

Please make sure you have the Kah Nee Ta Resort entered!!!

Observing Sites

Favorite Locations

- Texas Star Party
- Portland, Oregon
- Camp Hancock
- Kahului, Hawaii
- Skyview Acres
- Stub Stewart
- Home
- Fernhill Park
- Kah Nee Ta Resort**
- Oregon Star Party
- Maui Kai
- Maupin

New Delete Edit GPS

West Longitude +121°10'49"

Latitude +44°51'33"

Elevation 1720 feet

Time Zone PST -8

Standard Time Daylight Saving

Daylight Saving Rules [Configure](#)

Sky brightness at zenith: 21.7 mag/arcsec²

Seeing Excellent (<0.4" P10)

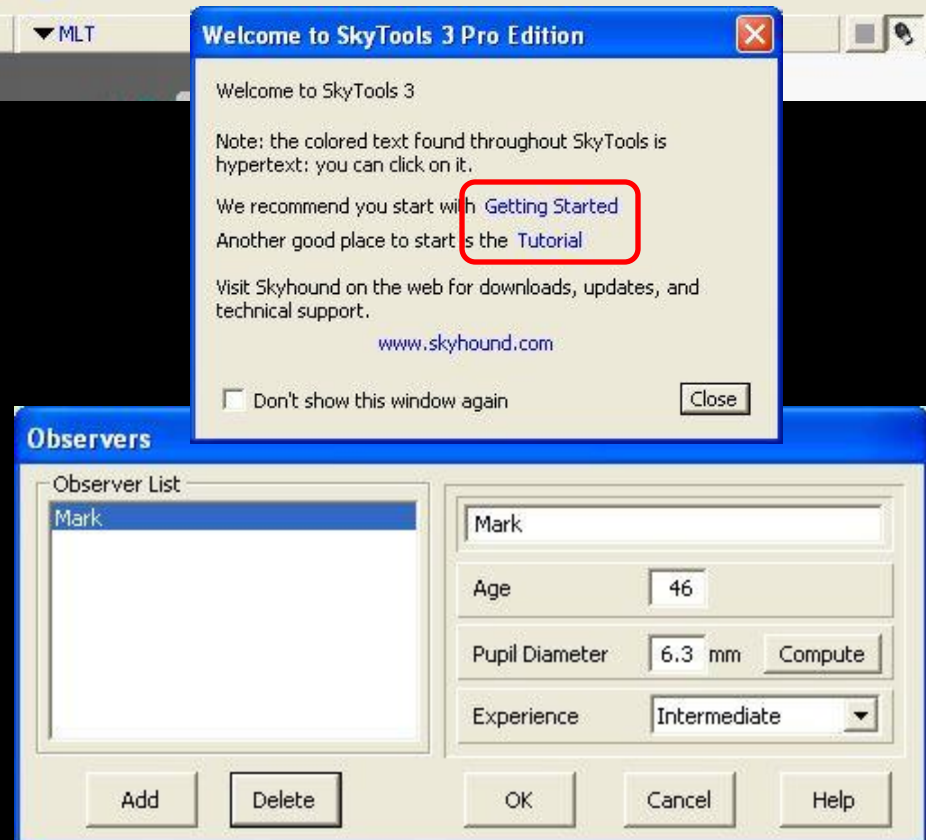
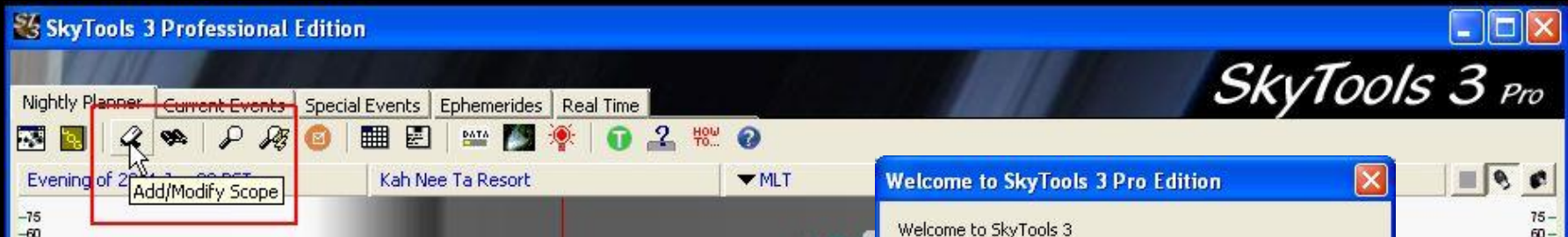
Air Temp 30 F° C

Relative humidity 70 %

Obstructed horizon not defined [Create](#)

OK Cancel Help

Please make sure you have 1 telescope, 2 eyepieces,
& 1 observer entered!!!
If you have the Pro Edition, enter 1 camera too!!!



Introduction to SkyTools 3

Mark A. Martin

February 19, 2011

HUGE THANKS to

Jim Todd & OMSI

Larry Godsey

Sameer Ruiwale

Greg Crinklaw

My Family

The purpose of SkyTools is to help the amateur astronomer
plan & execute astronomical observations.

It has Five Main Components

- **Nightly Planner** – observation planning
- **Current Events Tool** – events in near future
- **Special Events Tool** – historical or events in distant future
- **Ephemerides Tool**
- **Real Time Tool** – telescope/DSC/mount control

In addition, SkyTools 3 provides several different types of charts.
Some charts simulate views through telescopes or cameras.
One chart allows you to control mounts.

It has nearly complete support for visual observation and good support
for most types of amateur imaging.

Program Components in the Nightly Planner

SkyTools 3 Professional Edition

Nightly Planner | Current Events | Special Events | Ephemerides | Real Time | **Major Tool Tabs**

Buttons | **Links** | **Viewing Mode**

Evening of 2011 Jan 23 PST | Portland, Oregon | MLT | Mark

Night Bar

Observing List: Group: Mark's Lists | Note/Rating Group: My Notes | List Filters: All Classes, Vir, From 20:29 to 02:01

Primary ID	Con	RA (Ap)	Dec (Ap)	Mag	Size	Begin	Optimum	End	Difficulty	Best Difficul
***** M 90	Vir	12h37m25.1s	+13°05'51"	10.1	9.5'x 4.5'	00:34	05:02	06:36	challenging	detectable
***** M 86	Vir	12h26m47.5s	+12°52'48"	9.8	10.0'x 7.4'	00:24	04:50	06:36	challenging	detectable
***** M 84	Vir	12h25m39.3s	+12°49'16"	10.1	6.3'x 5.5'	02:31	04:49	06:22	difficult	easy
***** M 89	Vir	12h36m15.1s	+12°29'27"	10.7	6.9'x 6.6'	00:36	05:01	06:37	very challenging	detectable
***** M 87	Vir	12h31m24.4s	+12°19'33"	9.6	7.9'x 7.4'	02:36	04:56	06:23	difficult	easy
***** M 58	Vir	12h38m19.1s	+11°45'12"	10.5	5.6'x 4.4'	02:59	05:02	06:21	challenging	detectable
***** M 59	Vir	12h42m37.3s	+11°34'58"	10.7	4.8'x 3.3'	02:49	05:07	06:23	difficult	easy
***** M 60	Vir	12h44m15.1s	+11°29'17"	9.8	7.4'x 6.3'	02:53	05:09	06:23	difficult	easy
***** M 49	Vir	12h30m22.3s	+07°56'07"	9.3	9.3'x 7.6'	02:30	04:51	06:24	difficult	easy
***** M 61	Vir	12h22m30.6s	+04°24'35"	10.2	6.3'x 5.8'	00:59	04:45	06:38	challenging	detectable
***** Sombrero Galaxy	Vir	12h40m35.5s	-11°41'09"	9.1	9.1'x 5.6'	03:17	04:16	05:58	challenging	easy

Observing List & Group → **Objects in List**

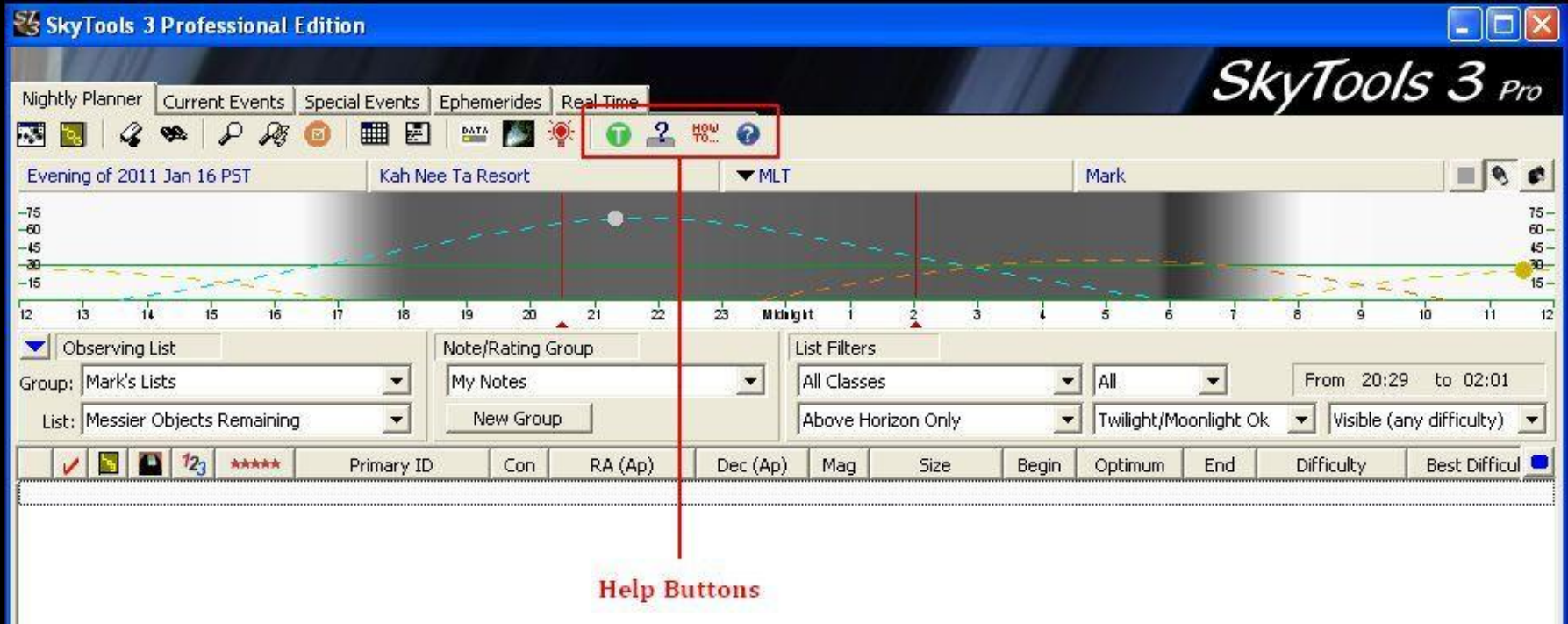
Notes & Ratings Group

List Filters

Column Headings → **Column Schemes**

Helpful Resources when Using SkyTools 3

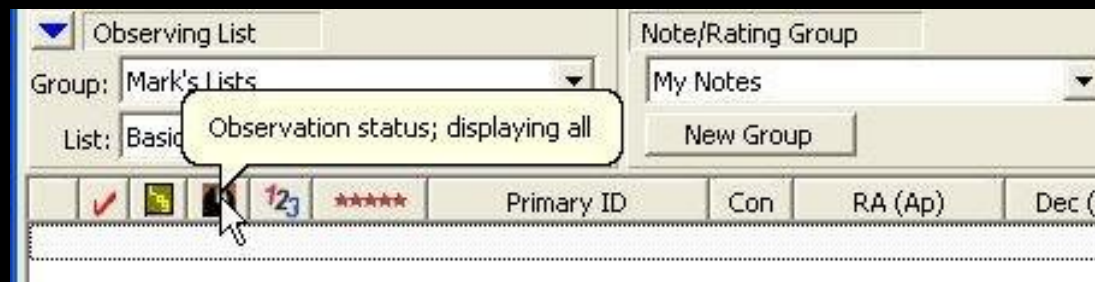
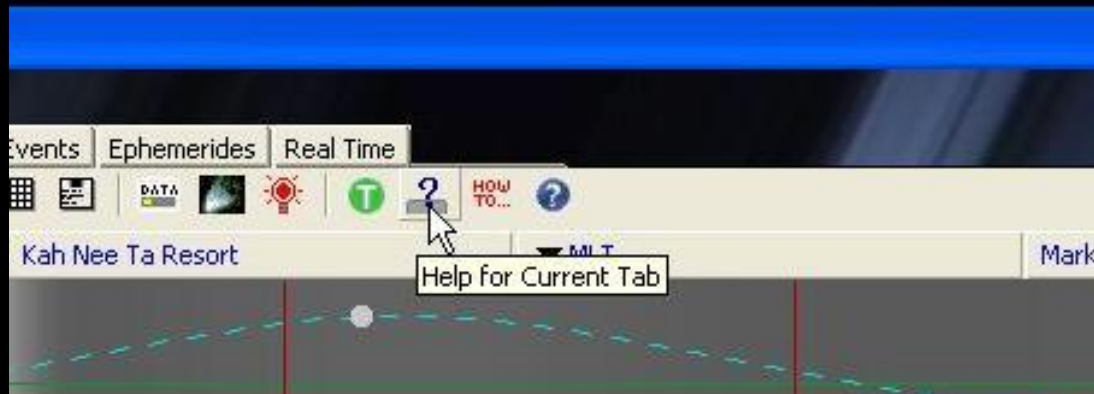
Help Buttons



Tutorials, Help for Current Tab, How To's, Help Index

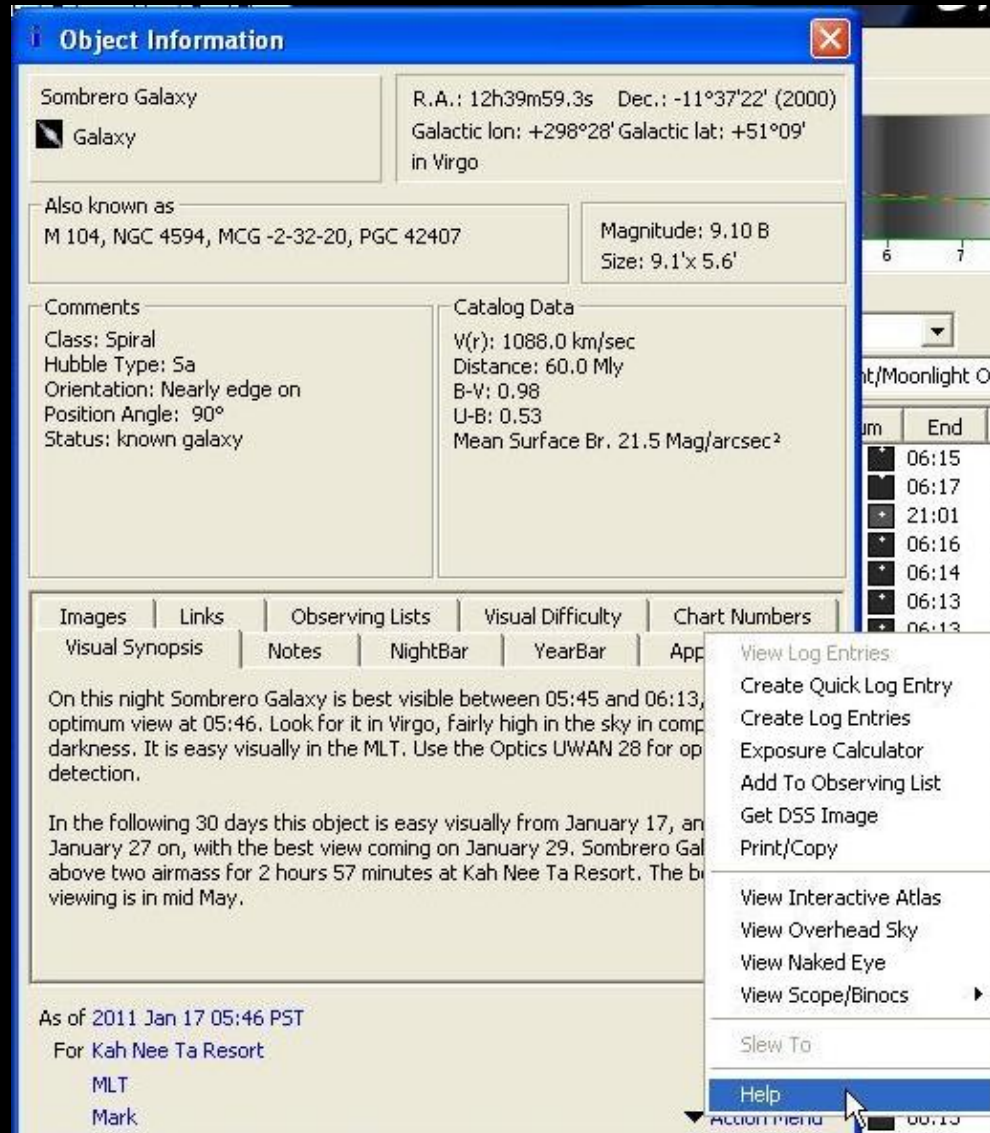
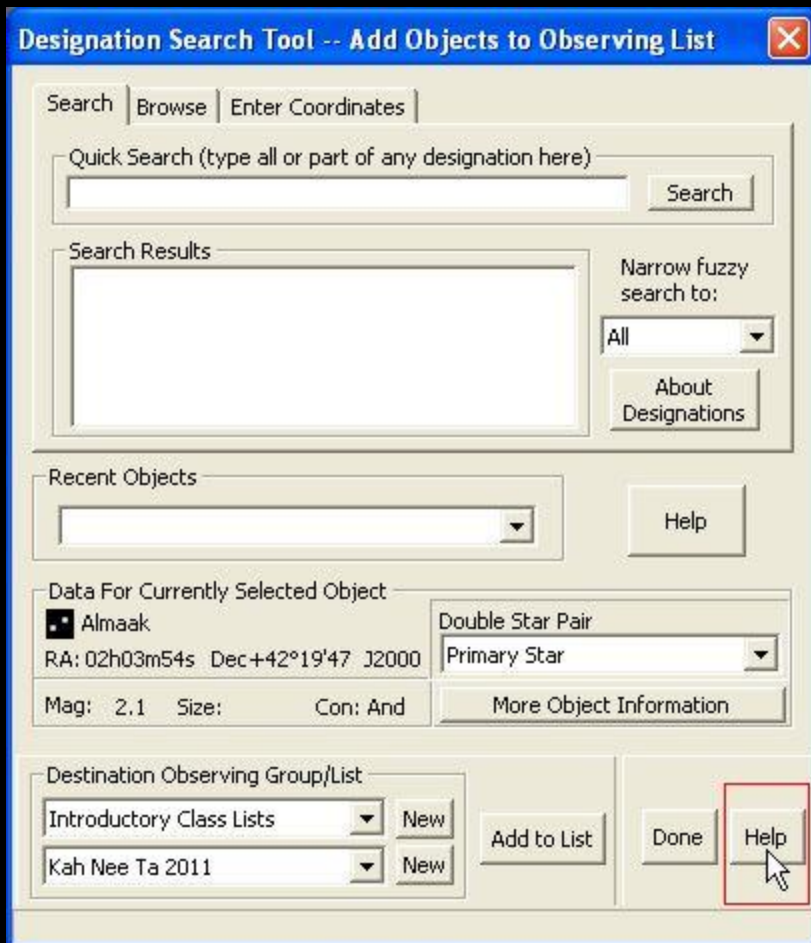
Helpful Resources when Using SkyTools 3

Tool Tips



Helpful Resources when Using SkyTools 3

Dialog Box Help Buttons & Menu Items



Helpful Resources when Using SkyTools 3

SkyTools Yahoo! Group

<http://groups.yahoo.com/group/skytools/>

Greg Crinklaw and others answer questions.

SkyTools 3 User Guides

Skyhound Download page

<http://www.skyhound.com/downloads.html>

Standard Edition: 566 pages

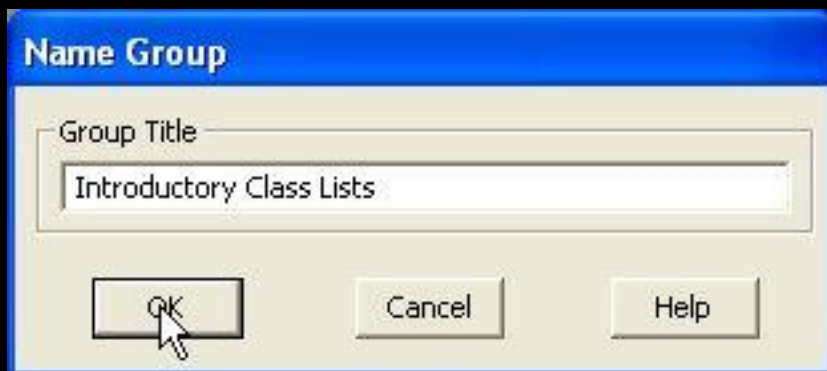
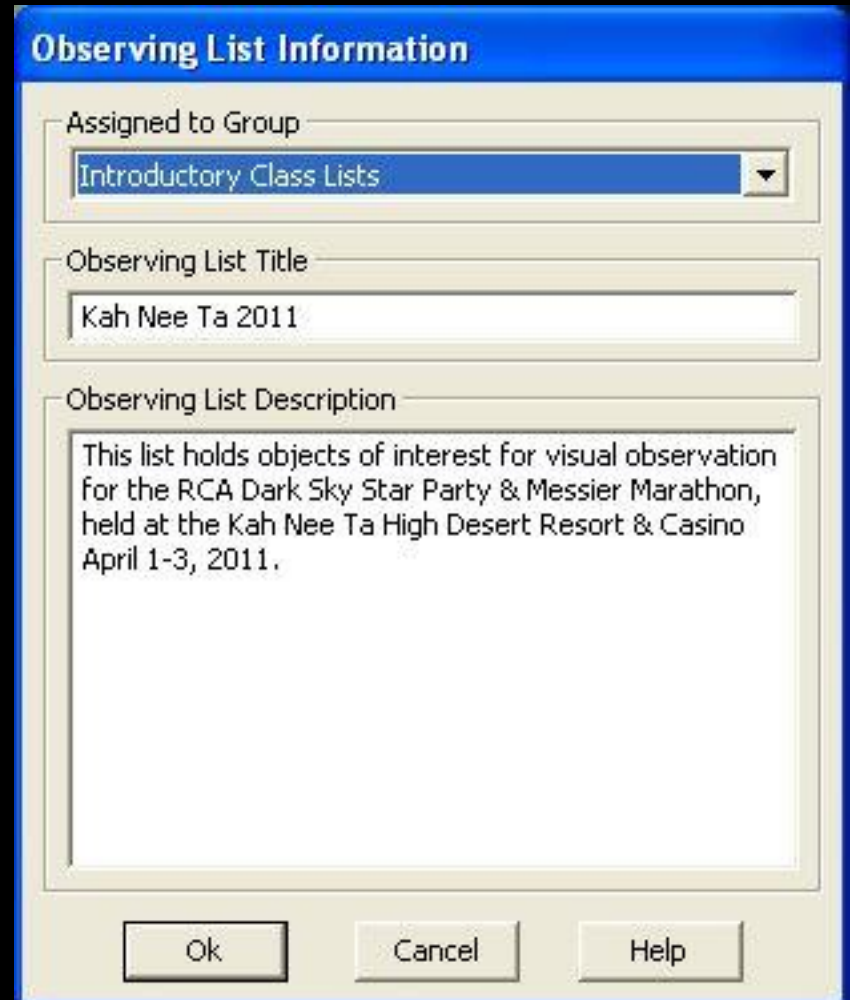
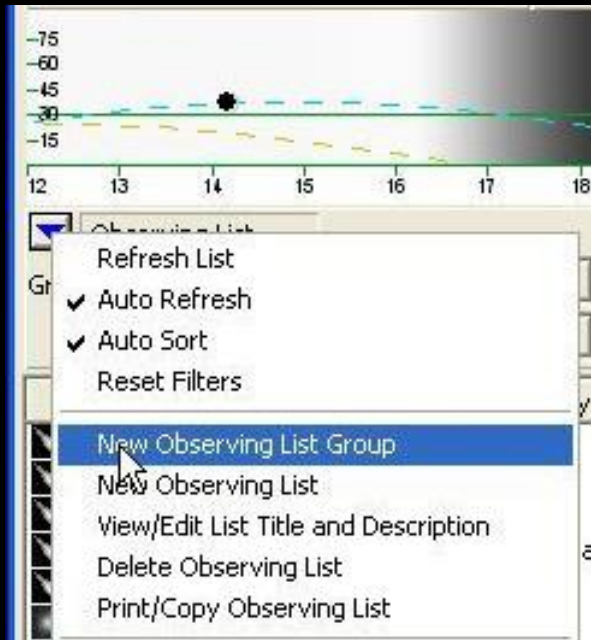
Professional Edition: 623 pages

Each is about 4 MB in size.

