Search button on the tool bar.

Open the pull-down under the Observing List heading and select the list you wish to add an object to.

The easiest way to find an object in the database is to type one of its designations into the Quick Search field and press enter.

Alternately, you may browse a database by selecting a class of object from the Reference Database pull-down, followed by a catalog under the Catalog pull down. Objects from that catalog will appear in the list to the right. For very large databases only a subset of objects will be displayed in the list. To see the next set, click on the down arrow (next to the Clr button) or press the Page Down key. To see the previous set, click on the up arrow or press the Page Up key. When you see the object you are looking for click on it to select it.

Once the object has been selected, click on the Add to List button. This will add the object to your observing list.

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Add Objects by Database Filter to Observing List

From the SkyTools planning window select the Nightly Planner tab. Click on the Database Power Search button on the tool bar.

Open the pull-down under the Destination Observing List heading and select the list you wish to add objects to.

Once a search is completed a list of matching objects will appear. Select one or more of these objects from the list and click Add to List to add them to your observing list.

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Enter Your Telescope Information

From the SkyTools planning window click on the telescope icon on the tool bar. This will start the Add/Modify Telescopes dialog. Click on the New button. Look for a preset telescope that closely matches your own. If you find a scope close to your own select it and click OK. Otherwise, select *Enter Manually* from the list and click OK. Edit the description and data for your scope as you wish.

See the Help button on the dialog for details.

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Enter Your Binocular Information

From the SkyTools planning window click on the binocular icon on the tool bar. This will start the Add/Modify Binoculars dialog. Click on the New button. Enter the data for your binoculars.

See the Help button on the dialog for details.

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Change the Date/Night for the Current Observing List

At the top of the Nightly Planner window you will see the current location in hypertext. Click on it. The Date of Local Evening dialog will start. Select the *Night* you wish to plan for. Note that SkyTools uses the local date of the evening to refer to the entire night so that the date will not change in the middle of an observing session. E.g. if the *Night* is set to August 12, this will refer not only to the evening of the 12th but the morning of the 13th as well.

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Change the Observing Location for the Current Observing List

At the top of the SkyTools planning window you will see the current location in hypertext. Click on it. To add your location to the Favorite Locations List in the Observing Sites dialog click on the Add button.

See the Help button on the dialog for details.


-0-

Change the Observer for the Current Observing List

From the Nightly Planner window click on the blue hypertext that says *Default Observer*. This will start the Observer Dialog. Click *Add*. Enter your name in box on the top right. If you know your dilated pupil diameter enter it. Otherwise enter your approximate age and click *Compute*. Your approximate dilated pupil diameter will be computed for the age you entered. Next select your experience level (this is an important factor in determining how faint you can see). Click *Ok* when finished.

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Print an Observing List

Open the Nightly Planner or Real Time tool. Click the  Observing List menu. A pop-up menu will appear. Choose Print/Copy from the menu. The Print/Copy Observing List dialog will appear.


Select a printer, paper orientation, margins and base font.

Choose the columns you wish to printed.

Click Print.

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Copy an Observing List to the Clipboard

Open the Nightly Planner or Real Time tool. Click the  Observing List menu. The Print/Copy Observing List dialog will appear.

Ignore the printer, paper orientation, margins and base font selections as they do not apply to the Copy operation.

Choose the columns you wish to appear.

Click Copy.

Start any text editor or spreadsheet and Paste the observing list into it. Many programs accept tabular data in the tab-delimited format that SkyTools uses. For instance, in *Word* select the observing list and choose Table Insert.

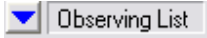
-0-

Delete an Observing List

Click the  menu. A pop-up menu will appear. Choose Delete from the menu.


-0-

Edit/View the Observing List Title/Description

Click the  menu. A pop-up menu will appear. Choose Edit Title/Description from the menu.

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Configure the List Columns

Click the  Observing List menu. A pop-up menu will appear. Choose Configure Columns from the menu. The Select Column Scheme dialog will appear.

See the Help button on the dialog for details.

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Update the Current Comets, Minor Planets and Novae Observing Lists


SkyTools ships with three special observing lists: *current comets*, *current minor planets*, and *current novae*. The contents of these lists are always changing as new discoveries are made.

The *Current Comets* list contains all of the comets currently brighter than 15th magnitude.

The *Current Minor Planets* list contains interesting minor planets. These are usually near-earth flyby's, where a minor planet can move very quickly. These minor planets are interesting to watch because they move appreciably as you watch them in the eyepiece.

The *Current Novae* list contains the currently bright Novae and Supernovae.

We maintain updated copies of these lists at our web site for download. If connected to the Internet, SkyTools can automatically download and update these lists.

To update the lists click the  Observing List menu.. A pop-up menu will appear. Choose Update "Current" Lists from Web from the menu.

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Copy/Move Objects from One List to Another

To copy or move a single object, right-click on the object you wish to copy/move in the observing list. Select Copy To... to copy it to another list or Move To... to move it there.

To copy or move multiple objects: click in the check-mark column to select (or "check") the entries you wish to copy or move.

Right-click in the check-mark column. Select Copy Checked To... to copy all checked objects to another observing list. Select Move Checked To... to move all checked objects.

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Delete Objects from an Observing List

To delete a single object, right-click on the object you wish to delete in the observing list. Select Delete.

To delete multiple objects: click in the check-mark column to select (or "check") the entries you wish to delete.

Right-click in the check-mark column. Select Delete Checked to delete all checked objects from the observing list.

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Sort the Observing List

Click on any of the observing list header buttons to sort the list: clicking on the designation column will sort in designation order, clicking on the magnitude column will sort in magnitude order, etc. Perhaps the most useful sort is by *optimum observing time* - this will sort the objects in the order you may wish to observe them in. Some modes have an optimum sort selection as well. Enabling this option will automatically sort the list in optimum order.

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Limit the Visibility of Objects in the List to a Set Time Period

There are two vertical red lines on the NightBar, usually found at the far ends. These lines determine a time period within which the observing list filters must be met. This can be useful if you are going to bed at a particular time, or plan to get up at 4:00 AM to start your observing: the observing list can be narrowed to only those objects appropriate to your time frame.

There are two times which delimit the time period: *After* and *Before*. Only those objects that meet the filter criteria between these two times will be listed in the observing list.

To Set the *After* time, place the mouse cursor over the leftmost vertical red line on the NightBar. The cursor will change to a left-right arrow. Left-click the mouse. Holding the button down, drag the vertical red line across the NightBar. Note that the *After* time will change as you drag (look under the *Filters* heading where it says *From (after time) to (before time)*.)

Drag the *Before* time line in a similar manner.

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See Object Information for an Object from the Observing List

Right-click in the observing list on the object you wish to see the information for. Select Object Info from the pop-up menu.

You may also simply double-click on the object in the list.

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Create a Log Entry for an Object from the Observing List

Right-click on an object in the observing list and select *Create Quick Log Entry*. A new log entry will be created according to your *new log default settings* and with default values taken from the entry in the observing list, including the observing location, date, and time. You will be prompted for any unknown items (such as the instrument used) that are set to *Ask* in your *new log default settings*.

The Observing Log dialog will open. Type in a description of the observing conditions, and a description of the object.

Click OK.

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Create Multiple Log Entries for an Object from the Observing List

Right-click in the observing list on the object you wish to create a log entry for. Select **Create Multiple Log Entries** from the pop-up menu.

The New Log Defaults dialog will start. This dialog can be used to enter one or more logs and is where the default selections are set. If all entries are set to *Ask*, you will be prompted for the information that defines your log entry. If the answer is always going to be the same, click on *Ask* to change the corresponding default to any value you select. Click *Save Defaults* to save the defaults you have entered for the next time a log entry is created.

Click **Create Log Entry**.

A new log entry will be created according to your *new log default settings* and with default values taken from the entry in the observing list, including the observing location, date, and time. You will be prompted for any unknown items (such as the instrument used) that are set to *Ask* in your *new log default settings*.

Now you should be looking at the Observation Log dialog. Type in a description of the observing conditions and a description of the object.

Click **OK**.

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Get an Online DSS image for an Object from the Observing List

SkyTools can download DSS (Digital Sky Survey) images if your computer is connected to the Internet. These images can be plotted in the chart background, or simply viewed. This can be essential for finding faint, wispy objects where knowing the exact size and location of the nebulosity can make the difference between success and failure.

Right-click on the observing list on the object you wish to download a DSS image for. Select Get DSS Image from the pop-up menu.

The Get Digital Sky Survey Image dialog will start. The target information will already be filled-in. Choose a survey and enter a field size.

See the Help button on the dialog for details.

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View a Chart for an Object from the Observing List

The easiest way to view a chart is to right click on a selection in the observing list. From the popup menu choose one of View Interactive Atlas, View Overhead Sky, View Naked-Eye, or View Scope or Binocs to view a telescope simulation chart.

The target object and observing location will be taken from the planning window.

The date and time will be taken from the optimum viewing time for objects listed in the observing list, unless there is no optimum time for the object on that night. In this case midnight is used.

To display the last chart viewed, click on the *Interactive Charts* icon on the tool bar at the top of the SkyTools planning window.

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View a Chart for Multiple Entries in an Observing List

This function can be useful for displaying a set of target objects on a single chart. Displaying the night's targets on an overhead sky chart can be of particular use.

Begin by selecting the target objects you wish to appear on your chart by clicking in the check-mark column to "check" the objects you want.

Right-click in the check-mark column of the observing list. Choose one of the View ... for all Checked Entries selections. The observing location for the chart will be taken from the planning window.

The primary target will be the first checked object in the list. The chart date and time will be taken from the optimum viewing time for this object, unless there is no optimum time for the object on that night. In this case midnight is used.

Each of the target objects will appear as a Target on the chart. Targets are delineated with a set of target cross hairs and labeled with the object's primary designation. These target cross hairs and labels are automatically enabled when multiple targets are drawn on a chart.

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Print a Chart for Multiple Entries in an Observing List

This function can be useful for displaying a set of target objects on a single chart. Printing the night's targets on an overhead sky chart can be of particular use.

Begin by selecting the target objects you wish to appear on your chart by clicking in the check-mark column to "check" the objects you want.

Right-click in the check-mark column of the observing list. Choose **Print Chart for all Checked Entries**. The observing location for the chart will be taken from the planning window.

The primary target will be the first checked object in the list. The chart date and time will be taken from the optimum viewing time for this object, unless there is no optimum time for the object on that night. In this case midnight is used.

Each of the target objects will appear as a target on the chart. Targets are delineated with a set of target cross hairs and labeled with the object's primary designation. These target cross hairs and labels are automatically enabled when multiple targets are drawn on a chart.

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Print a Chart for an Object from the Observing List

To print a chart right click on a selection in the observing list. From the popup menu choose Print Chart. The target object and observing location will be taken from the planning window.

The date and time will be taken from the optimum viewing time for objects listed in the observing list, unless there is no optimum time for the object on that night. In this case midnight is used.

The Print Chart dialog will appear. Choose the chart type, enter a title, and select the printer, orientation, margins and a base font for the information area.

Choose what information you wish printed (if any).

Click Print.

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Print Multiple Charts from an Observing List

Begin by selecting the objects you wish to make charts for by clicking in the check-mark column to "check" the objects you wish to print charts for.

To print charts, right click in the check-mark column of the observing list. Choose **Print Chart for Each Checked Entry**. The target object and observing location for each chart will be taken from the planning window.

The date and time will be taken from the optimum viewing time for objects listed in the observing list, unless there is no optimum time for the object on that night. In this case midnight is used.

The Print Chart dialog will appear. Choose the chart type, enter a title, and select the printer, orientation, margins and a base font for the information area.

Choose what information you wish printed (if any).

Click **Print**.

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View/Print a Chart from the NightBar

You can view an overhead sky or eyepiece chart directly from the NightBar by right-clicking on it. The place you click will determine the time used for the chart. This can be useful for a variety of reasons. For example, sometimes you may want to see what the sky will look like at sunset without bothering to select a target object for a chart.

Right-click at any point on the NightBar to see this popup menu:



The time of the chart will be taken from the point on the NightBar where you clicked. Select the type of chart to display; either the Overhead Sky, or Naked Eye chart. For the Naked Eye chart, select the viewing direction from the fly up menu. In the case above, a Naked Eye Chart will be drawn looking out to the southeast.

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Charts

[Set the Time](#)
[Set the Date](#)
[Set the target by name](#)
[Set the observing location](#)
[Zoom In/Out](#)
[Set the Field of View](#)
[Time-Step Forward/Backward](#)
[Set the Time Step](#)
[Select Real-Time Mode](#)
[Pan Up, Down, Left, and Right](#)
[Control Which Chart Elements are Displayed](#)
[Control Labels](#)
[Control the Star Sizing](#)
[Control Plottable Images](#)
[Control Coordinate Grid](#)
[Draw Motion Trails for Objects](#)
[Trace Object Motion](#)
[List Starfields Currently Visible on the Chart](#)
[Delete a Starfield](#)
[Print the Chart](#)
[Copy the Chart to the Clipboard](#)
[Change the Chart Style](#)
[Save the Chart Preferences Scheme](#)
[Apply a Chart Preferences Scheme](#)
[Customize the Colors, Styles, and Fonts](#)
[Measure Angular Distance](#)
[Download DSS Image for Cursor Location](#)
[Download a Supplemental Starfield](#)

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Set the Time

Click the hypertext time (which is separate from the date). Enter a new time. Click now to enter the current date/time. Click Ok.

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Set the Date

Click the date hypertext. Enter a new date. Click Ok.

-0-

Set the Target by Name

Click the target name hypertext in the upper left of the chart. Select a new target. Click Ok.

-0-

Set the Observing Location

Click the observing location hypertext. Select a new location. Click Ok.

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Zoom In/Out



Click the Zoom In or Zoom out buttons on the too bar.

Keyboard shortcuts:

Zoom In: Page Up

Zoom Out: Page Down

-0-

Set the Field of View



Click the Set Field of View button on the tool bar. This will start the *Set Field of View* dialog. Select a new field of view, either by using the slider, entering a value, or clicking on one of the presets. To zoom to the optimum field of view click Best.

Keyboard shortcuts:

Presets: Number keys

Best Field of View: b

Start Dialog: Ctrl-f

-0-

Time-Step Forward/Backward



Click the Time Step Back or Time Step Forward buttons on the tool bar. Each click will increment the time by the time step value (shown to the left of the time step buttons).

Keyboard shortcuts:

Time Step Forward: + or =

Time Step Backward: -

-0-

Set the Time Step



Enter a number and select the proper time units for it.

Keyboard shortcuts:

None

-0-

Select Real-Time Mode



Click the Real Time button on the tool bar. When depressed, the chart will keep the current time. Click again to disable.

Keyboard shortcuts:

Toggle real time mode: r

-0-

Pan Up, Down, Left, and Right

Use the arrow keys on the keyboard.

-0-

Control Which Chart Elements are Displayed



Click the View Controls button on the tool bar. This will start the View Controls Dialog. Select the *General Properties* tab to enable/disable various elements. Select the *Labels* tab to enable/disable various labels.

Keyboard shortcuts:

Start Dialog: Ctrl-v

-0-

Control Labels



Click the View Controls button on the tool bar. This will start the *View Controls* Dialog. Select the *Labels* tab to enable/disable various labels.

Keyboard shortcuts:

Start Dialog: Ctrl-v

Toggle all labels on/off: l

Toggle target cross hairs and labels on/off: t

Toggle star labels on/off: s

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Control the Star Sizing



Click the Preferences button on the tool bar. This will start the Chart Preferences Dialog. Select the Stars tab. Use the sliders under the *Star Sizing and Color* property to alter the appearance of the stars (within the current basic star style).

The Min Size slider controls the smallest star dot.

The Size slider controls how fast stars grow in size and ultimately how large they will become. The exact nature of this property depends on the type of star style being used (See the Chart Properties dialog).

The Saturation slider controls the color saturation for stars using the natural star color style. It has no effect for the other star styles.

The growth of stars of the Classic or Modern styles can be controlled via the Star Dots property. Choose Linear to grow the stars slowly, in a linear fashion, or Logarithmic to grow more quickly.

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Control Plottable Images



Click the View Controls button on the tool bar. This will start the *View Controls* Dialog.

Under the *Plottable Images* property choose how you wish images to be displayed in the chart background.

Images can be displayed as outlines or with the actual image data drawn in. Selecting Plot according to individual selection will draw image data according to the setting saved with the parameters for each image.

Keyboard shortcuts:

Start Dialog: Ctrl-v

Toggle Images On/Off: i

-0-

Control Coordinate Grid



Click the View Controls button on the tool bar. This will start the *View Controls* Dialog.

Under the *Coordinate Grid* property select the type of grid to display, how finely to draw the grid, and whether or not to draw the grid as lines or as crosses at intersections.

Note that the grid labels are enabled/disabled under the *Labels* tab.

Keyboard shortcuts:

Start Dialog: Ctrl-v

Equatorial Grid: F5

Horizon Grid: F6

Ecliptical Grid: F7

Grids Off: F8

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Draw Motion Trails for Objects



Click the Motion Trails button on the tool bar. This will start the *Motion Trails* Dialog.

Under the *Trail* property choose the object(s) that you wish to trail. Note that some of these options may not be available depending on the chart target object.

Under the *Total Time Span* property enter the amount of time you wish the trail to cover. Click the hypertext units to the right until the appropriate time units are selected.

Click OK.

This tab allows you to auto-select visual comparison stars according to several criteria. See the help button on the dialog for more information.

Keyboard shortcuts:

Start Dialog: Ctrl-t

-o-

Trace Object Motion



Click the Motion Trace button on the tool bar. This will start the *Trace Solar System Objects* Dialog.

Under the *What to Trace* property select All Solar System Objects to trace all moving objects.

To trace a specific object select the second radio button. Click on the hypertext to the right (*Nothing* indicates that no object has been selected) and select an object to trace via the *Object Requestor* Dialog.

Enter the number of trace positions you wish to generate.

Enter a trace *Interval*/value (how often you wish to plot the object) and click on the hypertext to the right until the proper units are selected.

Click Generate then Ok.

Keyboard shortcuts:

Start Dialog: Ctrl-a

-o-

List Starfields Currently Visible on the Chart



Click the Starfields button on the tool bar. This will start the *Starfields Currently Displayed* Dialog.

This dialog lists all of the supplemental starfields that lie within the chart area, regardless of if they are invisible or turned off.

Keyboard shortcuts:

Start Dialog: Ctrl-s

-0-

Delete a Starfield



Click the Starfields button on the tool bar. This will start the *Starfields Currently Displayed* Dialog.

This dialog lists all of the supplemental starfields that lie within the chart area, regardless of if they are invisible or turned off.

To delete a starfield, select it from the list and click Delete.

Keyboard shortcuts:

Start Dialog: Ctrl-s

-0-

Print the Chart



Click the Print Chart button on the tool bar. This will start the *Print Chart* Dialog.

Select a chart type (the current chart is the default), enter a title, select a printer, paper orientation, margins, and base font for the information elements. Choose the additional information you wish to be printed along with the chart (if any).

Click Print.

Keyboard shortcuts:

Start Dialog: Ctrl-p

-0-

Copy the Chart to the Clipboard



Click the Copy button on the tool bar. This will start the *Copy to Clipboard* Dialog.

Enter the dimensions of the chart you wish to create. A bitmap image of the chart with these dimensions will be created and placed in the clipboard.

Click Copy.

Open any image editing software. Start a new blank image and Paste the chart into it.

Keyboard shortcuts:

Start Dialog: Ctrl-c

-0-

Change the Chart Style



Click the Preferences button on the tool bar. This will start the *Chart Preferences* dialog.

Select the *Basic Style* tab.

Select a basic style under the *Basic Style* property.

Note that the current Scheme changes to *Not yet named or saved* when you make any changes. To save your new chart preferences as a scheme that can be used in other charts, click Save As... and enter a title for your new scheme

Click Close.

-0-

Save the Chart Preferences Scheme



Click the Preferences button on the tool bar. This will start the *Chart Preferences* dialog.

Type a name for the new chart scheme and click Save.

Click Close.

-0-

Apply a Chart Preferences Scheme



Click the Preferences button on the tool bar. This will start the *Chart Preferences* dialog.

To apply a chart preferences scheme select one from the *Scheme* list and click Open.

Click Close.

-0-

Customize the Colors, Styles, and Fonts



Click the Preferences button on the tool bar. This will start the *Chart Preferences* dialog.

-0-

Measure Angular Distance

Right-click the mouse with the cursor over the location where you would like to measure from. Select *Angular measure* from the popup menu.

The cursor is normally a green cross when not over an object. As you move it about the window the RA and Dec of the cursor is displayed in the bottom left of the chart window.

When the cursor passes over an object it turns to a blue circle. The name of the object under the cursor appears in the bottom left of the chart window.

If you start your measurement with the cursor over an object your measurement will start from the position of that object (regardless of the exact position of the little circle drawn on the chart). Otherwise, your measurement will be made from the position of the center of the cursor when you right-clicked.

As you move the cursor around the chart the angular distance between the original point and the point under the cursor is displayed in the bottom of the chart window (along with the position angle in degrees, measured from the original position).

As before, if you place the cursor over an object the position of the object will be used in the measurement.

Keyboard shortcut:

Alt-a

-o-

Download DSS Image for Cursor Location

You must be connected to the Internet to use the function because the Digital Sky images are downloaded from the web.

Right-click the mouse with the cursor over the location where you would like to obtain an image. Select *Get DSS image* from the popup menu. This will start the *Get Image* dialog.

If the cursor was over an object, the image will be created with this object at the center. Otherwise, the image will be created at the position of the cursor.

Select a survey and enter the size of the image in arc minutes.

Click Get Image.

Once the image has successfully downloaded it will appear in the chart at the location you requested. If it does not appear, click on the View Controls button on the tool bar, select the correct Plottable Images group and set the Plottable Images to be displayed in the chart views.

Keyboard shortcut:

Alt-d

-o-

Download a Supplemental Starfield

You must be connected to the Internet to use the function because the Starfield data are downloaded from the web.

Right-click the mouse on the chart and select *Get Starfield* from the popup menu. This will start the *Get Starfield* dialog. The stars in the starfield will be downloaded in a circular radius about the chart center.

Select a data source and enter the radius of the starfield circle in arc minutes.

Click Download.

Once the download has successfully completed the stars will appear in the chart (note that they tend to be very faint, often starting at 15th magnitude). If the stars do not appear, click on the View Controls button on the tool bar, and select the *General Properties* tab. Check the box next to *Supplemental Star Fields* under the *Display in View property*.

Keyboard shortcut:

Alt-s

-o-

Visual Simulation Charts

Telescope Charts

Switch View Window Positions

Click with the left mouse button in one of the views. Holding the left mouse button down, drag to another view and release the mouse button. This will switch the positions of the two views: the first will be placed at the location of the second, and the second will be placed at the former location of the first.

-0-

Customize the View Window Sizes

Place the mouse cursor over one of the borders between chart views. The cursor will change to a little set of arrows. Left-click the mouse and hold the button down. Drag the border to the appropriate new location and release the mouse button.

-0-

Turn View Windows On/Off



To turn the naked-eye view on/off find the Naked Eye View on/off button on the tool bar. When depressed this view is displayed. When not depressed the view is not displayed. Click the button to toggle between the on/off states.



To turn the binocular eyepiece view on/off find the Eyepiece View on/off button on the tool bar. When depressed this view is displayed. When not depressed the view is not displayed. Click the button to toggle between the on/off states.

Keyboard shortcuts:

Toggle Eyepiece view on/off: F9

Toggle Naked-Eye view on/off: F11

Turn all views on: F12

-0-

Change Eyepieces

Click on the eyepiece hypertext in the chart tool bar and select another eyepiece from the menu.

-0-

Select Best Resolution Eyepiece View

Click on the eyepiece hypertext in the chart tool bar and select Best Resolution from the menu.

-0-

Set the Orientation of the Eyepiece View

This view can be oriented with respect to the horizon (placing the *Zenith* up or down) or with respect to the equatorial coordinate system (placing *North* up or down).

Click in the eyepiece view to select it. Click on the *View Controls* button on the tool bar. Select the *Eyepiece View Properties* tab. Under *Initial Eyepiece View Properties* select *Equatorial* to orient with respect to the equatorial grid, or *Horizon* to orient with respect to the horizon.

-0-

Auto-Select Visual Comparison Stars



Click the View Controls button on the tool bar. This will start the *View Controls* Dialog. Select the *Comparison Stars* tab.

This tab allows you to auto-select visual comparison stars according to several criteria. See the help button on the dialog for more information.

Keyboard shortcuts:

Start Dialog: Ctrl-v

-0-

Interactive Atlas

Flip the Chart Vertically



Click the Flip Vertical button on the tool bar. Click again to reset.