Helping a friend or two or 60 learn the software

Using SkyTools 3 to Prepare for the Kah Nee Ta Star Party

1. Create the “Introductory Class Lists” observing list group
2. Create the empty “Kah Nee Ta 2011” observing list



If you have the Professional Edition, create the observing list “Kah Nee Ta 2011 Imaging” in the Introductory Class Lists group.

Observing List Information

Assigned to Group
Introductory Class Lists

Observing List Title
Kah Nee Ta 2011 Imaging

Observing List Description
This is a list of interesting targets for imaging during the RCA Dark Sky Star Party & Messier Marathon held at the Kah Nee Ta High Desert Resort & Casino on April 1-3, 2011.

Ok Cancel Help

Set Date, Location, Instrument, & Observer

SkyTools 3 Professional Edition

Nightly Planner | Current Events | Special Events | Ephemerides | Real Time

Evening of 2011 Jan 22 PST | Portland, Oregon | MLT | Mark

Observing List

Group: Introductory Class Lists | Note/Rating Group: My Notes | List Filters: All Classes, All, From 20:29 to 02:01

List: Kah Nee Ta 2011 | New Group

Primary ID | Con | RA (Ap) | Dec (Ap) | Mag | Size | Begin | Optimum | End | Difficulty | Best Difficul

Date | Observing Location | Instrument | Observer

A date stretches from noon on the given date until noon the next day.

Date of Local Evening

Tonight | Tomorrow | Last Night

Quick Date: Year Month Day
2011 4 1

OK | Cancel | Help

<< February 2011 >>

Su	M	T	W	Th	F	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28					

Date of Local Evening

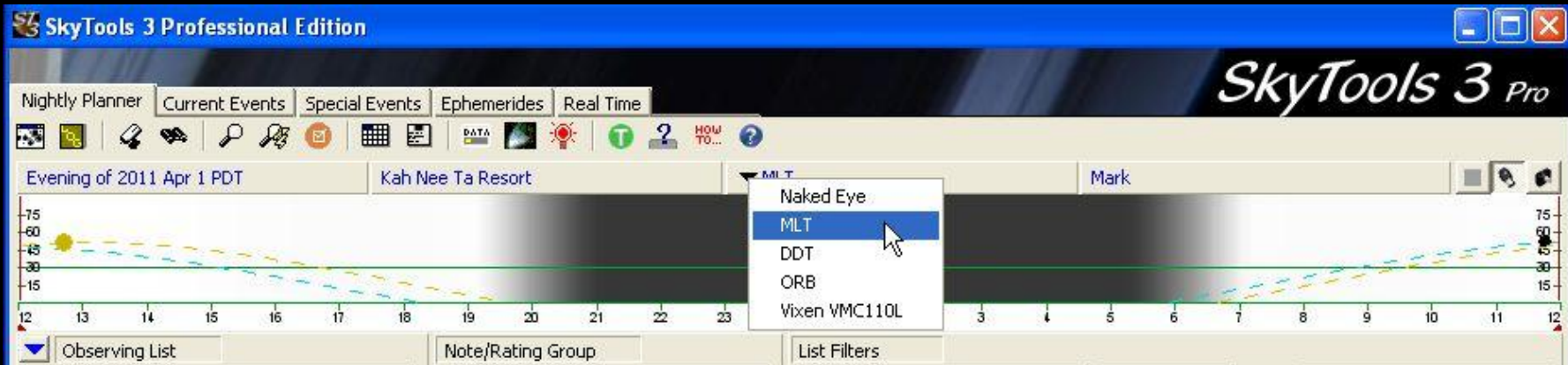
Tonight | Tomorrow | Last Night

Quick Date: Year Month Day

OK | Cancel | Help

<< April 2011 >>

Su	M	T	W	Th	F	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30



Observing Sites

Favorite Locations

- Texas Star Party
- Portland, Oregon
- Camp Hancock
- Kahului, Hawaii
- Skyview Acres
- Stub Stewart
- Home
- Fernhill Park
- Kah Nee Ta Resort**
- Oregon Star Party
- Maui Kai
- Maupin

West Longitude +121°10'49"

Latitude +44°51'33"

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Time Zone PST -8

Standard Time Daylight Saving
 Daylight Saving Rules [Configure](#)

Sky brightness at zenith: 21.7 mag/arcsec²

Seeing Excellent (<0.4" P10)

Air Temp 30 F C

Relative humidity 70 %

Obstructed horizon not defined [Create](#)

[New](#) [Delete](#) [Edit](#) [GPS](#)

[OK](#) [Cancel](#) [Help](#)

Observers

Observer List

- Mark

Mark

Age 46

Pupil Diameter 6.3 mm [Compute](#)

Experience Intermediate

[Add](#) [Delete](#) [OK](#) [Cancel](#) [Help](#)

My Equipment

Visual Observation

- ❑ 16" Meade Lightbridge Dobsonian telescope (\approx \$1900, MLT)

Imaging

- ❑ 10" Astro-Tech Imaging Newtonian (\approx \$600, AT10IN)
- ❑ Canon 40D 10.1 MP DSLR camera (\approx \$500 – 1000)
- ❑ SBIG ST-7XME Deluxe astronomical CCD camera (\$2495)

At prime focus with the AT10IN telescope, the cameras have the fields of view and resolutions

- Canon 40D = 75' x 50', 3.3"/pixel
- SBIG ST-7XME Deluxe = 23.3' x 15.5', 5.2"/pixel

Piggyback, the Canon 40D camera with a 50 mm f/1.4 lens has a field of view of 25.4° x 16.9°.

MLT Report



Mark

Intermediate, 6.3mm pupils

Kah Nee Ta Resort

Naked Eye Limiting Magnitude: 7.0

Comments/Data

Telescope type: Reflector

Aperture: 16.0 inches

Focal length: 72.0 inches

Focal ratio: 4.5

Mounting: Alt/Azimuth

Optical condition: a little dirty

Dawes resolution limit: 0.3"

Typical practical visual magnification limit: 880

Recommended eyepiece magnifications: 58, 100, 410 plus 2X Barlow

Typical limiting visual magnitude: 16.4

10 x 60 mm finder scope Field of View: 5.0° Limiting magnitude: 10.

Eyepiece Information

Eyepiece	Magnification	Field of View	Exit Pupil	Limiting Mag
Vixen NPL 25	73	41.0'	5.6	15.2
Plössl 15mm	122	24.6'	3.3	15.6
Optics UWAN 28 2.0x	131	37.7'	3.1	15.6
Vixen NPL 25 2.0x	146	20.5'	2.8	15.7
Optics SPL 12.5	146	22.6'	2.8	15.7
Scientific 100 Series 9	203	29.5'	2.0	15.8
Plössl 15mm 2.0x	244	12.3'	1.7	15.9

Close

Print/Copy

Help

Astro-Tech AT10IN Report



Mark

Intermediate, 6.3mm pupils

Kah Nee Ta Resort

Naked Eye Limiting Magnitude: 7.0

Comments/Data

Telescope type: Reflector

Aperture: 254.0mm

Focal length: 1016.0mm

Focal ratio: 4.0

Mounting: Equatorial

Optical condition: clean

Dawes resolution limit: 0.5"

Typical practical visual magnification limit: 550

Recommended eyepiece magnifications: 36, 64, 250 plus 2X Barlow

Typical limiting visual magnitude: 15.5

8 x 50 mm finder scope Field of View: 5.0° Limiting magnitude: 10.4

Canon 40D digital camera: 3888 x 2592 pixels (1x1 bins)

SBIG ST-7XME Deluxe CCD camera: 765 x 510 pixels (1x1 bins)

Camera Information

Camera	Focal State	Lens	Field of View	Resolution
SBIG ST-7XME Deluxe	Prime Focus		23.3'x 15.5'	5.2"/pix
Canon 40D	Prime Focus		75.0'x 50.0'	3.3"/pix
Canon 40D	Piggyback	50 mm f/1.4	25.4°x 16.9°	66.5"/pix

Eyepiece Information

Eyepiece	Magnification	Field of View	Exit Pupil	Limiting Mag
MaxView 40	25	103.9'	10.0	13.1
Optics LUMINAR 28	36	135.6'	7.0	13.8

Set Filters to Show All Objects

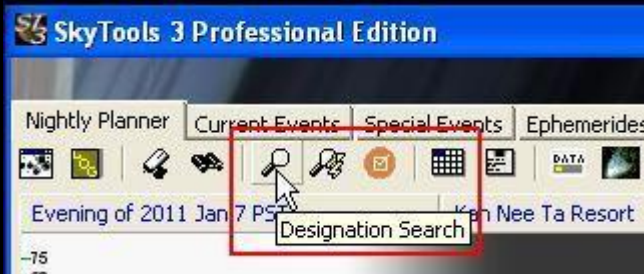
The screenshot displays the SkyTools 3 Professional Edition interface. At the top, the title bar reads "SkyTools 3 Professional Edition". Below it, a menu bar includes "Nightly Planner", "Current Events", "Special Events", "Ephemerides", and "Real Time". A toolbar with various icons is positioned below the menu. The main window shows a date and time selection area: "Evening of 2011 Jan 22 PST", "Kah Nee Ta Resort", and "MLT". A graph at the top shows celestial coordinates over time. Below the graph, the "Observing List" section is active, showing "Group: Introductory Class Lists" and "List: Kah Nee Ta 2011". The "List Filters" section is highlighted with a red box and contains the following settings:

- All Classes
- Above or Below Horizon
- All
- Day or Night
- From 20:29 to 02:01
- Ignore difficulty

Below the filters, a table header is visible with columns: Primary ID, Con, RA (Ap), Dec (Ap), Mag, Size, Begin, Optimum, End, Difficulty, and Best Difficul. Red arrows point from text labels to specific filter settings:

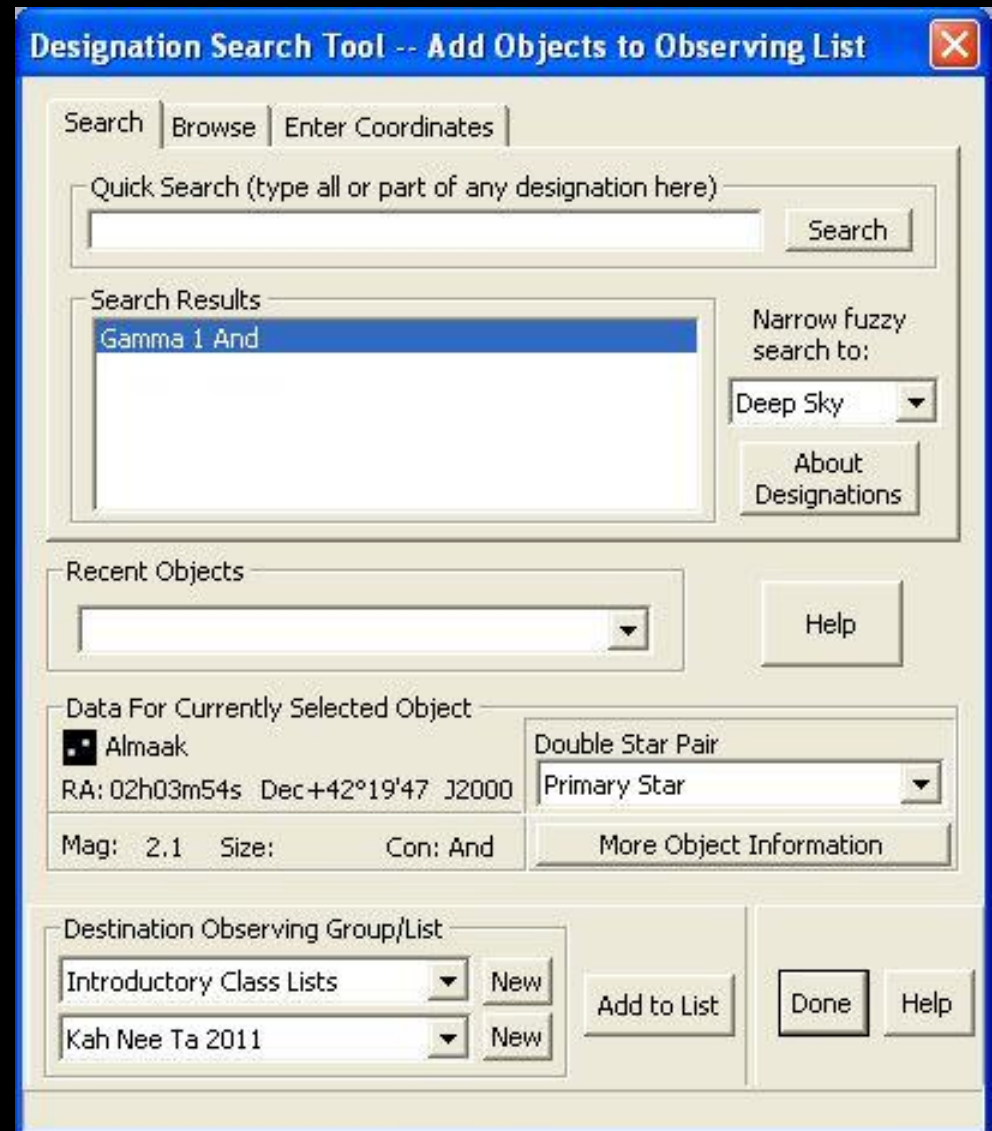
- Object Type** points to "All Classes".
- Position Relative to Horizon** points to "Above or Below Horizon".
- Constellation** points to "All".
- Time in Sky** points to "Day or Night".
- Maximum Difficulty** points to "Ignore difficulty".

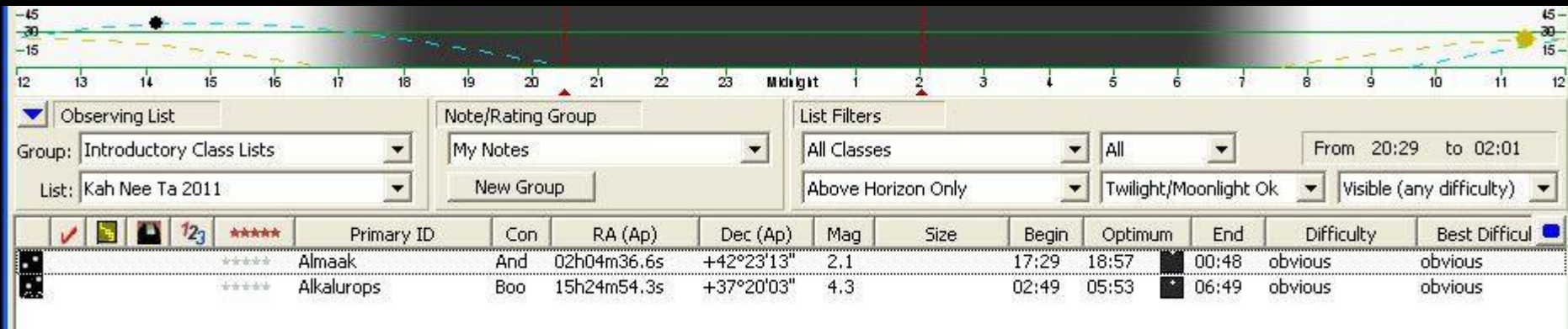
Using a Designation Search to Add an Individual Object to a List



Add γ Andromeda to our list.

Exercise: Add μ Boötis to the Kah Nee Ta 2011 observing List using a Designation Search for “mu boo”.





If you can't find the object in the search results,

1. Consult "About Designations" to check format of name.
2. Search by location (**Most reliable method**)
 - a. Find location – Wikipedia (<http://www.wikipedia.org>)
 SIMBAD (<http://simbad.u-strasbg.fr/simbad/>) for Milky Way
 NED (<http://nedwww.ipac.caltech.edu/>) for outside Milky Way
 - b. Open Interactive Atlas to position, look for object nearby, and add if found.
Alternative: Use Database Power Search Tool to search for objects within radius.

If you still can't find it, might want to add it to the Supplemental Database. (**Last resort**)

Exercise: Find the galaxy ESO 435-G019 in the SkyTools database.

Using a Database Power Search to Add Multiple Objects to a List



Examples:

1. Find all of the Messier galaxies in Coma and Virgo and add them to a list.
2. Find all planetary nebulae with surface brightness above a certain value that will be above 2x airmass and visible in complete darkness on a given night from a given location and add them to a list.
3. Find all of the globular clusters in the NGC within 10° of θ Ophiuchus and add them to a list.

To illustrate, let's find all of the Messier galaxies in Coma and Virgo and add them to our list.

Settings for Finding All Messier Galaxies in Coma & Virgo

The screenshot shows the 'Database Power Search Tool' interface. The 'Extragalactic' tab is selected. The 'Databases to Search' list includes 'Galaxies', 'Galaxy Groups', and 'Quasars'. The 'Catalog Designations' are set to 'Selected only', with 'Messier' selected. The 'Common Data Limits' are set to 'Magnitude ≥ None ≤ None' and 'Size ≥ None ≤ None'. The 'Light travel time' is set to 'None'. The 'Galaxy Limits' are set to 'Class: Any', 'Orientation: Any', 'SB: ≤ None mag/arcsec²', 'Interacting with 0 or more', 'V(r) ≥ None ≤ None km/s', and 'e (b/a) ≤ None'. The 'Quasar Type' is set to 'include BL Lac' and the 'Galaxy Group' is set to 'galaxy count ≥ None'. The 'Visibility Filters' are set to 'Evening of 2011 Apr 1', 'Kah Nee Ta Resort', 'Mark', and 'MLT'. The 'Visual Detection Difficulty' is set to 'Ignore difficulty'. The 'Conditions (for specific date)' are set to 'Above or Below Horizon' and 'Day or Night'. The 'Search Constellations' are set to 'Selected', with 'Vir' and 'Coma' selected. The 'Search Radius' is set to 'Within 001 degrees of Nothing'. The 'Include Objects With Log Entry' is set to 'Any'. The 'Search' button is highlighted.

Database Power Search Tool

Stars | Galactic Deep Sky | **Extragalactic** | Minor Planets | Comets

Databases to Search
Galaxies
Galaxy Groups
Quasars

Supplemental Deep Sky

Catalog Designations
All Selected only
Common Name
Messier
NGC
IC
Arp
Markarian
MCG
UGC
ESO
PGC/LEDA

Common Data Limits
Magnitude ≥ None ≤ None
Size ≥ None ≤ None

Light travel time ≥ None ≤ None Myr
Z (redshift) ≥ None ≤ None

Galaxy Limits
Class: Any
Orientation: Any
SB: ≤ None mag/arcsec²
Interacting with 0 or more
V(r) ≥ None ≤ None km/s e (b/a) ≤ None

Quasar Type include BL Lac

Galaxy Group galaxy count ≥ None

Mode [Icon] Reset

Visibility Filters
Evening of 2011 Apr 1
Kah Nee Ta Resort
Mark
MLT

Visual Detection Difficulty
Ignore difficulty

Conditions (for specific date)
Above or Below Horizon
Day or Night
If visible after 00:00
If visible before 00:00

Search Constellations
Any Selected
Pav PsA Sco Tau UMi
Peg Pup Scl Tel Vel
Per Pyx Sct Tri **Vir**
Phe Ret Ser TrA Vol
Pic Sge Ser Tuc Vul
Psc Sgr Sex UMa

Select All Clear All

Search Radius
Within 001 degrees
of Nothing

Include Objects With Log Entry
Any Logged Unlogged

Search Help

Object ID	Con	RA	Dec	Mag	Light Time	Type	Difficulty
-----------	-----	----	-----	-----	------------	------	------------

Your observing list should contain 20 objects after adding these galaxies.

Exercise: Use the Database Power Search Tool to find all of the planetary nebulae in Corvus (Crv) and Hydra (Hya) with magnitudes less than 12 that will be above the horizon, and visible in complete darkness on the first night of the Kah Nee Ta star party (April 1, 2011). Add these to the Kah Nee Ta 2011 observing list.

Exercise: Find all of the open clusters with magnitudes less than 8 that are within 10° of Sirius with visual detection difficulties that are Detectable or less difficult and add them to the Kah Nee Ta 2011 observing list.

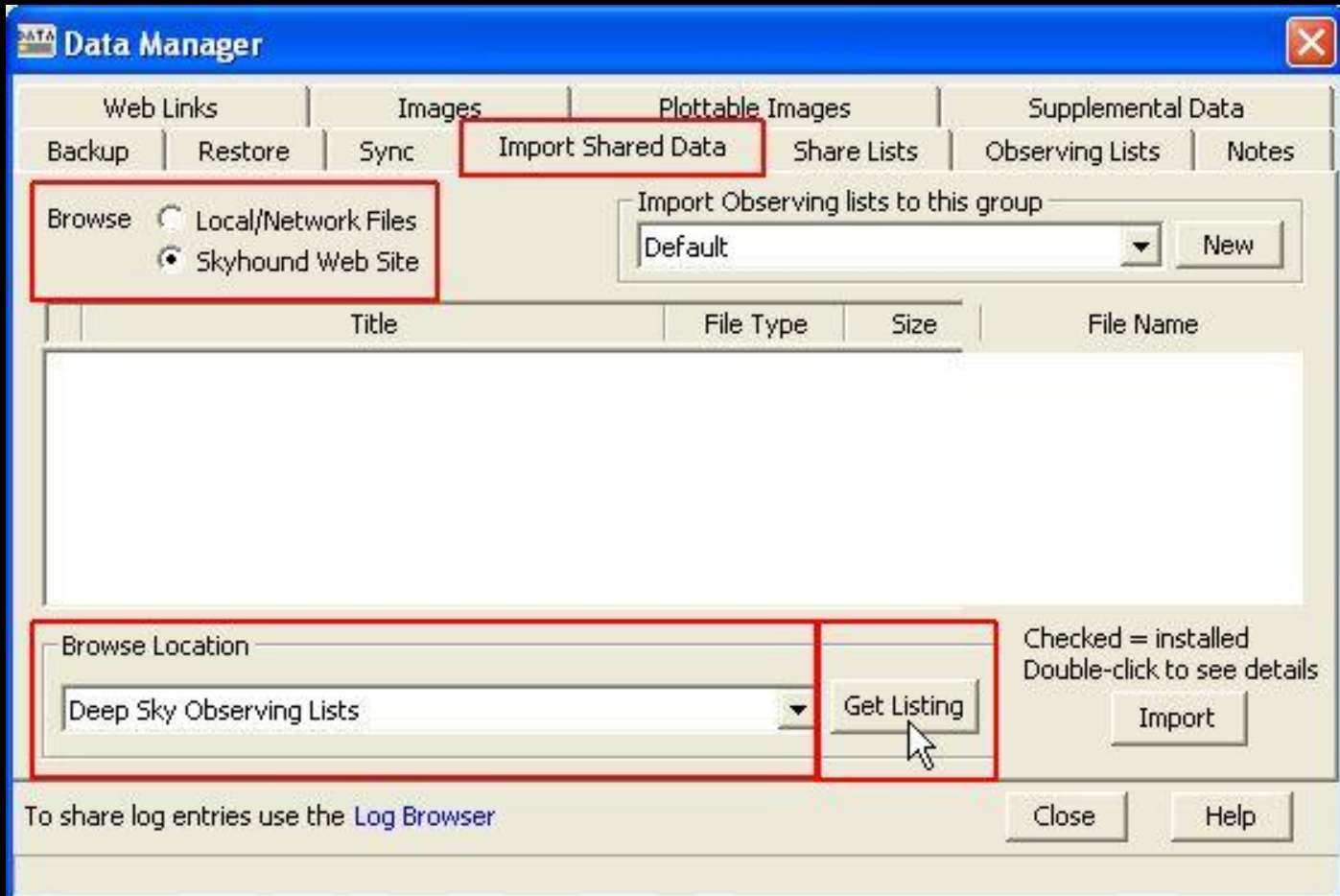
After completing these exercises, your observing list should contain
28 objects.

Downloading an Observing List and Copying Objects to Another List

Suppose you're working on your Astronomical League Caldwell List and you'd like to take the opportunity to log a few more objects under the dark skies of the star party. But SkyTools 3 doesn't include a list of the Caldwell objects by default. So we'll try to



download the list from the Internet. The tool for doing this is the **Data Manager**.



Data Manager [Close]

Web Links | Images | Plottable Images | Supplemental Data

Backup | Restore | Sync | Import Shared Data | Share Lists | Observing Lists | Notes

Browse Local/Network Files Skyhound Web Site

Import Observing lists to this group: Default New

Title	File Type	Size	File Name
2004 Sky and Telescope Deep Sky Wonders	Observing List	1.2 KB	2004SkyTelDSW.stx
2004 Sky and Telescope Targets	Observing List	1.4 KB	2004SkyTelTargets.stx
2005 Sky and Telescope Deep Sky Wonders	Observing List	1.2 KB	2005SkyTelDSW.stx
2005 Sky and Telescope Targets	Observing List	753 bytes	2005SkyTelTargets.stx
2006 Sky and Telescope Deep Sky Wonders	Observing List	753 bytes	2006SkyTelDSW.stx
AL Deep Sky Binocular	Observing List	510 bytes	ALDeepSkyBinocs.stx
AL Galaxy Groups and Clusters	Observing List	1.7 KB	AL Galaxy Groups and C

Browse Location: Deep Sky Observing Lists Get Listing Import

Checked = installed
Double-click to see details

To share log entries use the [Log Browser](#) Close Help

62 files found

Data Manager

Web Links | Images | Plottable Images | Supplemental Data

Backup | Restore | Sync | Import Shared Data | Share Lists | Observing Lists | Notes

Browse Local/Network Files Skyhound Web Site

Import Observing lists to this group: **Default** [New]

Title	File Type	Size	File Name
Arp Galaxy List	Observing List	2.2 KB	arp.stx
Best PK Planetaries	Observing List	378 bytes	BestPK.stx
Best and Brightest 200	Observing List	1.2 KB	BestandBrightest200.st
Caldwell Catalogue	Observing List	1.2 KB	caldwell.stx
Caroline Herschel's Deep Sky Objects	Observing List	470 bytes	caroline.stx
Challenging PNebs that Blink Well	Observing List	321 bytes	Pneb-03-Blinkers-Skyto
Deep Sky Observer's Guide - Neil Bone's Book	Observing List	1.2 KB	Deep Sky Observer's Gl

Browse Location: Deep Sky Observing Lists [Get Listing]

Checked = installed
Double-click to see details

Import

To share log entries use the [Log Browser](#)

63 files found

Close Help

Data Manager

Web Links | Images | Plottable Images | Supplemental Data

Backup | Restore | Sync | Import Shared Data | Share Lists | Observing Lists | Notes

Browse Local/Network Files Skyhound Web Site

Import Observing lists to this group: Default New

Title	File Type	Size	File Name
✓ AL Flat Galaxies	Observing List	1.5 KB	Al Flat Galaxies.stx
✓ AL Globular Cluster List	Observing List	3.0 KB	AL Globular Clusters.stx
✓ Caldwell Catalogue	Observing List	1.2 KB	caldwell.stx
✓ Herschel 400	Observing List	2.5 KB	H400.stx
✓ M31 Globular Clusters	Observing List	1.7 KB	m31_globulars.stx
✓ NSOG DSOs - Virgo	Observing List	2.2 KB	Virgo.stx
✓ RASC 40 Brightest Galaxies	Observing List	4.1 KB	RASC 40.stx

Browse Location: Deep Sky Observing Lists Get Listing

Checked = installed
Double-click to see details

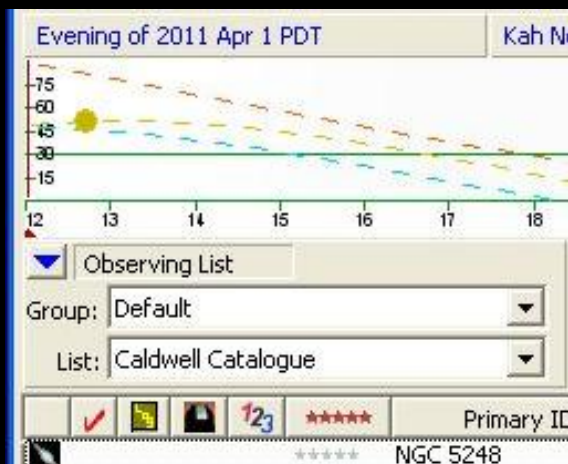
Import

To share log entries use the [Log Browser](#)

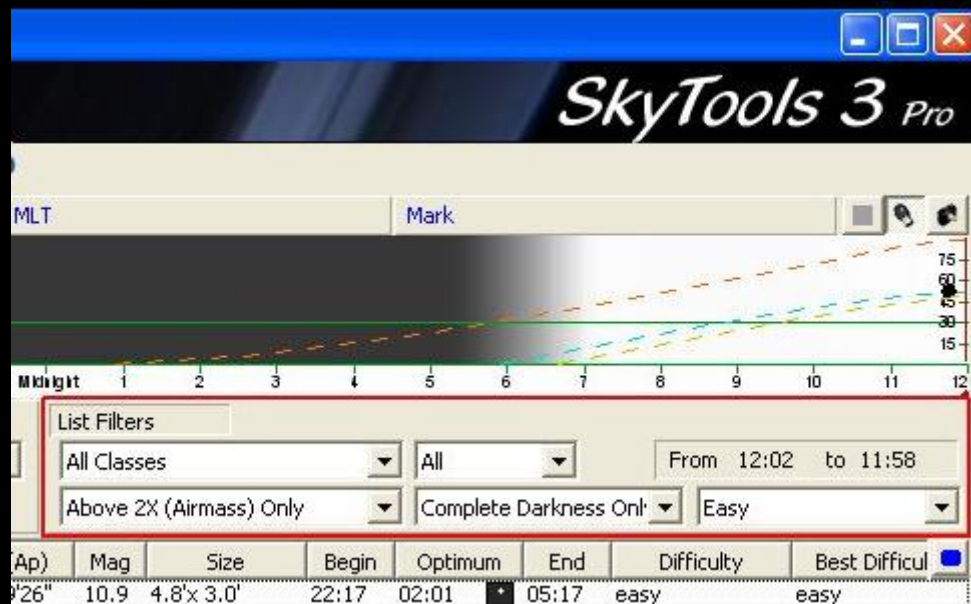
Close Help

Shared Data Acquisition complete

Select Caldwell List



Set Filters to Find Suitable Objects



The Filters Extract 20 Objects

Primary ID	Con
NGC 5248	Boo
NGC 2403	Cam
NGC 4449	CVn
NGC 5005	CVn
Whale Galaxy	CVn
NGC 559	Cas
NGC 663	Cas
NGC 40	Cep
Blinking Planetary	Cyg
Cat's Eye Nebula	Dra
Eskimo Nebula	Gem
NGC 7243	Lac
NGC 2238	Mon
NGC 2244	Mon
Chi Persei	Per
h Persei	Per
Spindle Galaxy	Sex
Hyades	Tau
NGC 4697	Vir
NGC 6885	Vul

20 objects out of 110 meet visibility criteria

Checks Allow Operations on More Than One Object at a Time

SkyTools 3 Professional Edition

Nightly Planner Current Events Special Events Ep

Evening of 2011 Apr 1 PDT Kah Nee T

Observing List

Group: Default

List: Caldwell Catalogue

Primary ID
NGC 5248
NGC 2403
NGC 4449
NGC 5005
Whale Galaxy
NGC 559
NGC 663
NGC 40
Blinking Planetary
Cat's Eye Nebula
Eskimo Nebula
NGC 7243
NGC 2238
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NGC 6885

SkyTools 3 Professional Edition

Nightly Planner Current Events Special Events Ep

Evening of 2011 Apr 1 PDT Kah Nee T

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NGC 2403
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Hyades
NGC 4697
NGC 6885

SkyTools 3 Professional Edition

Nightly Planner Current Events Special Events Ep

Evening of 2011 Apr 1 PDT Kah Nee T

Observing List

Group: Default

List: Caldwell Catalogue

Primary ID
NGC 5248
NGC 2403
NGC 4449
NGC 5005
Whale Galaxy
NGC 559
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NGC 40
Blinking Planetary
Cat's Eye Nebula
Eskimo Nebula
NGC 7243
NGC 2238
NGC 2244
Chi Persei
h Persei
Spindle Galaxy
Hyades
NGC 4697
NGC 6885

Copy the checked objects to the star party list.
There are now 48 objects on my list.

The screenshot shows the SkyTools 3 Professional Edition interface. At the top, there are tabs for 'Nightly Planner', 'Current Events', 'Special Events', and 'Ephemerid'. Below these is a toolbar with various icons. The main window displays a star chart for the 'Evening of 2011 Apr 1 PDT' at 'Kah Nee Ta Resor'. The 'Observing List' is visible, showing a table with columns for 'Group', 'List', 'Note/Rating', and 'Primary ID'. The 'List' is set to 'Caldwell Catalogue'. A context menu is open over the table, with 'Copy Checked To...' selected. The table contains several entries, including NGC 2403, NGC 4449, and NGC 5005, all of which are checked.

Group	List	Note/Rating	Primary ID	Co
Default	Caldwell Catalogue	*****	NGC 2403	Cam
Default	Caldwell Catalogue	*****	NGC 4449	CVn
Default	Caldwell Catalogue	*****	NGC 5005	CVn

The screenshot shows the 'Add Object to Observing List' dialog box. It has a blue title bar with a close button. The dialog contains two main sections: 'Group' and 'Observing List'. The 'Group' section has a dropdown menu set to 'Introductory Class Lists' and a 'New' button. The 'Observing List' section has a dropdown menu set to 'Kah Nee Ta 2011' and a 'New' button. At the bottom, there are three buttons: 'OK', 'Cancel', and 'Help'. A mouse cursor is pointing at the 'OK' button.

The screenshot shows a close-up of the 'Observing List' context menu. The menu is open over a table of objects. The 'Copy Checked To...' option is highlighted. The table contains several entries, including NGC 5248, NGC 2403, NGC 4449, NGC 5005, Whale Galaxy, and NGC 559. The 'Copy Checked To...' option is highlighted in blue.

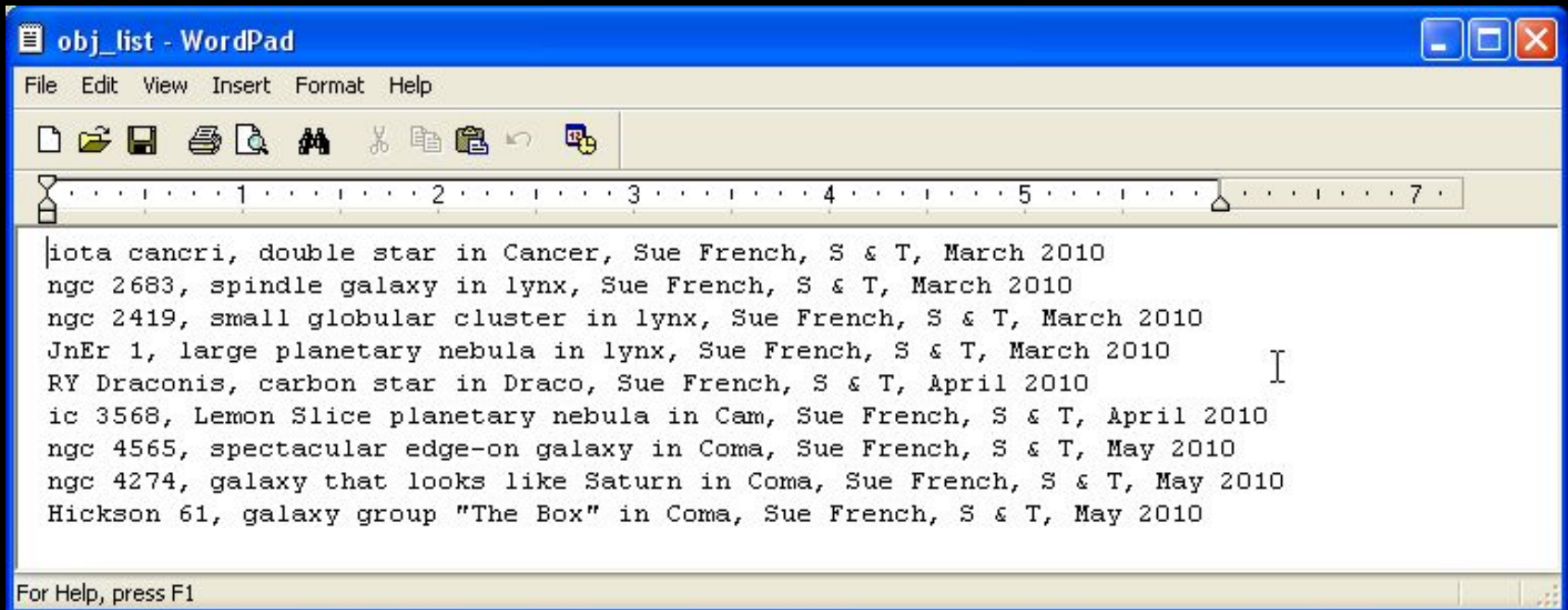
Group	List	Note/Rating	Primary ID	Co
Default	Caldwell Catalogue	*****	NGC 5248	
Default	Caldwell Catalogue	*****	NGC 2403	
Default	Caldwell Catalogue	*****	NGC 4449	
Default	Caldwell Catalogue	*****	NGC 5005	
Default	Caldwell Catalogue	*****	Whale Galaxy	
Default	Caldwell Catalogue	*****	NGC 559	

Exercise: Download another observing list from the Skyhound web site and add it to the Default observing list group. Add more objects to the Kah Nee Ta 2011 list until you've added 20 total.

Reading Objects from a File and Adding Them to an Observing List

Suppose that you 're looking through some old copies of Sky & Telescope during lunch at work and find a few objects you'd like to see during the star party. You could type these objects into a text file with one object per line and email the file to yourself at home. But rather than having to add the objects to your observing list manually, SkyTools can read the objects directly from the file

Download http://mark-a-martin.us/skytools/obj_list.txt



The screenshot shows a Windows WordPad window with the title bar 'obj_list - WordPad'. The window contains a list of astronomical objects, one per line, in a monospaced font. The objects are: Iota Cancri (double star in Cancer), NGC 2683 (spindle galaxy in Lynx), NGC 2419 (small globular cluster in Lynx), JnEr 1 (large planetary nebula in Lynx), RY Draconis (carbon star in Draco), IC 3568 (Lemon Slice planetary nebula in Coma), NGC 4565 (spectacular edge-on galaxy in Coma), NGC 4274 (galaxy that looks like Saturn in Coma), and Hickson 61 (galaxy group 'The Box' in Coma). The window also shows a menu bar (File, Edit, View, Insert, Format, Help), a toolbar with icons for file operations, and a status bar at the bottom that says 'For Help, press F1'.

```
obj_list - WordPad
File Edit View Insert Format Help
|iota cancri, double star in Cancer, Sue French, S & T, March 2010
ngc 2683, spindle galaxy in lynx, Sue French, S & T, March 2010
ngc 2419, small globular cluster in lynx, Sue French, S & T, March 2010
JnEr 1, large planetary nebula in lynx, Sue French, S & T, March 2010
RY Draconis, carbon star in Draco, Sue French, S & T, April 2010
ic 3568, Lemon Slice planetary nebula in Coma, Sue French, S & T, April 2010
ngc 4565, spectacular edge-on galaxy in Coma, Sue French, S & T, May 2010
ngc 4274, galaxy that looks like Saturn in Coma, Sue French, S & T, May 2010
Hickson 61, galaxy group "The Box" in Coma, Sue French, S & T, May 2010
For Help, press F1
```

SkyTools 3 Professional Edition

Nightly Planner | Current Events | Special Events

Evening of 2011 Apr 1 PDT | Kah N

Gr

- Refresh List
- Auto Refresh
- Auto Sort
- Reset Filters
- New Observing List Group
- New Observing List
- View/Edit List Title and Description
- Delete Observing List
- Print/Copy Observing List
- Configure Columns
- Read Objects From File**
- View List as Thumbnails
- Transfer Observing List to Telescope
- Update "Current" Lists from Web
- Help

St. Katherine's M

Create Observing List From File

Select File
C:\Documents and Settings\mark\Desktop\obj_list.txt

Observing List Group
Introductory Class Lists

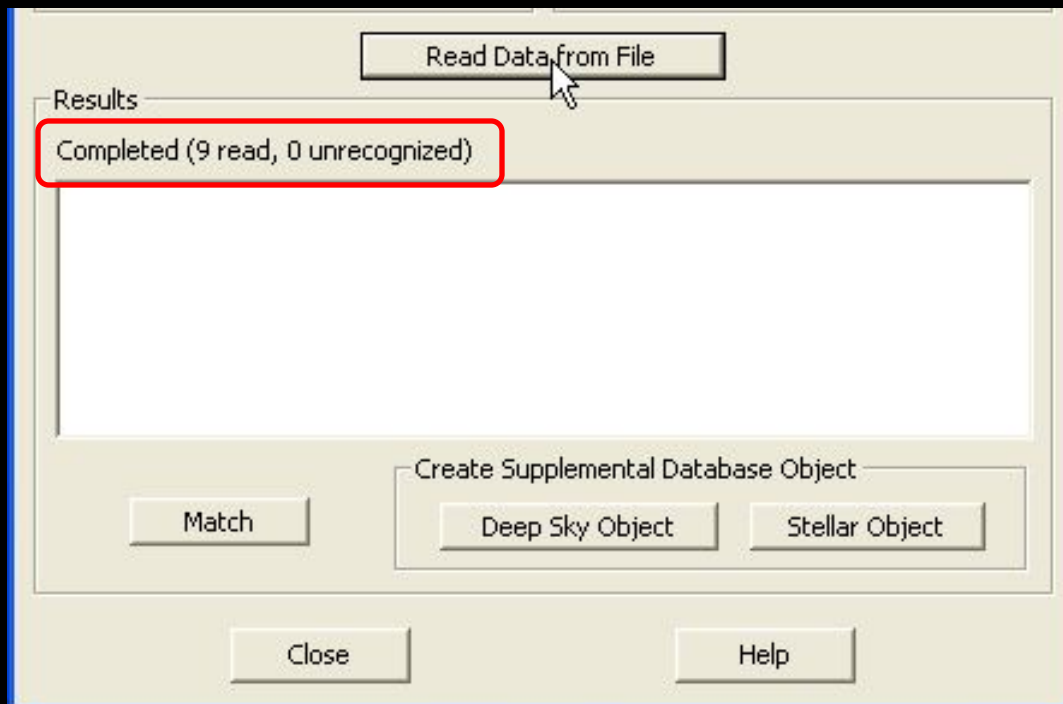
New Observing List Name
Sue French March-May 2010

Starting

Column width: Delimiting character

Results

Create Supplemental Database Object



Push the Read Data from File button. All objects were recognized.

Observing List

Group: Introductory Class Lists

List: Sue French March-May 2010

Note/Rating

My Notes

New Gro

	✓	📄	📷	123	*****	Primary ID	Con
📄					*****	Baby Eskimo	Cam
📄					*****	Iota Cnc	Cnc
📄					*****	NGC 4274	Com
📄					*****	Hickson 61	Com
📄					*****	NGC 4565	Com
📄					*****	RY Dra	Dra
📄					*****	PN G164.8+31.1	Lyn
📄					*****	Intergalactic Wanderer	Lyn
📄					*****	NGC 2683	Lyn

The first several columns of the new Observing list

Double-click or use the right-click menu to open the Object Information dialog box.

The screenshot shows a software interface with a table of astronomical objects. The table has columns for Primary ID, Con, RA (Ap), Dec (Ap), Mag, and S. The 'Baby Eskimo' row is selected, and a context menu is open over it. The menu options include: Object Info, View Interactive Atlas, View Overhead Sky, View Naked Eye, MLT, View Scope/Binocs, Center in Current Chart, Print Chart, Slew Scope to, Slew Scope to and Center in, Create Quick Log Entry, Create Log Entries, Get DSS image, Copy To..., Move To..., and Delete Entry.

Primary ID	Con	RA (Ap)	Dec (Ap)	Mag	S
Baby Eskimo	Cam	12h33m35.1s			
Iota Cnc	Cnc	08h47m22.6s			
NGC 4274	Com	12h20m26.8s			
Hickson 61	Com	12h13m00.5s			
NGC 4565	Com	12h36m56.6s			
RY Dra	Dra	12h56m56.2s			
PN G164.8+31.1	Lyn	07h58m46.0s			
Intergalactic Wanderer	Lyn	07h38m55.3s			
NGC 2683	Lyn	08h53m25.0s			

Enter notes under Notes tab on Object Information dialog box.

The screenshot shows the 'Object Information' dialog box for 'Baby Eskimo'. The dialog box has a title bar with an information icon and a close button. The main content is organized into several sections:

- Object Name:** Baby Eskimo, Planetary Nebula
- Coordinates:** R.A.: 12h33m06.8s Dec.: +82°33'50" (2000), Galactic lon: +123°39' Galactic lat: +34°32' in Camelopardus
- Also known as:** IC 3568, PN G123.6+34.5, PK 123-34.1, ARO 56
- Magnitude/Size:** Magnitude: 11.60, Size: 18"
- Comments:** Smooth disk plus smooth disk, brighter toward center. Fainter spherical envelope.
- Catalog Data:** Magnitude of central star: 13.4, Radial Velocity: -42 km/sec, Expansion Vel: 8.0 km/sec, Distance: 6800 ly, Mean Surface Br. 17.6 Mag/arcsec²
- Navigation/Action:** Images, Links, Observing Lists, Visual Difficulty, Chart Numbers, Visual Synopsis, Notes (selected), NightBar, YearBar, Apparent Data
- Group:** My Notes (dropdown), New Group (button)
- Notes:** A text area with a headline field containing "Also called the Lemon Slice Nebula. Found in Sue French's column in the April 2010 issue of Sky & Telescope."
- Footer:** As of 2011 Apr 2 00:57 PDT, For Kah Nee Ta Resort, MLT, Mark, Action Menu (dropdown)

Exercise: Explore the other tabs of the Object Information dialog box.

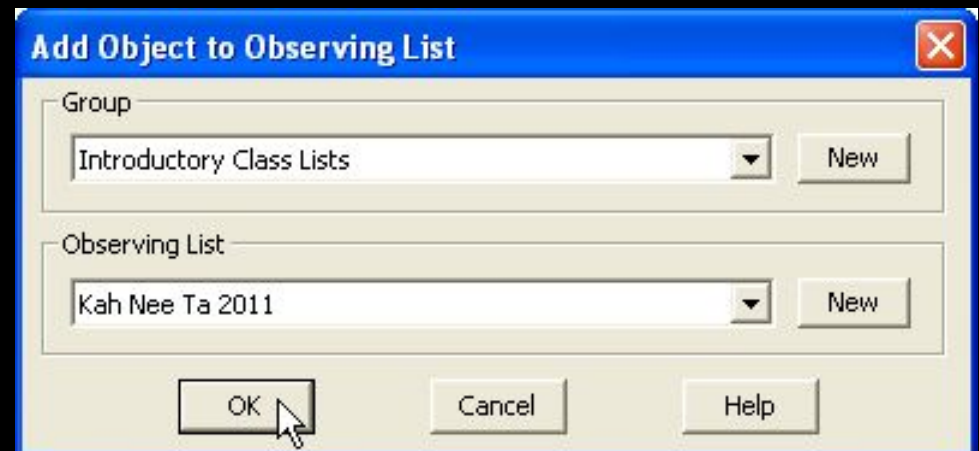


I now have 57 objects in my Kah Nee Ta 2011 observing list.



Check all objects and copy them to Kah Nee Ta 2011 list, as before.

Afterwards, clear checks from list, if desired.