Keyboard shortcut:

Delete

-0-

Mirror the Chart Horizontally



Click the Flip Horizontal button on the tool bar. Click again to reset.

Keyboard shortcut:

End

-0-

Increase/Decrease the Magnitude Limit



Click the Brighter or Fainter button on the tool bar. Doing so applies an offset to the stellar magnitude limit (which is computed as a function of the field of view). This offset remains in effect until reset (even if the chart and SkyTools are exited). To reset the offset use the Magnitude Limits Preferences tool bar button.

Keyboard shortcuts:

Brighter: <

Fainter: >

Reset: /

-0-

Set the Magnitude Limits by Object Type



Click the Magnitude Limits Preferences button on the tool bar. This dialog gives you a great deal of control over magnitude limits for many types of objects, both in terms of absolute values or relative offsets. See the help on that dialog for more information.

Keyboard shortcuts:

Start Dialog: Ctrl-m

-0-

Display Information For an On-Screen Object

When the cursor passes over an object it turns to a blue circle. The name of the object under the cursor appears in the bottom left of the chart window. To see the *Object Information* for this object double-click the mouse.

You can also right-click on the object and choose Info from the popup menu.

Keyboard shortcut:

Insert

-0-

Center the View at the Cursor Position

Right-click the mouse with the cursor over the location that you would like to place at the center of the view. Select *Center View at this position* from the popup menu.

The cursor is normally a green cross when not over an object. As you move it about the window the RA and Dec of the cursor is displayed in the bottom left of the chart window.

When the cursor passes over an object it turns to a blue circle. The name of the object under the cursor appears in the bottom left of the chart window.

If you center the chart with the cursor over an object, this object will become the new chart target. Otherwise, the chart target will be a position in the sky (the RA and Dec will appear instead of an object designation for the chart target).

Keyboard shortcut:

Home

-0-

Open the Context Viewer

Right-click the mouse with the cursor over the location where you would like to place a field of view circle. Select *Add FOV circle* from the popup menu.

Enter the diameter of the circle in minutes of arc (e.g. 60' arc minutes is one degree)

Keyboard shortcut:

None

-0-

Current Events Tool

[Print the Event List](#)
[View the Events in a Calendar](#)
[Delete Unwanted Events from the List](#)
[Add Objects to the Appulses/Transits/Occultations List](#)
[View/Print a Chart for a Particular Circumstance of an Event](#)
[View/Print a Chart for an Event](#)
[Print/Copy a Single Event](#)
[Sort the Circumstances of an Event](#)
[View the Circumstances of an Event](#)
[View Today's Events](#)
[Copy the Event List to the Clipboard](#)
[Choose When Events are to be Automatically Deleted](#)
[Create a Current Events List](#)

-0-

Print the Event List

Click the *Events* Hypertext Menu. Select *Print*. Choose a printer, paper orientation, margins and select a base font.

Click Print.

-0-

View the Events in a Calendar

Click the *Event Calendar* tool button on the tool bar. This button appears when the *Observing Lists* or *Current Events* tabs are selected. Note that only the Current Events (not the Special Events) are listed on the Calendar.

-0-

Delete Unwanted Events from the List

To delete a particular event select it from the event list (upper left) by left-clicking on it. The event will be highlighted. Right click on the selection to bring up the popup menu. Choose Delete Entry.

Choosing *Delete Similar* will delete all events of the same type as the event selected. For instance, if you selected a solar eclipse, all solar eclipses will be deleted from the list. This can be useful for deleting unwanted events that occur often, cluttering up the list.

Choosing *All Events* from the popup will clear the event list (in the same way as clicking the Clear button).

-0-

Add Objects to the Appulses/Transits/Occultations List

Click the Add button. Use the Object Requestor to find the object you wish to add to the list. Once the object has been selected click Ok.

-0-

View/Print a Chart for a Particular Circumstance of an Event

Select the event from the event list (upper left) by left-clicking on it. The event will be highlighted. The circumstances for the event will appear in the circumstance list (bottom). Select a circumstance from the circumstance list. The circumstance will be highlighted. Right-click on the selected circumstance to bring up the popup menu. Select Print or one of the charts to View...

The chart will be drawn at the time of the event circumstance, targeted at the primary object involved with the event.

-0-

View/Print a Chart for an Event

Select the event from the event list (upper left) by left-clicking on it. The event will be highlighted. Right click on the selection to bring up the popup menu. Select Print or one of the charts to View...

Many of the events with more than one circumstance will be drawn with object trails/traces automatically generated to show the entire event. For instance, a solar eclipse will draw the moon at first contact, mid-eclipse, and last contact.

-0-

Print/Copy a Single Event

Select the event from the event list (upper left) by left-clicking on it. The event will be highlighted. Right click on the selection to bring up the popup menu. Select Print or Copy.

If Print is chosen then select a printer, paper orientation, margins and base font. Click Print.

-0-

Sort the Circumstances of an Event

The circumstance list is the bottom window. First select an event from the event list (left window). The circumstances will be displayed in the circumstance window. If there is more than circumstance the list can be sorted by clicking on one of the column header buttons. For instance, clicking on the *Local Date/Time* button will sort the list in time order.

-0-

View the Circumstances of an Event

Select an event from the even list (upper left) by left-clicking on it. The event will be highlighted. The circumstances for the event will appear in the circumstance list (bottom).

In addition to the actual time of the event, many events have more than one circumstance. For instance, a solar eclipse breaks down into many circumstances: first contact, second contact, mid-eclipse, etc.

-0-

View Today's Events

Click the *Nightly Events Planner* tool button on the tool bar. This button appears when the *Observing Lists* or *Current Events* tabs are selected. Note that only the Current Events (not the Special Events) are listed.

-0-

Clear the Event List

Click the Clear button to empty and completely reset the event List.

-0-

Copy the Event List to the Clipboard

Click the *Events* Hypertext Menu. Select *Copy*.

Start any text editor or spreadsheet and Paste the observing list into it. Many programs accept tabular data in the tab-delimited format that SkyTools uses. For instance, in *Word* select the observing list and choose Table Insert.

-0-

Choose When Events are to be Automatically Deleted

Click Options. Select the appropriate radio button.

Click OK.

-0-

Create a Current Events List

Configure the events you wish to list under the *Events to Include* property. Add objects that you wish to include to the *Appulses/Transits/Occultations* property. All appulses, transits, and occultations between the objects in this list will be reported.

Click Options and enter the number of months ahead you wish to search for events.

Click Update Now.

-0-

Special Events Tool

[Create a Special Events List](#)

-0-

Create a Special Events List

Select the appropriate tab for the type of events you would like to search for.

The *General* tab searches for planetary conjunctions, oppositions, maximum elongations, Lunar phases, and meteor showers.

The *Two Bodies* tab searches for events between two bodies, such as eclipses, appulses, transits, and occultations.

The *Satellite Elongation* tab searches for the times when planetary satellites are at their greatest distances from the parent planet, often marking your best chance to observe them.

The *Satellite Events* tab searches for transits, eclipses, shadow transits, and occultations for the four major moons of Jupiter.

Enter a start date for the search by clicking the hypertext and select a minimum set of visibility criteria.

Click Compute.

-0-

Ephemerides Tool

[Create a Position Ephemeris](#)
[Create a Nightly Optimal Viewing Ephemeris](#)
[Create a Binary Star Orbit Ephemeris](#)
[Print an Ephemeris](#)
[Copy an Ephemeris to the Clipboard](#)
[View/Print a Chart for an Ephemeris Entry](#)
[Sort the Ephemeris](#)
[View/Print a Chart for the Entire Ephemeris](#)
[Create a Log Entry for an Ephemeris Entry](#)

-0-

Create a Position Ephemeris

Select Position as the *Ephemeris Type*.

Select a starting date by clicking on the hypertext under the *Starting at* property.

Select an object (preferably one that moves!) by clicking on the hypertext under the *Object to Compute Ephemeris for* property.

Select a location by clicking on the hypertext under the *Observing Location* property. The ephemeris may be generated for a particular location on Earth, or more generally, for the center of the Earth (*Geocentric*).

Enter a number under the *Over a period of* property to signify how far into the future the ephemeris should be computed for. Click on the hypertext units to the right until the correct units are found.

Enter a number under the *At Intervals of* property to signify how often positions are to be reported. Click on the hypertext units to the right until the correct units are found.

Select a minimum set of visibility criteria.

Click Compute.

-0-

Create a Nightly Optimal Viewing Ephemeris

Select Nightly Optimal Viewing as the *Ephemeris Type*.

Select a starting date by clicking on the hypertext under the *Starting at* property.

Select an object (preferably one that moves!) by clicking on the hypertext under the *Object to Compute Ephemeris for* property.

Select a location by clicking on the hypertext under the *Observing Location* property.

Enter a number under the *Over a period of* property to signify how far into the future the ephemeris should be computed for. Click on the hypertext units to the right until the correct units are found.

Select a minimum set of visibility criteria.

Click Compute.

-0-

Create a Binary Star Orbit Ephemeris

Select Binary Star Orbit as the *Ephemeris Type*.

Select a starting date by clicking on the hypertext under the *Starting at* property.

Select an object by clicking on the hypertext under the *Object to Compute Ephemeris for* property. *This object must be a long-period binary star.*

Select a location by clicking on the hypertext under the *Observing Location* property. The ephemeris may be generated for a particular location on Earth, or more generally, for the center of the Earth (*Geocentric*).

Enter a number under the *Over a period of* property to signify how far into the future the ephemeris should be computed for. Click on the hypertext units to the right until the correct units are found.

Enter a number under the *At Intervals of* property to signify how often positions are to be reported. Click on the hypertext units to the right until the correct units are found.

Select a minimum set of visibility criteria.

Click Compute.

-0-

Print an Ephemeris

First generate an ephemeris. Click the *Ephemeris* Hypertext menu and select Print.

Choose a printer, paper orientation, margins, and base font.

Click Print.

-0-

Copy an Ephemeris to the Clipboard

First generate an ephemeris. Click the *Ephemeris* Hypertext menu and select Copy.

Start any text editor or spreadsheet and Paste the observing list into it. Many programs accept tabular data in the tab-delimited format that SkyTools uses. For instance, in *Word* select the observing list and choose Table Insert.

-0-

View/Print a Chart for an Ephemeris Entry

First generate an ephemeris. Right-click on an entry in the ephemeris to bring up the popup menu. Select Print Chart or select a chart type to View...

A chart will be created displaying the ephemeris object at the date/time selected.

-0-

Sort the Ephemeris

First generate an ephemeris. Click on a column header button to sort by the column selected. For instance, clicking on the Local Date/Time column heading will sort the ephemeris by date and time (the default). It can be very useful to sort by other columns such as magnitude or visibility.

-0-

View/Print a Chart for the Entire Ephemeris

First generate an ephemeris. Click the *Ephemeris* Hypertext menu and select Print Chart or select a chart type to View...

For a *Position ephemeris* an object trail will be automatically generated for the duration of the ephemeris.

For an *Optimum Daily Observing ephemeris* a set of trace positions will be generated, marking the location of the object at each daily optimum time. These can very useful for comets on a Naked-Eye chart, marking the position to observe the comet each night.

For a *Binary Star ephemeris* an orbit trail will be automatically generated for the duration of the ephemeris.

-0-

Create a Log Entry for an Ephemeris Entry

First generate an ephemeris. Right-click on an entry in the ephemeris to bring up the popup menu. Select Create Log Entry. A log entry will be created for the ephemeris object at the time selected, applying your *new log defaults* settings. You will be prompted for any values that have no default (such as an observing instrument).

-o-

Managing Data

[Create a New Log Entry](#)
[Create Multiple Log Entries](#)
[Browse Log Entries](#)
[Print/Copy Log Entries](#)
[Associate Notes with an Object](#)
[Associate Images with an Object](#)
[Associate Web Links with an Object](#)
[Get an Online DSS image for an Object](#)
[Backup Your User Data](#)
[Restore Your User Data](#)
[Change How Often you are Prompted for Backup](#)
[Import an Observing List, Object Notes, Images, Links etc.](#)
[Share Observing Logs](#)
[Share Object Notes](#)
[Share Images](#)
[Import/Share Web Links](#)
[Import Chart Preference Scheme](#)
[Share Chart Preference Scheme](#)
[Make an Image Plottable on a Chart Background](#)
[View an Image Associated with an Object](#)
[View a Web Link Associated with an Object](#)
[Importing Log Entries](#)
[Print/Copy Log Entries](#)

-0-

Create a New Log Entry

You can create a new log entry at any point in the program where you have access to an object. This includes objects in observing lists, event lists, the *Object Information* window, and objects displayed on charts. The *Object Information* window is often used as a path to creating a log entry. When creating a log entry every effort is made to use the data at hand. For instance, if you create a log entry from an object in an observing list the observing location, date/time, and observer will be taken from the current settings for the list.

There are typically two ways to create a new log entry, often indicated as *Create New Log Entry* or *Create Multiple Log Entries*.

To create Multiple log entries start the *New Log Defaults* dialog.



This dialog allows you to set default values for things like the instrument used, the observer, the observing conditions, etc. This makes creating multiple log entries, perhaps all for the same night, a quick simple process and avoids entering the same information over and over again. Using this dialog a set of general defaults can also be saved for later use. These defaults are applied when you create a log entry without using the *New Log Defaults* dialog.

A single log entry is created using the current defaults set from the *New Log Defaults* dialog (see above). When you create a log entry you will be prompted to enter certain things, such as the object, and defaults will be inserted for others (such as the observer).

-0-

Create Multiple Log Entries

You can create a new log entry at any point in the program where you have access to an object. This includes objects in observing lists, event lists, the *Object Information* window, and objects displayed on charts. The *Object Information* window is often used as a path to creating a log entry. When creating a log entry every effort is made to use the data at hand. For instance, if you create a log entry from an object in an observing list the observing location, date/time, and observer will be taken from the current settings for the list.

There are typically two ways to create a new log entry, often indicated as *Create New Log Entry* or *Create Multiple Log Entries*.

Multiple log entries start the *New Log Defaults* dialog.



This dialog allows you to set default values for things like the instrument used, the observer, the observing conditions, etc. This makes creating multiple log entries, perhaps all for the same night, a quick simple process and avoids entering the same information over and over again.

Customize the dialog by entering the observing conditions (assuming all log entries you enter will be for the same night) and setting all constants (such as the observer). Any things that will change from one log entry to the next (such as the object) should be set to *Ask*. Click on the hypertext to change each item.

To create a log entry click **Create Log Entry**.

You will be prompted for the information not already provided (those set to *Ask*) and then the Log Dialog will start. Enter your observation description.

The New Log Defaults Dialog will remain open. When you wish to create another entry click the **Create Log Entry** button again.

-0-

Browse Log Entries



Click the Log Book icon on the main planning window tool bar. This will start the Log Browser. See the help button on this dialog for more information.

-0-

Search Log Entries



Click the Log Book icon on the main planning window tool bar. This will start the Log Browser. Select the *Search* tab. See the help button on this dialog for more information.

-o-

Associate Notes with an Object

Open the *Object Information* window for the object. This window can be accessed throughout the program. For instance, you can double-click on an object in an observing list to see it.



You can also click on the *Designation Search* button on the main planning window tool bar. Select any object and click More Object Information.

Once you have the *Object Information* window displayed select the *Notes* tab. Type in a headline and descriptive notes for this object. If notes already exist, simply append new ones. You can paste text into this window by right-clicking in the window at the position you wish to paste text and selecting Paste.

-0-

Associate Images with an Object

Open the *Object Information* window for the object. This window can be accessed throughout the program. For instance, you can double-click on an object in an observing list to see it.



You can also click on the *Designation Search* button on the main planning window tool bar. Select any object and click More Object Information.

Once you have the *Object Information* window displayed select the *Images* tab. Click the Add button. Browse to the location of the image file you wish to associate with the object. Enter a description of the image (defaults to the file name).

Click OK.

-0-

Associate Web Links with an Object

Open the *Object Information* window for the object. This window can be accessed throughout the program. For instance, you can double-click on an object in an observing list to see it.



You can also click on the *Designation Search* button on the main planning window tool bar. Select any object and click More Object Information.

Once you have the *Object Information* window displayed select the *Links* tab. Click the Add button. Type in a URL or right-click in the edit window to Paste one in--select Paste from the popup. Enter a description for the link.

Click Ok.

-0-

Get an Online DSS image for an Object

This action appears in many places in SkyTools, including the right-click menu of an object in an observing list or on a chart. Look for Get DSS Image in various popup menus.

Perhaps the most ubiquitous place to create a DSS (Digital Sky Survey) image is from the *Object Information* window for the object. This window can be accessed throughout the program. For instance, you can double-click on an object in an observing list to see it. Once you have the *Object Information* window displayed click the Action Menu. Select Get DSS Image.

Once the *Get Image* dialog is displayed click the Help button for more information regarding its use.

-0-

Backup Your User Data



Click on the Data Manager button on the main planning window tool bar. Select the *Backup* tab.

Choose the items you wish to backup and select a backup location. Note that a backup folder will be created at the backup location you select--files will not be written to the selected folder itself.

Click Backup Now.

-0-

Restore Your User Data



Click on the Data Manager button on the main planning window tool bar. Select the *Restore* tab.

Browse to the folder where you saved the backup you wish to restore. Note that each set of backup files are saved in a folder called "SkyTools Backup...". Do not browse to this folder, but the folder above it!

Click Restore.

-0-

Change How Often you are Prompted for Backup



Click on the Data Manager button on the main planning window tool bar. Select the *Backup* tab.

Select your preference under the *Prompt for Backup* property.

-0-

Import an Observing List, Object Notes, Images, Links etc.



Click on the Data Manager button on the main planning window tool bar. Select the *Import Shared Datab* tab.

SkyTools can create various export files that contain everything from observing lists to log entries.

To browse the contents of the available files located in a folder on your computer or local network select the *Local/Network Files* radio button.

Click Browse and locate the folder with export files in it. The files in this folder will be listed. Click on any item to see more information about it.

To browse the files available at our web site select the *Skyhound Web Site* radio button. Select the area to browse via the pull down menu.

-0-

Share an Observing List via a File



Click on the Data Manager button on the main planning window tool bar. Select the *Share Lists* tab.

Select an observing list group to display.

Your observing lists will be listed. Select a list for export. Choose the additional items you wish to export along with the observing list: check the box next to Logs to share log entries, or choose a notes, links, or image group to share. These items will be shared for each object in the list from the group specified.

Click Share List.

-0-

Share Observing Logs



Click the Log Book icon on the main planning window tool bar. This will start the Log Browser. Select a tab and click Share. See the help button on this dialog for more information.

-o-

Share Object Notes



Click on the Data Manager button on the main planning window tool bar. Select the *Notes* tab.

Select a notes group. The objects with associated notes will be listed. Click **Share**.

-0-

Share Images



Click on the Data Manager button on the main planning window tool bar. Select the *Images* tab.

Select a image group. The objects with associated images will be listed. ClickShare.

-0-

Share Web Links



Click on the Data Manager button on the main planning window tool bar. Select the *Web Links* tab.

Select a web links group. The objects with associated web links will be listed. ClickShare.

-0-

Import Chart Preference Scheme



Click on the Data Manager button on the main planning window tool bar. Select the *Import Shared Datab*.

SkyTools can create various shared data files for a variety of data and settings, including chart preference schemes.

To browse the contents of the available files located in a folder on your computer or local network select the *Local/Network Files* radio button.

Click Browse and locate the folder with shared files in it. The files in this folder will be listed. Click on any item to see more information about it.

Look for entries marked *Chart Scheme*.

To browse the files available at our web site select the *Skyhound Web Site* radio button. Select the area to browse via the pull down menu.

-0-

Share Chart Preference Scheme

Open a SkyTools chart. Click on the Preferences tool button to start the *Chart Preferences* dialog. Select the scheme under the *Scheme* property for export.

Click Share.

-0-

Make an Image Plottable on a Chart Background



Click on the Data Manager button on the main planning window tool bar.

For an image that has already been associated with an object:

Select the *Images* tab. Double-click on the object the image is associated with to start the *Object Information* window. Double-click on the image in the image list to bring up the *ImageView*, the SkyTools image viewer. Right-click on the image and select *Make Plottable*.

For an image that has not already been associated with an object:

Select the *Plottable Images* tab of the *Data Manager*. Click Import Image.

-0-

View Notes Associated with an Object

Open the *Object Information* window for the object. This window can be accessed throughout the program. For instance, you can double-click on an object in an observing list to see it.



You can also click on the *Designation Search* button on the main planning window tool bar. Select any object and click More Object Information.

Once you have the *Object Information* window displayed select the *Notes* tab.

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Set a Five-Star Rating for an Object

There are two ways to set a five-star rating for an object:

1. From an observing list

Ratings are assigned to a notes/rating group. Begin by selecting the notes group you wish to assign the rating to on the Nightly Planner (or Real Time tool).

If the ratings column is not displayed use the column configuration dialog to display it.

Right-click on the rating column in the observing on the line showing your object. Select the rating you want.

2. From the Object Information Window

Open the *Object Information* window for the object. This window can be accessed throughout the program. For instance, you can double-click on an object in an observing list to see it.

Select the *Notes* tab. Choose the group you want to assign the rating to. Click on the rating icon to the right of the headline; select the rating.

-o-

View an Image Associated with an Object

Open the *Object Information* window for the object. This window can be accessed throughout the program. For instance, you can double-click on an object in an observing list to see it.



You can also click on the *Designation Search* button on the main planning window tool bar. Select any object and click More Object Information.

Once you have the *Object Information* window displayed select the *Images* tab.

-0-

View a Web Link Associated with an Object

Open the *Object Information* window for the object. This window can be accessed throughout the program. For instance, you can double-click on an object in an observing list to see it.



You can also click on the *Designation Search* button on the main planning window tool bar. Select any object and click More Object Information.

Once you have the *Object Information* window displayed select the *Links* tab.

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Importing Log Entries

Use the Data Manager to import log entries (along with all other types of export files).

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Print/Copy Log Entries

Click the Print/Copy button to start the Print/Copy Observing Logs Dialog.

-0-

Imaging

[Open the Exposure Calculator](#)

[Add a camera to a telescope](#)

[Add a filter to a camera](#)

[Set up for eyepiece projection](#)

[Set up for afocal projection](#)

-0-

Open the Exposure Calculator

The exposure calculator must be opened for a specific object.

The most common way to open the exposure calculator is from an observing list displayed in the Nightly Planner or Real Time tool. Select imaging mode. Right-click on the object you wish to do your calculations for. Select *Exposure Calculator* from the menu.

Alternately select the object and press "e".

The exposure calculator will inherit the telescope, camera, location, and date selections from the planning tool.

Related Topics

[Exposure Calculator](#)

-0-

Add a camera to a telescope



Click the Add/Modify Telescopes button on the planner tool bar.

Select the telescope you wish to add a camera to.

Click the Add/Edit Cameras button.

Click the Help button on the Select Cameras to Use with Telescope dialog for more information

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Add a filter to a camera



Click the Add/Modify Telescopes button on the planner tool bar.

Select the telescope you wish to add a camera to.

Click the Add/Edit Cameras button.

Select a camera to add a filter to.

Click the Assigned Filters button.

Click the Help button on the dialog for more information

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Set up for eyepiece projection



Click the Add/Modify Telescopes button on the planner tool bar.

Select the telescope you wish to add a camera to.

Click the Add/Edit Cameras button.

Select a camera.

Check the box next to Eyepiece Projection to enable this feature.

Click the hypertext to the right.

Click the Help button on the dialog that appears for more information.

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Set up for afocal projection



Click the Add/Modify Telescopes button on the planner tool bar.

Select the telescope you wish to add a camera to.

Click the Add/Edit Cameras button.

Select a camera.

Check the box next to Afocal Projection to enable this feature.

Click the hypertext to the right.

Click the Help button on the dialog that appears for more information.

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Misc.

Reference Points

A new class of "objects" has been added to SkyTools called Reference Points. These reference points include the Celestial Poles, the Galactic Poles, Zenith, and the Galactic Center. To target one of these locations simply type the appropriate string into the Quick Search Window. You may also browse the reference points by selecting Reference Points as the catalog on the Browse tab of the .Object Requestor. In addition to the full strings many reference points can be identified by their abbreviations, which include NCP, SCP, NGC, SGP, and Z (for Zenith). Except for Zenith these abbreviations are what appear as labels on the charts. Toggle the display of these labels of via the Reference Points check box on the Labels tab of View Controls menu. Their colors/fonts are controlled via the Reference points/Directions selection of the Labels tab of the Chart Preferences dialog.

Reference points can be targeted for charts and telescopes and added to observing lists. But they have no Object Information and cannot have log entries or other data such as notes, ratings, images, and web links attached to them.

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Obstructed Horizons

An obstructed horizon defines the portion of the sky that can actually be seen from a particular observing location, taking into account structures, trees, mountains, etc.

Each location in your observing locations database can have an obstructed horizon defined for it.

The obstructed horizon is drawn onto the charts as a line with the same color and style as the perfect (or non-obstructed) horizon. Use the *View Controls* dialog to enable/disable the drawing of horizons independently for each chart view.

The obstructed horizon is used to compute the times of rising and setting for an object *if it is enabled* for the location on the Observing Sites dialog.

Obstructed rising is defined as the first time an object is visible. Obstructed setting is defined as the last time the object is visible.

The times of obstructed rising and setting are displayed in the columns of an observing list, replacing the *Rise* and *Set* times normally displayed for a perfect horizon.

Creating An Obstructed Horizon

There are three ways to input an obstructed horizon. The horizon can be drawn on an Overhead Sky or Naked Eye chart. Horizon coordinates can be read from a file, and horizon coordinates can be read from a connected telescope (Real Time necessary).

Use the [Create Obstructed Horizon dialog](#) accessed via the Observing Sites dialog for all but the drawing method.

To Draw Your Obstructed Horizon:

With this method we will trace the outline of the obstructed horizon on a SkyTools *Overhead Sky* or *Naked Eye* chart.

Step 1: Print an overhead sky chart for your observing location and for a chosen date and time. Alternately, print several Naked Eye charts that cover the entire sky.

Step 2: Go to your observing location at the appointed time (perhaps starting a few minutes early). Bring the chart you printed in Step 1 with you.

Step 3: Using a pencil, roughly sketch your obstructed horizon on the chart *relative to the stars*. Do this quickly before the stars move appreciably (say, within ten minutes).

Step 4: Start SkyTools and display a new chart for the same location and at the same date/time as when you made your sketch.

Step 5: Right-click on the chart and select *Add/Edit Obstructed Horizon*. A default obstructed horizon will be displayed that is at the apparent horizon. This horizon will have small boxes at regular intervals drawn on it.

Step 6: Place the mouse cursor over one of the boxes on the obstructed horizon. The cursor will change to a grabby-hand when over one of these boxes. Depress and hold the left mouse button. As you move the mouse the altitude of the spot on the obstructed horizon will change. Release the mouse button when the point on the obstructed horizon matches the altitude of your sketch (once again: relative to the stars).

Step 7: Repeat step six until you have reproduced the obstructed horizon that you sketched.

Step 8: Right-click on the chart and select *Exit Obstructed Horizon Editing* from the menu. If the horizon disappears at this point, click on the View Controls tool button at the top of the chart, select the General Properties tab and place a check mark next to *horizon* (under the Display In Views property). Note that you may need to follow a similar procedure to make the horizons visible in other views.

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Plottable Images

These are images that have been prepared for display in the background of the various SkyTools charts. In order to display these images properly SkyTools needs to know the position of the image center, the map projection used to generate it (if any), how large it is on the sky, and the amount of arbitrary rotation (if any). This information can be entered manually (if known). Digital Sky Survey (DSS) Images that are downloadable by SkyTools already have these parameters set and are automatically registered in the Plottable Image database.

Plottable images can be viewed using the SkyTools image viewer. As with all images this viewer does not alter the actual image data. For plottable image the parameters of any processing applied to the image are saved in the database. Each time the image is displayed by SkyTools, either in the viewer or in a chart background, the processing is automatically reapplied. For example, if you invert the image data in the viewer such that it contains black stars on a white background, and increase the contrast, this is how the image will be displayed in the chart background.

Plottable images can also be associated with objects (see [Object Images](#)). DSS images downloaded by SkyTools with a specified target object can be added to both databases.

Related Topics

[Data Manager: Plottable Images Tab](#)

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Observing Lists

Observing lists form the backbone of the SkyTools user data because they are lists of objects, and each of these objects may have user data associated with it. As an organizational tool this can be quite useful. For instance, you can create an observing list that consists of only those objects that have user notes associated with them. This observing list can be exported for use by someone else. The notes (and other data associated with objects) can be exported along with the observing list. This provides a means of transferring user data (such as notes) from one computer to another for specific objects only.

A SkyTools observing list is little more than a list of objects that appear in the SkyTools databases (including the user's supplemental data). When shared, the SkyTools export file contains a list of records. Each record contains a pointer to the object in the SkyTools database, consisting of an object type and an internal SkyTools index to the object in the database for that object type. If the object referred-to is in the user's supplemental database the supplemental data that defines this object is appended to the export file. When imported, if the object does not exist on the target machine it is added to that machine's supplemental database. If the information in the export file is more recent, the information in the supplemental database on the target machine is updated. This is how the "current" observing lists work - the data that describes newly discovered objects are automatically imported along with the observing list, freeing most users from having to download these data themselves and from the worry that their database information may be out of date.

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Supplemental Databases

The SkyTools supplemental databases include data for comets, minor planets, stellar (star-like) objects, deep sky objects, and skymarks. These supplemental databases are used to add objects to SkyTools that are not already in the main database. In particular, recently discovered comets, minor planets, and novae/supernovae are stored here.

The Supplemental Databases are managed via the [Supplemental Data tab](#) of the Data Manager.

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Shared Data

SkyTools uses a single shared data file format for all shared data. The standard file extension for SkyTools shared data files is .stx.

Each file has a standard header containing a user-entered title and description along with basic information regarding what the export file contains. The title is limited to 64 characters. The description can be any length.

Types of user data that can be exported:

- Notes and ratings associated with objects
- Web links associated with objects
- Images associated with objects
- Observing Lists
- Observing Logs
- Chart Preference Schemes

To avoid security risks associated with exporting web links only simple URLs or ftp requests are exportable. Any link that does not start with `http://`, `https://` or `ftp` will simply be ignored during the export/import processes. In addition, the URLs must be simple: they may not contain form data or run cgi scripts.

Observing lists may also contain shared items associated with each of the objects in the list, including notes, web links, images, plottable images and log entries.

If an item is shared that refers to an entry in the user's supplemental database, the defining database information is shared along with the item and installed at the time of import if necessary.

The SkyTools Data Manager is used to share and import most data.

Related Topics

[Data Manager](#)

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DSS Image Sources

SkyTools downloads Digital Sky Survey images from several online sources.

The Digitized Sky Survey is a digitization of the photographic sky surveys made via the Palomar and UK Schmidt telescopes.

SkyTools download sources:

- SkyView: <http://skyview.gsfc.nasa.gov>
- StScI MAST DSS: <http://archive.stsci.edu/dss/index.html>
- LEDAS: <http://ledas-www.star.le.ac.uk/DSSimage/>

The primary purpose for offering more than one data source is that these sites are not always available.

Note: these sources may change at any time, rendering SkyTools no longer able to connect to use them properly. If this happens, we will work to release an SkyTools update as soon as we are made aware of the changes.

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Visibility Icons

■ The observation planner often displays small icons that indicate the visibility of an object at a specific time. The shading of the background of the icon describes the darkness of the sky at that time. The height of the small dot describes the altitude of the object. If it is at the bottom of the icon it is near the horizon, while objects at the zenith are represented at the top.

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USNO-A.2.0 Data Sources

SkyTools can download stars in small regions from the extensive USNO-A2.0 catalog of over 500 million stars published by the US Naval observatory.

SkyTools can currently obtain small fields of the catalog over the web from two sources:

- Strasbourg VizieR: <http://vizier.u-strasbg.fr/viz-bin/VizieR>
- The ESO/ST-ECF Science Archive: http://archive.eso.org/skycat/servers/usnoa_res

Note: these sources may change at any time, rendering SkyTools no longer able to connect to use them properly. If this happens, we will work to release an SkyTools update as soon as we are made aware of the changes.

USNO-A2.0 catalog reference:

Monet, D., Bird A., Canzian, B., Dahn, C., Guetter, H., Harris, H., Henden, A., Levine, S., Luginbuhl, C., Monet, A. K. B., Rhodes, A., Riepe, B., Sell, S., Stone, R., Vrba, F., & Walker, R. 1998, The USNO-A2.0 Catalogue, (U.S. Naval Observatory, Washington DC).

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SkyTools Date Entry Format

Dates and times are entered into SkyTools in one of two basic formats.

The most common format is Year Month Day Time Key1 Key2... , separated by spaces and always in that order.

The entry may be truncated at any point (such as 1998.5, or 1998 January 12). The month may be entered as the full string, abbreviated to the first three letters, or as a number. The time may be entered as hours and decimals, or in time format (separated by colons).

The following "keys" can be appended:

BC The year is taken to be BC.

UT The time is taken as UT (or GMT).

PM or p The time is taken as PM (12 hours are added).

Another format is the Julian day number. These numbers may be entered directly, instead of the date, as JD number.

Examples (all for the same date/time):

1998 January 1 12:00:00

1998 Jan 1 12:00

1998 1 1 12:00

1998 Jan 1 12

1998 Jan 1 12.0

1998 Jan 1.5

1998 jan 1 0 PM

1998 jan 1 0p

1998.00215

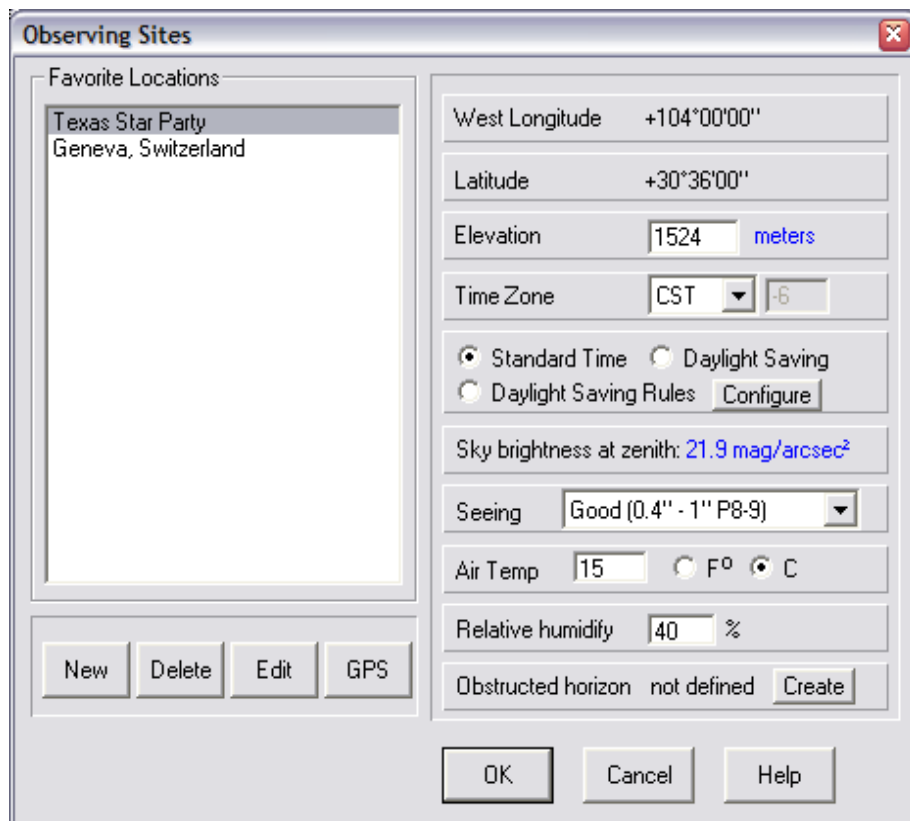
JD 2450185.29167

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Dialogs

Observing Sites Dialog

This dialog is used to manage your observing locations. It is used to select a location for use by the program. New locations can be created and existing locations can be edited. The settings for the selected location appear on the right side of the dialog.

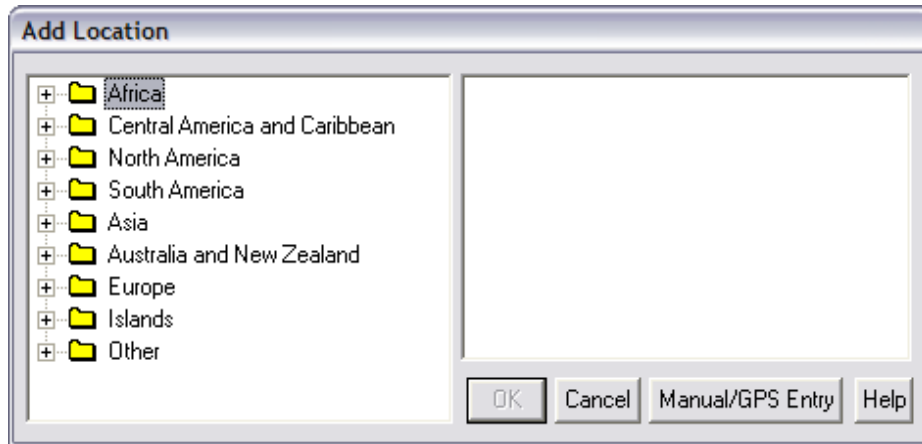


Select Location	Highlight a location by clicking on it and then press the OK button. You may also double-click on the location in the list.
Create New Location	Click on the New button. This will start the Add Location Dialog .
Delete Location	Select a location and either press the Delete button or the delete key on the keyboard.
Edit Longitude and Latitude	Select the a location and click the Edit button.
Get Coordinates from GPS	Select the a location and click the GPS button.
Change Elevation	Select the preferred unit by clicking on the blue hypertext unit ("feet" in the above example). The choices are feet or meters. Now click on the elevation window and type in your elevation
Set Time Zone	If in North America select a North American time zone from the pull-down list or GMT+ otherwise. If you select GMT+, enter the number of hours difference between your <i>local standard time</i> and Greenwich Mean Time (Also known as Universal Time).
Daylight Savings Settings	The Daylight Savings Time settings determine how SkyTools computes daylight savings time. To force standard time year round select Standard Time by clicking on it. Similarly, to force the program to use Daylight Savings Time year round, select Daylight Savings. The number of hours that daylight savings time differs from standard time (usually one) is entered in the Daylight Savings Rules Dialog .
Set Sky Brightness	The Sky brightness at zenith determines your level of local light pollution and is a critical factor. If your simulation charts aren't matching what you see or image, try adjusting the sky brightness of your location to something more appropriate.
Set Seeing	Select the astronomical seeing (steadiness of the atmosphere). The selections are rated on the Pickering scale (P1 to P10) and by the FWHM of the seeing profile in arc seconds.
Set Temperature	Select the units in degrees Fahrenheit or Celsius. Type the current (or expected) temperature.
Set Relative Humidity	Type the relative humidity in percent.
Manage the Obstructed Horizon	An obstructed horizon depicts the observable horizon including obstructions such as mountains, tress and buildings. To create an obstructed horizon for the selected location click the Create button. Once an obstructed horizon is created you may enable/disable it via clicking on the enable/disable hypertext. When enabled all calculations and simulations will take into account the obstructed horizon.

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Add Location Dialog

This dialog is used to select locations to add to the Favorite Observing Sites list.



There are two ways to select a location to add to the favorites list. The easiest way is to select a location from our extensive list. Click on the appropriate folder in the window on the left. In this case, North America was clicked on, followed by USA and the state of Arizona.

The locations available for the state of Arizona appear in the window on the right. Click on one to select it (in this case Flagstaff is selected). Click on the OK button to add the selected location to the favorites list and close the dialog. You may also simply double-click on the location (Flagstaff).

If your location does not appear in the SkyTools database, you can enter the location data manually by clicking on the Manual Entry button. This will open the Manual Location Entry Dialog.

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Drawing your Obstructed Horizon

With this method we will trace the outline of the obstructed horizon on a SkyTools *Overhead Sky* or *Naked Eye* chart.

Step 1: Print an overhead sky chart for your observing location and for a chosen date and time. Alternately, print several Naked Eye charts that cover the entire sky.

Step 2: Go to your observing location at the appointed time (perhaps starting a few minutes early). Bring the chart you printed in Step 1 with you.

Step 3: Using a pencil, roughly sketch your obstructed horizon on the chart *relative to the stars*. Do this quickly before the stars move appreciably (say, within ten minutes).

Step 4: Start SkyTools and display a new chart for the same location and at the same date/time as when you made your sketch.

Step 5: Right-click on the chart and select Add/Edit Obstructed Horizon. A default obstructed horizon will be displayed that is at the apparent horizon. This horizon will have small boxes at regular intervals drawn on it.

Step 6: Place the mouse cursor over one of the boxes on the obstructed horizon. The cursor will change to a grabby-hand when over one of these boxes. Depress and hold the left mouse button. As you move the mouse the altitude of the spot on the obstructed horizon will change. Release the mouse button when the point on the obstructed horizon matches the altitude of your sketch (once again: relative to the stars).

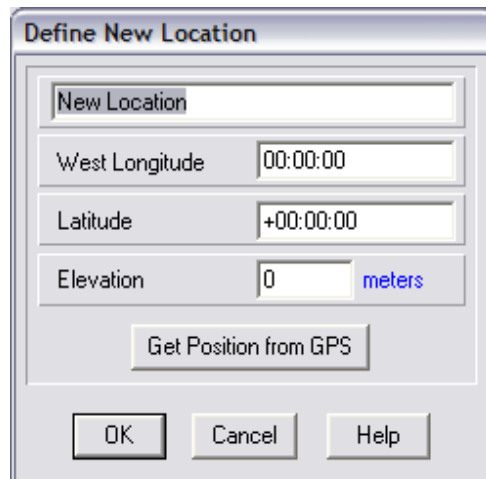
Step 7: Repeat step six until you have reproduced the obstructed horizon that you sketched.

Step 8: Right-click on the chart and select Exit Obstructed Horizon Editing from the menu. If the horizon disappears at this point, click on the View Controls tool button at the top of the chart, select the General Properties tab and place a check mark next to Horizon (under the Display In Views property). Note that you may need to follow a similar procedure to make the horizons visible in other views.

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Manual Location Entry Dialog

This dialog is used to enter a new location by manually entering the basic location data. It is also used to edit the basic data from an existing location.



Type in your location name in place of "New Location".

Enter the west longitude of the location in degrees and decimals, in degrees:minutes:seconds, or degrees:minutes or even degrees:minutes:seconds.decimals.

Examples (all the same): 105.5, 105:30, 105:30:00, 105:30:00.0

Look out for longitudes measured from the east. These longitudes are measured eastward from Greenwich and have a different sign. For North America, west longitudes are positive. For Europe and Asia west longitudes are negative.

Enter the latitude similarly.

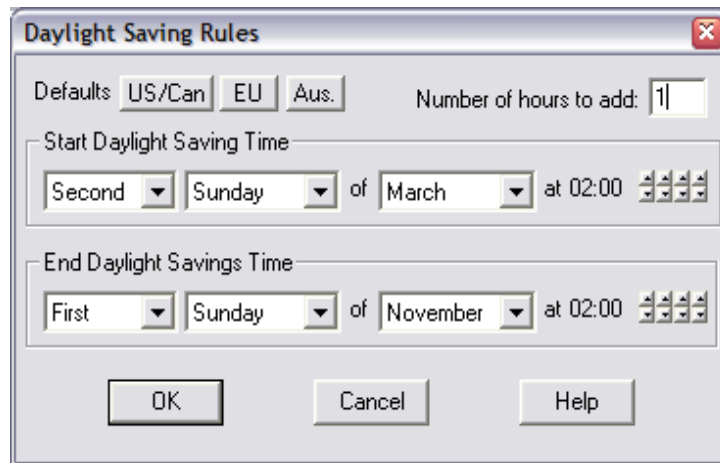
Click the Set Position from GPS button to read your position from a GPS receiver connected to the computer.

To add your new location to your favorites list click on the OK button.

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The Daylight Saving Rules Dialog

This dialog is used to select the rules governing when Daylight Saving Time is in effect. Using these rules SkyTools will automatically adjust for Daylight Saving Time.



Define the start of the daylight saving period by selecting the week of the month ("Second" above), day of that week ("Sunday") and month ("March"). Use the spin button on the right to select the time of day when daylight saving goes into effect (usually 02:00).

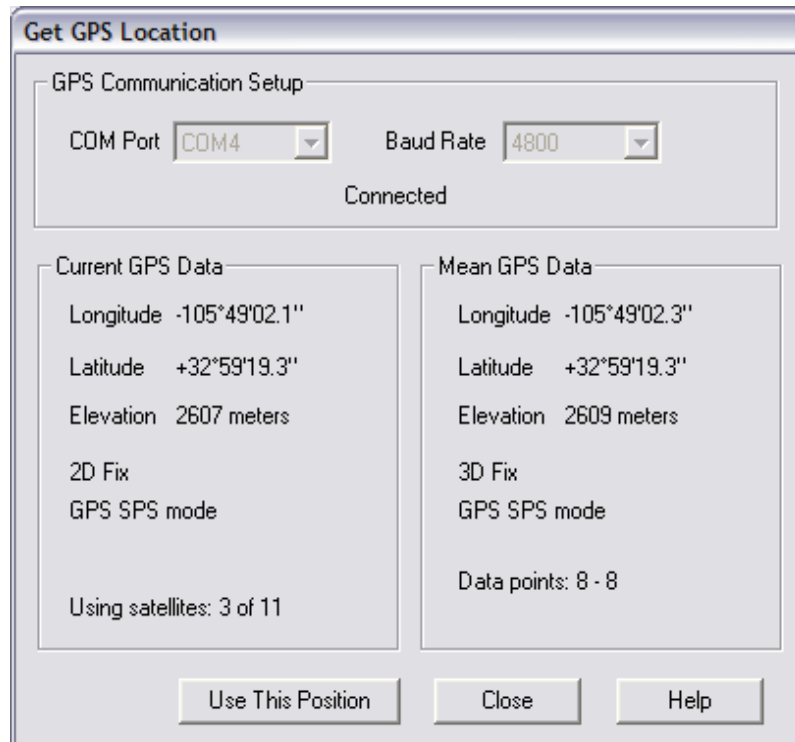
The end of the daylight saving period is defined similarly.

If you live in the U.S., Canada, Europe, Australia, or a country which has adopted one of these standards, simply click on either the US/Can (U.S. and Canada), EU (European Union), or Aus. (Australia) buttons. Note that these standards are set politically, and may be revised at any time such that the defaults presented by SkyTools are no-longer valid. If this happens, please let us know and we will update them.

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Get GPS Location Dialog

This dialog allows you to input a new observing location into SkyTools via a connected GPS unit, or to update a location that has already been created.



A GPS connected to your computer that supports the standard NMEA-0183 interface is required to use this feature.

Location data that can be read from a GPS are: longitude, latitude, and elevation. All other parameters (such as the time zone) must be entered separately.

Obtaining a Position from a GPS unit
Connect the GPS unit to your computer

Set up your GPS unit to communicate via the NMEA-0183 protocol (sometimes referred to as just NMEA).

Set the baud rate to 4800 (which is the rate defined by the NMEA standard). Only change this value if you are certain of what you are doing.

Select the appropriate COM Port. Note that even units connected via a USB port will be assigned to a COM port internally. See your GPS documentation for the COM port typically assigned. Be aware that in some cases this COM port may have been reassigned because of a conflict. You may need to simply try each COM port until you find the one that connects. The status will change to Connected once communication is established with the GPS unit.

The instantaneous data from the GPS is displayed on the left. The mean position of the highest quality received is displayed on the right. The mean position is what will be used by SkyTools. Once a mean position has been established the Use This Position button will become enabled. Click this button to accept this position.

For Garmin GPS units with a proprietary USB interface you may need to download their Spanner tool.

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Create Obstructed Horizon Dialog

This dialog is used to create an obstructed horizon for an observing location. An obstructed horizon defines the area of the sky that is visible from where you are observing. It may include obstructions from buildings, trees, mountains, etc.

Create Obstructed Horizon

Draw your obstructed horizon

Instructions

Read your obstructed horizon from a text file

The file format is one data pair per line separated by whitespace:
Azimuth Altitude (both in degrees)

Example:
142 10
148.12345 10.45634
156.2345 11.77564

File Name

Browse

Read File

Define your obstructed horizon by moving your telescope

No telescope is connected

Begin Cancel Finish

Take a Single Reading

Take Multiple Readings

Point your telescope at your obstructed horizon and click the Start button below to begin taking readings. Slowly move your telescope along the obstructed horizon. A reading will be taken every second. Click the Stop button below to stop taking readings. You may start/stop as many times as you want. Click Finish to create the obstructed horizon.

Start Readings Stop Readings Delete Last Readings

Close Help

There are three ways to input an obstructed horizon:

Draw Your Obstructed Horizon

With this method we will trace the outline of the obstructed horizon on a SkyTools *Overhead Sky* or *Naked Eye* chart.

Step 1: Print an overhead sky chart for your observing location and for a chosen date and time. Alternately, print several Naked Eye charts that cover the entire sky.