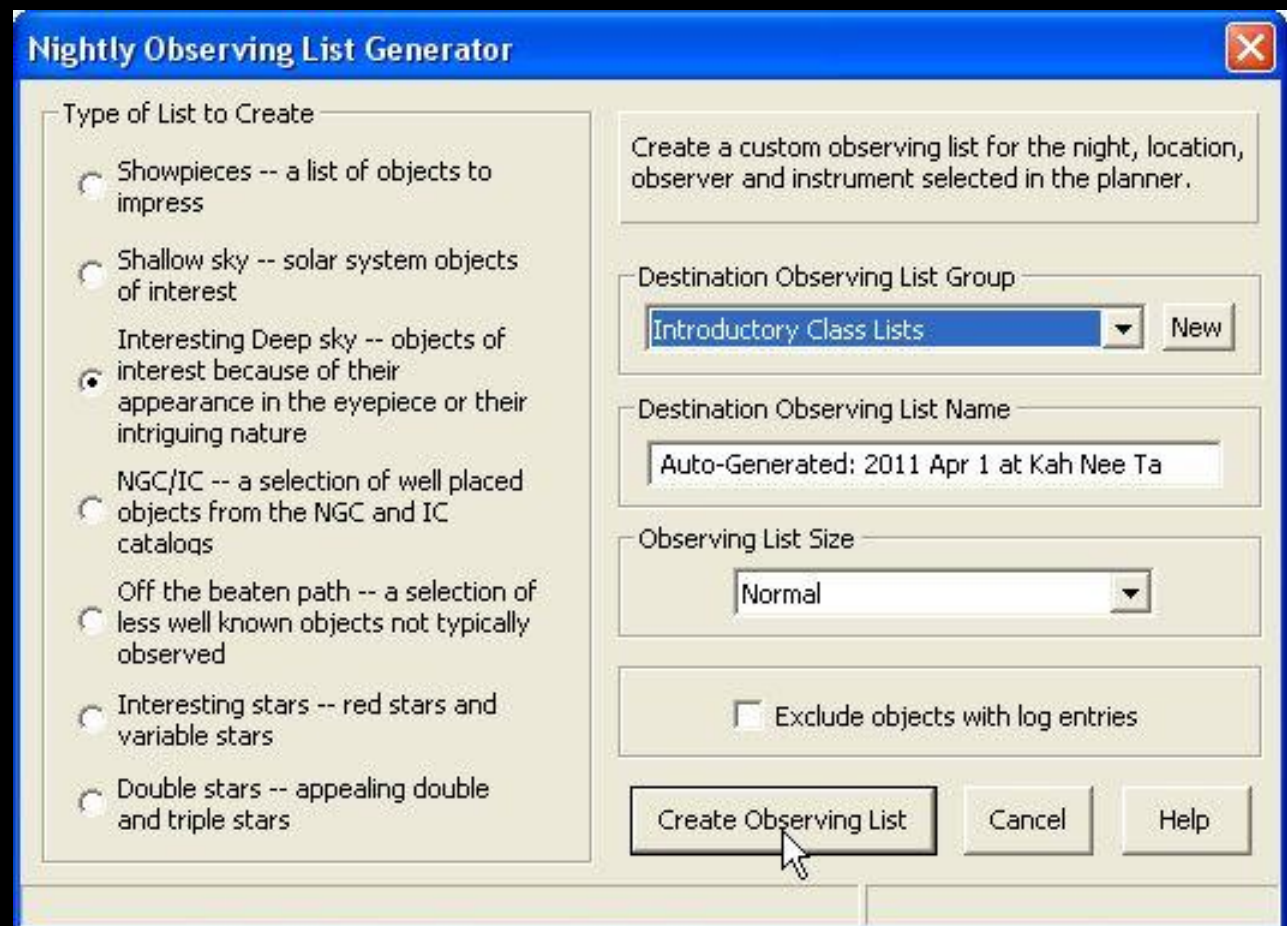
Automatically Generating an Observing List



Nightly Observing List Generator button

Nightly Observing List Generator with options set

Your list will differ from mine.



The original automatically-generated list contained 26 objects running the entire gamut of visual detection difficulties. This is the list filtered to increase visibility (18 objects) and sorted by object type. To sort by the value in a column, click on the column heading.

Evening of 2011 Apr 1 PDT Kah Nee Ta Resort

Observing List

Group: Introductory Class Lists

List: Auto-Generated: 2011 Apr 1 at Kah I

Primary ID	Con
***** NGC 2782	Lyn
***** NGC 3808B	Leo
***** NGC 5996	Ser
***** NGC 3628	Leo
***** Siamese Twins	Vir
***** NGC 5665	Boo
***** NGC 5426	Vir
***** NGC 40	Cep
***** IC 351	Per
***** Eskimo Nebula	Gem
***** NGC 2022	Ori
***** Crab Nebula	Tau
***** Hubble's Variable Nebula	Mon
***** Intergalactic Wanderer	Lyn
***** Hickson 68	CVn
***** Hickson 37	Cnc
***** Hickson 54	Leo
***** Hickson 40	Hya

Mark

List Filters

All Classes All From 12:02 to 11:58

Above 2X (Airmass) Only Complete Darkness Only Detectable

Mag	Size	Begin	Optimum	End	Difficulty	Best Difficul
12.3	3.4'x 2.4'	20:56	21:46	02:16	detectable	detectable
12.5	45"x 20"	20:51	00:05	04:41	easy	easy
13.2	1.5'x 0.7'	00:15	04:10	05:21	detectable	detectable
10.0	12.3'x 3.3'	20:56	23:44	03:45	easy	easy
11.7	4.4'x 2.3'	21:22	01:01	04:41	detectable	detectable
12.7	2.0'x 1.2'	23:23	02:56	05:19	detectable	detectable
12.7	2.9'x 1.3'	00:06	02:27	04:49	detectable	detectable
10.7	1.0'	02:58	04:50	05:23	easy	easy
11.9	8.0"	20:46	21:16	21:35	obvious	obvious
8.6	47"	20:45	21:25	00:26	obvious	obvious
11.7	28"	20:51	21:18	21:53	easy	easy
8.4	8.0'	20:59	21:21	22:35	detectable	detectable
2.2'x 1.5'		20:58	21:21	22:46	detectable	detectable
10.3	4.6'	20:55	21:28	01:03	detectable	detectable
10.5	9.2'	21:06	02:18	05:21	easy	easy
12.1	3.2'	21:07	21:44	23:56	detectable	detectable
15.0	42"	20:59	23:54	03:57	detectable	detectable
12.5	1.7'	21:04	22:03	00:08	detectable	detectable

7 galaxies, 4 planetary nebulae, 2 diffuse nebulae, 1 globular cluster, and 4 unknown

Exploring Hickson 68

If Hickson 68 isn't on your automatically-generated list, add it using a Designation Search for "hickson 68".

Open the Object Information dialog box for Hickson 68.

It turns out that Hickson 68 is a galaxy group.

Also check out the Year Bar and the Night Bar.

Object Information

Hickson 68
Galaxy Group

R.A.: 13h53m40.9s Dec.: +40°19'41 (2000)
Galactic lon: +82°37' Galactic lat: +71°34'
in Canes Venatici

Also known as

Magnitude: 10.50
Size: 9.2'

Comments

Catalog Data
5 member galaxies
Brightest member: 10.5
Redshift (z): 0.01
Light Time: 0.1 Gyr

Images | Links | Observing Lists | Visual Difficulty | Chart Numbers
Visual Synopsis | Notes | NightBar | YearBar | Apparent Data

On this night Hickson 68 is best visible between 21:06 and 05:21, with the optimum view at 02:18. Look for it in Canes Venatici, high in the sky in complete darkness. It is easy visually in the MLT. Use the Plössl 15mm for optimum visual detection.

In the following 30 days this object is very challenging visually from April 2-15, and again from April 20 on, with the best view coming on April 25. Hickson 68 passes high overhead at Kah Nee Ta Resort. The best evening viewing is in late May.

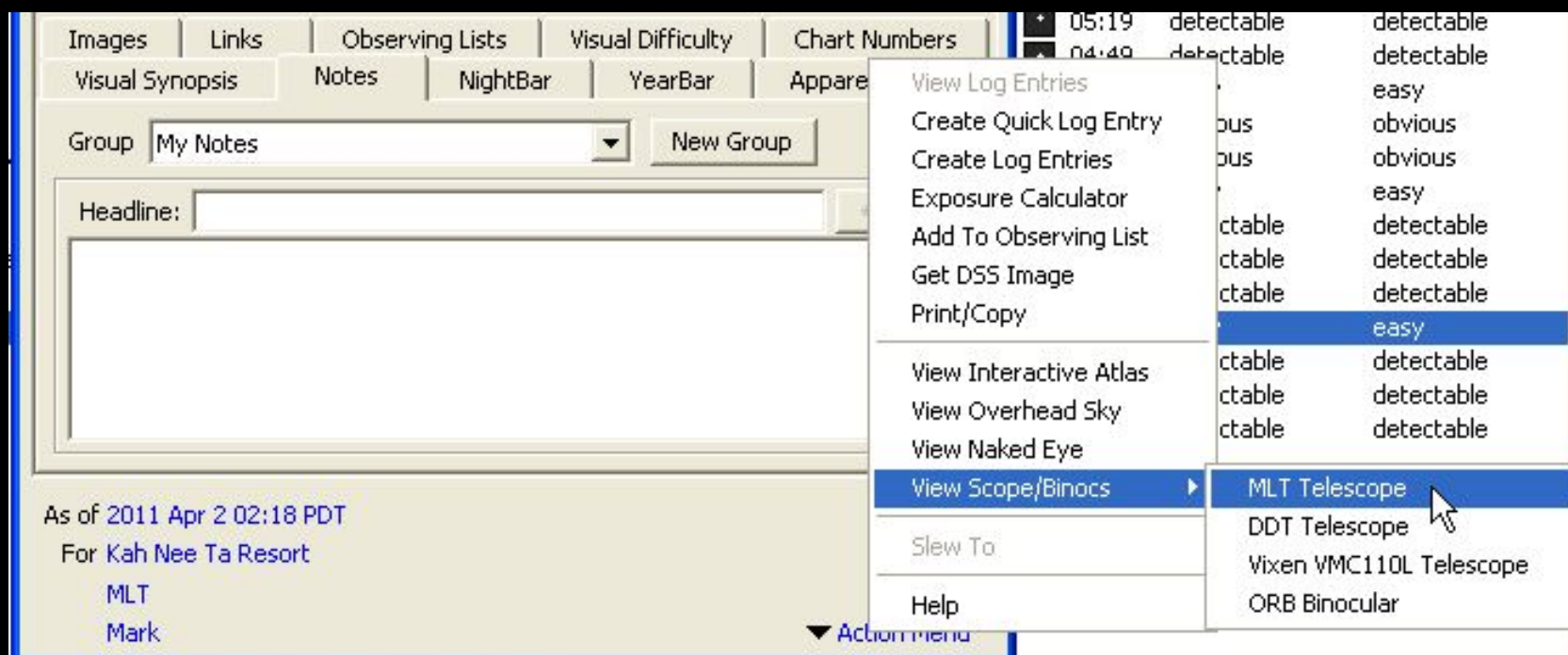
As of 2011 Apr 2 02:18 PDT
For Kah Nee Ta Resort
MLT
Mark

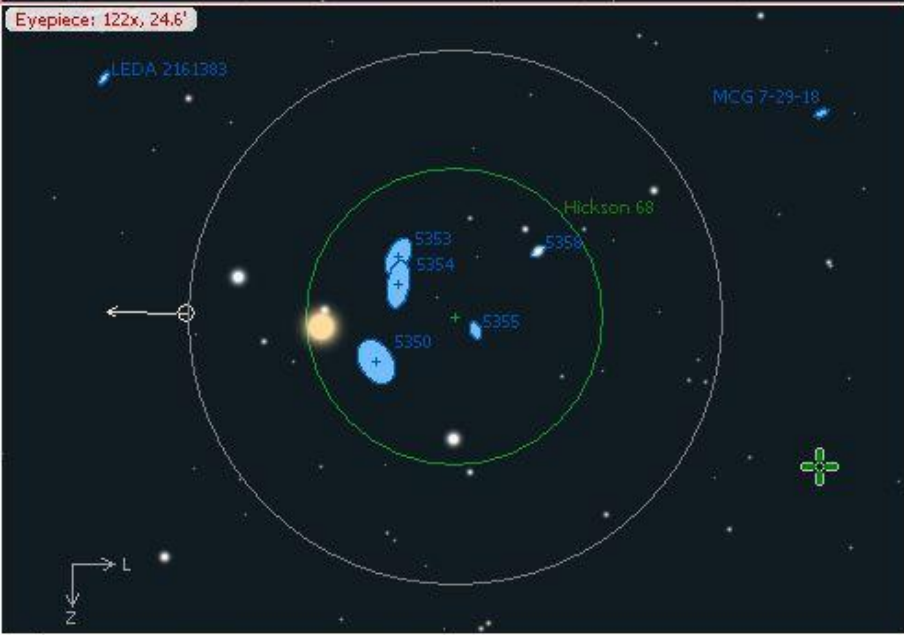
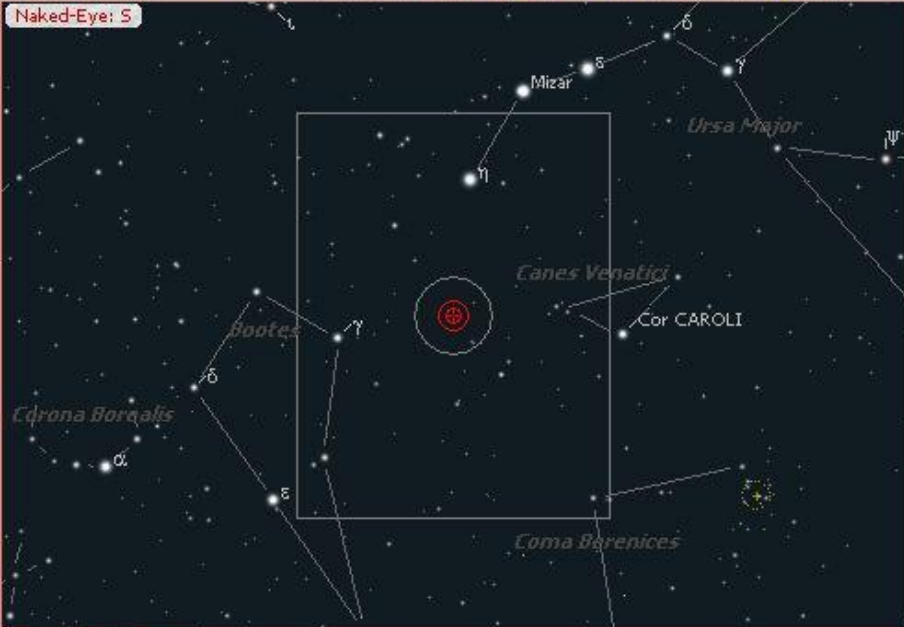
▼ Action Menu

But what will Hickson 68 look like in your telescope?

It's possible to get an idea of this using a Visual Sky Simulation.

Choose the view associated with your telescope from the Action Menu at the bottom right-hand corner of the Object Information dialog box.





Visual Sky Simulation

- Simulates naked eye, finder, and eyepiece views of the object.
- Each view may be individually configured, zoomed, or even toggled off or on.
- Views may also be interchanged.
- Can change the date, location, instrument, observer, or even the object.

View-specific controls operate whichever view is selected. Select a view by clicking on it. The selected view has a faint red highlight around it.

Initial settings:

- ❖ Eyepiece is whichever eyepiece was last used with telescope.
- ❖ Date is the date in the tool from which the chart was opened.
- ❖ Time is the optimal viewing time that SkyTools calculated for the date.

The 3 views of the Visual Sky Simulation comprise the context method of object finding:

If you can make all 3 views match the star fields visible in them using your naked eyes/reflex site, finders, and eyepiece, respectively, then you will have found the object you're looking for.

Button, Key, or Mouse Click	Action
Eye Button	Toggle Naked Eye view off or on
Finder Button	Toggle Finder view off or on
Circular Star Field Button	Toggle Eyepiece view off or on
F9 Key	Show Eyepiece view only
F10 Key	Show Finder view only
F11 Key	Show Naked Eye view only
F12 Key	Show all 3 views
Shift-Click-Drag	Interchange 2 views

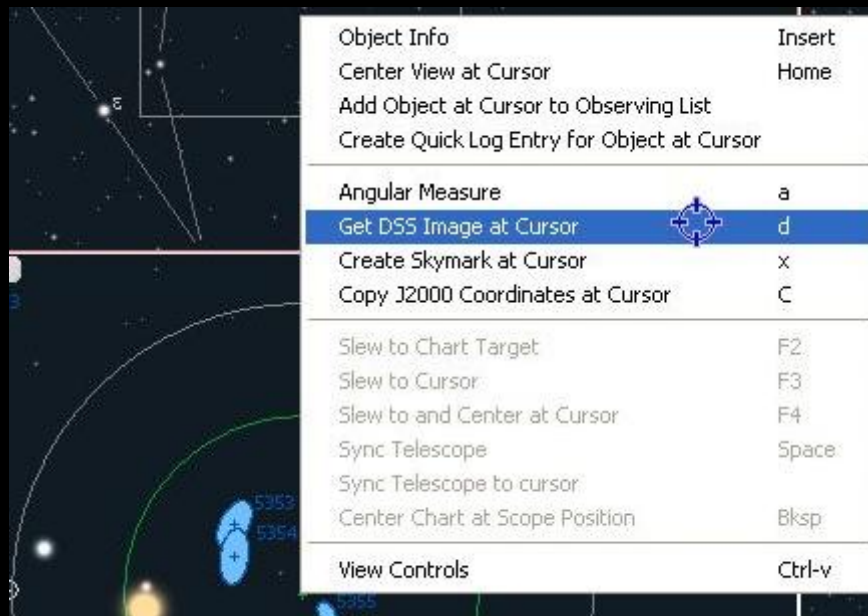
Controls for the views displayed in a Visual Sky Simulation and their arrangement on the chart.

Exercise: Play with the Visual Sky Simulation to get a feeling for how it works.

Deep-Sky Objects in a Visual Sky Simulation

- Represented by **GEOMETRIC** shapes.
- **Brightness** is not represented.
- The 👁 **visual detection difficulty** 👁 is estimated for the object in the selected view. This is displayed in the bottom right-hand side of the window.
- Full ★ **sky reports** ★ are available by pushing the blue button next to difficulty.

It's possible to make the view a little more realistic by overlaying a DSO with an image.



Get Digital Sky Survey Image [X]

Position of Image Center

Get position from object Hickson 68

RA 13h53m40.9s Dec +40°19'41" Equinox 2000.0

DSS Source SkyView (US) Survey First Generation DSS (Blue)

File Name Hickson 68 Image Size 15.00 arc min

Plottable Image Group My Plottable Images New Group

Image Link Associate Image with Hickson 68
Image Link Group My Images New Group

Default Display Action Plot image in views View image on completion Plot image outline

Get Image Close Help

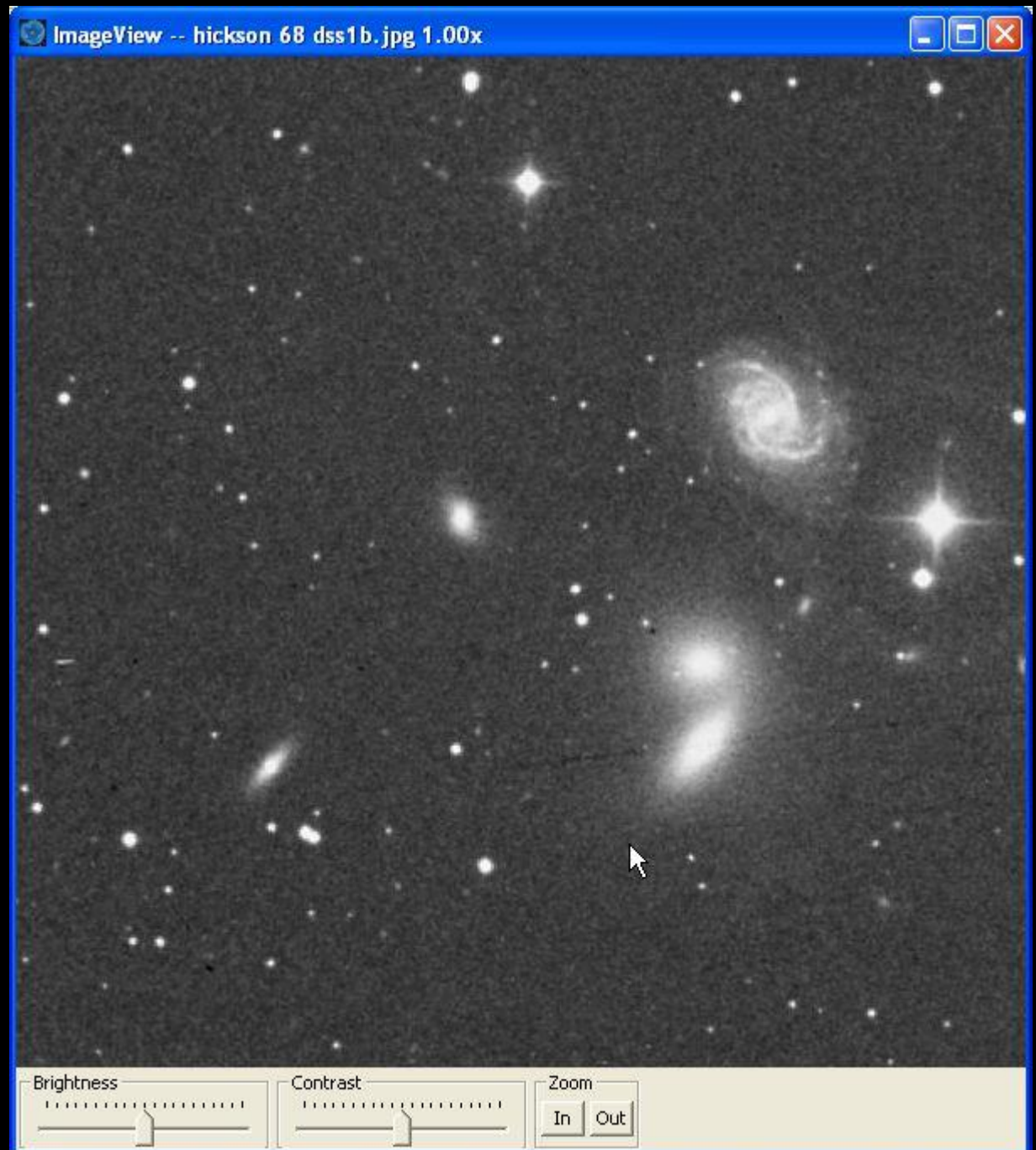
Settings to select type of image and to open the image in ImageView after download.

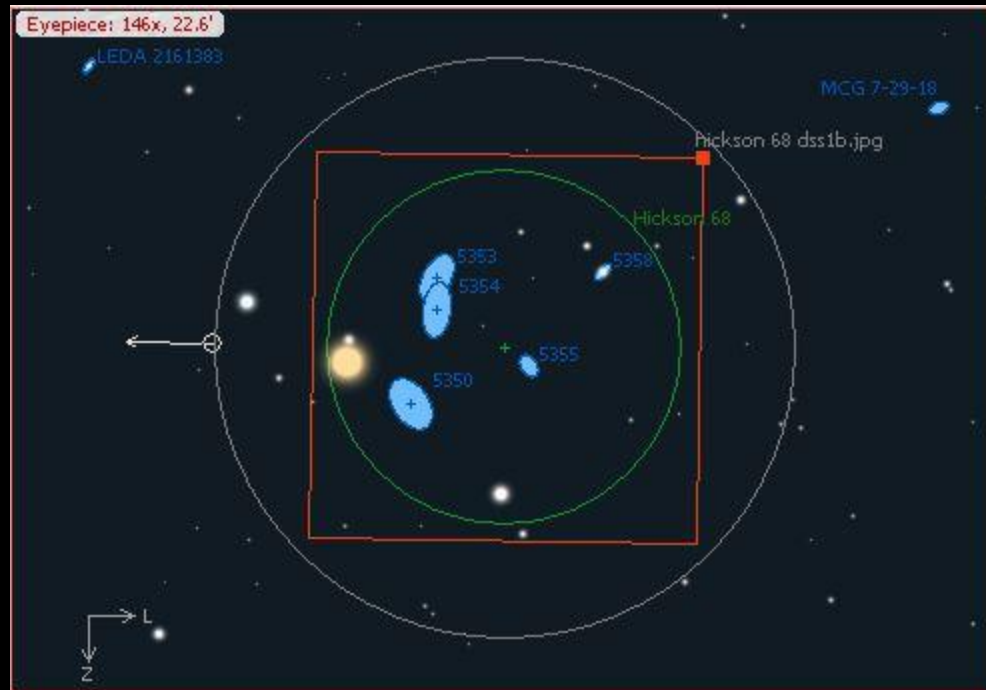
Professional Edition has a greater number of image types to download.

Slide Brightness slider to the left until the brightness of the background is closer to the sky brightness in the Visual Sky Simulation.

Afterwards, close ImageView and the Get Digital Sky Survey Image dialog box.

Images and Image Groups Are managed using the “Images” and “Plottable Images” tabs of the Data Manager.