Step 2: Go to your observing location at the appointed time (perhaps starting a few minutes early). Bring the chart you printed in Step 1 with you.

Step 3: Using a pencil, roughly sketch your obstructed horizon on the chart *relative to the stars*. Do this quickly before the stars move appreciably (say, within ten minutes).

Step 4: Start SkyTools and display a new chart for the same location and at the same date/time as when you made your sketch.

Step 5: Right-click on the chart and select Add/Edit Obstructed Horizon. A default obstructed horizon will be displayed that is at the apparent horizon. This horizon will have small boxes at regular intervals drawn on it.

Step 6: Place the mouse cursor over one of the boxes on the obstructed horizon. The cursor will change to a grabby-hand when over one of these boxes. Depress and hold the left mouse button. As you move the mouse the altitude of the spot on the obstructed horizon will change. Release the mouse button when the point on the obstructed horizon matches the altitude of your sketch (once again: relative to the stars).

Step 7: Repeat step six until you have reproduced the obstructed horizon that you sketched.

Step 8: Right-click on the chart and select Exit Obstructed Horizon Editing from the menu. If the horizon disappears at this point, click on the View Controls tool button at the top of the chart, select the General Properties tab and place a check mark next to Horizon (under the Display In Views property). Note that you may need to follow a similar procedure to make the horizons visible in other views.

Read Horizon Coordinates from a File

First prepare a file with Azimuth, Altitude data pairs. The format is one pair of coordinates per line. The Azimuth is first followed by the Altitude, separated by a space. Both must be in degrees. Azimuth is measured eastward from the North. These pairs represent the altitude, measure from the local horizon, that marks the edge of your obstructed horizon at each azimuth.

Enter the path to your file (or use the Browse button). Click the Read File button.

Read the Horizon Coordinates from a Telescope

You must have a telescope connected via the Real Time tool to use this feature. It should also be properly initialized such that it will report accurate positions. Positions are typically returned in RA/Dec from a telescope; the time and location is used to convert these into altitude and azimuth.

There are two ways to measure your obstructed horizon with a telescope:

Method 1: One Reading at a Time -- click the Begin button when you are ready to start recording positions. Point your telescope at a position in the sky marking the edge of your obstructed horizon. Click the Take a Single Reading button. Move the telescope around the horizon to another point. Click the Take a Single Reading button again. Repeat until you have defined the horizon all around the sky. You may take as much time as you wish. Click the Finish button.

Method 2: Multiple Readings

With this method you will slowly sweep your telescope around the horizon marking the edge of the obstructed region. Once started, a reading will be taken every second so you must move the telescope carefully. Point your telescope at the edge of your obstructed horizon. To begin taking readings click the Start Readings button. A new reading will be taken every second. Click the Stop Readings button to take a break, flip the mount, or make other adjustments. You may start/stop as many times as you wish.

If you make a mistake you can click the Stop Readings button. Clicking the Delete Last

Readings button will delete the last set of readings (everything after you last clicked the Start Readings button). Simply do that set over again.

Once you have defined the horizon all around the sky click Finish.

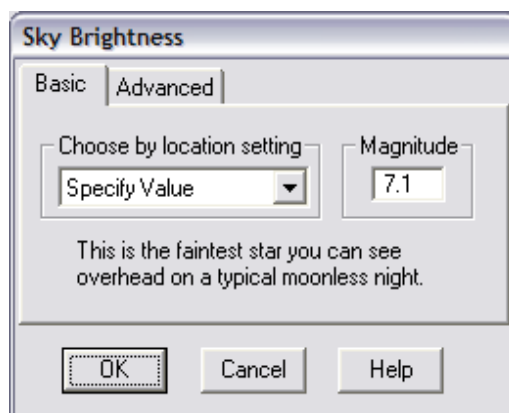
-0-

Sky Brightness Dialog

This dialog is used to set the sky brightness at the zenith for an observing site. The sky brightness is a measure of your local light pollution. This value is critical for many calculations performed by SkyTools, including visual difficulty and the visual limits of the simulation charts. It is also critical for imaging, affecting the calculation of SNR and optimum sub-exposure times.

The Basic Tab

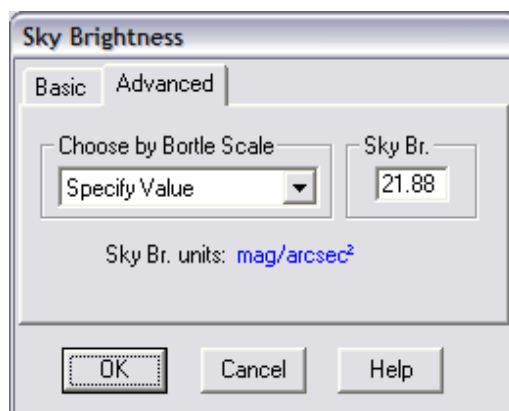
This method approximates the sky brightness based on an estimate of the faintest naked eye star that can be detected near the zenith. This estimate should be made on a typical dark night with no interfering twilight or moonlight. The observer should be well dark adapted and some care should be taken in the estimate.



Either select a preset magnitude limit according to your location type (urban, suburban, country etc.) or choose Specify Value to enter the magnitude limit directly into the magnitude limit box.

The Advanced Tab

This method approximates the sky brightness either directly or via the Bortle Scale. The results from a device such as the Sky Quality Meter may be entered directly. The reading or estimate should be made on a typical dark night with no interfering twilight or moonlight.



Either select the best estimate of your site on the Bortle Scale or choose Specify Value to enter the sky brightness directly into the Sky Br. box.

Entering a Sky Brightness -- click the Sky Br. units hypertext to toggle the units from

mag/arcsrc² to mag/arcmin². Type a value into the box.

Using the Bortle Scale -- The Bortle Scale is designed to estimate the sky brightness based on certain criteria:

Class	Title	Description
1	Excellent dark sky site	Zodiacal light, gegenschein, zodiacal band visible; M33 direct vision naked-eye object; Scorpius and Sagittarius regions of the Milky Way cast obvious shadows on the ground; Airglow is readily visible; Jupiter and Venus affect dark adaptation; surroundings basically invisible.
2	Typical truly dark site	Airglow weakly visible near horizon; M33 easily seen with naked eye; highly structured Summer Milky Way; distinctly yellowish zodiacal light bright enough to cast shadows at dusk and dawn; clouds only visible as dark holes; surroundings still only barely visible silhouetted against the sky; many Messier globular clusters still distinct naked-eye objects.
3	Rural sky	Some light pollution evident at the horizon; clouds illuminated near horizon, dark overhead; Milky Way still appears complex; M15, M4, M5, M22 distinct naked-eye objects; M33 easily visible with averted vision; zodiacal light striking in spring and autumn, color still visible; nearer surroundings vaguely visible.
4	Rural/suburban transition	Light pollution domes visible in various directions over the horizon; zodiacal light is still visible, but not even halfway extending to the zenith at dusk or dawn; Milky Way above the horizon still impressive, but lacks most of the finer details; M33 a difficult averted vision object, only visible when higher than 55°; clouds illuminated in the directions of the light sources, but still dark overhead; surroundings clearly visible, even at a distance.
5	Suburban sky	Only hints of zodiacal light are seen on the best nights in autumn and spring; Milky Way is very weak or invisible near the horizon and looks washed out overhead; light sources visible in most, if not all, directions; clouds are noticeably brighter than the sky.
6	Bright suburban sky	Zodiacal light is invisible; Milky Way only visible near the zenith; sky within 35° from the horizon glows grayish white; clouds anywhere in the sky appear fairly bright; surroundings easily visible; M33 is impossible to see without at least binoculars, M31 is modestly apparent to the unaided eye.
7	Suburban/urban transition	Entire sky has a grayish-white hue; strong light sources evident in all directions; Milky Way invisible; M31 and M44 may be glimpsed with the naked eye, but are very indistinct; clouds are brightly lit; even in moderate-sized telescopes the brightest Messier objects are only ghosts of their true selves.
8	City sky	Sky glows white or orange--you can easily read; M31 and M44 are barely glimpsed by an experienced observer on good nights; even with telescope, only bright Messier objects can be detected; stars forming familiar constellation patterns may be weak or completely invisible.
9	Inner City sky	Sky is brilliantly lit with many stars forming constellations invisible and many weaker constellations invisible; aside from Pleiades, no Messier object is visible to the naked eye; only objects to provide fairly pleasant views are the Moon, the Planets and a few of the brightest star clusters.

Note: the Bortle scale is unfortunately somewhat flawed, particularly toward the dark sky end. The visibility of objects such as globular clusters varies greatly between individuals, so don't place too much emphasis on any one criterion. In practice a Bortle 1 sky is largely unattainable. Most very dark sky sites will register as Bortle 2.

The Edit Observing Site Dialog

This dialog is used to edit an observing location that appears in a log entry. Changes made here are saved with the log entry: they do not modify locations in your favorite locations list. The site name, lat/lon, elevation, time zone, daylight savings rules, and limiting magnitude may be edited directly.

The 'Edit Observing Site' dialog box contains the following fields and controls:

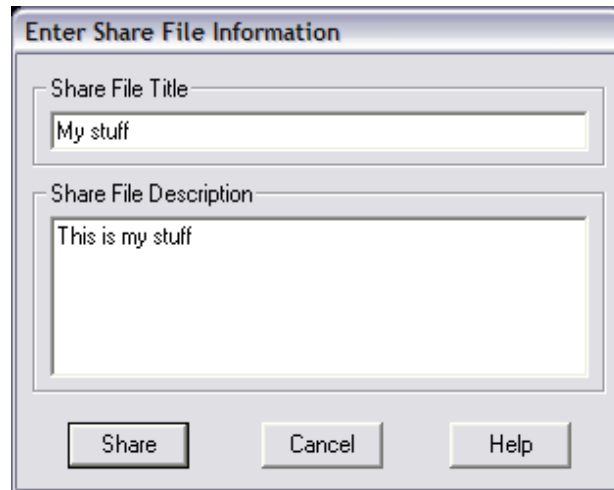
- Site Name: Text field containing 'Texas Star Party'.
- West Longitude: Text field containing '+104°00'00''.
- Latitude: Text field containing '+30°36'00''.
- Elevation: Text field containing '1524' with a unit dropdown set to 'meters'.
- Time Zone: Dropdown menu set to 'CST' and a field containing '-6'.
- Daylight Saving: Radio buttons for 'Standard Time' (selected) and 'Daylight Saving', with a 'Daylight Saving Rules' button and a 'Configure' button.
- Naked-eye magnitude limit: Text field containing '21.9 m'.
- Seeing: Dropdown menu set to 'Good (0.4" - 1" P8-9)'.
- Air Temp: Text field containing '15' with radio buttons for 'F°' and 'C' (selected).
- Relative humidity: Text field containing '40' with a '%' symbol.
- Buttons: 'OK', 'Cancel', 'Add to Favorites', 'Find New', and a help icon (?) at the bottom.

Location Name	Type a name for your location
West Longitude	<p>Enter the west longitude of the location in degrees and decimals, in degrees:minutes:seconds, or degrees:minutes or even degrees:minutes:seconds.decimals.</p> <p>Examples (all the same): 105.5, 105:30, 105:30:00, 105:30:00.0</p> <p>Look out for longitudes measured from the east. These longitudes are measured eastward from Greenwich and have a different sign. For North America, west longitudes are positive. For Europe and Asia west longitudes are negative.</p>
Latitude	Enter the latitude similarly to the longitude.
Elevation	To change the Elevation, first select the preferred unit by clicking on the blue hypertext unit ("meters" in the above example). The choices are feet or meters. Now click on the elevation window and type in your elevation.
Set Time Zone	If in North America select a North American time zone from the pull-down list or GMT+ otherwise. If you select GMT+, enter the number of hours difference between your <i>local standard time</i> and Greenwich Mean Time (Also known as Universal Time).
Daylight Savings Settings	The Daylight Savings Time settings determine how SkyTools computes daylight savings time. To force standard time year round select Standard Time by clicking on it. Similarly, to force the program to use Daylight Savings Time year round, select Daylight Savings. The number of hours that daylight savings time differs from standard time (usually one) is entered in the Daylight Savings Rules Dialog .
Set Naked-Eye Magnitude Limit	The naked-eye magnitude limit determines your level of local light pollution and is a critical factor. If your simulation charts aren't matching what you see, try changing the naked-eye magnitude limit of your location to something more appropriate.
Set Seeing	Select the astronomical seeing (steadiness of the atmosphere). The selections are rated on the Pickering scale (P1 to P10) and by the FWHM of the seeing profile in arc seconds.
Set Temperature	Select the units in degrees Fahrenheit or Celsius. Type the current (or expected) temperature.
Set Relative Humidity	Type the relative humidity in percent.
Manage the Obstructed Horizon	An obstructed horizon depicts the observable horizon including obstructions such as mountains, trees and buildings. To create an obstructed horizon for the selected location click the Create button. Once an obstructed horizon is created you may enable/disable it via clicking on the enable/disable hypertext. When enabled all calculations and simulations will take into account the obstructed horizon.

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Enter File Share Information Dialog

This dialog is used for sharing information with other SkyTools users via a SkyTools Shared Data File (.stx).

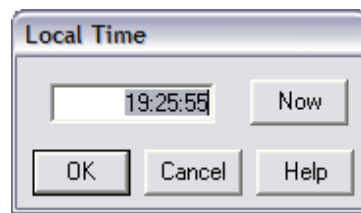


Type a title and description. Click Share to save the data to a SkyTools .stx file.

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Local Time Dialog

This dialog is used to enter the local time.



Type the time in hours and decimals or in the SkyTools time format (hours:minutes:seconds). As always, you may truncate the time to (hours:minutes, or hours only).

You may use 24-hour time or append "p" to indicate hours past noon. E.g. "23:51" or "11:51p"

In the picture above the time is 19 hours, 25 minutes, 55 seconds, or 25 minutes 55 seconds after 7 PM.

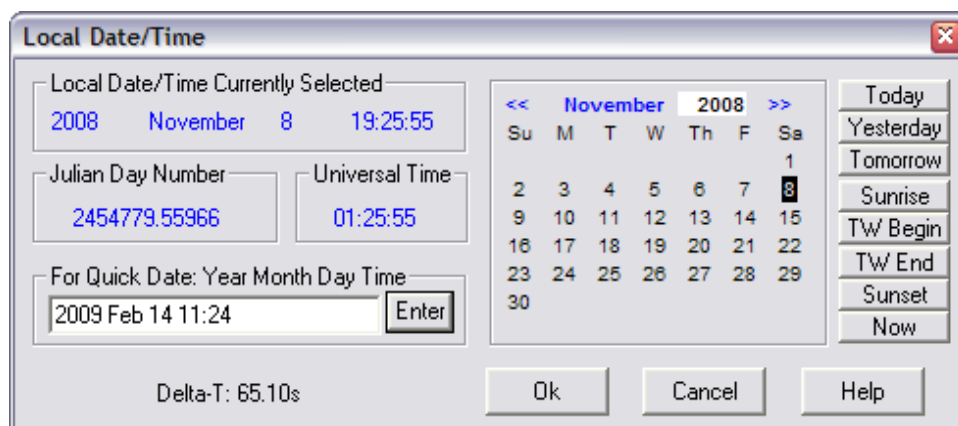
Click the Now button to obtain the current time from your computer's clock.

Click Ok when done.

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Date/Time Entry Dialog

This dialog is used to enter dates and times.



Current Time and Date

The currently selected date is shown as a calendar on the right and in blue hypertext at the left. The time only appears as hypertext. These blue hypertext date/times indicate what will be selected when you click Ok.

Enter a Full Date and Time

For an entirely new date, the simplest form of entry is to click on the Quick Date edit window, type in the date and *press* Enter. Dates and times are entered in the SkyTools date and time entry formats (see below). Note that unless you press Enter the new date will not be accepted, and it must be selected before you click Ok.

Enter a Partial Date or Time

If you only want to change part of the current date or time, click on the hypertext part that you want to change. For instance, to change the time, click on the time (shown as "19:25:25" above). Enter a new time in the date entry window and press enter. You will see the new value appear in the dialog. Use colons to separate hours, minutes and seconds. Minutes and seconds are optional. Note that unless you press Enter the new date will not be accepted, and it must be accepted before you click Ok.

Using the Calendar

You can also select the date from the calendar on the right. To select the year, click on the year displayed (2008 above). Type in the year you want and *press enter*. Select the month by clicking on the blue hypertext month (November above). Alternately, you can click on the "<<" arrow to view the previous month. Clicking on ">>" will advance to the next. Select the day by clicking on it in the calendar.

Date Entry Format

SkyTools dates are entered in the same order they are displayed in: year month day. You can truncate to the left, leaving off the day or the month and date. The month can be entered as a number or as the month string.

For instance, you could enter "2008 Jan 5", "2008 1 5", "2008 Jan", or even "2008.2"

Quick Date/Time Buttons

Clicking on one of the quick date buttons will select the date based on the date in your computer.

Clicking on one of the quick time buttons will select a time based on the current date selection. TW end selects the end of evening twilight on the date specified. TW Begin selects the beginning of morning twilight. Note that the Sunrise and TW Begin buttons will advance the

date to the next morning.

Time Entry Format

Local times are in hours and can be entered with colons separating hours, minutes, and seconds, or as decimals. Times can be entered in 24-hour format. Or a "p" can be appended to indicate "PM". "UT" can be appended to indicate that the time is UT rather than local.

Examples: "12:11:14", "12:11.1", "12.2", "12a", or "12p"

Julian Day Number Entry

A Julian day number can be specified by entering JD followed by the Julian Day number.

Example: "JD 245675.12"

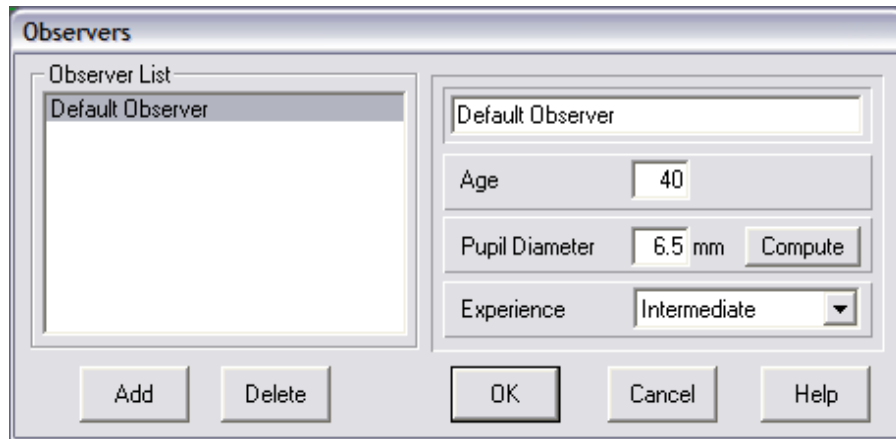
Delta-T

The current value for Delta-T in use by the program for the selected date is also indicated (in seconds). Delta-T is the time difference obtained by subtracting Universal Time from Terrestrial Time. This is a correction for the irregular rotation of the earth. Values of Delta-T in the future can only be estimated.

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Observers Dialog

This dialog is used to tell SkyTools about the pupil diameter and experience level of the observer(s). The observer's level of experience and dilated pupil diameter is used to model the limiting stellar magnitude of the observer using various instruments.



If you do not know the dilated pupil diameter of the observer (and most people don't) it can be estimated from your age. To estimate your pupil diameter enter your age and click the Compute button.

The pupil diameter is used in conjunction with the observer's naked-eye limiting magnitude in order to estimate the limiting magnitude of a particular telescope, as used by that observer.

Note: it is possible to vary the pupil diameter at various points in the program to see its effect on the limiting magnitude (for instance, the charts and telescope report). Varying the pupil diameter alone, without a corresponding change in naked-eye limiting magnitude of the observing location is nonsensical and will lead to nonsensical results (smaller pupils seeing fainter).

The observer's Experience level has a large effect on the faintest stars that can be seen. An experienced observer can see up to several magnitudes fainter than a beginner!

This experience factor covers a wide variety of things that are not in the limiting magnitude model, experience only being the most readily identifiable. You can think of this parameter as a fine adjustment to make SkyTools model your own limiting magnitudes as closely as possible.

If you routinely see stars that are fainter than are drawn or indicated by SkyTools then consider increasing your experience level. In the opposite case, lower your experience level until you get a good match.

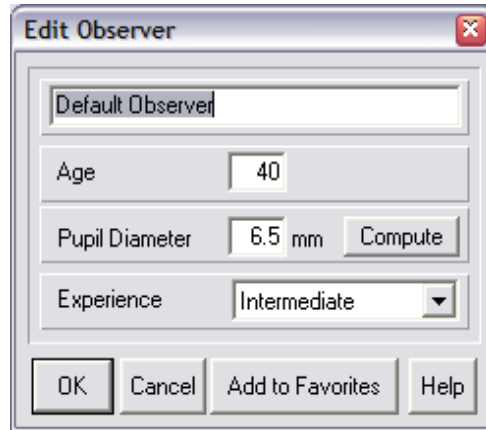
To edit an observer simply enter new information and click Ok to save it.

To create a new observer click Add. A new observer will be added to the list with default values. Simply edit these values to suit you. Click Ok.

To delete an observer, select the observer you wish to delete and click Delete.

The Edit Observer Dialog

This dialog is used to edit the observer information that was entered with a log entry. The observer's level of experience and dilated pupil diameter is used to model the limiting stellar magnitude of the observer using various instruments. Changes made here will only apply to the log entry; they will not affect settings in your global *Observers* list.



If you do not know the dilated pupil diameter of the observer (and most people don't) it can be estimated from your age. To estimate your pupil diameter enter your age and click the Compute button.

The pupil diameter is used in conjunction with the observer's naked-eye limiting magnitude in order to estimate the limiting magnitude of a particular telescope, as used by that observer.

Note: it is possible to vary the pupil diameter at various points in the program to see its effect on the limiting magnitude (for instance, the charts and telescope report). Varying the pupil diameter alone, without a corresponding change in naked-eye limiting magnitude of the observing location is nonsensical and will lead to nonsensical results (smaller pupils seeing fainter).

The observer's Experience level has a large effect on the faintest stars that can be seen. An experienced observer can see up to several magnitudes fainter than a beginner!

This experience factor covers a wide variety of things that are not in the limiting magnitude model, experience only being the most readily identifiable. You can think of this parameter as a fine adjustment to make SkyTools model your own limiting magnitudes as closely as possible.

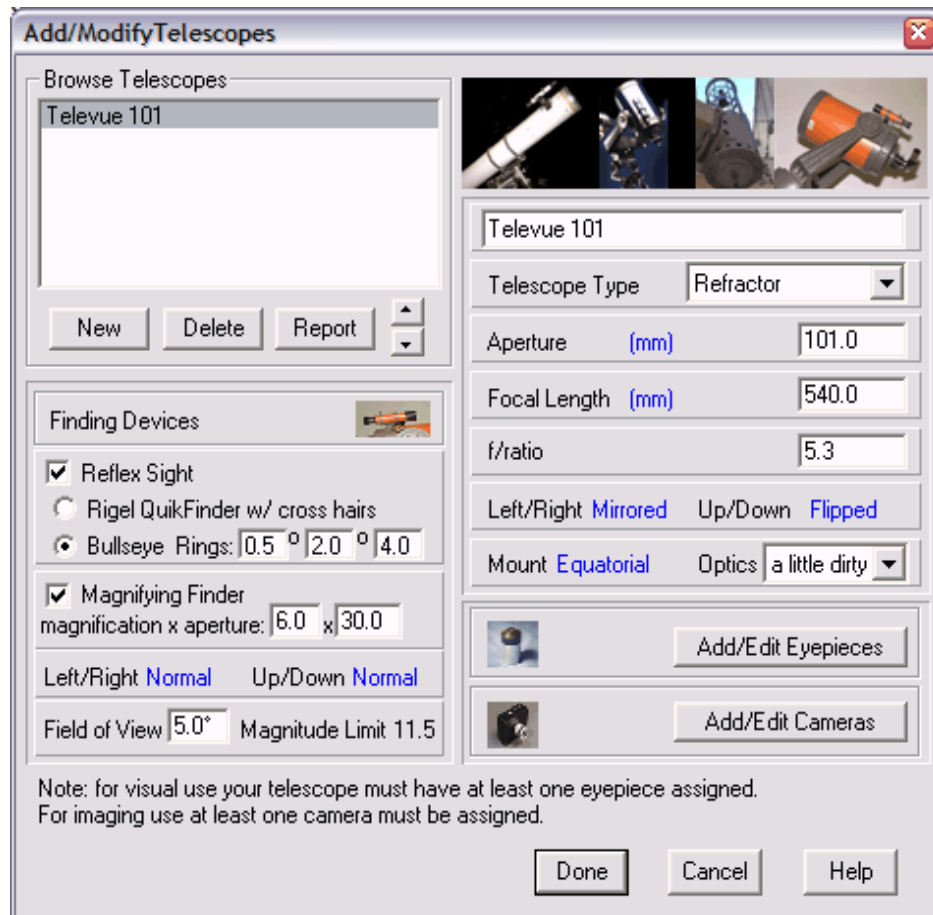
If you routinely see stars that are fainter than are drawn or indicated by SkyTools then consider increasing your experience level. In the opposite case, lower your experience level until you get a good match.

Click Add to Favorites to add the edited observer to your global *Observers* list.

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The Telescopes Dialog

This dialog is used to set up telescopes for use with SkyTools. Each telescope listed here will have a custom simulation chart created for it.



Creating a Telescope

To add a new telescope click the New button. You will be presented with a list of telescopes to choose from. Select your telescope from the list (or one very close to it).

If your telescope does not appear on the list, select Enter Manually.

You may change your telescope information at any time. The basic information for your scope begins with a name. Next is the aperture. Before entering a number, click on the units hypertext ("mm" in the above example) until the appropriate unit is found. You may enter either the focal length or f/ratio (the other will be computed for you from the aperture).

Click on the Left/Right: Mirror/Normal and Up/Down: Flipped/Normal hypertext to set the scope's natural orientation as seen in the eyepiece. For instance, a Newtonian reflector will typically show a view that is a *mirror* image (left and right reversed) and *inverted* (up and down reversed). For such a scope you would select Left/Right to be mirrored and Up/Down to be inverted. Note that the effect on the orientation of mirror diagonals is handled separately for each eyepiece.

Add Eyepieces

Eyepieces are added by clicking on the Add/Edit Eyepieces button. This will start the Select Eyepieces Dialog.

Add Cameras

Cameras are added by clicking the Add/Edit Cameras button. This will start the Select Cameras to Use with Telescope dialog.

Add a Finding Device

If you have a non-magnifying reflex sight finding device such as a Telrad or Rigel QuikFinder, check the Reflex Sight box. Enter the diameters of any rings that you want to display on the simulation chart in degrees. You may enter 0 to leave all or some of them blank.

If you have a magnifying finder, check the Magnifying Finder box and enter the magnification, aperture (in mm), and field of view (degrees). The aperture is easily measured with a ruler if you don't know what it is. The magnification is often inscribed on the eyepiece, sometimes along with the aperture. The field of view is the diameter (degrees) of the view through the finder.

If you don't know what the field of view for the finder is, you can measure the field of view by locating a star near the celestial equator (Declination ~0) and timing how long it takes to cross your field of view. Divide the time in minutes by 4 to get the field of view in degrees.

Additional Functions

To delete the selected telescope click the Delete button or press the Delete key on the keyboard.

To see a report describing the selected telescope click on the Report button.

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The Edit Instrument Dialog

This dialog is used to edit the telescope data entered for a log entry. Changes made in this dialog will affect the log entry only: they do not affect your global telescope settings.

You may change your telescope information at any time. The basic information for the scope begins with a name. Next is the aperture. Before editing the aperture number, click on the units hypertext ("inches" in the above example) until the appropriate unit is found. You may specify either the focal length or f/ratio (the other will be computed for you from the aperture).

Click on the Left/Right: Mirror/Normal and Up/Down: Flipped/Normal hypertext to set the scope's natural orientation as seen in the eyepiece. For instance, a Newtonian reflector will typically show a view that is a *mirror* image (left and right reversed) and *inverted* (up and down reversed). For such a scope you would select Left/Right to be mirrored and Up/Down to be inverted. Note that the effect on the orientation of mirror diagonals is handled separately for each eyepiece.

Eyepieces are added by clicking on the Add/Edit Eyepieces button. This will start the Select Eyepieces Dialog.

If the telescope has a non-magnifying reflex sight finding device such as a Telrad, check the Reflex Sight box. Enter the diameters of any rings that you want to display on the simulation chart in degrees. You may enter 0 or leave them all or some of them blank.

If it has a magnifying finder, check the Magnifying Finder box and enter the magnification, aperture (in mm), and field of view (degrees). The aperture is easily measured with a ruler if you don't know what it is. The magnification is often inscribed on the eyepiece, sometimes along with the aperture. The field of view is the diameter (degrees) of the view through the finder. If you don't know what the field of view for the finder is, you can measure the field of view by locating a star near the celestial equator (Declination ~0) and timing how long it takes to cross your field of view. Divide the time in minutes by 4 to get the field of view in degrees.

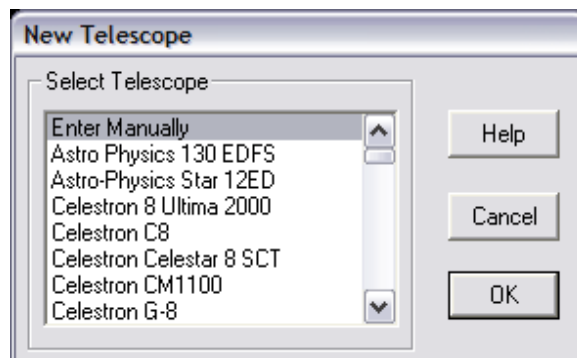
To see a report describing the selected telescope click on the Report button.

Click Save in Database to write the changes back to your telescope database.

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The Select New Telescope Dialog

This dialog is used to add a new telescope for use with SkyTools.



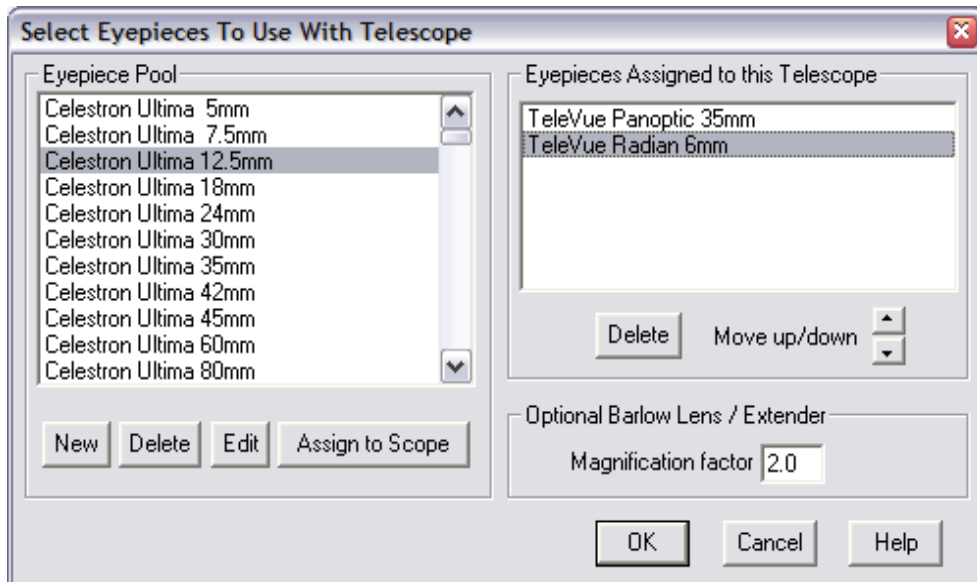
If you see your telescope in the list select it and click **OK**.

To manually create a telescope select **Enter manually** and click **OK**. You will be returned to the **Add/Modify Telescopes** dialog where you will enter your telescope information.

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The Select Eyepieces to Use with Telescope Dialog

This dialog is used to assign eyepieces to a telescope from a list of pre-defined eyepieces. You may also add or delete eyepieces to/from the pre-defined list (pool).



The Eyepiece Pool contains a list of pre-defined eyepieces that can be assigned to a telescope. To assign an eyepiece from the pool, select it from the list and click on the **Assign to Scope** button (or double-click on it). The eyepiece will be added to the assigned eyepiece list on the right.

To delete an eyepiece from the list of assigned eyepieces select the eyepiece in the *Eyepieces Assigned to the Telescope* list and click on the **Delete** button.

To change the order of the eyepieces assigned to the telescope, select one of the eyepieces and click on the up/down control to move the selection up or down in the list. The top eyepiece in the list is the default eyepiece. The default eyepiece is used when a telescope simulation chart is printed without first being displayed on the screen.

If you use a Barlow lens, enter the magnifying factor of your Barlow.

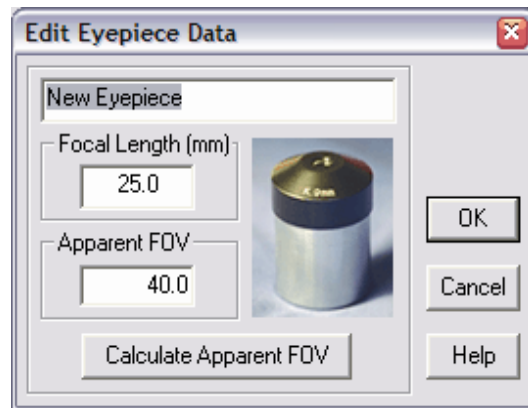
To create a new eyepiece click the **New** button. This will open the *Edit Eyepiece Data* dialog. Enter the data for your new eyepiece. The new eyepiece will appear at the bottom of the eyepiece pool, where it can now be assigned to telescopes.

To edit an existing eyepiece in the pool click the **Edit** button. This will open the *Edit Eyepiece Data* dialog.

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The Edit Eyepiece Data Dialog

This dialog is used to edit the eyepiece data for an eyepiece in the eyepiece pool. The pool is the list of eyepieces you can assign to any telescope. Although eyepiece data can be edited at any time, this dialog is typically used when adding a new eyepiece to the pool.



Enter a description of the eyepiece in the top window.

The focal length is straight forward, and is usually inscribed on the eyepiece itself.

The apparent field of view of the eyepiece can be a little harder to come by. Note that this is different from the true field of view that the eyepiece gives when attached to a telescope. If you don't know the apparent field of view of an eyepiece, and have measured the true field of view, use the *Apparent Field of View Calculator* by clicking on the Calculate Apparent FOV button.

To delete the selected eyepiece from the pre-defined list, click on the Delete button or press the delete key on the keyboard. Note that this will also delete the eyepiece from the assigned list as well.

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The Telescope Report Dialog

This dialog generates a report for your telescope, listing basic information and computing limits.

The Dawes resolution limit is the theoretical ability of the telescope to resolve (separate) two stars of the same magnitude. This is the classic limit: it is for the best possible case and is computed from the aperture only.

The practical magnification limit is based on the 50x per inch of aperture rule of thumb. In some cases, under extreme conditions, it is possible to use higher magnifications. Most visual observers will find this limit more than their conditions will typically permit.

The recommended eyepiece magnifications are based on pupil diameters as recommended by Al Nagler, modified to include a 2X Barlow lens. These recommendations are intended to describe a minimum set of eyepieces that will cover the entire appropriate range of magnifications for the telescope. It is not necessary to match the magnifications here exactly: they should be considered rough guidelines only. Still, if you lack eyepieces near the low or high magnification ranges, you may wish to consider purchasing an eyepiece that produces a magnification similar to those recommended. It is easy to take a virtual test drive of new eyepieces by temporarily adding eyepieces to your telescope from the pool.

Camera Information

This table lists the field of view and optimum resolution for each camera in each focal state that has been defined. Focal states include:

- Prime Focus - the image plane of the camera is placed at the focal point of the telescope without any eyepieces or camera lenses in between.
- Extender - a focal extender has been placed between the telescope and camera.
- Reducer - a focal reducer has been placed between the telescope and camera.
- Eyepiece Projection - as configured for the telescope on the Accessories group of the Select Cameras to Use with Telescope dialog.
- Afocal Projection - as configured for the telescope on the Accessories group of the Select Cameras to Use with Telescope dialog.

Eyepiece Information

This table lists the field of view for each eyepiece when combined with this telescope. The *stellar* limiting magnitude is also computed, applying the naked-eye limiting magnitude from the observing location and the pupil diameters/experience level of the observer.

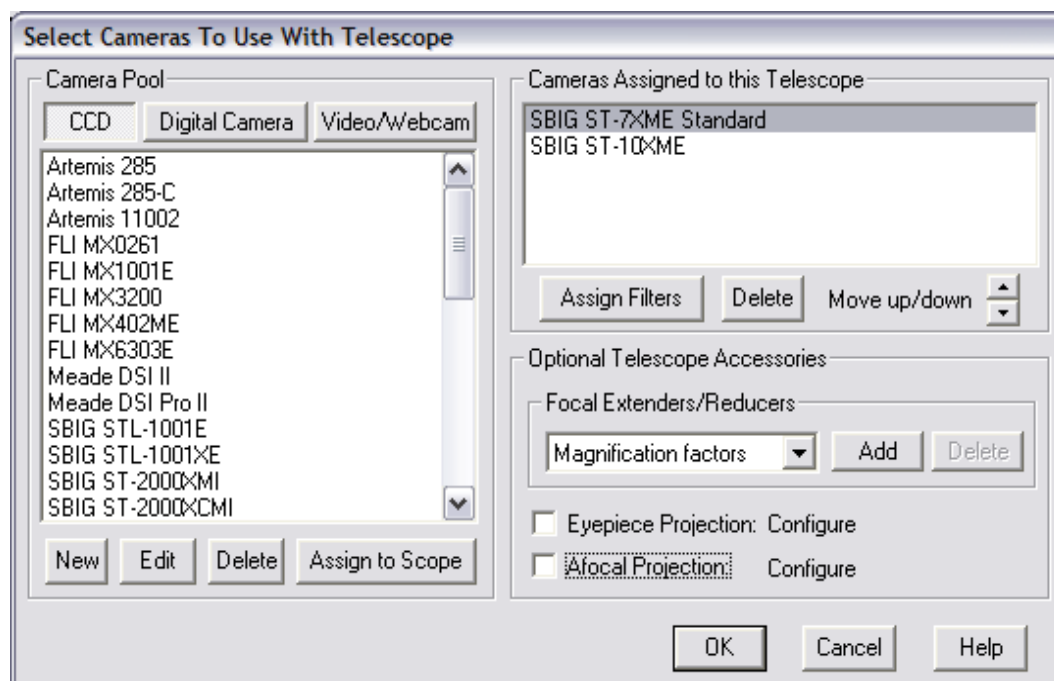
Of particular use, note how the limiting magnitude changes with each eyepiece. This part of the report can provide you with critical information regarding which eyepiece will allow you to see the faintest stars. Note that for extended objects, the size of the object comes into play. In these cases the object may be best visible in an eyepiece other than the one indicated here.

Lastly, note that it is possible to vary the pupil diameter of the observer to see its effect on the limiting magnitude. Varying the pupil diameter alone, without a corresponding change in naked-eye limiting magnitude of the observing location is nonsensical and will lead to nonsensical results (smaller pupils seeing fainter).

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The Select Cameras to Use with Telescope Dialog

This dialog is used to assign cameras to a telescope from a list of pre-defined cameras. You may also add or delete cameras to/from the pre-defined list (pool).



Assign a Camera

Select the type of camera via the radio buttons above the camera pool.

Select the camera you wish to add and either double-click on it to click Assign to Scope. The camera will appear in the cameras assigned to telescope listing on the right.

Assign Filters

Filters can be assigned to astronomical CCD cameras only. Select the camera you wish to assign filters to in the list of assigned cameras (top right). Click the Assign Filters button. This will open the Assign Filters to Camera dialog.

Assign Lenses

Lenses can be assigned to digital cameras only. Select the camera you wish to assign lenses to in the list of assigned cameras (top right). Click the Assign Lenses button. This will open the Assign Lenses to Camera dialog.

Add Telescope Accessories

A camera often has optics inserted between it and the telescope. These optics come in the form of Barlow lenses or focal extenders, focal reducers and eyepieces. Taken together we call these accessories.

We assign accessories to the telescope itself, rather than to a particular camera. They are all available for use with each camera.

As many as ten different focal extenders or focal reducers may be assigned to a telescope. A focal extender increases the focal length of the telescope. A focal reducer reduces the focal length. A Barlow lens is a type of focal extender. Click the Add button to insert an extender/reducer into the list. Enter the magnification factor specified by the manufacturer. In some cases focal ratio is used instead. To convert a focal ratio to magnification factor divide the focal ratio by ten. For example, a f/5 focal reducer has a corresponding magnification factor of

0.5. To remove the selected extender/reducer click Delete.

Eyepieces

Eyepiece and Afocal projection both depend on eyepieces. To configure these you must first assign eyepieces to your telescope. This is done via the Assign Eyepieces on the Add/Modify Telescopes dialog.

Eyepiece Projection is the use of an eyepiece between the telescope and camera. The camera must not have a lens in place (see afocal projection for the lens case). The final image scale depends on both the focal length of the eyepiece and the separation between the focal plane of the camera and the eyepiece. Because eyepiece projection is so sensitive to how it is set up only one eyepiece projection case can be set up at a time, typically for only one camera. To enable eyepiece projection check the box labeled Eyepiece Projection. Click the hypertext to the right ("Configure" above) to open the Configure Eyepiece Projection dialog. Once configured the eyepiece and separation selected will be displayed in the hypertext.

Afocal Projection is the use of an eyepiece between the telescope and camera, with a lens in place on the camera. In the configuration the camera is placed against the eyepiece similarly to the eye. The final image scale depends on the camera lens and eyepiece selected. To enable afocal projection check the box labeled Afocal Projection. Click the hypertext to the right ("Configure" above) to open the Configure Afocal Projection dialog. If you change eyepieces you must return to this dialog to switch eyepieces. Once configured the eyepiece selected will be displayed in the hypertext.

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The Configure Eyepiece Projection Dialog

This dialog is used to set up a telescope and camera to use eyepiece projection. Eyepiece projection is the use of an eyepiece between the telescope and camera, with no lens in place on the camera. For the case where a camera lens is in place see afocal projection instead.

Configure for Eyepiece Projection

Select an eyepiece from the list. Eyepieces must first be assigned to the telescope via the Add/Edit Eyepiece button on the Add/Modify Telescopes dialog.

Enter the separation between the image plane of the camera and the eyepiece in mm.

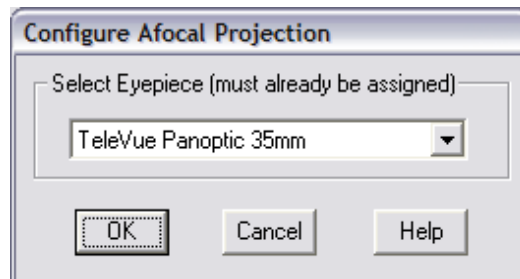
Calculate Optimum Distance to Camera

Use the calculator to compute the optimum distance *for planetary imaging* to enter above. The optimum distance is computed for the telescope/camera and filter *for the eyepiece selected*. The optimum distance is the distance at which the resolution of the camera is reached.

-0-

The Configure Afocal Projection Dialog

This dialog is used to set up a telescope and camera to use afocal projection. Afocal projection is the use of an eyepiece between the telescope and camera with a lens in place on the camera. For the case where there is no lens on the camera see eyepiece projection instead.

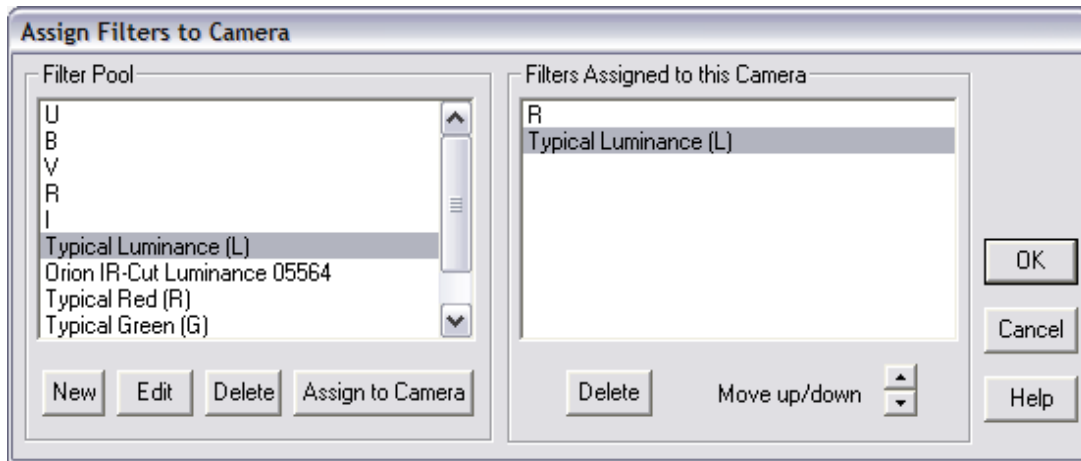


Select the eyepiece to use in conjunction with the camera. Eyepieces must first be assigned to the telescope via the Add/Edit Eyepiece button on the Add/Modify Telescopes dialog.

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The Select Filters to use with Camera Dialog

This dialog is used to assign filters to a camera from a list of pre-defined filters. You may also add or delete filters to/from the pre-defined list (pool).



The Filter Pool contains a list of pre-defined filters that can be assigned to a camera. To assign a filter from the pool, select it from the list and click on the **Assign to Camera** button (or double-click on it). The filter will be added to the assigned filters list on the right.

To delete a filter from the list of assigned filters select the filter in the *Filters Assigned to the this Camera* list and click on the **Delete** button.

To change the order of the filters assigned to the camera, select one of the filters and click on the up/down control to move the selection up or down in the list.

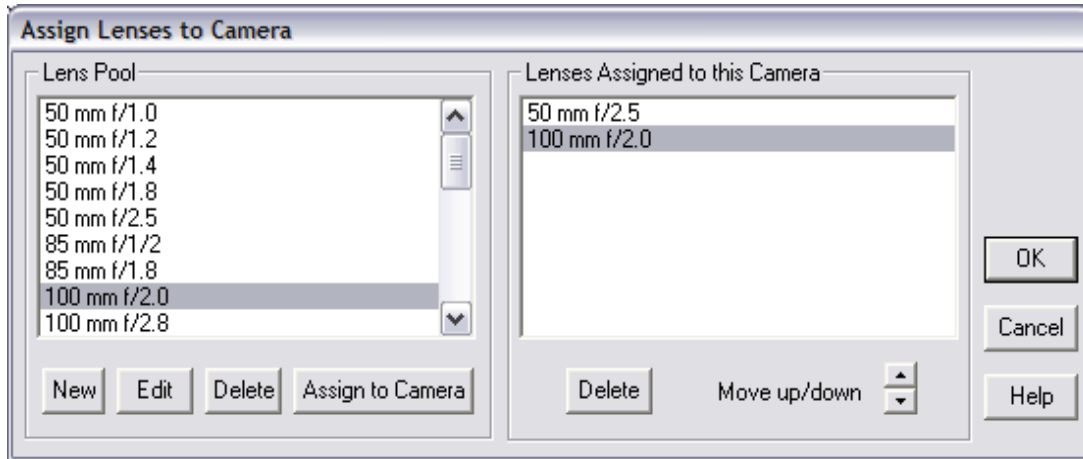
To create a new filter click the **New** button. This will open the *Edit Filter Data* dialog. Enter the data for your new filter. The new filter will appear at the bottom of the filter pool, where it can now be assigned to cameras.

To edit an existing filter in the pool click the **Edit** button. This will open the *Edit Filter Data* dialog.

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The Select Lenses to use with Camera Dialog

This dialog is used to assign lenses to a camera from a list of pre-defined lenses. You may also add or delete lenses to/from the pre-defined list (pool).



The Lens Pool contains a list of pre-defined lenses that can be assigned to a camera. To assign a lens from the pool, select it from the list and click on the **Assign to Camera** button (or double-click on it). The lens will be added to the assigned lens list on the right.

To delete a lens from the list of assigned lenses select the lens in the *Lenses Assigned to the this Camera* list and click on the **Delete** button.

To change the order of the lenses assigned to the camera, select one of the lenses and click on the up/down control to move the selection up or down in the list.

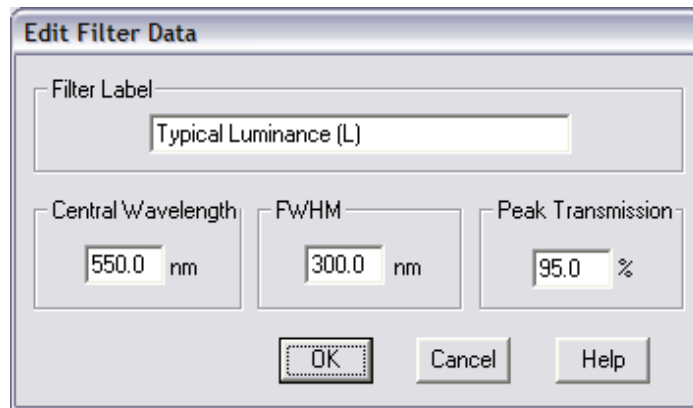
To create a new lens click the **New** button. This will open the *Edit Lens Data* dialog. Enter the data for your new lens. The new lens will appear at the bottom of the lens pool, where it can now be assigned to cameras.