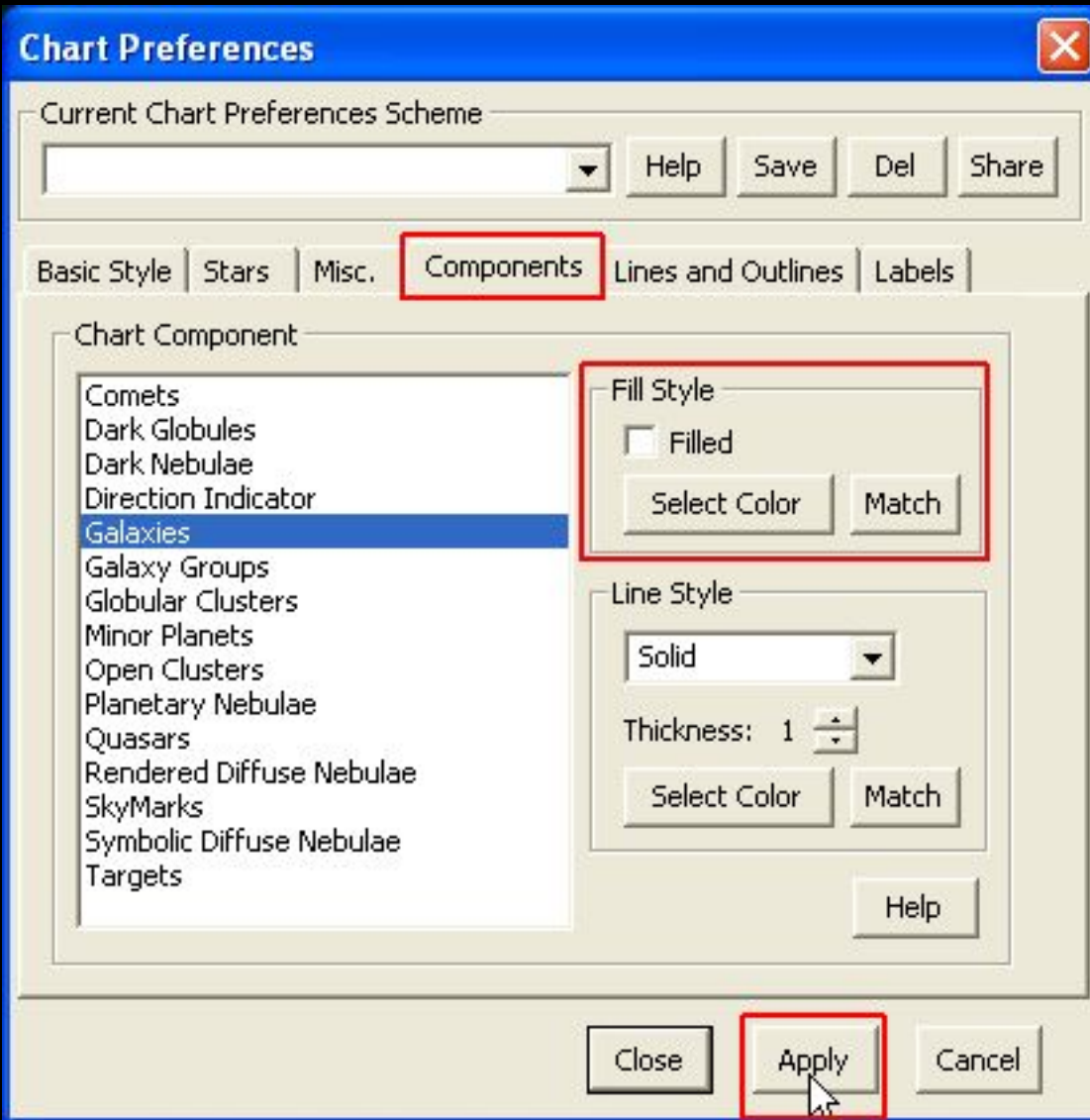




Click on the Eyepiece view to select it. You should now see the orange square above. It marks the image boundaries in the view.

If the orange square is not visible,

1. Use View button to open View Controls.
2. In the Plottable Images section, select "Plot according to individual selection".
3. Push the Apply button
4. Push the Close button.



Next, remove fill from the galaxy symbols in the Chart Preferences dialog box for the Eyepiece view.

Object Info Insert

Center View at Cursor Home

Add Object at Cursor to Observing List

Create Quick Log Entry for Object at Cursor

Show plottable image

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

Eye-piece: 146x, 22.6'

LEDA 2161383

Hickson 68

5353

5354

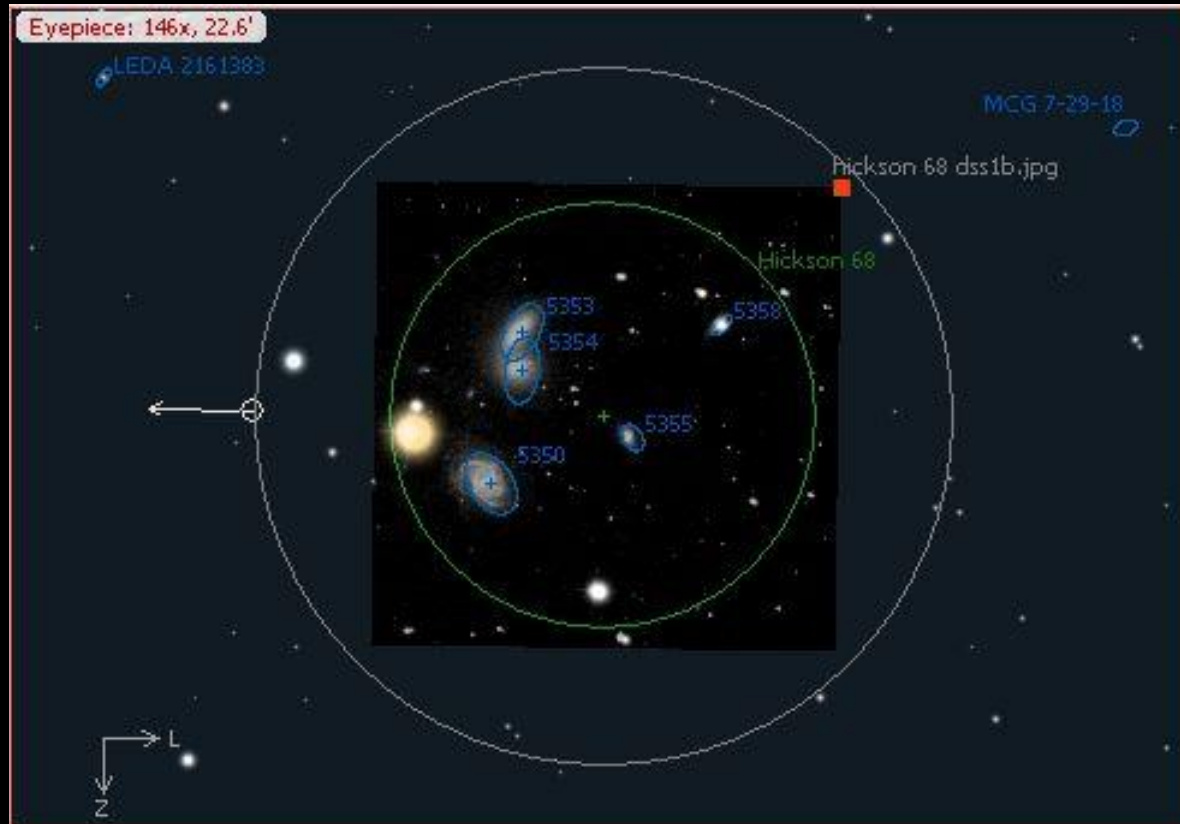
5358

5355

5350

hickson 68 dss1b.jpg, V0.0

The Final Result

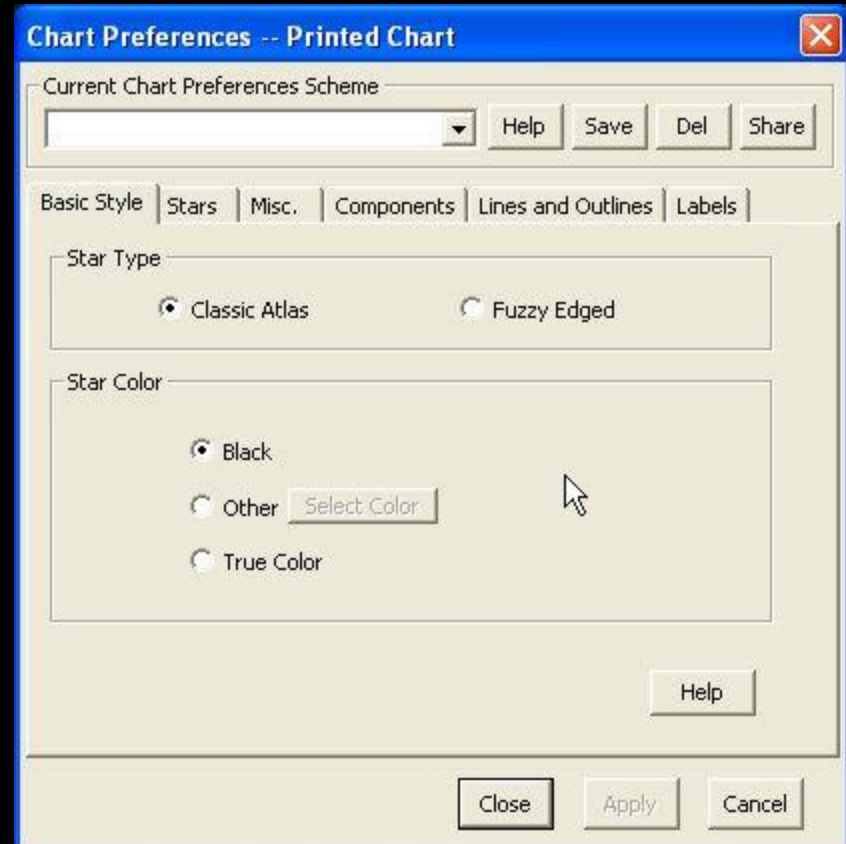
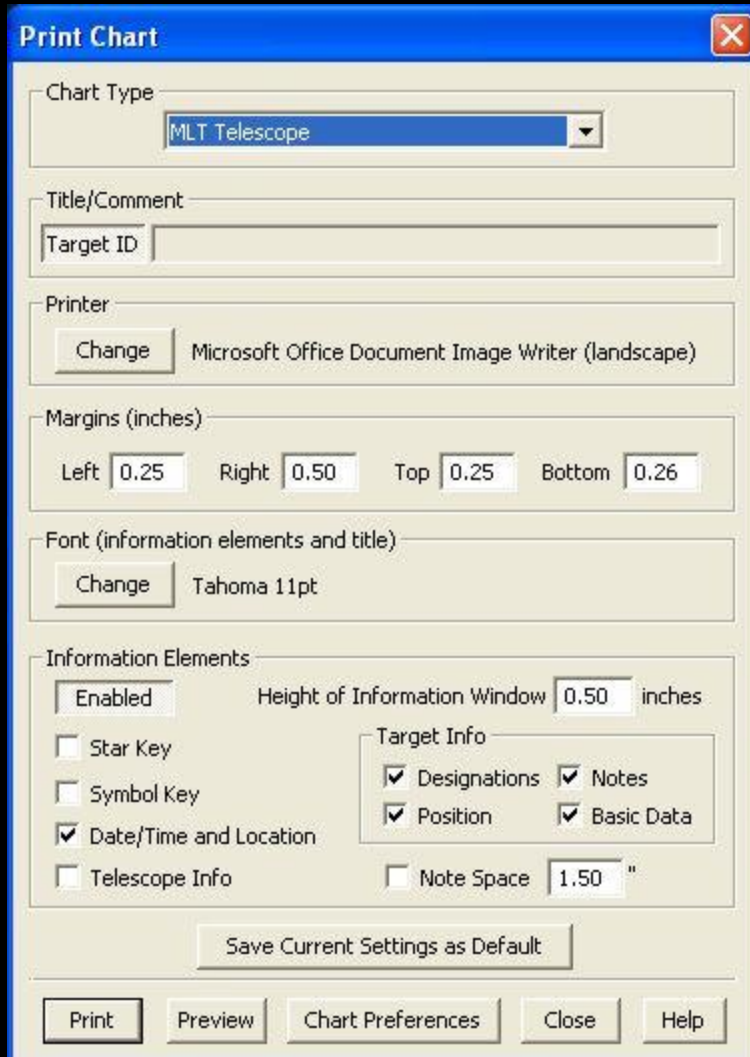


Exercise: Right-click on another object in the automatically-generated observing list and create the corresponding Visual Sky Simulation associated with the instrument of your choice. Then overlay the object with an image of your choice.

Printing a Visual Sky Simulation

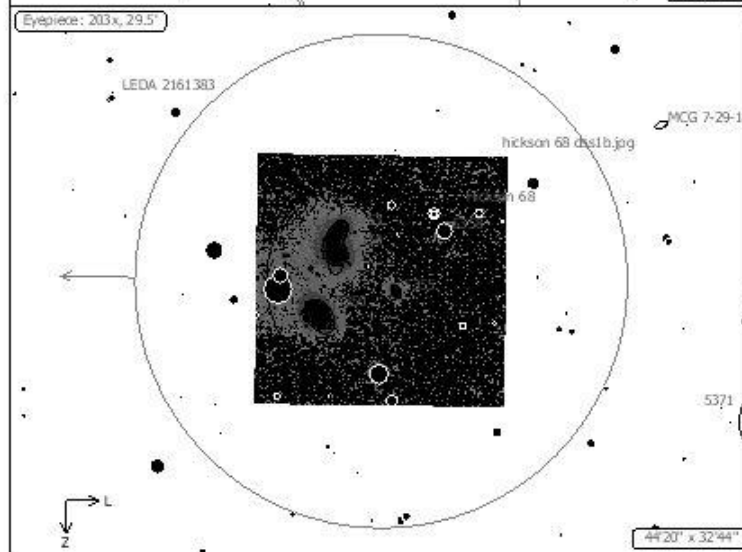
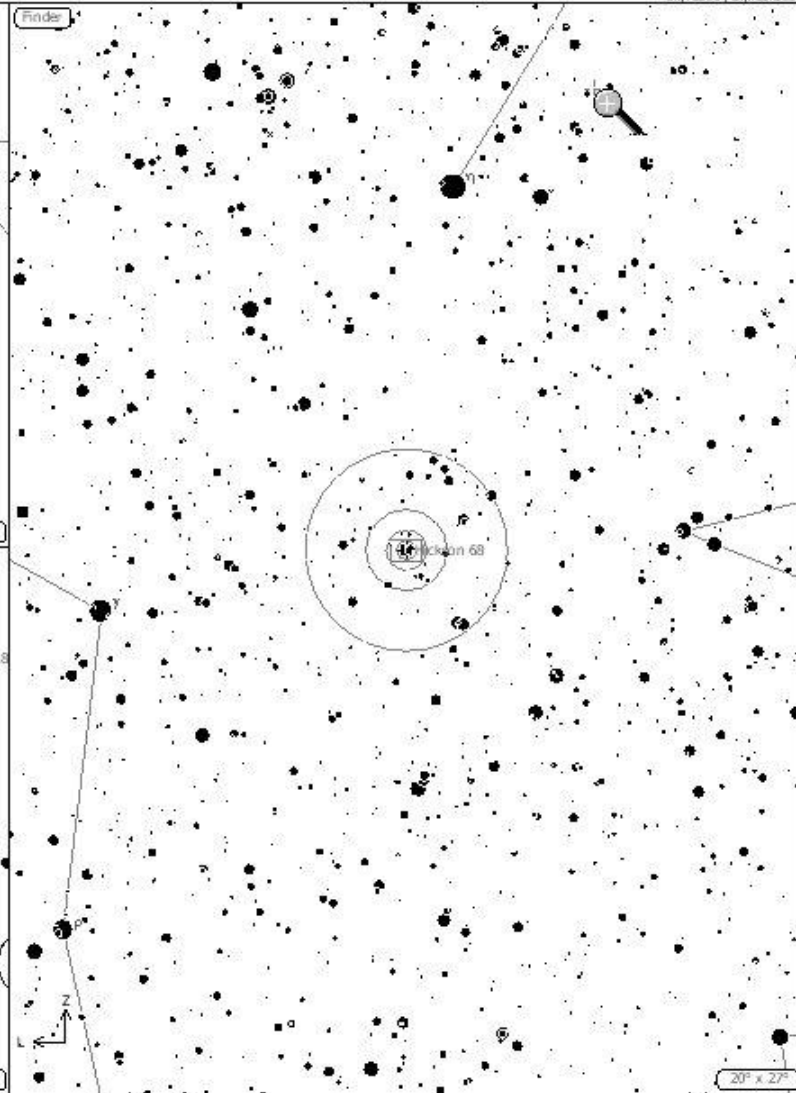
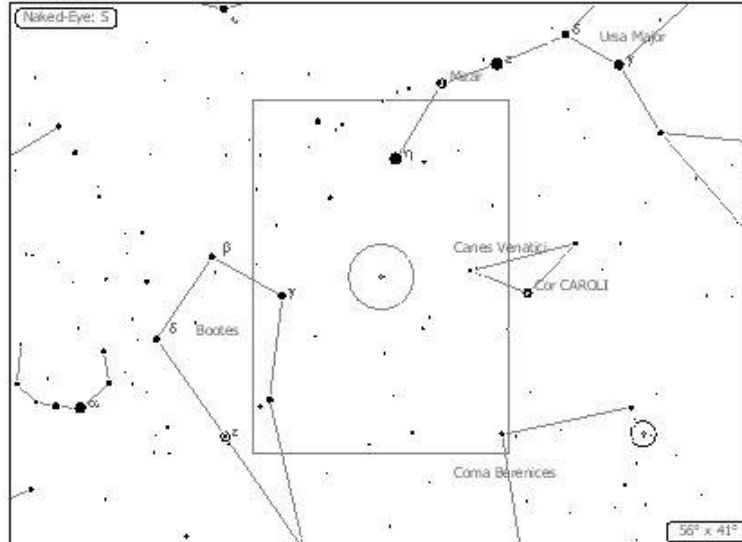


Preferences may also be set from a preview.



Hickson 68

SkyTools 3 / Skyboard.com

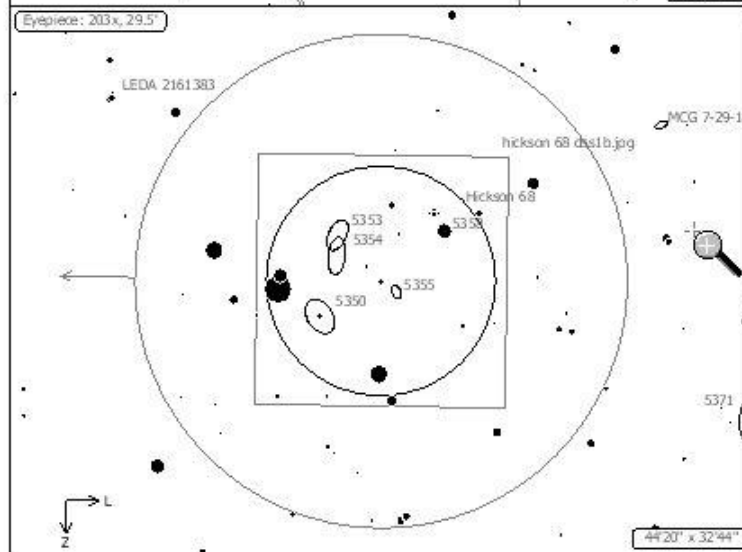
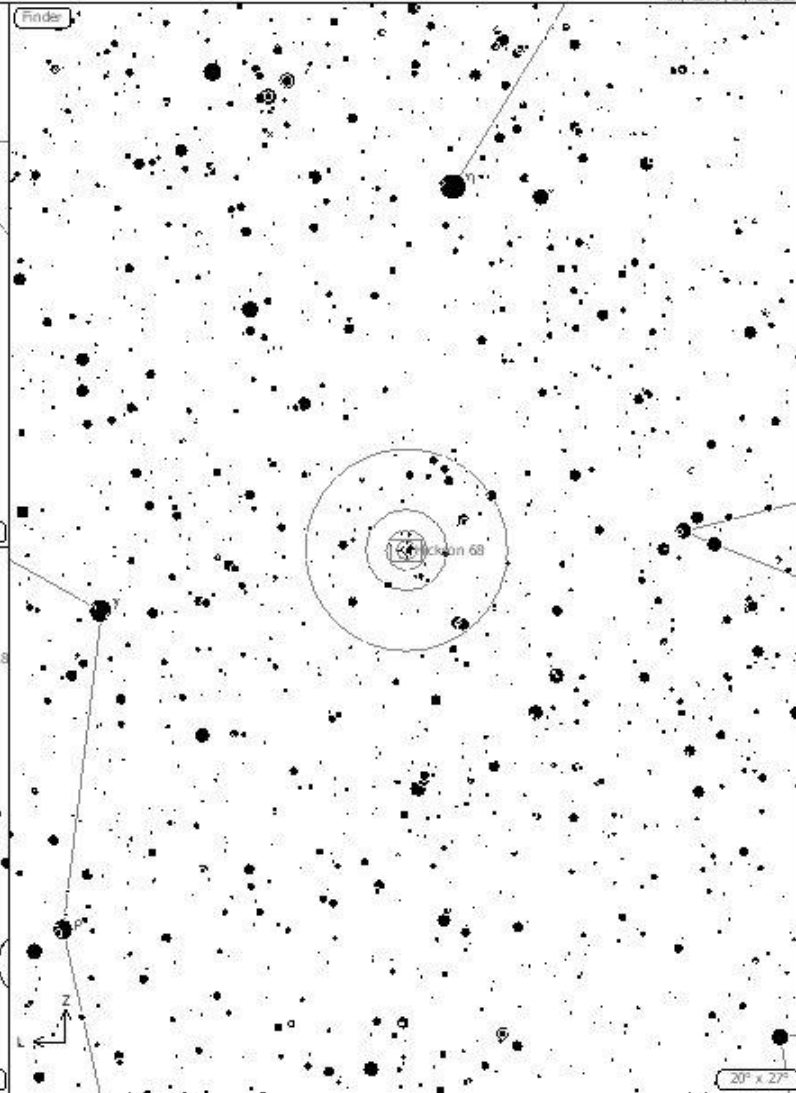
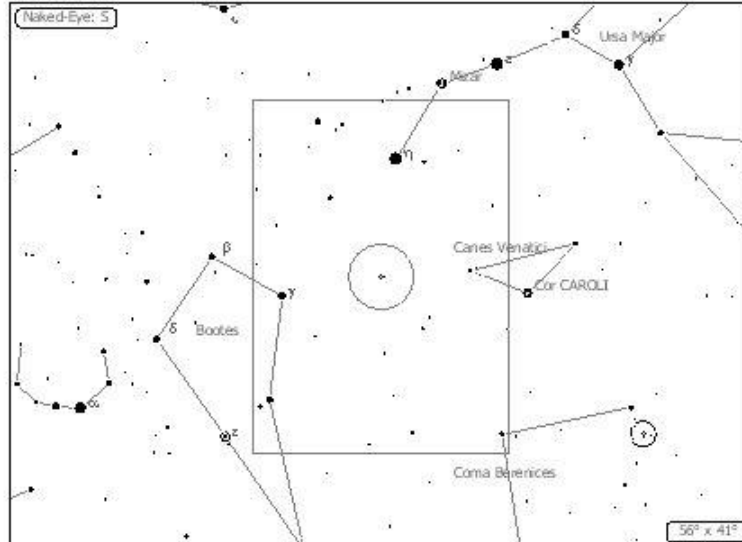


2011 April 20:18, Kah Nee Ta Resort
Fully dark ML 15.6 target detectable
Hickson 68 (Galaxy Group)

R.A.: 13h53m40.9s Dec.: +40°19'41" J2000 (CVh)
Magnitude: 10.50 Size: 9.2" Light Time: 0.1 Gyr

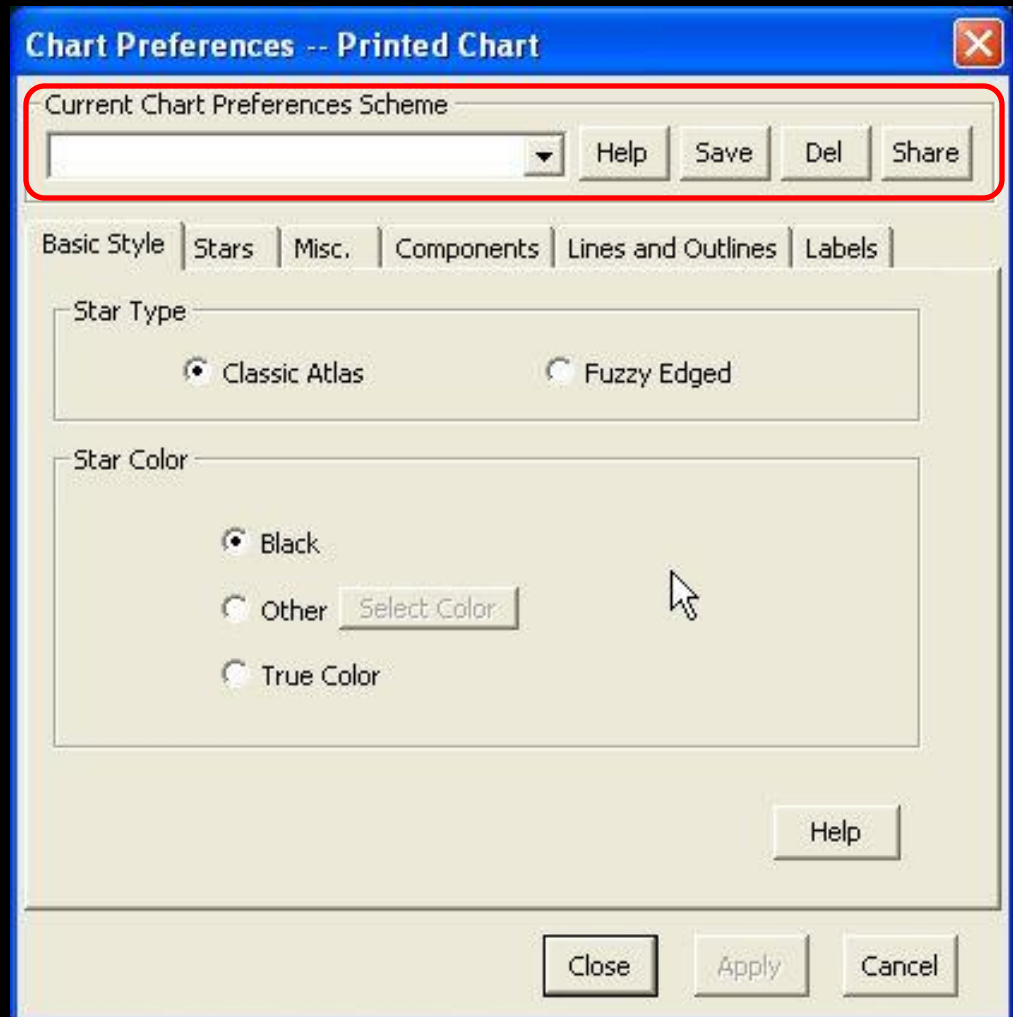
Hickson 68

SkyTools 3 / Skyboard.com



2011 April 20:18, Kah Nee Ta Resort
Fully dark ML 15.6 target detectable
Hickson 68 (Galaxy Group)

R.A.: 13h53m40.9s Dec.: +40°19'41" J2000 (CvH)
Magnitude: 10.50 Size: 9.2" Light Time: 0.1 Gyr



Settings that you like can be saved as a Chart Preferences Scheme.