To edit an existing lens in the pool click the **Edit** button. This will open the *Edit Lens Data* dialog.

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The Edit Filter Data Dialog

This dialog is used to edit the data for a filter in the filter pool. The pool is the list of filters you can assign to any camera. Although filter data can be edited at any time, this dialog is typically used when adding a new filter to the pool.



Enter a descriptive Filter Label. Although long labels are allowed, it is best to keep the labels short for best readability within the program.

Appropriate Filters

Not all filters can be accurately modeled by SkyTools. The model works best for broadband continuum filters. Narrow band filters, and in particular emission line filters, cannot be accurately modeled. This is as much due to a lack of emission line strength data as it is to the model. Creating narrow band filters that isolate an emission line is possible, but the results will be highly suspect.

Wavelength Units

The wavelengths entered on this dialog are in nanometers (nm). Here are the conversions from other units to nm:

1 nm = 10 (Å) Angstroms
1 nm = 0.001 microns

The Central Wavelength is the peak wavelength of the filter in nm.

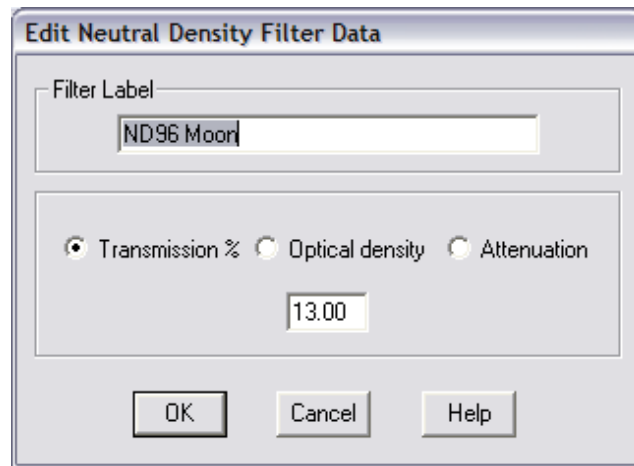
The FWHM (Full Width at Half Max) defines how wide the filter is in nm.

The Peak Transmission is a measure of how much light is transmitted at the central wavelength in percent.

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The Edit Neutral Density Filter Dialog

This dialog is used to edit the data for a neutral density filter in the filter pool. The pool is the list of filters you can assign to any camera. Although filter data can be edited at any time, this dialog is typically used when adding a new filter to the pool.



Enter a descriptive Filter Label. Although long labels are allowed, it is best to keep the labels short for best readability within the program.

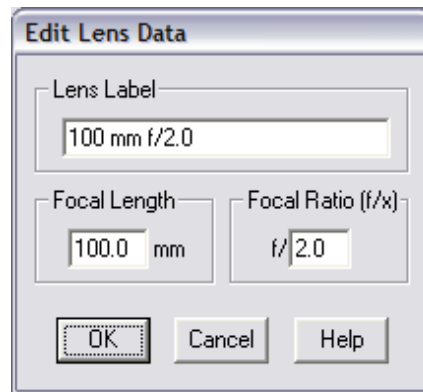
Filter Transmission

The "density" of a neutral density filter can be described in different ways, depending on the type of filter and the manufacturer. Select the appropriate density units from: Transmission (specified in percent), Optical Density, and Attenuation. Enter the value provided in the filter specifications.

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The Edit Lens Data Dialog

This dialog is used to edit the data for a lens in the lens pool. The pool is the list of lenses you can assign to any camera. Although lens data can be edited at any time, this dialog is typically used when adding a new lens to the pool.



Enter a Lens Label. Although long labels are allowed, it is best to keep the labels short for best readability within the program.

Enter the Focal Length of the lens in mm. Enter the Focal Ratio of the lens. The focal ratio is often described as "f/x" where the x is the focal ratio to enter. For example, f/2 is entered above.

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The Edit Camera Data Dialog

This dialog is used to edit the data for a camera in the camera pool. The pool is the list of cameras you can assign to any telescope. Although camera data can be edited at any time, this dialog is typically used when adding a custom camera to the pool. SkyTools uses this data to compute everything from the field of view to optimum sub-exposure times. Some of the data below can be difficult to obtain. It may be necessary to contact the camera or detector manufacturer for detailed technical specifications.

Camera Type

Three basic types of cameras are supported. Astronomical CCD cameras are the traditional electronic cameras used by astronomers for long exposure astrophotography. Digital Cameras are the so-called Prosumer digital cameras that can be used for general astrophotography, although their higher thermal noise levels limit exposure times. Video Cameras/Web Cams are devices that are ideally suited for planetary/lunar/solar imaging because they take many frames which can be stacked to defeat the effects of seeing.

Camera Model

The model name should be kept short to improve readability within the program

Pixel size

This is the size of each individual pixel on the detector in microns. Most detectors have square pixels so the two values will be equal.

Number of Effective Pixels

This is the number of pixels that are used by the camera. Enter the width X height. Note that the detector may in some cases have more pixels than are actually used. The image scale is

determined by these values in conjunctions with the pixel size, so it is important to use the actual number of pixels.

Built-in lens

Use this field to enter the focal length of a non-removable lens. This parameter applies to video/web cams only. In most cases this field will be left blank. For a digital camera without a removable lens add the built-in lens via the Assign Lenses button on the Select Cameras to use with Telescope dialog.

Gain

Enter the gain of the detector and electronics. Some astronomical CCD cameras have a different gain when binned than when unbinned. In all other cases a single gain is entered; the second field is left blank or equal to the first. Typical values are between 2 and 4.

Read Noise

Enter the readout noise in electrons.

Dark Signal

Enter the dark signal, or thermal noise, in electrons per second. This value is critical for digital cameras because the optimum sub-exposure time is determined by the dark signal rather than the sky. Unfortunately it can be difficult to obtain the dark signal for many digital cameras. Typical values for modern Prosumer digital cameras fall between 2 and 20 electrons/sec. If SkyTools suggests sub-exposure times that are too long for your camera, increase this value.

Bit Depth

The bit depth describes the dynamic range of the images obtained with the camera, or how large the ADU numbers can get. An 8-bit camera delivers signal values (ADU) from 0 to 255. A 16-bit camera delivers ADU from 0 to 65535. Few, if any, current cameras use 32 bits. If you don't know what to enter here use 16 bits.

Quantum Efficiency

The quantum efficiency describes how sensitive the detector used by the camera is over the light spectrum. A variety of detectors (or sensors) are available for selection. Determine which detector your camera uses and select it from the list. Note that there can be subtle differences between detectors. Some may have microlenses added and some will have a window. The QE values will differ in these cases.

To enter your own custom values select Manual Entry. Enter the absolute quantum efficiency at each wavelength, in percent. The values for a given detector often must be read from a graph of quantum efficiency vs. wavelength from the technical specifications for the detector. Sometimes graphs of relative quantum efficiency are shown. These will peak at 100%. It is important that absolute values be used instead. Zero values may be left blank. It may help to note that 1 nm = 10 Angstroms = 0.001 microns.

Optional Built-in Guider Chip

Some astronomical CCD cameras, most notably from SBIG, have a built-in offset guider chip. This is a second, smaller, detector that is usually aligned along the (top) long side of the main detector. SkyTools will use this information to plot the relative position of the guide detector on the Interactive Atlas chart. Click the box next to Enable to enable the use of such a guide chip. The Offset from CCD center describes where the center of the guide detector is relative to the center of the main detector. The first value is the horizontal distance from the center of the guide detector to the center of the main detector in mm. In all current SBIG cameras this value is zero, and can be left blank. The second value describes how far the center of the guide detector is above the center of the main detector in mm.

As an example, if the main detector has a vertical extent of 8 mm, and the guide detector is placed at a distance of half that away (4 mm), the center of the of the guide detector would be positioned on the top edge of the main detector. Likewise, if it were positioned at -4 mm away, the center of the guide detector would be on the bottom edge of the main detector. Typically the guide detector is placed just above the main detector such that they are separated by only a

few mm. To place the bottom edge of the guide detector at the top edge of the main detector, use the following formula, where H is the full height of the main detector in mm, and h is the full height of the guide detector: $y = H/2 + h/2$.

As with the main detector the pixel size is the size of each individual pixel on the detector in microns. Most detectors have square pixels so the two values will be equal. Also enter the number of pixels for the width X height of the detector.

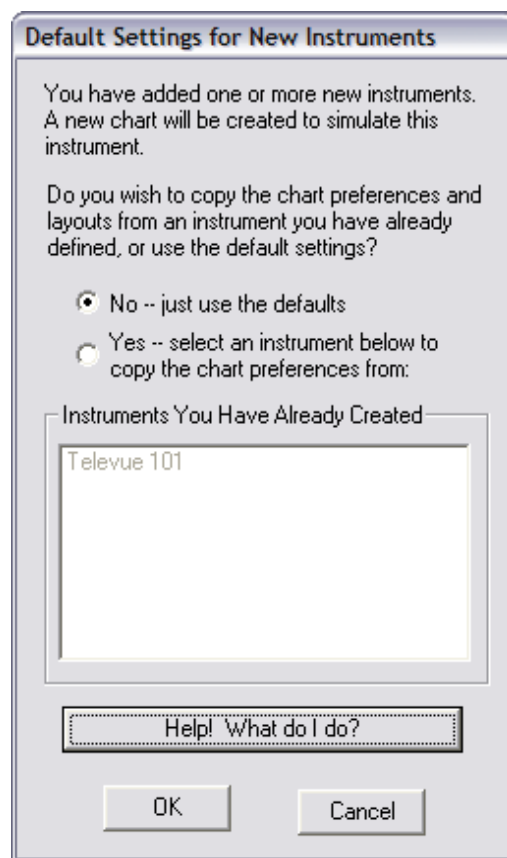
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The Default Settings for New Instrument Dialog

Is this your first telescope? If so, select **No** and click **Ok** now. This dialog is of no importance to you at this point in time. Otherwise, read on...

When you create a new telescope or binocular a custom chart is also created. This chart will simulate the view with this new instrument. Rather than stick you with our default settings each time you create a new chart for a new instrument, this dialog gives you the option to copy the preference settings from an existing chart (created for an existing instrument).

As an example, lets say you buy a new telescope down the road. You have your simulation chart for your old telescope customized just the way you want it, with nice fonts and a great color scheme. Do you have to start all over from scratch for your new telescope? Nope. That's where this dialog comes in. When you create a new telescope you can use this dialog to inherit the chart preferences from your old telescope.



To apply the defaults shipped with SkyTools select the **No -- just use the defaults** radio button and click **Ok**.

To inherit the settings from another chart that is defined for a previously defined telescope, select the **Yes -- select an instrument below to copy the chart preferences from** radio button. Choose an instrument from the list. Click **Ok**.

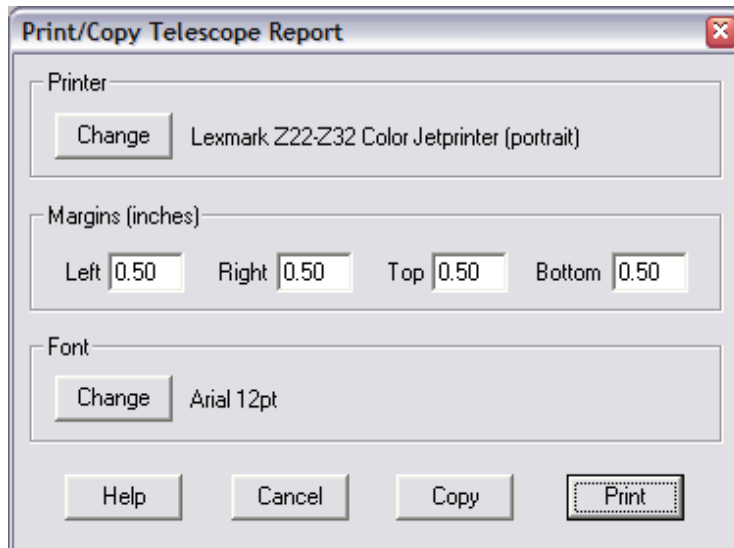
Why isn't my telescope listed? That's ok, it's not supposed to be. This dialog is used to copy chart settings from an existing telescope to the new telescope you just created. You can't copy a telescope's settings to itself, so naturally the telescope(s) you just created aren't listed. Simple select **No** and press **Ok**.

Are you still unsure what to do? If so select **No and click **Ok**!**

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The Print/Copy Dialog

This generic dialog is used to print or copy to the clipboard various information, such as telescope reports.



Printer

Select the printer and paper orientation. The name of the printer and the current paper orientation are displayed. To change the printer or paper orientation, click the **Change** button. The Printer Setup dialog will appear.

Margins

Use this property to set the page margins in inches.

Font

Use this property to change the base font size and style. Click the **Change** button to modify the font.

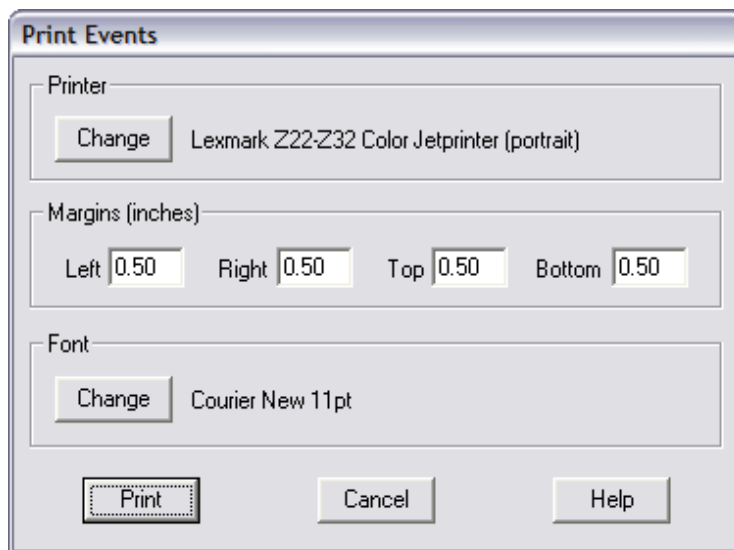
Click the **Print** button to start printing.

Click the **Copy** button to send the text to the clipboard for pasting into any word processor or text editor.

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The Print Dialog

This generic dialog is used to print various information, such as event lists.



Printer

Select the printer and paper orientation. The name of the printer and the current paper orientation are displayed. To change the printer or paper orientation, click the **Change** button. The Printer Setup dialog will appear.

Margins

Use this property to set the page margins in inches.

Font

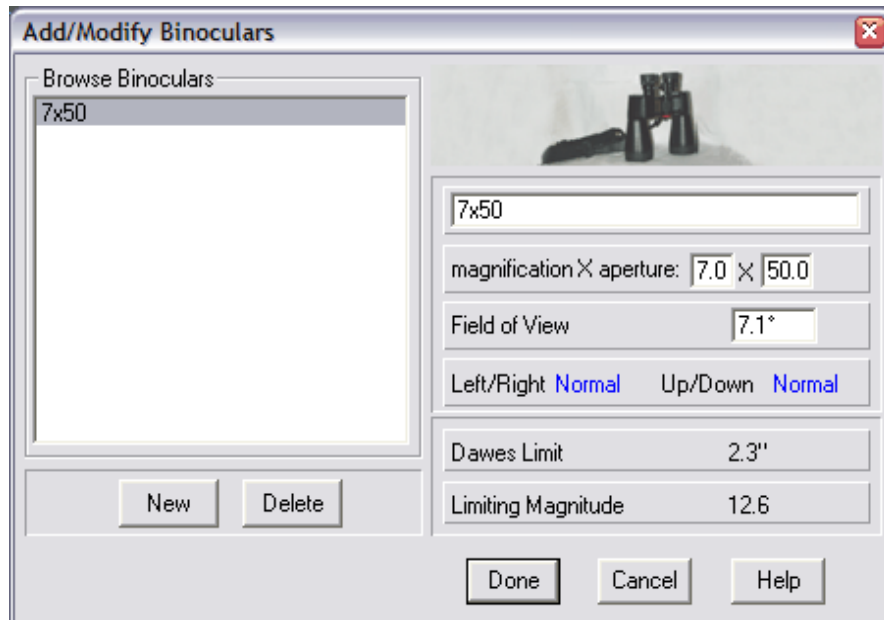
Use this property to change the base font size and style. Click the **Change** button to modify the font.

Click the **Print** button to start printing.

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Binoculars Dialog

This dialog is used to set up binoculars for use with SkyTools. Each pair of binoculars listed here will have a custom finder chart created for it in the chart list.



To add a pair of binoculars click on the New button. A default binocular will be added to our list. Edit the description of your binoculars in the field in the upper right (where it says "7x50" above). Enter the magnification of the binoculars and aperture (in mm). These numbers are usually inscribed on the binoculars. For example, a pair of 7x50 binoculars have a magnification of 7, and an aperture of 50mm.

The Field of View is also an important parameter because it is drawn on the simulation chart. Some binoculars have the field of view inscribed on them. Otherwise check the manufacturer's specifications.

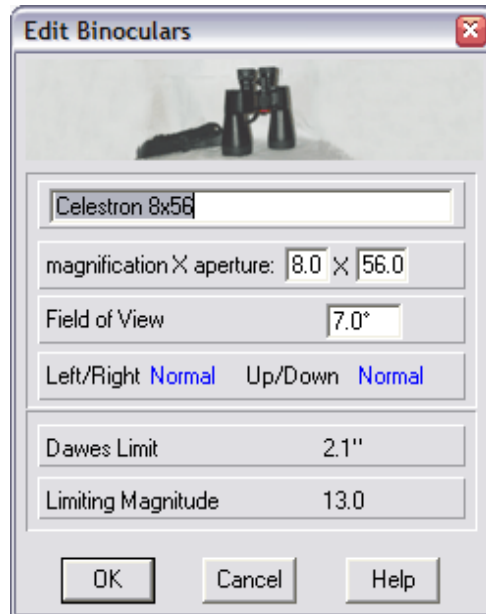
If you use a mirror device with your binoculars you will need to set the Left/Right and Up/Down orientation to match your view.

To delete the selected pair of binoculars either click on the Delete button or press the Delete key on the keyboard.

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The Edit Binoculars Dialog

This dialog is used to edit the binocular data entered for a log entry. Changes made in this dialog will affect the log entry only: they do not affect your global binocular settings.



Edit the description of your binoculars in the field at the top.

Edit the magnification of the binoculars and aperture (in mm). These numbers are usually inscribed on the binoculars. For example, a pair of 7x50 binoculars have a magnification of 7, and an aperture of 50mm.

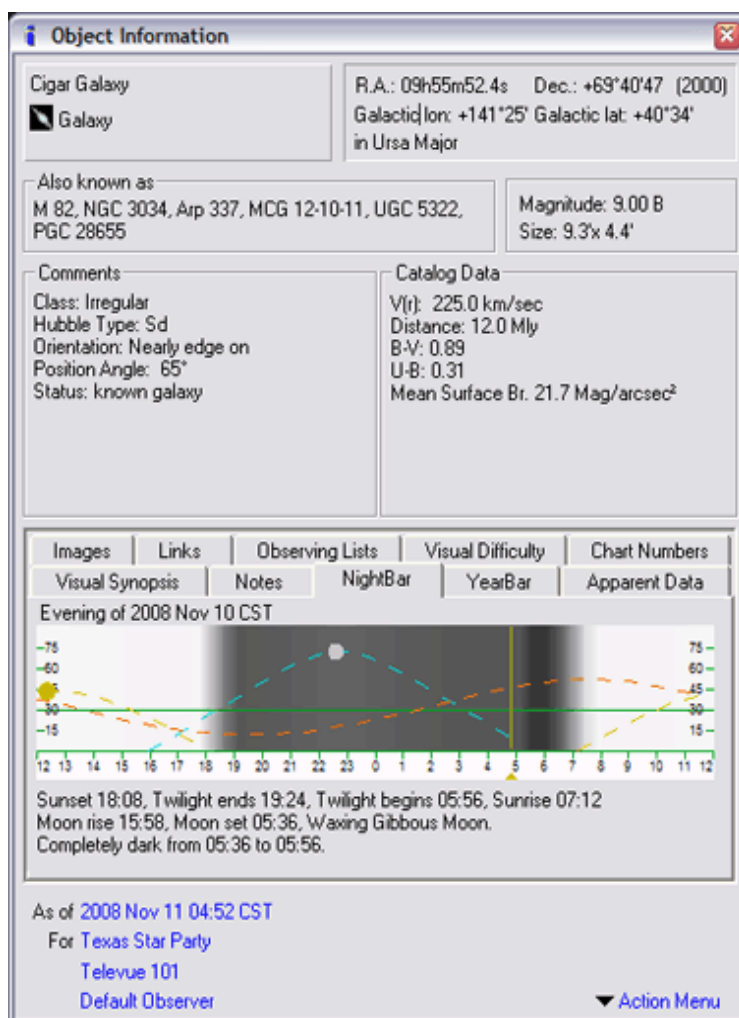
The Field of View is also an important parameter because it is drawn on the simulation chart. Some binoculars have the field of view inscribed on them. Otherwise check the manufacturer's specifications.

If you use a mirror device with your binoculars you will need to set the Left/Right and Up/Down orientation to match your view.

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The Object Information Window

SkyTools is *object oriented* in the sense that all of the tools revolve around some sort of selected object. As such, the object information window is much more than just a list of catalog data - it brings together *all* of the information related to each object and also serves as one of the many hubs of SkyTools.



The exact appearance of this window depends on the type of object displayed. In general, the primary designation and object type are displayed in the upper left. The J2000 position, galactic coordinates and constellation are displayed in the top right.

The Also known as property lists all of the catalog designations for this object that SkyTools is aware of. You may use any of these designations in SkyTools to refer to this object.

Various catalog and orbit data will also be displayed, as appropriate.



Log Icon

If the object has a log entry a logbook icon will appear next to the designation. Click the icon to open view the log entries for this object.

Action Menu

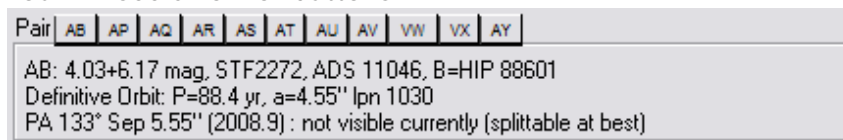
Click to see a menu of operations that can be performed using the current object as a starting point.

Changing Current Data

The current date, observing location, instrument, and observer appear as hypertext at the bottom left of the dialog. These values were inherited from the context of the dialog when it was started. To change the date/time click the [As](#) of hypertext. To change the location, instrument, or observer click on the appropriate hypertext following [For](#). The Apparent Data, NightBar, YearBar, Visual Difficulty, and Visual Synopsis tabs are computed for the date/time, location, instrument and observer.

Multiple Star Systems

You will see a row of buttons:



Multiple star system are broken down into star pairs. Each of the buttons represents one pair. The primary (brightest) star of the system is identified with the letter "A" by convention. The next brightest star is "B", and so on. The "AB" button will describe the A and B pair of stars in the information window below the buttons.

Deciphering the Star Pair Information

The first line lists the magnitudes of the two stars as "magnitude of first star + magnitude of second." Following the magnitudes are the double star catalog designations for the pair, and in some cases, the identification of the second component star in the SkyTools database.

In the example we have the following information:

- Star "A" is 4.03 magnitude
- Star "B" is 6.17 magnitude
- The WDS ID is STF2272
- The ADS catalog number is 11046
- Star "B" is HIP 88601 in the SkyTools database.

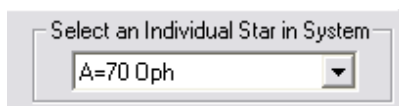
If there is an orbit for this pair, the quality of the orbit, orbital period, and semi-major axis will be listed next. The third line indicates the position angle and separation of the two stars, measured from the "A" star to the "B" star.

In the example above we have the additional information:

- This pair has an orbit which is considered to be definitive
- The orbital period (how long it take star "B" to apparently orbit once around star "A") is 88.4 years.
- The semi-major axis of the apparent orbit is 4.55 seconds of arc. This is essentially half the long dimension of the orbit on the sky.
- The position angle (angle, measured from north from star "A" to star "B") is currently 133 degrees.
- The current separation of the two stars is 5.55 arc seconds (for the date 2008.9)

Selecting a Component Star in the System

Many of the stars in a double star system are in the database as single stars. Each of these component stars have their own Object Information that can be displayed. To view the object information for a component star select it from the menu:



Tabs

The tabs at the bottom of the dialog bring together additional information about the object.

Visual Synopsis Tab

A visual synopsis is a summary of the current and future visibility of an object. This may include everything from when comet Halley will return to information about satellite events for Jupiter.

Notes Tab

The Notes tab is where you type (or paste) user notes and 5-star ratings for this object. Notes can be of any length. The headline is a short description that appears in a fly-up window when you pass the cursor over the object in an observing list. The five-star rating can be displayed in a column of your observing list.

Notes Groups

Notes are organized into Notes Groups. Be sure to select the appropriate group to store your notes and ratings in. Only one note group at a time can be made active when viewing an observing list on the Nightly Planner or Real Time tools. The active note group is selected on that tool. As you pass your cursor over the observing list the headlines from the active notes group will be displayed as flyups. The ratings column of the observing list will display ratings from the active group. And when you open an object information window from an observing list the active notes group will be automatically selected in the Notes tab.

The notes in a specific group can also be shared along with an observing list. Creating a notes group for a use with an observing list is a good way organize your notes. For instance, you could create a "Herschel 400" notes group and enter the original notes by the Herschels for each object in the Herschel 400 list. When you share your version of the Herschel 400 list include the notes from your Herschel group. When another person imports your Herschel 400 list they will also import a new Herschel 400 notes group, which they can make active when viewing that observing list.

Notes groups can also be used to organize notes or ratings by observer. Each observer using SkyTools can create their own notes group where they can enter their own notes, headlines, and object ratings.

The top most group selection is Show All. If selected the notes from each group will be displayed, one after the other. In this mode ratings are not displayed.

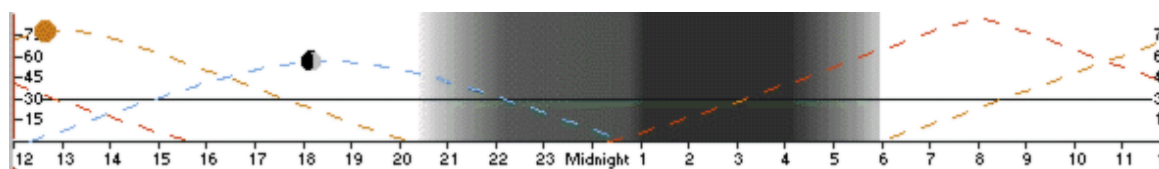
Ratings



To edit a 5-star rating right-click on it and select the number of stars you wish to assign. No stars means no rating has been assigned. The rating is located just to the right of the Headline. Remember, a specific notes group must first be selected; the ratings will be set for that notes group only.

NightBar Tab

The NightBar is displayed in the same way as the NightBar on the Nightly Planner and Real Time tools. This window speaks volumes about the night selected. The NightBar displays how dark the sky will be as a function of local time (labeled across the bottom). The effects of moonlight and twilight are accurately represented.

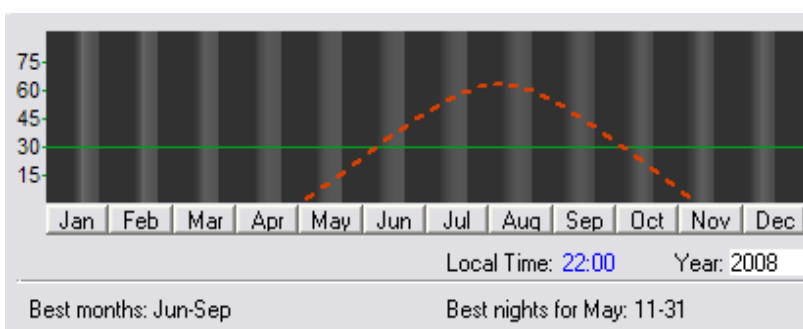


Also represented are lines that display the altitudes of various objects vs. time. The horizon is at the bottom of the NightBar and the zenith is at the top. The green horizontal line represents Two Airmass, which is approximately 30 degrees above the horizon. It is always preferable to view objects when they are above this line. The yellow line represents the altitude of the sun, the light blue is the moon, and the red line represents the object.

According to the NightBar then, the sun sets at approximately 20:30, with twilight ending at about 22:10. The moon is up at that time and doesn't set until nearly 1:00 AM. This represents the start of the dark period, which ends as twilight begins at around 4:30 AM. The object (red line) rises at about the time the moon sets, but is best viewed after 3:00 AM.

YearBar Tab

The YearBar works similarly to the NightBar except that it displays an entire year at a glance.



The altitude of the object is drawn as a red line. The sky darkness is drawn in the background. It is important to remember that the graphic displays the daily altitude and sky darkness *at a fixed time (22:00 above)*. The prime months to observe this object *at the selected time* are indicated on the lower left.

Type in a year. Click the time hypertext to change the time.

Click a month button to see the best dates to observe the object *at the selected time* during this month.

Apparent data Tab

The Apparent Data tab lists various timely information about the object for the date, time and location indicated at the bottom of the dialog.

Images Tab

The Images tab is where the user can associate images with the object. Each associated image consists of a file name/path to the image and a description.

The descriptions of the images that have been associated are listed. To view an image, double-click on it, or select it and click View. Edit the image description or file path by clicking the Edit button. Delete the association (not the image) by clicking Delete.

To add a new image, click the New button. Enter the path to the image file directly or use the Browse button to locate it. Type a description into the description field (this defaults to the file name).

Links Tab

The Links tab is where the user can associate web links (URL's) with the object. Each

associated link consists of a URL and a description.

The descriptions of the links that have been associated are listed. To view a link in your web browser, double-click on it or select it and click View. Edit the link description or URL by clicking the Edit button. Delete the association by clicking Delete.

To add a new link, click the New button. Enter the URL or paste it in from your browser. Type a description into the description field (this defaults to the file name).

Observing Lists Tab

This tab lists the observing lists that this object can be found in. Double-click on an observing list to open it in the Nightly Planner or Real Time tool (if open).

Visual Difficulty Tab

This tab lists the approximate visual difficulty of this object in each instrument set up for use by SkyTools.

The Current column indicates the visual difficulty for the date/time, observer, and location indicated at the bottom of the dialog.

The Best column indicates the visual difficulty under optimum conditions at the location indicated at the bottom of the dialog.

Visual Difficulty is an Estimate

It is important to remember that the visual difficulty is an estimate. It is meant to give a rough idea of the visibility of an object. Objects that SkyTools claims are not visible may well be visible, and objects that SkyTools claims are visible may not be. This uncertainty comes about primarily due to a lack of quality data for astronomical objects. Some types of objects will have more reliable estimates than others, and objects with less reliable data will have a correspondingly less reliable estimate.

Chart Numbers Tab

This tab indicates the chart numbers where the object can be found on various popular star atlases.

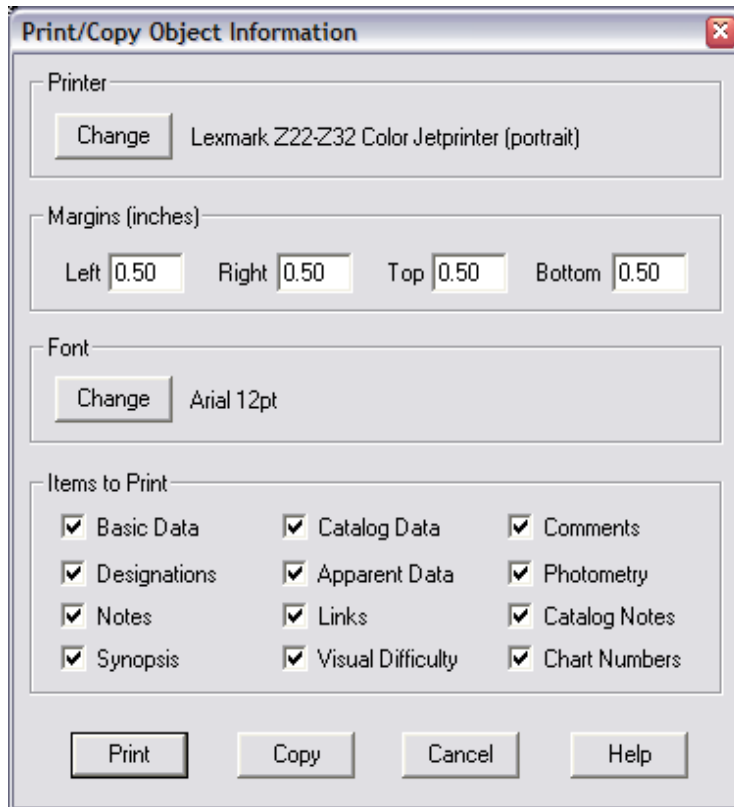
Catalog Notes Tab

The Catalog Notes tab is primarily used to display notes for this object from various catalogs.

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The Print/Copy Object Information Dialog

This dialog is used to print object information or to copy it to the clipboard for pasting into any word processor or text editor.



The Printer, Margins, and Font properties affect the printed output only.

Use the Printer property to select the printer and paper orientation. The name of the printer and the current paper orientation are displayed. To change the printer or paper orientation, click the Change button. The Printer Setup dialog will appear.

Use the Margins property to set the page margins in inches.

Use the Font property to change the base font size and style. Click the Change button to modify the font.

Use the Items to Print property to choose the information to be output:

- Basic Data - this is the information displayed in the upper-right corner of the dialog. It includes the position, magnitude, size, and galactic coordinates.
- Catalog Data - this is additional data that appears on the right side of the dialog, including radial velocity, distance, orbit data for solar system objects, etc.
- Comments - these are items primarily from the left side of the dialog. They include Hubble class for galaxies, the current status for solar system objects, etc. In addition, this check box will output multiple star component information.
- Designations - these are the alternate designations for the object,
- Apparent Data - this is the data displayed on the Apparent Data tab.
- Photometry - stellar photometric magnitudes and color indices in various magnitude systems.

- Notes - user notes from the Notes tab.
- Links - user web links from the Links tab.
- Catalog Notes -- these include descriptions of the variability of variable stars by type and the chart numbers where the object can be found on various atlases.
- Synopsis - the visual observing synopsis from the Synopsis tab.
- Visual Difficulty - visual difficulty ratings by telescope from the Visual Difficulty tab.
- Chart Numbers -- these are the chart numbers where the object can be found on various atlases.

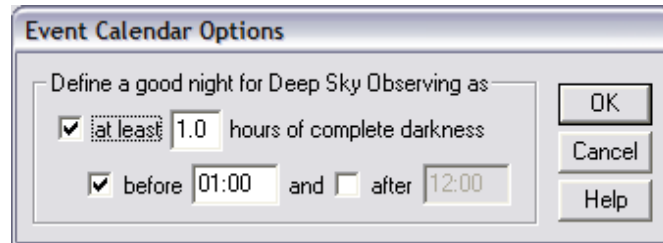
Click the Print button to start printing.

Click the Copy button to send the text to the clipboard for pasting into any word processor or text editor.

-0-

Event Calendar Options Dialog

This dialog is used to configure the display of the Telescope icons on the Event Calendar which signify good nights for deep sky observing.



Enable the *Good Night for Deep Sky Observing* Icons

Check the box next to at least... to enable the good night for observing icons.

Define a Good Night

Enter the minimum number of hours of complete darkness you require.

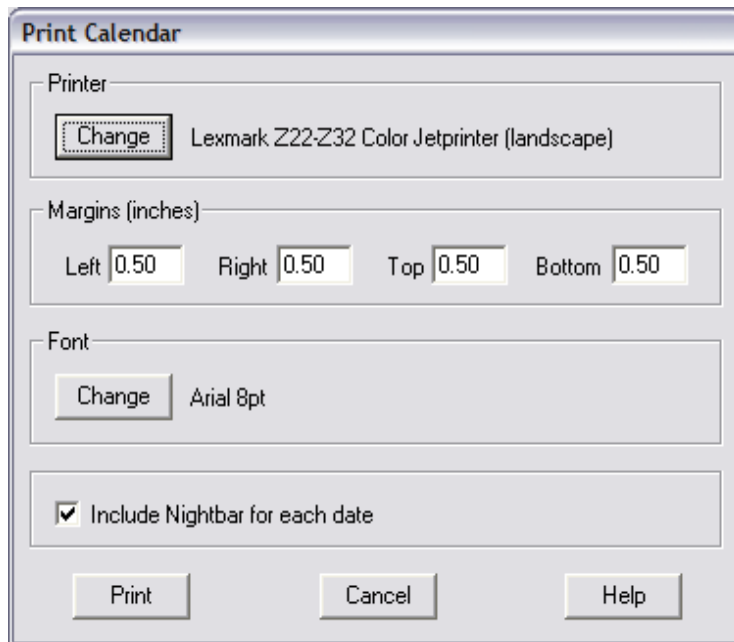
You may also define a time period during which the minimum number of hours of darkness must occur within. The time range is defined by the *after* and *before* times.

In the example above, only those nights with at least one hour of darkness that occurs before 1:00 AM will be considered good for observing. These nights will get a telescope icon on the calendar.

-0-

The Print Calendar Dialog

This dialog is used to print the Events Calendar.



Printer

Select the printer and paper orientation. The name of the printer and the current paper orientation are displayed. To change the printer or paper orientation, click the **Change** button. The Printer Setup dialog will appear.

Margins

Use this property to set the page margins in inches.

Font

Use this property to change the base font size and style. Click the **Change** button to modify the font.

Check the box next to **Include Nightbar for each date** to include little shaded NightBars like the one found on the Nightly Planner at the top of each day.

Click the **Print** button to start printing.

-0-

The Get Digital Sky Survey Image Dialog

This dialog is used to download a *Digital Sky Survey* (DSS) image from the Internet. The downloaded images can be associated with an object and are automatically made *plottable* on SkyTools charts. You must be connected to the Internet for this function to work.

Position of Image Center

Enter the position at which to obtain an image. As the title suggests, the center of the image will be at the position indicated.

You may enter a position directly via the *RA* (Right Ascension), *Dec* (Declination) and *Equinox* fields. The equinox will be assumed to be standard J2000 if left blank.

Or you may obtain the position from an object in the SkyTools database by clicking the *Get position from object* button. This button will start the Object Requestor. Use this tool to select an object.

If the position is taken from an object the final image can be associated with that object; it will show up in the Images tab of the Object Information window.

Enter coordinates using the standard SkyTools coordinate entry format (RA is in hours, Dec is in degrees, values may be decimals, or separated by colons or spaces in time format - e.g. "10.5" or "10:30:00" or "10 30 00").

Often the object or position is already set when you start this dialog (taken from the object clicked-on in an observing list, for instance).

DSS Source (server)

Select the web server to access to generate the image. The SkyView and STScI sites offer the second-generation sky survey, which is of higher quality.

Survey

Select which sky survey to use when generating the image. The second-generation sky survey offers higher quality images in two colors: the *red* images are more sensitive to red light and often show HII regions well. The *blue* images are more sensitive to blue light and are often best for galaxies, reflection nebulae, and most planetary nebulae. As of this writing, the blue images are not generally available for declinations less than zero.

The SkyView server has more selections, including an IR image. H-Alpha surveys (low resolution), Sloan Digital Sky Survey images (only available in the Northern Hemisphere), and 2MASS IR images are also available.

File Name

Enter a file name for the image. File names default to the name of the object or the position in the sky plus the survey used, but you can edit them to just about anything you wish.

Image Size

Enter the size of the image on the sky in arc minutes. Beware of images that are too large. In general, first generation DSS images are limited to 60' and second generation DSS images are limited to 30'. Some servers will generate an error for large images. Others will take so long to respond that a time out may occur, depending on the server load.

Plottable Image Group

All plottable images are assigned to a group. Only one plottable images group can be active for display in a chart view background at a time. The active plottable images group is selected via the View Controls dialog for the chart view.

Image Link

Plottable images can be optionally assigned to objects via an Image Link. The plottable image must be associated with a specific object (rather than a location in the sky). To create an image link click the check box next to Associate Image with... (object name).

Select an Image Group to assign the image link to. Image links are organized into groups. You can think of groups as folders where links are kept. Groups of image links can be easily shared with others as a SkyTools .stx file.

Default Display Action

For a plottable image to appear on a chart view background three conditions must be met: the correct plottable images group must be selected in the View Controls dialog, the display of plottable images must be selected (also in the View Controls dialog) and the image itself must be enabled for display.

To enable/disable a plottable image for display select Plot Image in views. To display only the image outline select Plot Image outline.

The display status of all images can be overridden from the View Controls dialog by selecting Always Plot Image Data.

View image on completion

Check this box to open the image in the Image Viewer once the download is complete.

Some Notes About DSS Images

Not all images have the same quality or resolution. Some images may not be available in all parts of the sky. Some images will return an error if they are too large, or in other cases it will take so long for them to be generated that the dialog will time out with an error.

Some sources do a better job of preparing the image as you have requested it and images may be prepared poorly in some parts of the sky. A poorly prepared image may not line up with the stars on the SkyTools chart. In these cases it is possible to manually change the rotation angle or position of the image center to make the stars match better. These parameters can be edited via the Plottable Images Parameters dialog, which can be launched via the Plottable Images tab of the Data Manager or via a right-click on the corner of a DSS image drawn in a chart background

-0-

The Get Multiple Digital Sky Survey Images Dialog

This dialog is used to download multiple *Digital Sky Survey* (DSS) images from the Internet. Multiple objects are selected via the observing list displayed on the Nightly Planner or Real Time tools. The downloaded images can be associated with the objects and are automatically made *plottable* on SkyTools charts. You must be connected to the Internet for this function to work.

DSS Source (server)

Select the web server to access to generate the images. The SkyView and STScI sites offer the second-generation sky survey, which is of higher quality.

Survey

Select which sky survey to use when generating the image. The second-generation sky survey offers higher quality images in two colors: the *red* images are more sensitive to red light and often show HII regions well. The *blue* images are more sensitive to blue light and are often best for galaxies, reflection nebulae, and most planetary nebulae. As of this writing, the blue images are not generally available for declinations less than zero.

Thy SkyView server has more selections, including an IR image. H-Alpha surveys (low resolution), Sloan Digital Sky Survey images (only available in the Northern Hemisphere), and

2MASS IR images are also available.

Image Size

Select Adjust to size of object to download images that will be large enough include the object comfortably. This selection can lead to errors for very large objects due to limitations on the image sizes. Unfortunately the maximum size of an image depends on the server, survey, and even the server load, so it can be a matter of trial of error.

Alternately select Enter one size for all and an image size on the sky in arc minutes. Again, beware of images that are too large. In general, first generation DSS images are limited to 60' and second generation DSS images are limited to 30'. Some servers will generate an error for large images. Others will take so long to respond that a time out may occur, depending on the server load.

If Image Already Exists

File names will be automatically generated based on the name of the object and the survey selected. Choose the action to be taken if an image file of the same name already exists. Choose to Skip the download, Replace the existing file, or create a unique file name by appending a number to the file name.

Plottable Image Group

All plottable images are assigned to a group. Only one plottable images group can be active for display in a chart view background at a time. The active plottable images group is selected via the View Controls dialog for the chart view.

Image Link

Plottable images can be optionally assigned to objects via an Image Link. To create an image link for each object check the box next to Associate Image with object.

Select an Image Group to assign the image links to. Image links are organized into groups. You can think of groups as folders where links are kept. Groups of image links can be easily shared with others as a SkyTools .stx file.

Default Display Action

For a plottable image to appear on a chart view background three conditions must be met: the correct plottable images group must be selected in the View Controls dialog, the display of plottable images must be selected (also in the View Controls dialog) and the image itself must be enabled for display.

To enable/disable a plottable image for display select Plot Image in views. To display only the image outline select Plot Image outline.

The display status of all images can be overridden from the View Controls dialog by selecting Always Plot Image Data.

Progress Results

Any errors encountered will be listed here along with the total number of files successfully downloaded.

Some Notes About DSS Images

Not all images have the same quality or resolution. Some images may not be available in all parts of the sky. Some images will return an error if they are too large, or in other cases it will take so long for them to be generated that the dialog will time out with an error.

Some sources do a better job of preparing the image as you have requested it and images may be prepared poorly in some parts of the sky. A poorly prepared image may not line up with the stars on the SkyTools chart. In these cases it is possible to manually change the rotation angle or position of the image center to make the stars match better. These parameters can be edited via the Plottable Images Parameters dialog, which can be launched via the Plottable

Images tab of the Data Manager or via a right-click on the corner of a DSS image drawn in a chart background.

-0-

The Import Plottable Image Dialog

This dialog is used to enter the information necessary to make an image plottable (displayable in the background) on the SkyTools charts.

File to Import

Enter the full path and file name of the file you wish to "make plottable." If you don't recall the full path to the image, use the Browse button to browse to it.

Image Group to place image into

All plottable images are assigned to a group. Only one plottable images group can be active for display in a chart view background at a time. The active plottable images group is selected via the View Controls dialog for the chart view.

Position of Image Center

Enter the precise coordinates of the image center via the *RA* (Right Ascension), *Dec* (Declination) and *Equinox* fields. Enter coordinates using the standard SkyTools coordinate entry format (RA is in hours, Dec is in degrees, values may be decimals, or separated by colons in time format - e.g. "10.5" or "10:30:00" or " 10 30 00"). The equinox will be assumed to be standard J2000 if left blank.

Image Projection

If the image has been projected using a standard map projection, select the map projection. Otherwise select Unknown.

Height of Image

Enter the vertical extent of the image in arc minutes.

Image Type

Select the image file format. This can usually be discerned from the file name extension: .gif if GIF, .jpg or .jpeg is JPEG, .bmp is Window Bitmap, and .fits or .fts is FITS format

Rotation Angle

Enter an angle from the North/South (J2000) line in degrees. This field may be left blank to indicate that the image is properly aligned in north/south direction relative to the J2000 equinox.

Image Display

For a plottable image to appear on a chart view background three conditions must be met: the correct plottable images group must be selected in the View Controls dialog, the display of plottable images must be selected (also in the View Controls dialog) and the image itself must be enabled for display.

To enable/disable a plottable image for display select Plot Image in views. To display only the image outline select Plot Image outline.

The display status of all images can be overridden from the View Controls dialog by selecting Always Plot Image Data.

Comment

Enter any sort of comment or description of the image.

-0-

The Plottable Image Parameters Dialog

This dialog is used to edit the information used to plot an image on the charts. Use this dialog to edit the plottable image data or to assign the image to another plottable image group.

Position of Image Center

Enter the precise coordinates of the image center via the *RA* (Right Ascension), *Dec* (Declination) and *Equinox* fields. Enter coordinates using the standard SkyTools coordinate entry format (RA is in hours, Dec is in degrees, values may be decimals, or separated by colons in time format - e.g. "10.5" or "10:30:00" or " 10 30 00"). The equinox will be assumed to be standard J2000 if left blank.

Image Projection

If the image has been projected using a standard map projection, select the map projection. Otherwise select Unknown.

Height of Image

Enter the vertical extent of the image in arc minutes.

Image Type

Select the image file format. This can usually be discerned from the file name extension: .gif if GIF, .jpg or .jpeg is JPEG, .bmp is Window Bitmap, and .fits or .fts is FITS format

Image Group to place image into

All plottable images are assigned to a group. Only one plottable images group can be active for display in a chart view background at a time. The active plottable images group is selected via the View Controls dialog for the chart view.

Comment

Enter any sort of comment or description of the image.

Rotation Angle

Enter an angle from the North/South (J2000) line in degrees. This field may be left blank to indicate that the image is properly aligned in north/south direction relative to the J2000 equinox.

Display on Chart

For a plottable image to appear on a chart view background three conditions must be met: the correct plottable images group must be selected in the View Controls dialog, the display of plottable images must be selected (also in the View Controls dialog) and the image itself must be enabled for display.

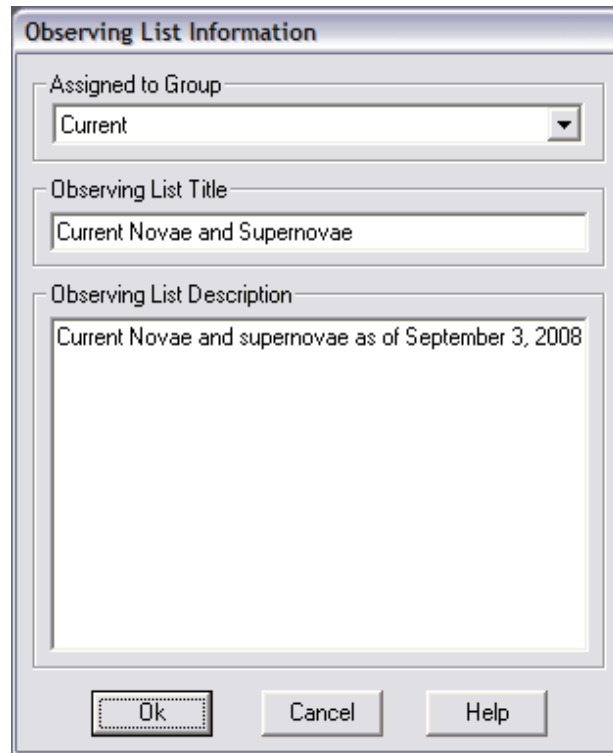
To enable/disable a plottable image for display check the box next to Display. Otherwise only an image outline will be drawn.