Chart Preference Schemes are managed from this dialog box.

Exercise: Switch to the Visual Sky Simulation for the object you chose in the last Exercise. Push the Print button and open the preview. Experiment with the Chart Preferences until you find a format you like. Save your settings as a Chart Preferences Scheme.

I'm adding Hickson 68, Hickson 37, the Siamese Twins, and all other objects that are not galaxies or galaxy groups to the Kah Nee Ta 2011 observing list. This is 10 more objects.

✓	123	*****	Primary ID	Con
		*****	NGC 2782	Lyn
		*****	NGC 38088	Leo
		*****	NGC 5996	Ser
		*****	NGC 3628	Leo
✓		*****	Siamese Twins	Vir
		*****	NGC 5665	Boo
		*****	NGC 5426	Vir
		*****	NGC 40	Cep
		*****	IC 351	Per
		*****	Eskimo Nebula	Gem
		*****	NGC 2022	Ori
		*****	Crab Nebula	Tau
		*****	Hubble's Variable Nebula	Mon
		*****	Intergalactic Wanderer	Lyn
		*****	Hickson 68	CVn
		*****	Hickson 37	Cnc
		*****	Hickson 54	Leo
		*****	Hickson 40	Hya

As before, check the objects to copy.

Then right-click in the check column and choose "Copy Checked To ..."

Finally, select the Kah Nee Ta 2011 observing list as the destination.

When you're done, you can clear the checks from the list or even delete the automatically-generated list.

Exercise: Add whichever 10 objects you prefer from your automatically-generated list to the Kah Nee Ta 2011 observing list. Afterwards, the Kah Nee Ta 2011 should have 64 objects.

Finding and Keeping Track of Interesting Events

Aside from interesting celestial objects, SkyTools 3 can also help us find interesting events. These events involve bodies within the solar system that move quickly enough for us to observe their motions and include

- ✓ eclipses;
- ✓ major meteor showers;
- ✓ lunar phases;
- ✓ conjunctions, oppositions, and elongations for major and minor planets;
- ✓ events involving the major satellites of Jupiter and Saturn;
- ✓ and events involving Jupiter's Great Red Spot.

Two major tools calculate events:

1. The Current Events Tool

- a) Events a number of months in the future from the current date
- b) Populates the Events Calendar and the Nightly Events Planner

2. The Special Events Tool

- a) Events between a nearly arbitrary date and a date up to years from the first date.

Both tools calculate the same types of events but are configured a little differently.

Calculating Elongations of Saturn's Major Moons During the Star Party

We'll use the Special Events Tool for this, to reduce the number of events to sift through. The 7 largest moons of Saturn, in order of decreasing size, are Titan, Rhea, Iapetus, Dione, Tethys, Enceladus, & Mimas.

The screenshot displays the SkyTools 3 Professional Edition interface. The 'Special Events' tab is active, showing a search for 'Events for Kah Nee Ta Resort'. The 'Visible Events Only' filter is selected. The 'Satellite Elongations' sub-tab is open, showing a list of satellites with checkboxes for selection. The 'Acceptable viewing conditions' are set to 'Above Horizon Only' and 'Complete Darkness Only'. The 'Report only if' section is set to 'Visible After 18:00' and 'Visible Before 06:00'. The 'Starting at' field is set to '2011 April 1 12h01m'. The 'Over a period of' field is set to '2 Days'. A 'Local Date/Time' dialog box is open, showing the current date and time as '2011 February 10 00:00:00' and '08:00:00' respectively. The dialog box also shows a calendar for February 2011 with the 10th highlighted. The 'For Quick Date: Year Month Day Time' field is set to '2011 4 1 12:01:00'.

Special Events Tool Configuration:

- Search: Events for Kah Nee Ta Resort
- Show: All Events Visible Events Only
- Sub-tab: Satellite Elongations
- For these satellites:
 - Phobos
 - Deimos
 - Io
 - Europa
 - Ganymede
 - Callisto
 - Amalthea
 - Himalia
 - Mimas
 - Enceladus
 - Tethys
 - Dione
 - Rhea
 - Titan
 - Hyperion
 - Iapetus
 - Phoebe
 - Ariel
 - Umbriel
 - Titania
 - Oberon
 - Triton
 - Charon
- Acceptable viewing conditions:
 - Above Horizon Only
 - Complete Darkness Only
- Report only if:
 - Visible After 18:00
 - Visible Before 06:00
- Starting at: 2011 April 1 12h01m
- Over a period of: 2 Days
- Buttons: Compute, Help

Local Date/Time Dialog:

- Local Date/Time Currently Selected: 2011 February 10 00:00:00
- Julian Day Number: 2455602.83333
- Universal Time: 08:00:00
- For Quick Date: Year Month Day Time: 2011 4 1 12:01:00
- Buttons: Enter, Ok, Cancel, Help
- Delta-T: 67.08s

Pressing the Compute button shows there will be 5 events.
 Select an event by clicking on it. This will show its details below.

The screenshot shows the SkyTools 3 Professional Edition interface. The main window title is "SkyTools 3 Professional Edition". The menu bar includes "Nightly Planner", "Current Events", "Special Events", "Ephemerides", and "Real Time". The toolbar contains icons for various functions. The main area displays "Events for Kah Nee Ta Resort" with a filter set to "Visible Events Only". A list of events is shown, with "2011 Apr 1 Tethys Western Elongation" selected. The right-hand panel shows configuration options for satellite events, including a list of satellites with checkboxes, viewing conditions (Above Horizon Only, Complete Darkness Only), and report options (Visible After, Visible Before). The "Compute" button is visible at the bottom right of the panel. The status bar at the bottom shows the local date/time as "2011 Apr 1 21:00", the description as "Western Elongation", and the object as "Tethys".

Night	Event
2011 Apr 1	Tethys Western Elongation
2011 Apr 1	Mimas Eastern Elongation
2011 Apr 2	Tethys Eastern Elongation
2011 Apr 2	Enceladus Western Elongation
2011 Apr 2	Mimas Eastern Elongation

For these satellites:

- Phobos
- Deimos
- Io
- Europa
- Ganymede
- Callisto
- Amalthea
- Himalia
- Mimas
- Enceladus
- Tethys
- Dione
- Rhea
- Titan
- Hyperion
- Iapetus
- Phoebe
- Ariel
- Umbriel
- Titania
- Oberon
- Triton
- Charon

Acceptable viewing conditions:

-
-

Report only if:

- Visible After
- Visible Before

Starting at: 2011 April 1 12h01m

Over a period of: Days

Buttons: Compute, Help

Local Date/Time	Description	Object
2011 Apr 1 21:00	Western Elongation	Tethys

The Western Elongation of Tethys will occur at 9 p.m., which is prime viewing time.
 Let's see what the Saturnian system will look like at this time.

Events for Kah Nee Ta Resort

▼ Events

Night	Event
2011 Apr 1	Tethys Western Elongation
2011 Apr 1	Mimas Eastern Elongation
2011 Apr 2	Tethys Eastern Elongation
2011 Apr 2	Enceladus Western Elongation
2011 Apr 2	Mimas Eastern Elongation

Local Date/Time

2011 Apr 1 21:00

- View Interactive Atlas
- View Overhead Sky
- View Naked Eye
- View Scope/Binocs ▶
- Print Chart
- Object Information
- Create Quick Log Entry
- Slew To



Right-click on the event details and choose “View Interactive Atlas”.

The Interactive Atlas is SkyTools’ general star chart, useful for free-form exploring.



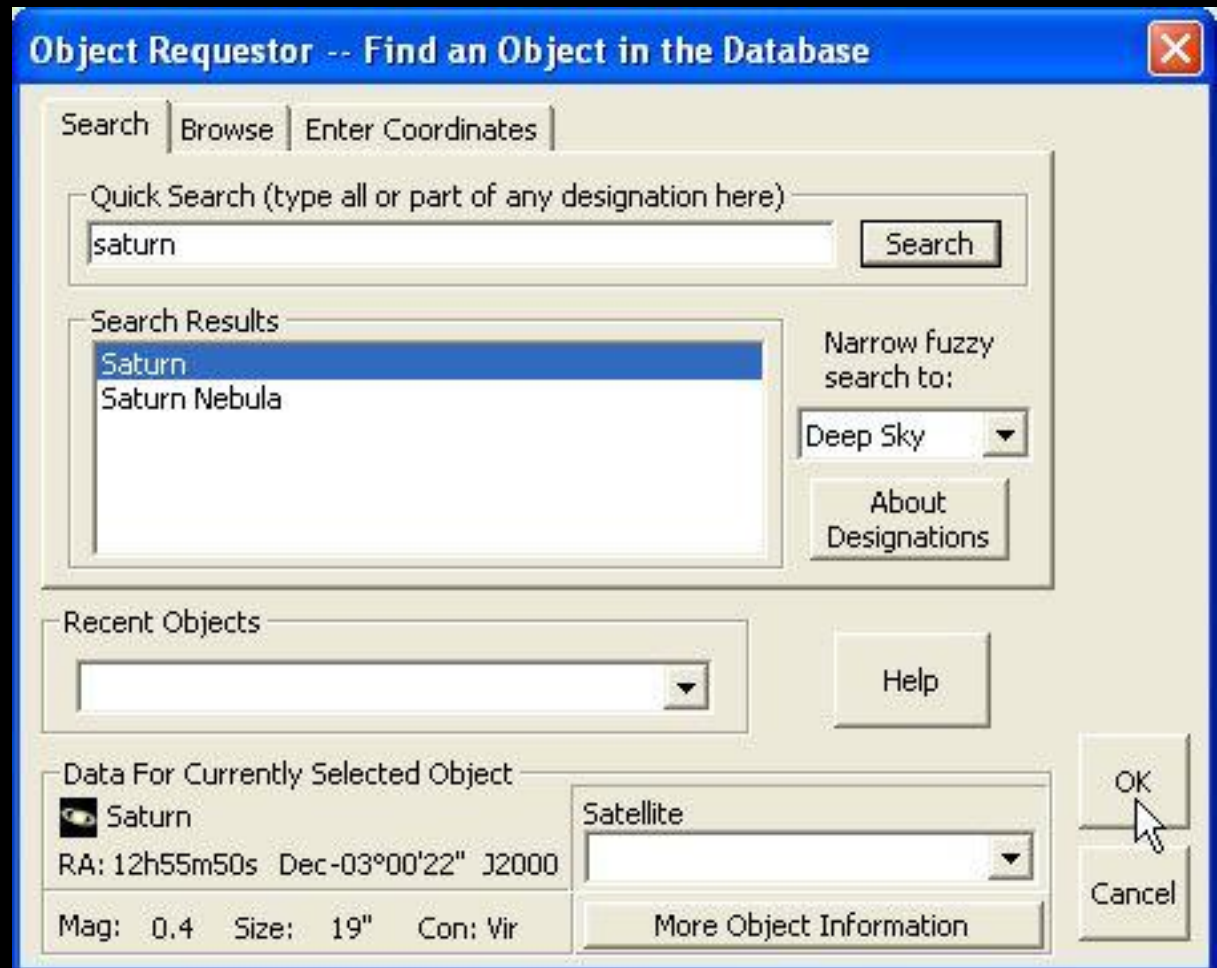


Follow the object link in the upper left-hand corner to open the Object Requestor.

Type "saturn" in the Quick Search box.

Then press the Enter key or the Search button.

Last, push the OK button.

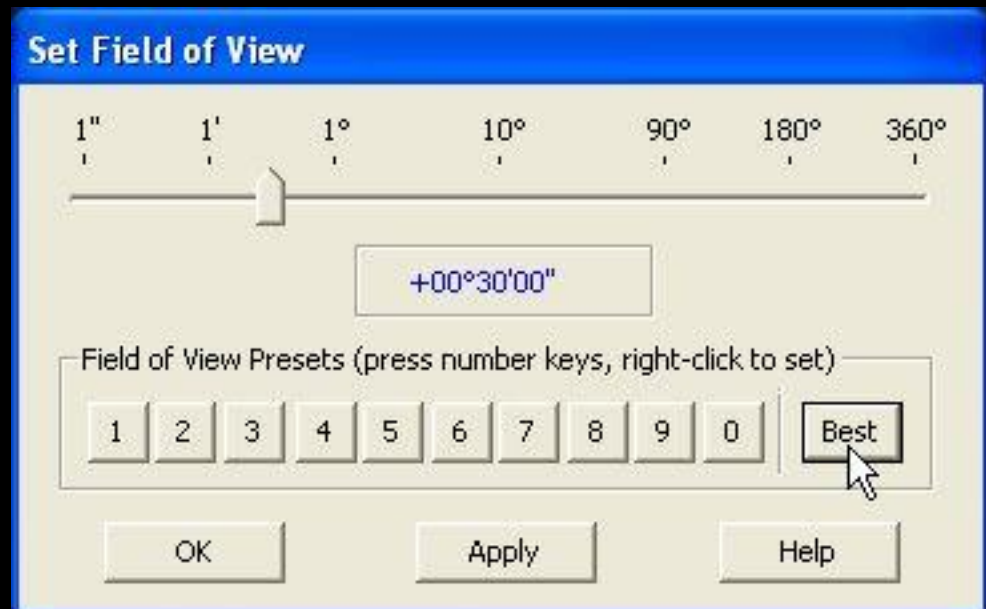


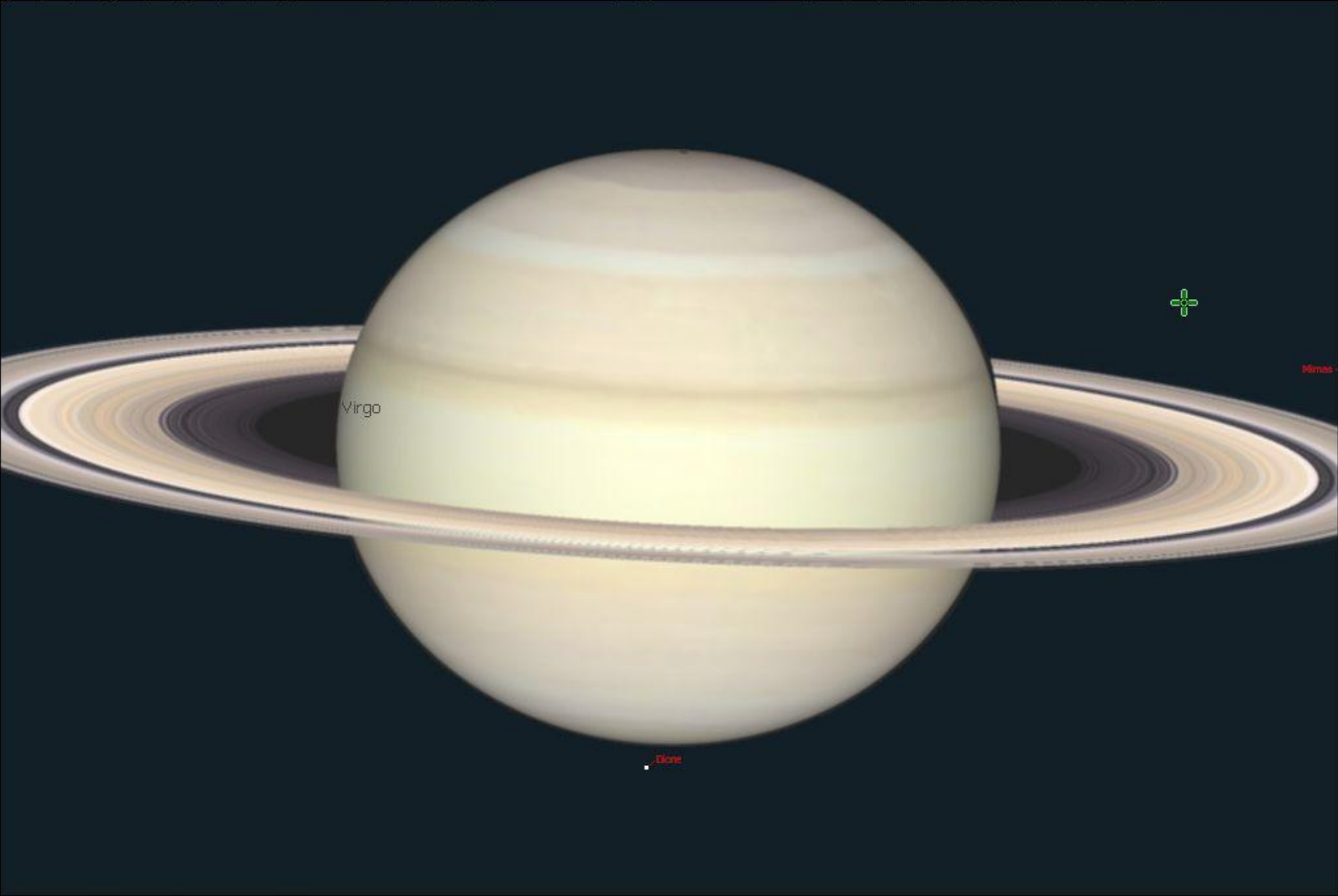


Push the Set Field of View button in the upper left-hand corner of the Interactive Atlas.

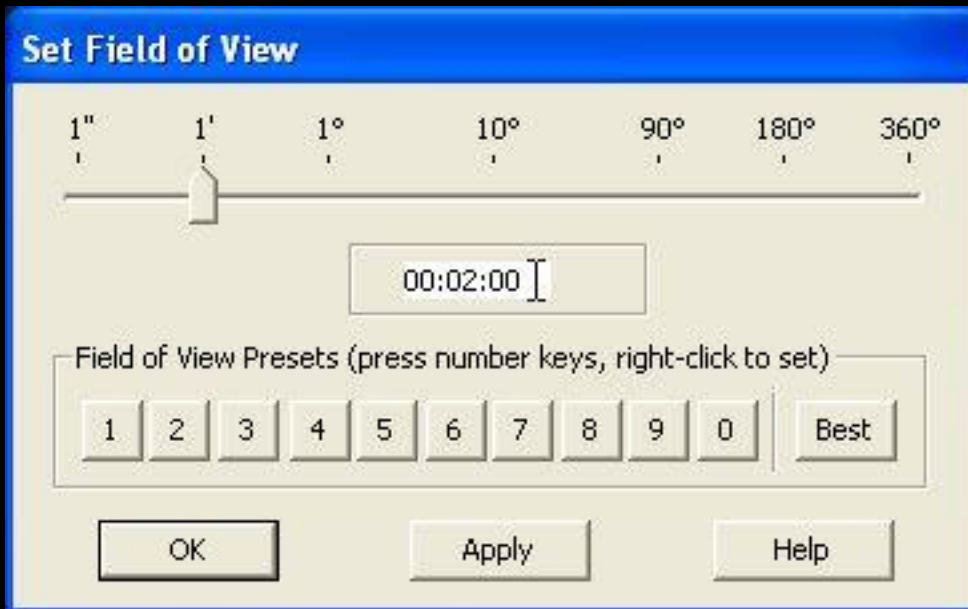
Push the Best button in the Set Field of View dialog box.

Then press the OK button.





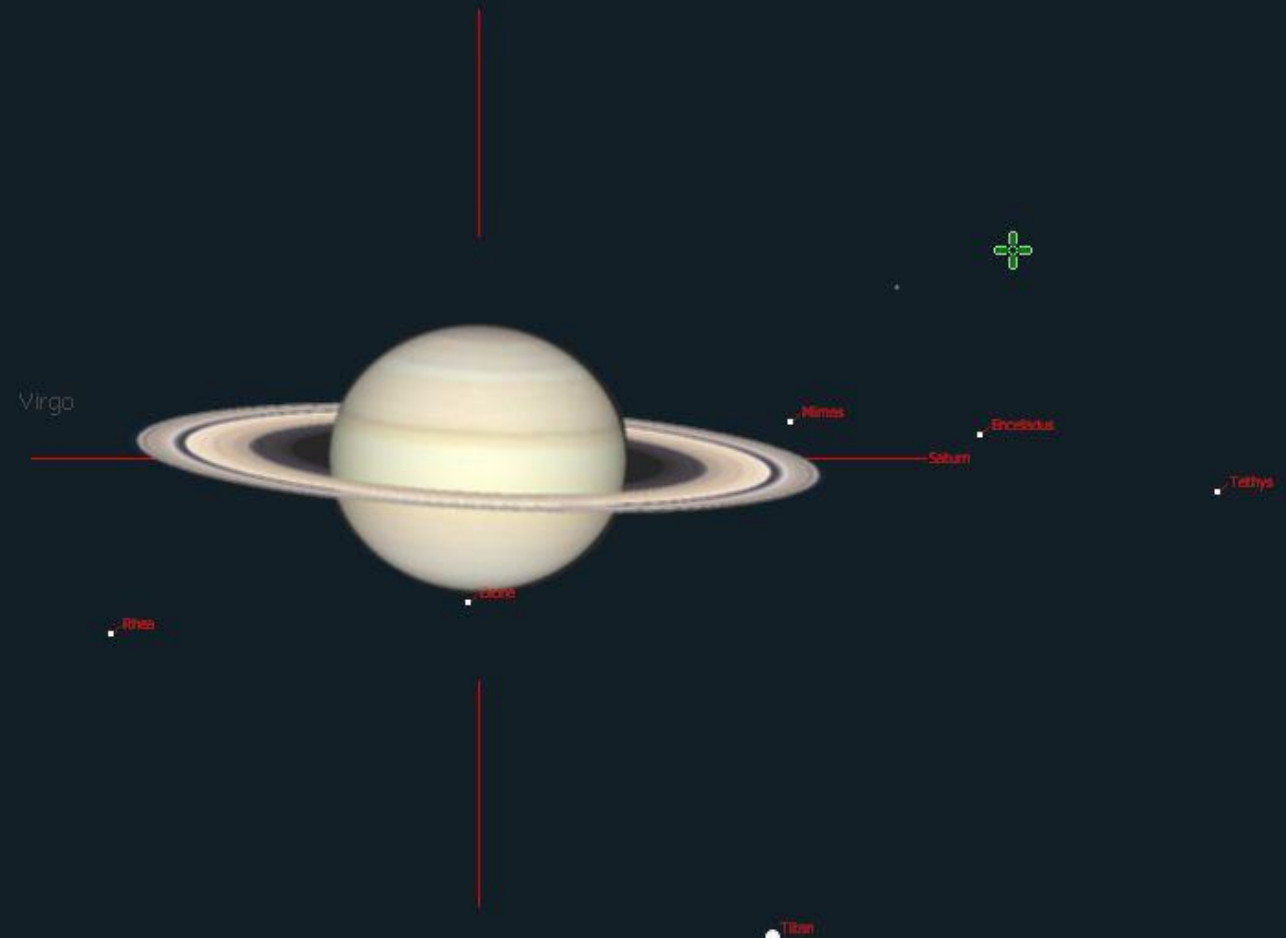
It's a nice view but too close to Saturn to show us the configuration of the moons.