The display status of all images can be overridden from the View Controls dialog by selecting Always Plot Image Data.

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The Observing List Information Dialog

This dialog is used to describe an observing list. Any changes made will be saved after pressing Ok.



Assigned to Group

Indicates the observing list group that the list is currently assigned to. Select another observing list group to reassign it.

Observing List Title

This title will appear in the Observing Lists menu. Note that each observing list must have a unique title. If a new observing list is created with the same title as an old one, the old list will be replaced with the contents of the new one.

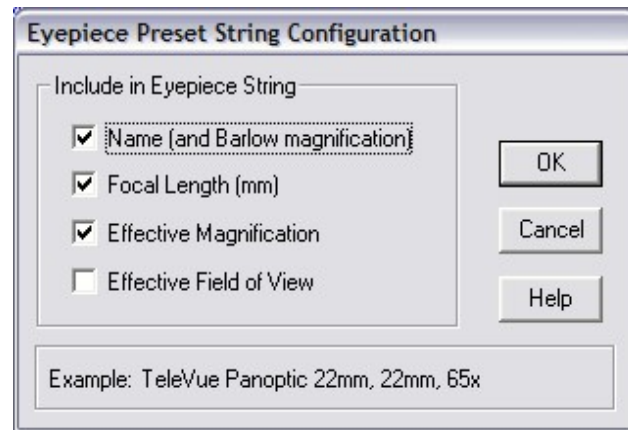
Observing List Description

Enter a description of the observing list in the *Observing List Description* field. This description can be of any length. You can paste text into it by right-clicking in the edit window and selecting Paste from the menu.

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The Eyepiece Preset String Configuration Dialog

This dialog is used to configure the eyepiece preset menu. When clicked, this menu will list all of the available eyepieces. When an eyepiece is selected the eyepiece description will be inserted into your observing log description.

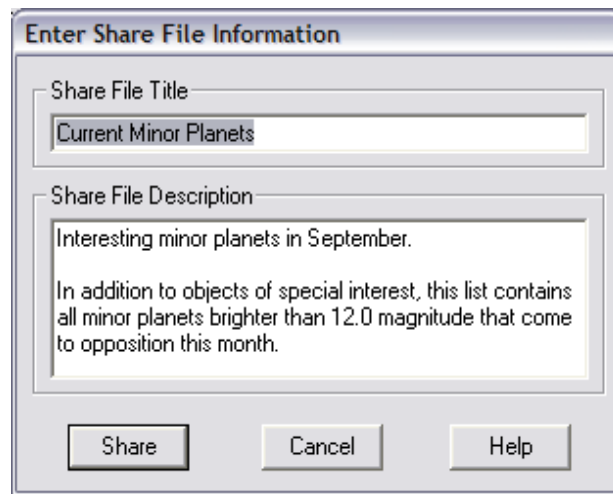


This preset applies to observations made with telescopes only. The purpose of this dialog is to choose what you wish to be copied into the descriptive window when you select a particular eyepiece. Choices include the name of the eyepiece, focal length, effective magnification, and effective field of view. For instance, you could configure the preset to automatically enter *TeleVue Panoptic 22mm, 65x, 54'* when you select this eyepiece from the preset menu.

-O-

The Share File Dialog

This dialog is used to enter a title and description for a SkyTools share data (.stx) file.



The title and description will be listed on the Import Shared Data tab of the Data Manager when shared data files are being browsed.

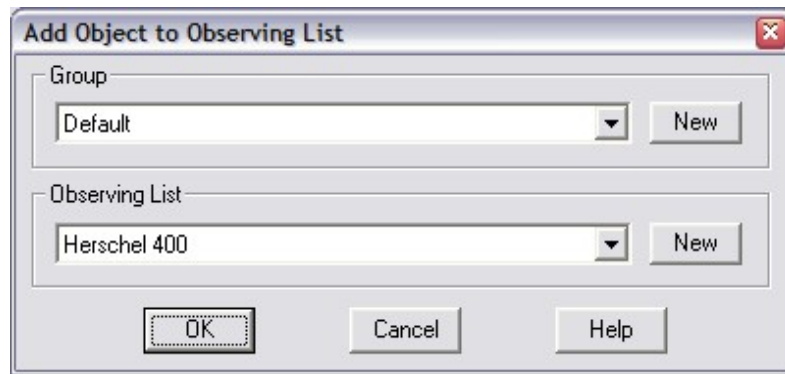
Once a title and description have been entered you will be prompted for a path and filename for your export file.

All shared data files must have the .stx file name extension or they will not be recognized as SkyTools files.

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The Add Object to Observing List Dialog

This dialog is used to add a single object to an observing list from the Object Information window or to Copy/Move one or more objects to another observing list. In both cases, the observing list selected with this dialog is the destination of the operation.



Select the observing list from the pull down menu that you want to add, move, or copy one or more objects to. To create a new observing list click on the Create New List button. Click on OK to complete the operation.

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Contacting Skyhound

Skyhound is on the web at: www.skyhound.com.

E-mail us with general questions at info@skyhound.com

Call us at 575-682-1183

By mail: Skyhound, PO Box 1182, Cloudcroft, NM, 88317 USA

For technical support please use the support contact form at our web site

In addition to these methods, you may send us feedback electronically, directly from SkyTools.
See Configure SkyTools: Program Tab.

-0-

Technical Support

Contact Skyhound if you have any questions or problems with this software.

By phone: 575-682-1183

By e-mail: support@skyhound.com

Or visit us on the web at: skyhound.com

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The Beta Test Team

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In other words, it is ok to install SkyTools on both your desktop and laptop, but it isn't ok to install it on your friend's computer.

Limited Warranty

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Glossary

Afocal Projection – when the camera is attached to the telescope with both an eyepiece and the lens of the camera in place.

Appulse – the time at which two celestial bodies appear closest in the sky as seen from a specific location on the earth.

Declination – measured north and south from the celestial equator to the celestial poles much like latitude on the earth. Often abbreviated Dec, it is measured in degrees, minutes, and seconds of arc. The Dec is zero at the equator, +90 degrees at the north celestial pole, and -90 degrees at the south celestial pole.

DSS Image – a Digital Sky Survey image (downloaded from the web).

Effective Resolution – the image resolution in arc seconds. This is an indication of the detail that can be expected in the final image. The resolution of the imaging device is computed from the Nyquist Theorem and image scale. The resolution of the optical system is approximated by the Dawes limit. The resolution allowed by the atmosphere is based on the FWHM of the seeing. The effective resolution is the combination of all three and is essentially the largest of these three factors.

Ephemeris – a list of positions for a moving celestial body at regular intervals.

Eyepiece Projection – when the camera is attached to the telescope with an eyepiece but no camera lens. Varying the distance between the eyepiece and the camera detector will vary the effective focal length of the system and thus change the scale and field of view.

Focal Extender – (often called a Barlow) This is an additional lens that increases the focal length of the system and thus increases the magnification and makes the field of view smaller.

Focal Reducer – an additional lens that decreases the focal length of the system and thus lowers the magnification and makes the field of view larger.

Geocentric – with reference to the center of the Earth: Geocentric positions do take into account the location of the observer on the Earth.

Greatest Elongation – when Mercury or Venus reach the point furthest away from the Sun.

Naked Eye Limiting Magnitude – the magnitude of the faintest star that can be seen with the unaided eye nearly overhead. This magnitude characterizes the light pollution of an observing location.

Obstructed Horizon – the practical horizon for an observing location, taking into account mountains, buildings, trees, etc.

Occultation – when one celestial body passes in front of another, completely blocking it from view. The moon regularly occults stars, as do asteroids.

Optimum Viewing Ephemeris – a list of optimum times to view an object on a daily basis.

Optimum Viewing Time – the optimum time to view an astronomical object on a given night, taking into account the type of object, how bright it is, how high it is in the sky, and how dark the sky is.

Piggyback – when the camera is fixed to the telescope but without looking through it. In this case the telescope is used merely to track the stars during the exposure.

Plottable Image – an image that has been set up to be displayed on the chart background.

Prime Focus – when the camera is attached to the telescope with no eyepiece or camera lens. The image is focused directly on the camera detector

Prosumer Digital Camera – a digital camera that fills the gap between cameras designed for the consumer market and those designed for professionals. These cameras often work well for astronomical imaging.

Right Ascension – measured eastward on the celestial sphere from the vernal equinox, parallel to the celestial equator, much like longitude on the earth. Often abbreviated as RA, it is measured in hours, minutes and seconds. All the way around the sky once is 24 hours of RA.

Satellite Elongation – when a satellite of orbiting a planet reaches its furthest point away from the planet. Two of these elongations occur for each orbit of the satellite.

Satellite Event – when something interesting occurs regarding a satellite of another planet such as when the satellite passes in front of the planet (transit), the shadow of the satellite passes in front of the planet (shadow transit), the satellite passes behind the planet (occultation), or when the satellite passes into the planet's shadow (eclipse).

Solar Conjunction – when a planet appears close to the Sun in the sky.

Solar Opposition – when a planet or minor planet that orbits further from the Sun than the Earth is in the opposite direction of the Sun, marking the time when it is closest to the Earth and visible in the middle of the night.

SNR – this is the Signal-to-Noise Ratio, which is a measure of the quality of the image of the target object.

- An SNR of 3 means the target is marginally detectable
- An SNR of at least 7 means the target is detectable
- An SNR of 10 is required for a confident detection
- A SNR of 100 will produce a good image of the target and/or produce quality photometry

Sub-exposure – a single exposure of a target object that will be stacked with other exposures to create the final image.

Supplemental Starfield – a circular field of supplemental stars derived from the USNO-A2.0 catalog that contains stars many magnitudes fainter than the typical limit of the GSC catalog (and the SkyTools stellar database).

Topocentric – with reference to the location of an observer on the Earth. Topocentric coordinates consider the effect of the location of the observer on the Earth.

Transit – when one celestial body passes in front of another, only partially blocking the farther object from view. Mercury transits the face of the sun, and mars may on rare occasions transit Jupiter.

-0-

Index

- A -

Acknowledgements 612
 Add a camera to a telescope 522
 Add a filter to a camera 523
 Add Location Dialog 540
 Add Objects by Database Filter to Observing List 401
 Add Objects by Designation to an Observing List 400
 Add Objects to the Appulses/Transits/Occultations List 473
 Apply a Chart Preferences Scheme 450
 Associate Images with an Object 500
 Associate Notes with an Object 499
 Associate Web Links with an Object 501
 Auto-Select Visual Comparison Stars 462

- B -

Backup Your User Data 503
 Begin a 30-day Trial of an Add-on 384
 Binoculars Dialog 585
 Browse Designations Tab 296
 Browse Log Entries 497

- C -

Center the View at the Cursor Position 468
 Change Eyepieces 459
 Change how often screen and charts are updated 397
 Change How Often you are Prompted for Backup 505
 Change SkyTools Global Settings 382
 Change the Chart Style 448
 Change the Date/Night for the Current Observing List 404
 Change the Great Red Spot Position 387
 Change the Observer for the Current Observing List 406
 Change the Observing Location for the Current Observing List 405
 Chart Keyboard Shortcuts
 Chart Preferences 77, 81, 86, 87
 Basic Style Tab 77
 Component Styles Tab 81
 Label Styles
 Lines and Outlines Style Tab 86
 Chart Preferences Schemes 88
 Chart Preferences: Basic Style Tab (Printer) 79
 Chart Preferences: Misc Tab 82
 Chart Preferences: Stars Tab 84
 Charts 43
 Check for Program Updates 395
 Choose When Events are to be Automatically Deleted 482
 Clear the Event List 480
 Comet File Format 246
 Comets 361
 Configure a Pushto Telescope (DSC) via ASCOM 234

- Configure a Telescope 396
- Configure Pushto Indicators 235
- Configure Real Time Refresh Rates 237
- Configure the Argo Navis 232
- Configure the List Columns 411
- Configure the Sky Commander 233
- Constellation Tab 201
- Constellations 357
- Contacting Skyhound 610
- Control Coordinate Grid 441
- Control Labels 438
- Control Panel 145
- Control Plottable Images 440
- Control the Star Sizing 439
- Control Which Chart Elements are Displayed 437
- Controls 173
- Coordinate Systems 349
- Copy All Objects to an Observing List 158
- Copy an Ephemeris to the Clipboard 181, 489
- Copy an Observing List to the Clipboard 408
- Copy Some or All Data from the CDRom to Your Hard Drive 389
- Copy the Chart to the Clipboard 447
- Copy the Event List to the Clipboard 481
- Copy/Move Objects from One List to Another 413
- Copying Events to the Clipboard 157
- Create a Binary Star Orbit Ephemeris 487
- Create a Current Events List 483
- Create a Log Entry for an Ephemeris Entry 182, 493
- Create a Log Entry for an Object from the Observing List 418
- Create a New Log Entry 494
- Create a New Observing List 398
- Create a Nightly Optimal Viewing Ephemeris 486
- Create a Position Ephemeris 485
- Create a Special Events List 484
- Create an Observing List from a File 399
- Create an Observing Location from GPS 390
- Create an Obstructed Horizon 388
- Create Multiple Log Entries 496
- Create Multiple Log Entries for an Object from the Observing List 419
- Create New Observing List Dialog
- Create Observing List From File
- Create Obstructed Horizon Dialog 546
- Create/Edit Skymark 262
- Create/Edit Supplemental Comet Osculating Elements 252
- Create/Edit Supplemental Deep Sky Object 260
- Create/Edit Supplemental Minor Planet Osculating Elements 255
- Create/Edit Supplemental Stellar Object 258
- Creating a Log Entry for an Event 156
- Current Events Tool
- Customize the Catalog Designations 383
- Customize the Colors, Styles, and Fonts 451
- Customize the View Window Sizes 457

- D -

- Dark Nebulae 373
- Dark Nebulae 373
- Data Manager 264, 265, 271, 273, 275, 277, 279
 - Backup Tab 264
 - Images Tab 277
 - Import Tab
 - Notes Tab 273

- Plottable Images Tab 279
- Restore Tab 265
- Web Links Tab 275
- Data Manager: Observing Lists Tab 283
- Data Manager: Share lists 281
- Data Manager: Supplemental Data 240
- Data Manager: Sync Tab 267
- Database Power Search Tool 299
- Database Power Search: Comets Tab 311
- Database Power Search: Extragalactic Tab 307
- Database Power Search: Galactic Deep Sky Tab 305
- Database Power Search: Minor Planets Tab 309
- Database Power Search: Stars Tab 303
- Date of Local Evening Dialog 71
- Date/Time Entry Dialog 557
- Daylight Saving 543
- Deep Sky and Stellar Imaging 343
- Deep Sky File Format 249
- Delete a Starfield 445
- Delete an Observing List 409
- Delete Objects from an Observing List 414
- Delete Unwanted Events from the List 472
- Deleting Events 154
- Diffuse Nebulae 372
- Display Information For an On-Screen Object 467
- Double Star Imaging 345
- Download a Supplemental Starfield 454
- Download ASTORB Supplemental Minor Planets 251
- Download DSS Image for Cursor Location 453
- Draw Motion Trails for Objects 442
- Drawing your Obstructed Horizon 541
- DSS Image Sources 533

- E -

- Edit/View the Observing List Title/Description 410
- Enter Coordinates Tab 294
- Enter File Share Information Dialog 555
- Enter Your Binocular Information 403
- Enter Your Telescope Information 402
- Ephemerides Tool
- Event Calendar Options Dialog 594

- F -

- Flip the Chart Vertically 463

- G -

- Galaxies 366
- Galaxy Groups 368
- General Tab 162
- Get an Online DSS image for an Object 502
- Get an Online DSS image for an Object from the Observing List 420
- Get GPS Location Dialog 544
- Globular Clusters 375
- GOTO Telescopes 225
- GPS 544

- H -

How To... 379

- I -

ImageView - the SkyTools Image Viewer 324
 Imaging Mode Observing List Columns 69
 Import an Observing List, Object Notes, Images, Links etc. 506
 Import Chart Preference Scheme 512
 Importing Log Entries 519
 Improve Performance on a Slow Computer 380
 Increase/Decrease the Magnitude Limit 465

- L -

License Agreement 613
 Limit the Visibility of Objects in the List to a Set Time Period 416
 List Starfields Currently Visible on the Chart 444
 Local Time Dialog 556
 Logging Observations 46
 Lunar and Planetary Imaging 344

- M -

Make an Image Plottable on a Chart Background 514
 Making Charts for Events 153
 Manual Location Entry Dialog 542
 Map Projections 352
 Measure Angular Distance 452
 Minor Planet File Format 247
 Minor Planets 362
 Minor Planets 362
 Mirror the Chart Horizontally 464
 Modify your SkyTools Registration Information 394

- N -

Naked Eye Chart 121
 Name Group Dialog
 New In SkyTools 3 15

- O -

Object Requestor 289
 Observation Planner 52
 Observing Lists
 Observation Planning 22
 Observers Dialog 559
 Observing Comets 339
 Observing Deep Sky Objects 341
 Observing Double and Multiple Stars 342
 Observing Lists 530
 Observing Logs

Observing Minor Planets 340
 Observing Sites Dialog 537
 Observing the Sun, Moon & Planets 337
 Obstructed Horizon 546
 Obstructed Horizons 527
 Offset Tracking Dialog
 Open Clusters 374
 Open the Context Viewer 469
 Open the Exposure Calculator 521
 Options dialog 148
 Overhead Sky Chart 116

- P -

Pan Up, Down, Left, and Right 436
 Pier Flip Dialog
 Planetary Nebulae 370
 Planner Keyboard shortcuts 74
 Planning Imaging Sessions 26
 Planning Visual Observations 23
 Plottable Images 529
 Prime Solar System Bodies 360
 Print a Chart for an Object from the Observing List 424
 Print a Chart for Multiple Entries in an Observing List 423
 Print an Ephemeris 180, 488
 Print an Observing List 407
 Print Multiple Charts from an Observing List 425
 Print the Chart 446
 Print the Event List 470
 Print/Copy a Single Event 476
 Print/Copy Log Entries 520
 Printing Charts 138
 Printing Events 155
 Purchase an Add-on 385
 Pushto Telescopes (or DSCs) 229

- Q -

Quasars 369

- R -

Read Supplemental Data from File 250
 Real Time Imaging 37
 Real Time Observing 33
 Real Time Tool 213
 Real Time Tool 213
 Real Time Visual Observing 34
 Reference Points 356, 526
 Register SkyTools 393
 Restore Your User Data 504
 Results 176

- S -

Satellite Elongations Tab 166
 Satellite Events Tab 168

Save the Chart Preferences Scheme 449
 Scenario 105
 Search Log Entries 498
 Search Tab 197, 292
 See Object Information for an Object from the Observing List 417
 Select Best Resolution Eyepiece View 460
 Select Column Scheme Dialog
 Select Columns Dialog 63
 Select Real-Time Mode 435
 Send Feedback 392
 Set a Five-Star Rating for an Object 516
 Set the Date 428
 Set the Field of View 432
 Set the Magnitude Limits by Object Type 466
 Set the Observing Location 430
 Set the Orientation of the Eyepiece View 461
 Set the Target by Name 429
 Set the Time 427
 Set the Time Step 434
 Set up for afocal projection 525
 Set up for eyepiece projection 524
 Setting up ASCOM for GOTO Telescopes 228
 Setting Up SkyTools
 Share an Observing List via a File 507
 Share Chart Preference Scheme 513
 Share Images 510
 Share Object Notes 509
 Share Observing Logs 508
 Share Web Links 511
 Shared Data 532
 Simple Mode Observing List Columns 64
 Sky Brightness Dialog 549
 Skymarks 376
 skytools
 SkyTools Date Entry Format 536
 SkyTools Preferences: Data Installation Tab 333
 SkyTools Preferences: Designations Tab 331
 SkyTools Preferences: Preferences Tab 329
 SkyTools Preferences: Program Tab 326
 Solar Imaging 346
 Sort the Circumstances of an Event 477
 Sort the Ephemeris 178, 491
 Sort the Observing List 415
 Special Events Tool
 Star Hopping 335
 Starfields Currently Displayed 104
 Stars 363
 Stellar File Format 248
 Supplemental Data Download 244
 Supplemental Data Overview 242
 Supplemental Databases 531
 Switch View Window Positions 456
 Synchronize Telescope Time Dialog

- T -

Technical Reference 353
 Technical Support 611
 Telescope Mount Alignment Tool Dialog
 The Add Object to Observing List Dialog 609
 The Binocular Chart 131
 The Chart Scenario Dialog

The Configure Afocal Projection Dialog 572
 The Configure Eyepiece Projection Dialog 571
 The Configure Menu Presets Dialog 211
 The Copy Chart to Clipboard Dialog
 The Current Events Tool 142
 The Daylight Saving Rules Dialog 543
 The Default Settings for New Instrument Dialog 581
 The Edit Binoculars Dialog 586
 The Edit Camera Data Dialog 578
 The Edit Eyepiece Data Dialog 567
 The Edit Filter Data Dialog 575
 The Edit Instrument Dialog 563
 The Edit Lens Data Dialog 577
 The Edit Neutral Density Filter Dialog 576
 The Edit Observer Dialog 560
 The Edit Observing Site Dialog 552
 The Ephemerides Tool 171
 The Events Calendar 149
 The Export Observing Logs Dialog 203
 The Exposure Calculator Tool 314
 The Eyepiece Preset String Configuration Dialog 607
 The Get Digital Sky Survey Image Dialog 596
 The Get Multiple Digital Sky Survey Images Dialog 599
 The Get Starfield Dialog 103
 The Import Plottable Image Dialog 602
 The Log Browser
 Class Tab
 Instrument Tab
 Location Tab
 Misc Tab
 Night Tab
 Observer Tab
 Search Tab
 The Magnitude Limits Dialog
 The New Log Defaults Dialog 210
 The Nightly Events Planner 151
 The Object Information Window 587
 The Observation Log Dialog 184
 The Observing List Information Dialog 606
 The Plottable Image Parameters Dialog 604
 The Print Calendar Dialog 595
 The Print Chart Dialog 139
 The Print Dialog 584
 The Print/Copy Dialog 583
 The Print/Copy Object Information Dialog 592
 The Print/Copy Observing List Dialog 72
 The Print/Copy Observing Log Dialog 206
 The Print/Copy Observing Logs Dialog 208
 The Select Cameras to Use with Telescope Dialog 569
 The Select Eyepieces to Use with Telescope Dialog 566
 The Select Filters to use with Camera Dialog 573
 The Select Lenses to use with Camera Dialog 574
 The Select New Telescope Dialog 565
 The Share File Dialog 608
 The Share Log Entries Dialog 205
 The SkyTools Observing System 13
 Plan, Observe, Log 13
 The Special Events Tool 159
 The Telescope (Star Hopping) Chart 126
 The Telescope Report Dialog 568
 The Telescopes Dialog 561
 The Trace Dialog 101
 The Trail Dialog 99
 The Thumbnail Viewer 136

The View Controls Dialog 89, 92, 95, 97
 Comparison Stars Tab 95
 General Properties Tab 89
 Labels Tab 92
 View Properties Tab 97
 Thumbnail Options Dialog
 Time-Step Forward/Backward 433
 Trace Object Motion 443
 Transfer Observing List to Argo Navis
 Turn View Windows On/Off 458
 Two Bodies Tab 164

- U -

Unlock an Add-on You Have Purchased 386
 Update an Observing Location from GPS 391
 Update the Current Comets, Minor Planets and Novae Observing Lists 412
 Update "Current" Observing Lists Dialog 70
 Upgrading from SkyTools 2 18
 Using the Context Viewer 111,
 Using the Interactive Atlas 105
 USNO-A.2.0 Data Sources 535

- V -

View a Chart for an Object from the Observing List 421
 View a Chart for Multiple Entries in an Observing List 422
 View a Web Link Associated with an Object 518
 View an Image Associated with an Object 517
 View Notes Associated with an Object 515
 View the Circumstances of an Event 478
 View the Events in a Calendar 471
 View Today's Events 479
 View/Print a Chart for a Particular Circumstance of an Event 474
 View/Print a Chart for an Ephemeris Entry 179, 490
 View/Print a Chart for an Event 475
 View/Print a Chart for the Entire Ephemeris 492
 View/Print a Chart from the NightBar 426
 Visibility Filters
 Visibility Icons 534
 Visual Detection Difficulty Estimation 347
 Visual Mode Observing List Columns 67

- Z -

Zoom In/Out 431