Open the Set Field of View dialog box again.

Click on the field in the middle and enter 00:02:00 for 2 arcminutes.

Then press the OK button.



This view shows 6 of the 7 largest moons. Only Iapetus is missing. Since this is a nice configuration, we'll plan to observe it during the star party. But, first, let's take the opportunity to explore the Interactive Atlas more.

Control	Action
Select Region with Left Mouse Button	Zoom in on selected region.
Hold Control Key and Select Region with Left Mouse Button	Zoom out from selected region.
Mouse Wheel Forward One Click	Zoom in one step.
Mouse Wheel Backward One Click	Zoom out one step.
Page Up Key	Zoom in one step.
Page Down Key	Zoom out one step.
+ Button	Zoom in one step.
- Button	Zoom out one step.
"b" Key	Set field of view to "best" level for the selected object.
Number Keys 0 – 9	Set field of view to the predefined level for that number.
Set Field of View Button	Set field of view to a desired value.

Field of View Controls, i.e. Zoom Controls, in the Interactive Atlas

Control	Action
Arrow Keys	Shift view one frame in the direction of the arrow key pressed.
Cursor	Can choose to center chart on the selected target using the right-click menu.
Object Link	Entering a different object will create the chart centered on that object.

Navigation Controls in the Interactive Atlas

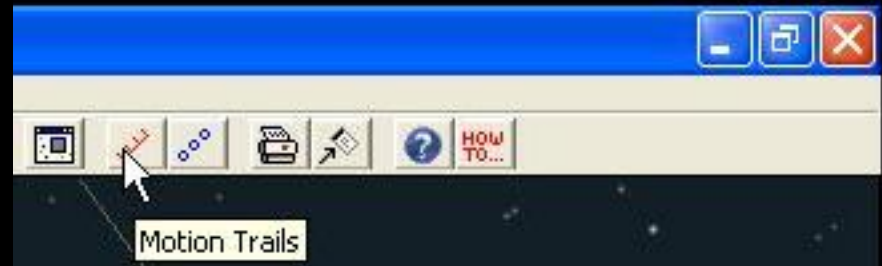
To display the list of all keyboard shortcuts, press “k” when any chart is selected.

Exercise: Use the object link to navigate to NGC 4438, which is a galaxy in a crowded region of the Virgo-Coma cluster, and set the field of view to 2°. Experiment with navigating and zooming among the plentiful galaxies. Right click on any object in the field of view and choose Object Info to learn more about the object. After experimenting for awhile, close the Interactive Atlas by clicking on the window's “X” and re-open it for the elongation of Tethys from the Special Events tool.

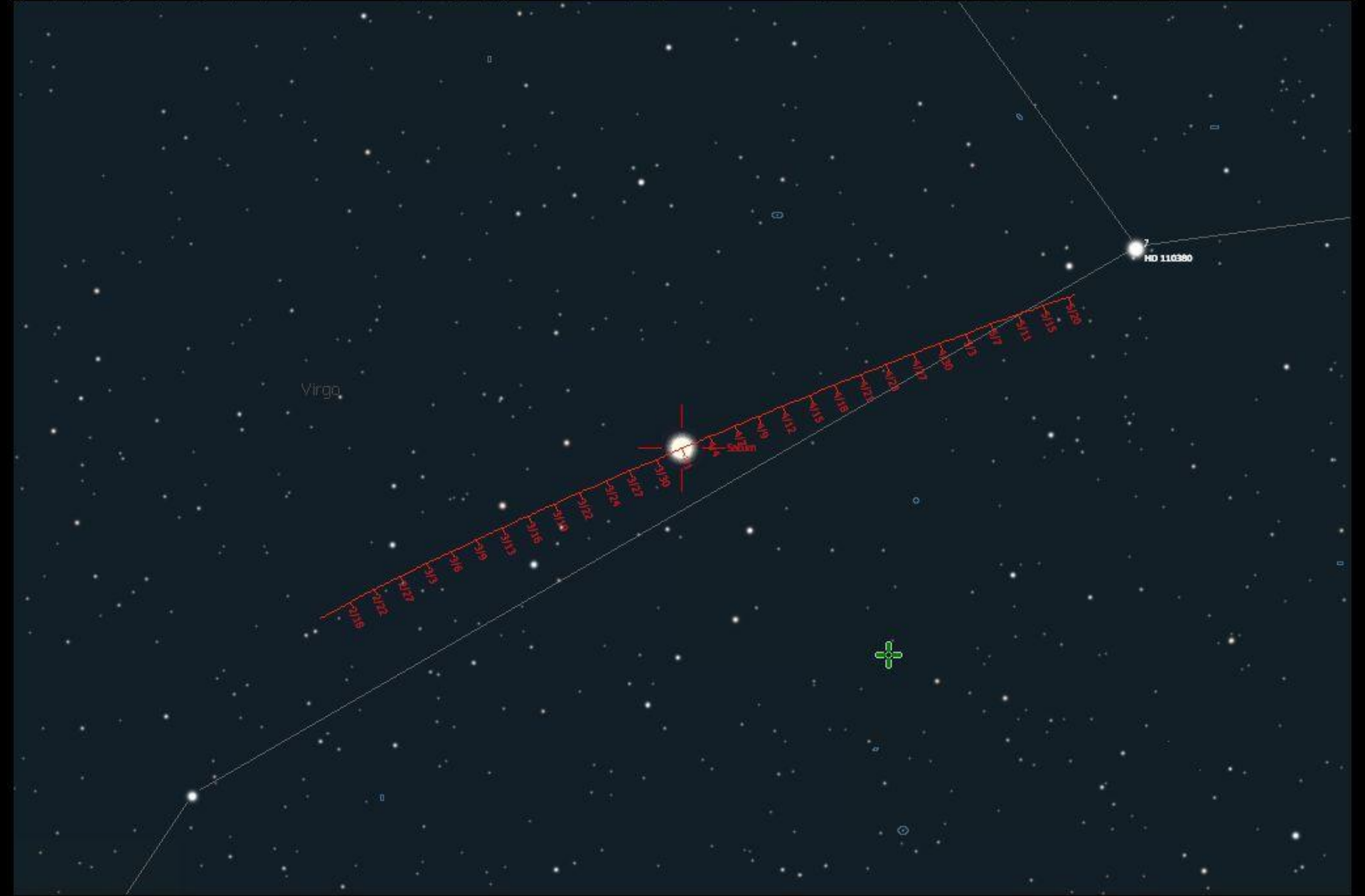
Motion Trails

Center the field of view on Saturn again but, this time, set the field of view to 10°.

Push the Motion Trails button on the top left side of the Interactive Atlas.



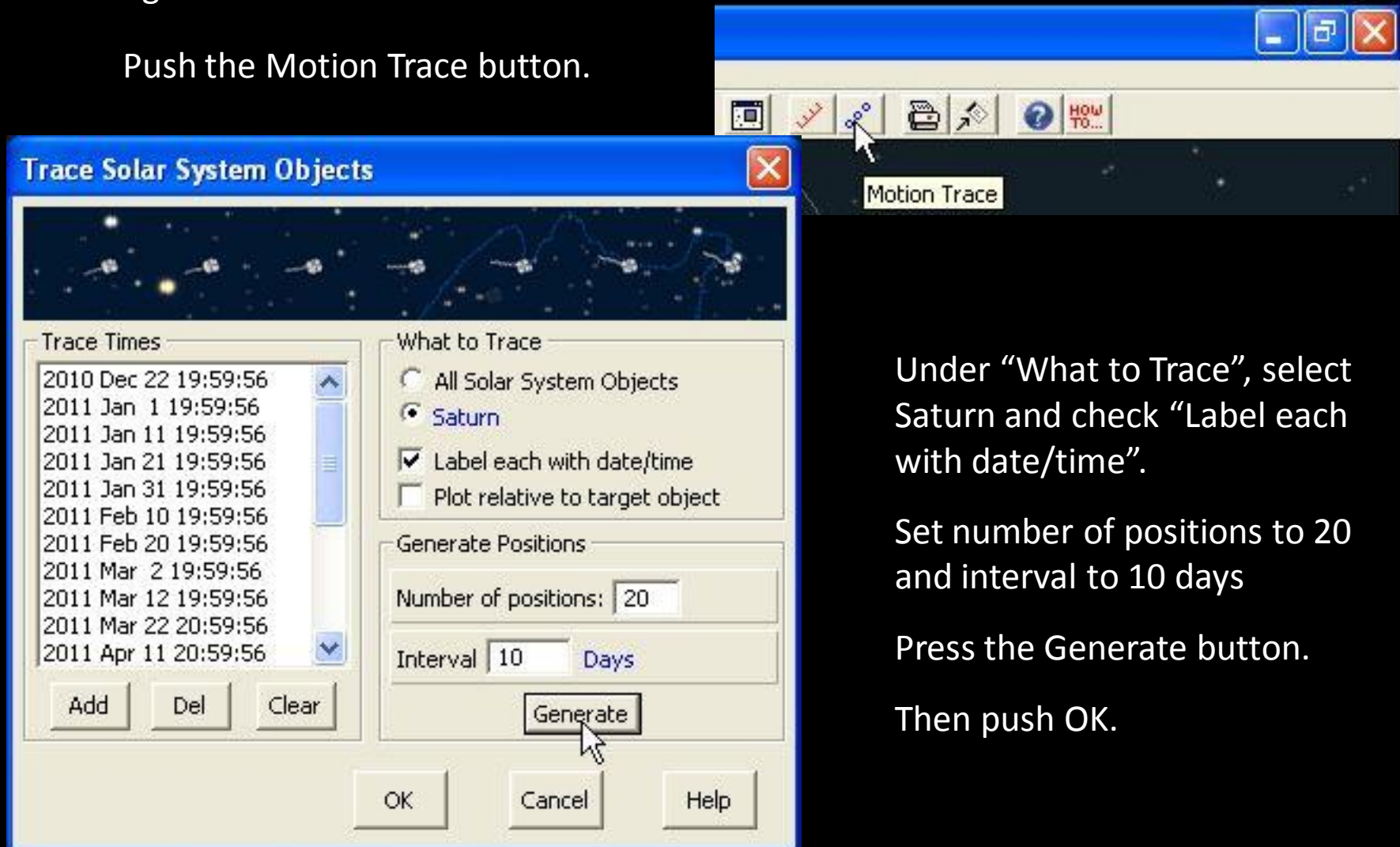
Select “Target object only”.
Set the Time Span to 100 days.
Check “Label tick marks”.
Then press OK.



Motion Trace

Turn off the motion trails by opening the Motion Trails dialog box again and selecting “Nothing” in the Trail frame.

Push the Motion Trace button.

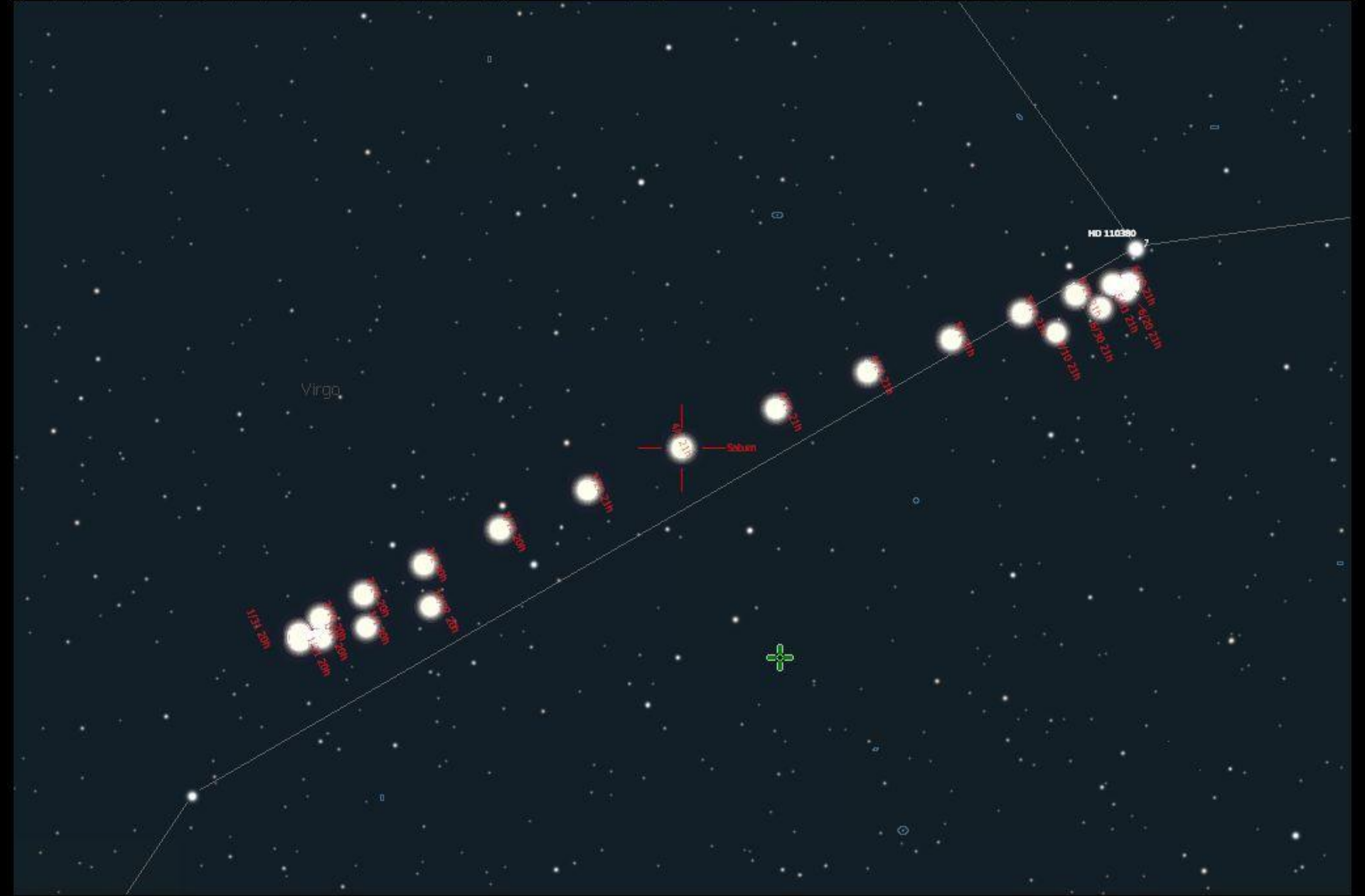


Under “What to Trace”, select Saturn and check “Label each with date/time”.

Set number of positions to 20 and interval to 10 days

Press the Generate button.

Then push OK.

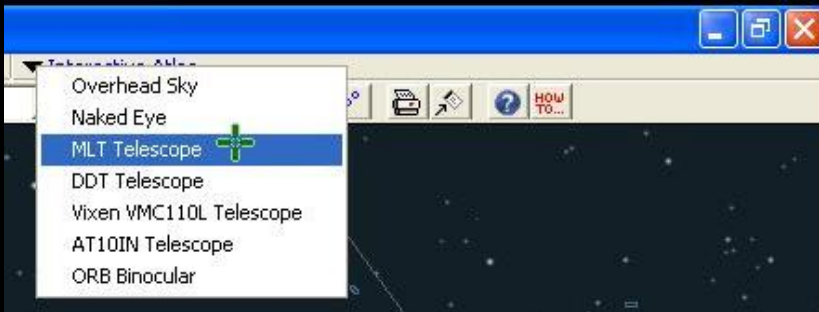


Each trace is an image of Saturn at the specified date and time. If the field of view was narrower, we would even see some of Saturn's moons at the time points.

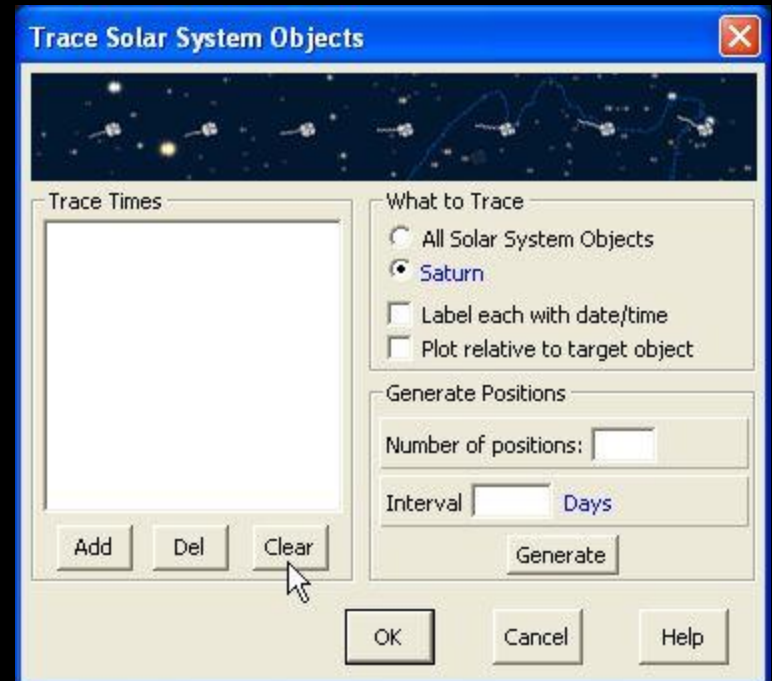
Exercise: Zoom in close enough to see some of Saturn's moons in the traces near one of its turning points. Reset the date and re-center the field on Saturn, if necessary.

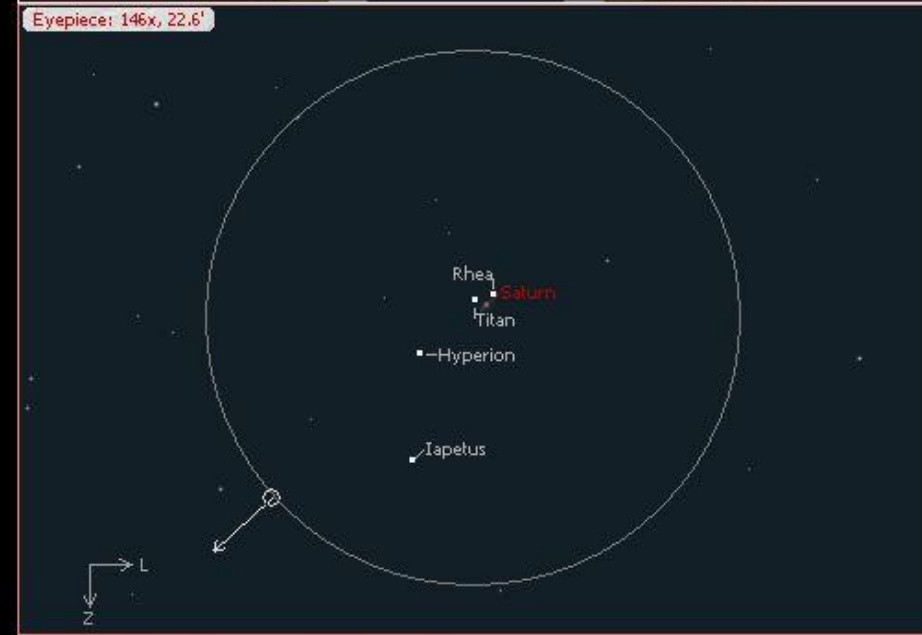
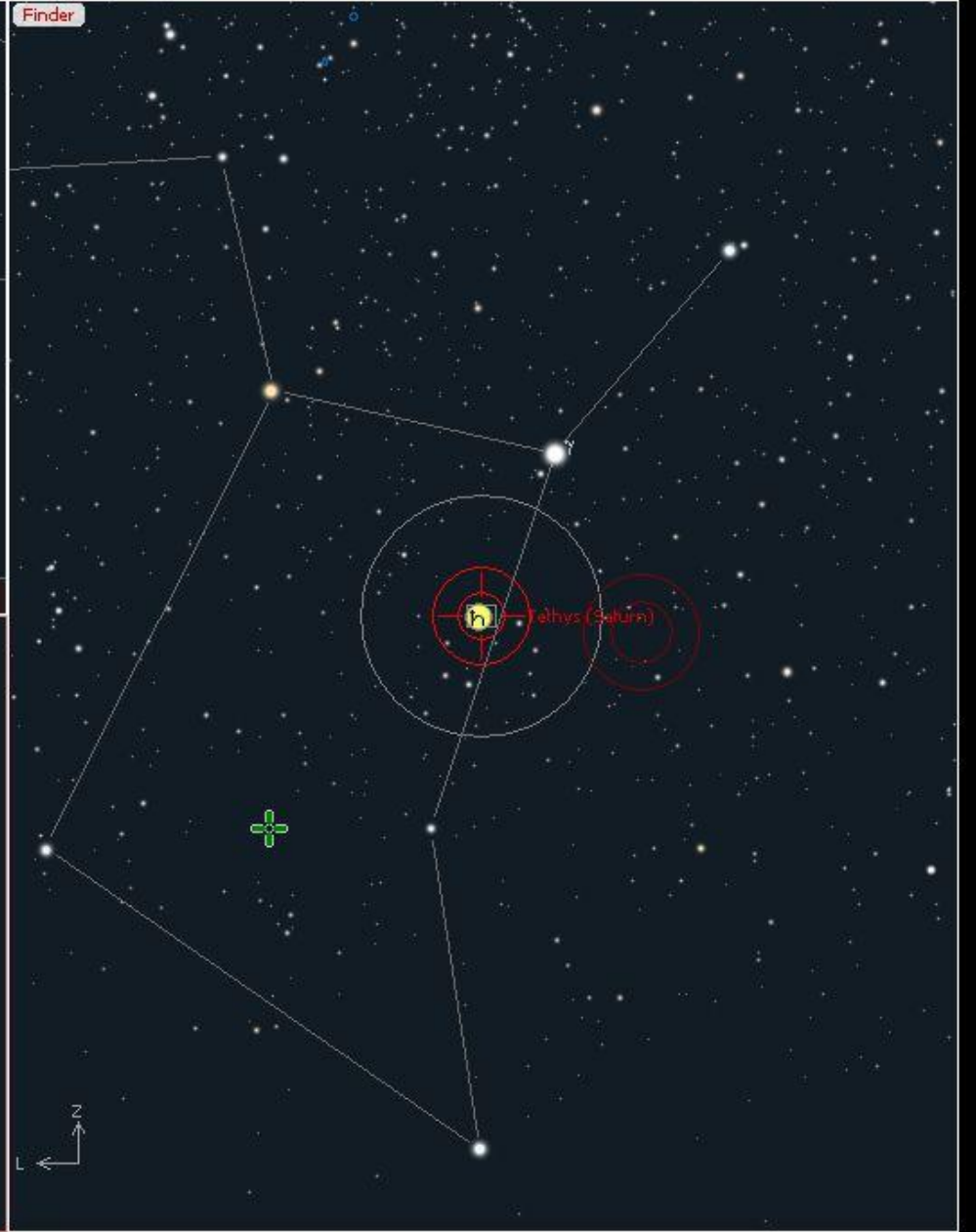
We've seen that the Saturnian system will be in an attractive configuration at the time of the April 1, 2011 Western elongation of Tethys. But what will the view look like in our telescopes? To answer this, we need to consult a different chart.

First, turn off traces by clearing trace times.



Then choose a telescope from the instrument link on the IA.





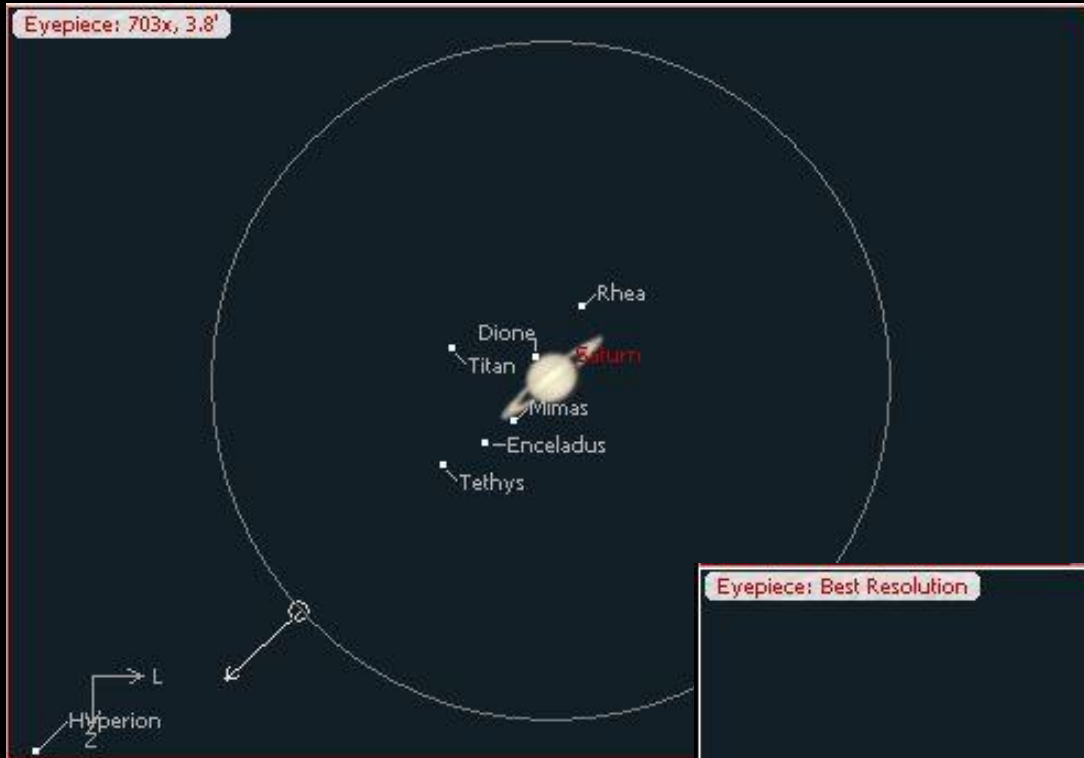
The dimmer concentric red circles in the Naked Eye and Finder views denote the Earth's shadow in the sky.

We now see Iapetus in the eyepiece view, which is $\approx 38' \times 27'$. Before, it was far outside the field of view.



Change eyepieces to investigate possible views.

This is 352x, which is probably my highest usable magnification.



This is the highest magnification hypothetically possible with my equipment.

This is the “Best Resolution” view, which corresponds to Dawes’ Limit. It’s awesome but impossible.



Exercise: Calculate the events for Saturn's major moons using the Current Events Tool instead and verify that the April 1 Western elongation of Tethys is predicted to occur at the same time. Open the Events Calendar from the Current Events Tool and see what information it contains for March. Open the Nightly Events Planner for the first night of the star party April 1, 2011 and explore the information it contains.



I'd like to observe this event at the star party. But you can't add events to observing lists. What can you do?

1. Print a chart of the event to remind you about it.
2. If you use SkyTools at the telescope, open the Nightly Events Planner during the observing session to remind you. You can also slew a telescope to the event from here if you have one connected.
3. Set an alarm on your watch or computer for a time long enough before the event to allow you to set up to observe it.

Preparing an Observing List for a Visual Observing Session

Consider the size of your list.

My list currently contains 64 objects and there is one event I'd like to observe for a total of 65 observations. That's a lot! But there are reasons to have a larger list than you expect to be able to finish.

1. Visibility may be poor in some parts of the sky or at some times during the night.
2. Your observing window may end up being different than you expect.
3. You change your mind at the last minute about the objects you'd most like to see.
4. Conditions end up being ideal and you're able to make more observations than usual.
5. Unobserved objects can be easily copied or moved to another observing list. So your efforts are not wasted.

On a good night, I've been able to observe approximately 35 objects. So maybe my list is even a bit too small.

Check for objects that won't be visible or will be too hard to see.

Sort list by **Visual Detection Difficulty** and remove, move, or hide objects that you won't be able to see or that have difficulties that are too high.

The left screenshot shows an 'Observing List' window. The 'Group' is 'Introductory Class Lists' and the 'List' is 'Kah Nee Ta 2011'. The table below shows three objects:

Primary ID	Con
PN G164.8+31.1	Lyn
Hickson 37	Cnc
Crab Nebula	Tau

The right screenshot shows a detailed view of the 'PN G164.8+31.1' object. The 'Difficulty' is 'not visible' and the 'Best Difficul' is 'not visible'. The table below shows the object's visibility parameters:

Begin	Optimum	End	Difficulty	Best Difficul
20:53	21:31	02:59	not visible	not visible
21:07	21:44	23:56	detectable	detectable
20:59	21:21	22:35	detectable	detectable

Move this object to the list “Kah Nee Ta 2011 Imaging” in case it will be visible to a camera. All other objects have difficulties that are “detectable” or easier.

Set filters to make sure that objects will be **visible under good conditions**.

All objects on my list will be optimally visible in complete darkness and above the horizon. Only 6 objects will be optimally visible below 2x airmass – those in Crv, Hya, CMa, and And.

Exercise: Check the visibility of the objects on your Kah Nee Ta 2011 list.

Prioritize objects.

Give objects high, normal, or low priorities.

Some possible criteria are

1. Give a higher priority to objects in any observing programs you're participating in.
2. Give a higher priority to objects with smaller observing windows, e.g objects to the South for a Northern Hemisphere observer.
3. Sort by object type and give a higher priority to the objects of each type that you'd most like to see and lower priorities to other objects.

Right-click in priority column for object and choose 1 of 4 priority values.

Must be done one at a time.



Exercise: Prioritize the objects in your Kah Nee Ta 2011 observing list.

Check optimal observing times.

Sort by optimal observing time and make sure that there aren't too many objects to observe around the same time.

Or look at all objects at the same time in the Interactive Atlas and make sure that there aren't too many objects around the same right ascension.

My list is somewhat concentrated around the Coma-Virgo Cluster of Galaxies. But that's because it contains all of the Messier galaxies in Coma & Virgo. There are also quite a few optimal observing times around 9 p.m. Otherwise, it's pretty well distributed.

(See the Interactive Atlas image on the next slide. It's a Cylindrical projection with a 270° FOV centered on NGC 2683.)

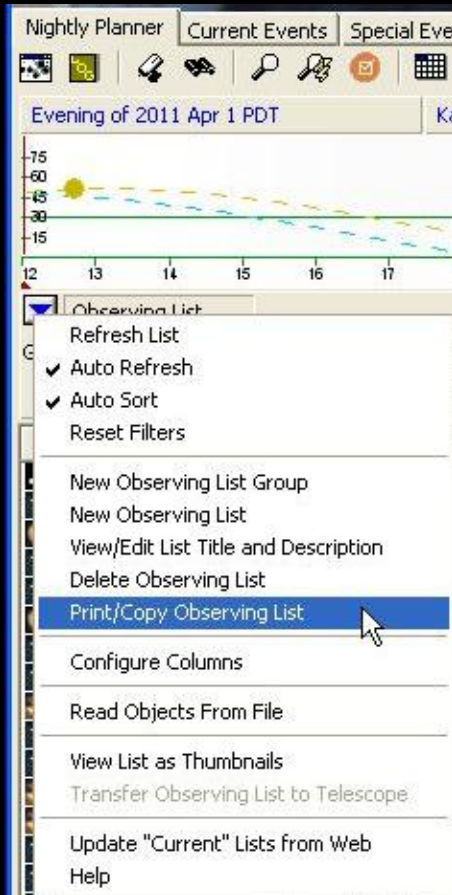
If the objects are bunched up, you might consider adding objects in other regions of the sky and possibly moving or deleting some of the objects that are crowded.



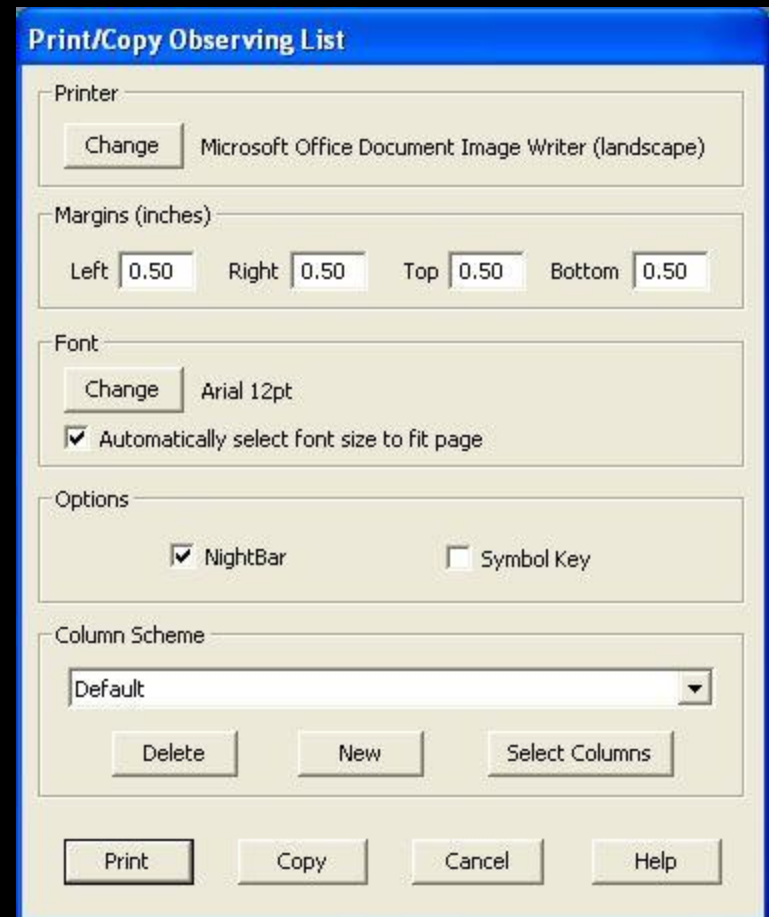
Print anything needed.

If you won't be using a computer at the telescope, print the observing list.

Print any charts you'd like to have hard copies of while observing.

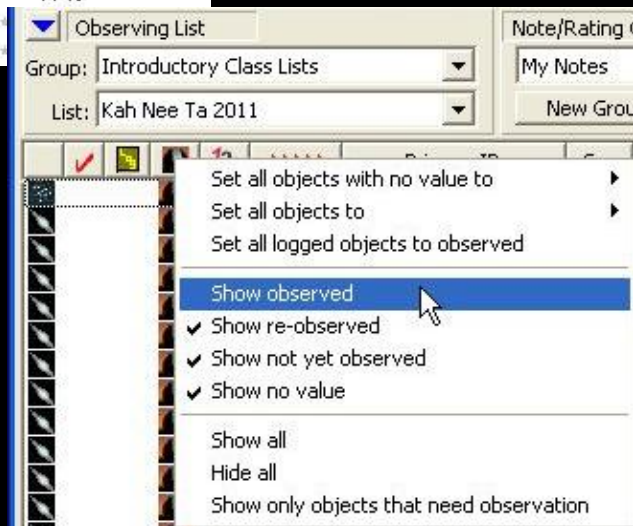
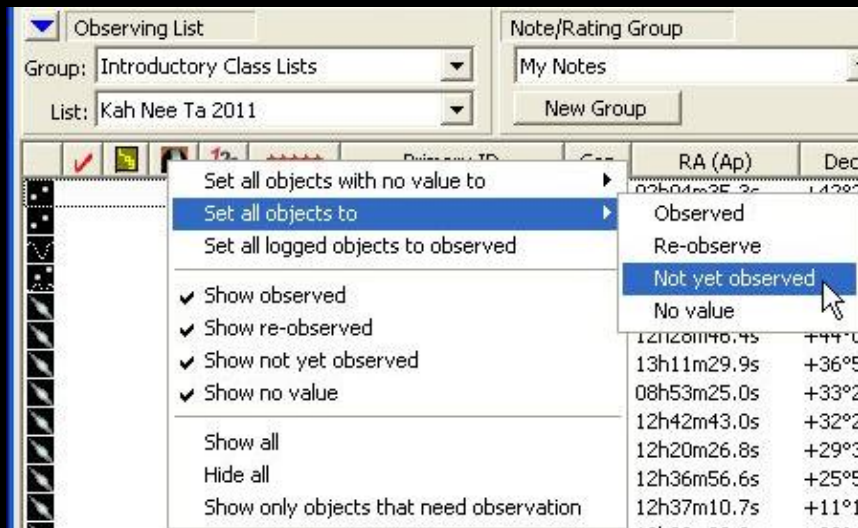


To print an observing list, choose "Print/Copy Observing List" from the Observing List Menu.



Set Observation Status for all objects.

If you will be using SkyTools at the telescope, set the observation status of all objects to “Not yet observed” and set the list to hide objects with the observation status “Observed”.



Adjust settings on the day of the star party.

On the day of the star party,

1. Reset weather conditions for the observing location.
2. Set the times that the observing session will start and end.
3. Set an alarm or alarms on your computer or watch to remind you of any events you want to observe.

Planning an Imaging Session

My Imaging Equipment

- ❑ 10" Astro-Tech Imaging Newtonian (\approx \$600, AT10IN)
- ❑ Canon 40D 10.1 MP DSLR camera (\approx \$500 – 1000)
- ❑ SBIG ST-7XME Deluxe astronomical CCD camera (\$2495)

At prime focus with the AT10IN telescope, the cameras have the fields of view and resolutions

- Canon 40D = 75' x 50', 3.3"/pixel
- SBIG ST-7XME Deluxe = 23.3' x 15.5', 5.2"/pixel

Piggyback, the Canon 40D camera with a 50 mm f/1.4 lens has a field of view of 25.4° x 16.9°.

SkyTools 3 supports afocal, eyepiece projection, prime focus, and piggyback imaging with DSLRs, astronomical CCDs, and web/video cameras. I will only discuss prime focus imaging of deep sky objects.

Choosing Suitable Targets

It's easy enough to find objects that would look great if you could take a high-quality image of them. And you could easily make an observing list of these objects using any of the methods I showed you for finding objects in the SkyTools database. But finding objects that your equipment is capable of imaging well is another challenge altogether.

What we really need is a way to search the database for only those objects that you could image well. The Database Power Search Tool is helpful for this purpose. But the Database Power Search Tool doesn't have an imaging mode and there are some issues to consider.

Using the Database Power Search Tool to Identify Potential Targets

Probably want to restrict targets to **high altitudes and appropriate levels of darkness**. These choices correspond to filters in the Power Search Tool. Must use visual mode to activate filters.

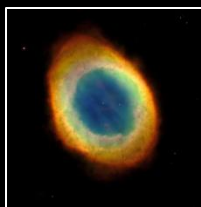
Might only want to search for a **class of objects with an object type**. For example, it probably isn't very interesting to image elliptical galaxies.

What are the **smallest sizes** for objects to be reasonably imaged with the cameras?
Objects look smaller and have decreased resolution with larger pixel sizes.



Pixels = 800 x 500
Apparent size $\approx 9.4'$ x $5.9'$

HST reduced, pixels $\approx 0.7''$ x $0.7''$



Pixels = 174 x 177
Apparent size $\approx 2.0'$ x $2.1'$

These don't include the effects of atmosphere, differences in sensor sensitivity, imperfections in imaging sensors, or differences in processing.



Pixels = 160 x 100



Pixels = 100 x 63

Canon 40D
pixels $\approx 3.5''$ x $3.5''$



Pixels = 37 x 38

SBIG ST-7XME
pixels $\approx 5.6''$ x $5.6''$



Pixels = 23 x 24

If an object is **too large** for the FOV, you'll have to take multiple images, appropriately placed to create a mosaic of the object. You might want to **limit the object size** to avoid having to make a larger mosaic than you're comfortable with.

What is the **minimum surface brightness or minimum magnitude** needed to keep exposure times reasonably short relative to pixel sensitivity & noise? It depends on the characteristics of your camera and the spectrum of light that an object emits. If you don't know an appropriate limit, don't set one at first. Then, after you've generated an initial list, try different limits to find the brightest targets.

Once we identify potential targets, the Exposure Calculator will help with this.

For example, let's find all of the spiral galaxies larger than 8' and surface brightness ≤ 22 mag/arcsec² that are visible in complete darkness and above 2x airmass on the first night of the star party.

- Open the Database Power Search Tool.
- Enter the settings shown on the next slide.
- Push the Search button.
- Then select the Kah Nee Ta 2011 Imaging list from the Introductory Class Lists group, push the Select All button, and press the Add to List button.

Database Power Search Tool

Stars | Galactic Deep Sky | Extragalactic | Minor Planets | Comets

Databases to Search
 Galaxies
 Galaxy Groups
 Quasars
 Supplemental Deep Sky

Catalog Designations
 All Selected only
 Common Name
 Messier
 NGC
 IC
 Arp
 Markarian
 MCG
 UGC
 ESO
 PGC/LEDA

Common Data Limits
 Magnitude \geq None \leq None
 Size \geq 8.00 ' \leq None '
 Light travel time \geq None \leq None Myr
 Z (redshift) \geq None \leq None

Galaxy Limits
 Class: ∇ Spiral
 Orientation ∇ Any
 SBr: \leq 22.0 mag/arcsec²
 Interacting with 0 or more
 V(r) \geq None \leq None km/s e (b/a) \leq None

Quasar Type include BL Lac
 Galaxy Group galaxy count \geq None

Mode Reset

Visibility Filters
 Evening of 2011 Apr 1
 Kah Nee Ta Resort
 Mark
 MLT

Visual Detection Difficulty
 Ignore difficulty ∇
 ∇

Conditions (for specific date)
 Above 2X (Airmass) Only ∇
 Complete Darkness Only ∇
 If visible after 00:00
 If visible before 00:00

Search Constellations
 Any Selected

And Ari CVn Cen Com
 Ant Aur CMa Cep CrA
 Aps Boo CMI Cet CrB
 Aqr Cae Cap Cha Crv
 Aql Cam Car Cir Crt
 Ara Cnc Cas Col Cru

Select All Clear All

Search Radius
 Within 001 degrees
 of Nothing

Include Objects With Log Entry
 Any Logged Unlogged

Search Help

Object ID	Con	RA	Dec	Mag	Light Time	Type	Difficulty
NGC 2683	Lyn	08h53	+33°23	10.0	---	Spiral b	easy
Bode's Galaxy	UMa	09h57	+69°01	7.8	12 Myrs	Spiral b	easy
M 65	Leo	11h20	+13°02	10.1	41 Myrs	Spiral a	easy
M 66	Leo	11h21	+12°56	9.7	41 Myrs	Spiral b	easy
Sombrero Galaxy	Vir	12h41	-11°41	9.1	60 Myrs	Spiral	easy
Whale Galaxy	CVn	12h43	+32°29	9.5	---	Spiral c	easy
NGC 4656	CVn	12h45	+32°06	9.7	---	Spiral	easy
M 94	CVn	12h51	+41°03	8.7	17 Myrs	Spiral b	easy
Black Eye Galaxy	Com	12h57	+21°37	9.3	12 Myrs	Spiral b	easy
Whirlpool Galaxy	CVn	13h30	+47°08	8.7	43 Myrs	Spiral c	easy

Destination Observing List Group
 Introductory Class Lists ∇ New

Destination Observing List
 Kah Nee Ta 2011 Imaging ∇ New

Add to List Select All Unselect All

Search Complete: 10 objects found

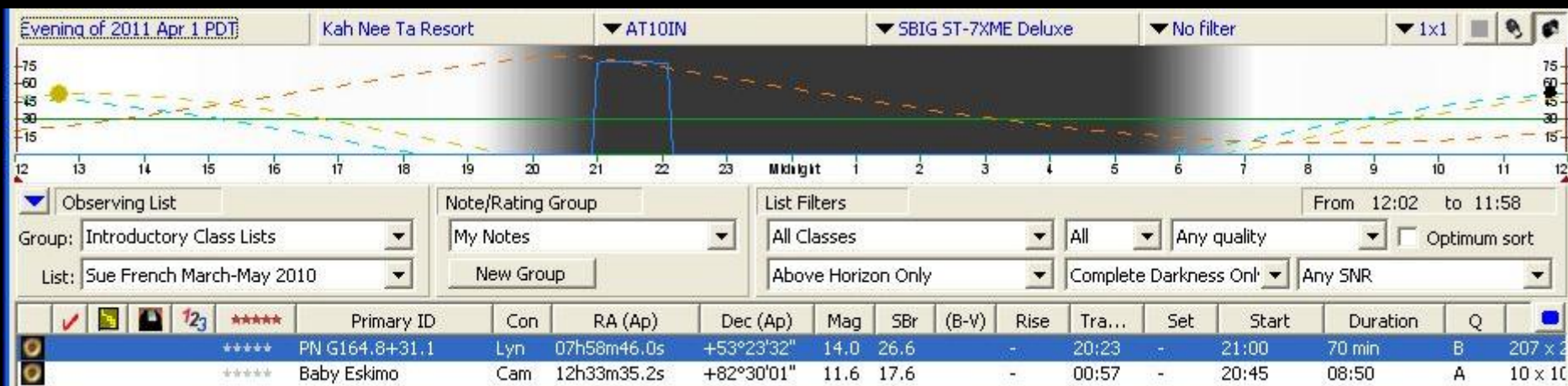
Suggestions for Using the Database Power Search Tool to find Suitable Imaging Targets:

- ✓ Use the tool in visual mode rather than simple mode to activate filters.
- ✓ Set Conditions filters to limit search to appropriate altitudes and darkness. Might want to set time limits (or constellations) too to help insure that objects will be visible long enough to image.
- ✓ Restrict searches to appropriate classes within object types, e.g. spiral galaxies rather than just galaxies.
- ✓ Set a minimum object size based on what's reasonable for your camera.
- ✓ You might want to set a maximum object size too to avoid the need to create mosaics larger than you're comfortable making.
- ✓ Try setting upper limits for object surface brightness or magnitude.

Exercise: Use the Database Power Search Tool to find all of the globular clusters with diameters larger than 8' visible in complete darkness, above 2x airmass only, and before 1 a.m. on the first night of the star party. Add these objects to the Kah Nee Ta 2011 Imaging observing list.

Exercise: Find all planetary nebulae larger than 7' with surface brightness ≤ 26 mag per arcsec² visible before midnight in complete darkness and above 2x airmass on the first night of the star party. Add these objects to our imaging list. What happens if you decrease the surface brightness limit?

If you do both visual observation and imaging, you **might want to revisit objects rejected from your visual observing lists**. For example, consider the planetary nebula PN G164.8+31.1 that I rejected from the visual observing list since it wasn't visible in my telescope.



Load the Sue French March-May 2010 observing list in the Nightly Planner and make sure that you are in imaging mode. This PN is large enough to occupy 207 x 207 pixels in the SBIG camera and it has an overall quality rating of B, which is pretty good. It might be worth considering. Let's go ahead and copy it to our imaging list.

Taking a Closer Look at Our Imaging List

We now have a list of 23 objects that we want to consider imaging at the star party. Since you might typically image only a few objects per night, this is a long list. However, most of the reasons I gave for wanting a large list for visual observation also pertain here. And we aren't done refining our list yet.

Next steps

1. Prioritize objects. Your priorities are used in sorting.
2. Set Observation status of all objects to "Not yet observed".
3. Set list filters to guarantee appropriate altitude, darkness, exposure quality.
4. Set times for beginning and end of observing session.
5. Check the "Optimum sort" check box.
6. Look at timeliness index and image size, resolution, and quality.

These should help narrow the list down some more.

Exercise: Perform these steps for the Kah Nee Ta 2011 Imaging list. Would any of these objects be good targets for your imaging equipment? If so, write down a list of the objects that you would choose to image at the star party.

Using the Interactive Atlas and the Context Viewer to Frame Images

In addition to looking more closely on the list itself, you might want to **get a better idea of what the images might look like**. As with visual observing, one of the SkyTools charting tools can help us here.

The Context Viewer simulates an instrument within the Interactive Atlas.

It allows you to use the eyepiece or camera view while using the Interactive Atlas and allows you to control a mount from the Interactive Atlas.

Use the IA and the Context Viewer to frame nice images. Print any that look good.

Create an Exposure Schedule

Use the exposure windows in the Night Bar or the exposure intervals in the list to make a rough plan of imaging for the night. Don't forget to include the time required to reposition and readjust equipment between exposures.

It should be possible to greatly refine your exposure schedule using the Exposure Calculator.

SkyTools 3 and Optical Filters

Using a filter with a telescope and camera is like using a different instrument.

What to Do After an Observing Session

Back-up and print logs to preserve them. Use the Search tab on the Log Browser to list only the logs that are new since you last printed them.

Copy unobserved objects to future lists.