

Astromist 2.4

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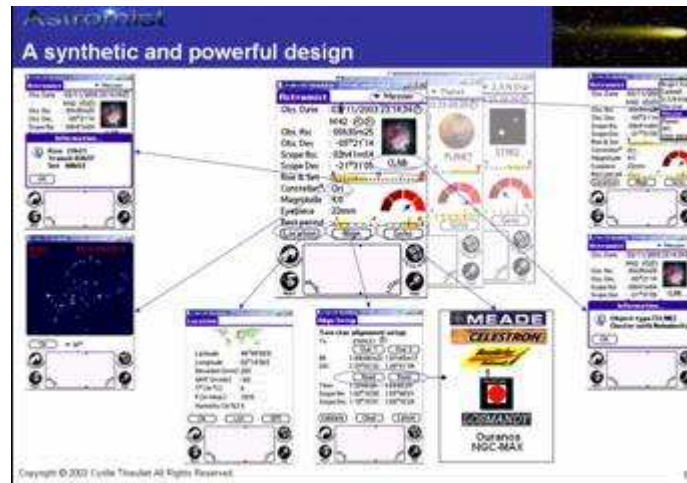
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1. Introduction

1.1. Objectives

Most high-end telescopes (“scopes”) sold today come with computer-controlled motor-drives that allow you to point to thousands of objects in the night sky. Although quite intuitive, their output is limited and, due to the small screen display, the user interface is rarely easy to use. This configuration makes the thousands of objects found in the telescope’s database especially difficult to sort, choose or identify.



In order to simplify telescope use, various PC software programs exist that allow an enthusiast to view powerful interactive “sky charts” and then select an object simply by clicking on it. Most of these software applications (apps) are designed to zoom in and out on the sky map and filter objects by their visibility to avoid confusion on the displayed map. However few of these apps help you answer very simple questions that all astronomers commonly have:

- I want to look at M57; what is the best eyepiece to use with my telescope to see it?
- Can I see this object tonight? If not, when is the best time of year to observe it?
- Which galaxies are visible tonight with my telescope?
- Tonight I am planning an observation session of one hour. What objects can I see during this time frame?
- Are these objects easy to see or not?
- Which objects will be visible higher in the sky tonight considering that I have a mountain on my horizon?
- What are the easiest objects to observe tonight? The most difficult?
- How can I find an object if my mount is not aligned?
- What objects can I see easily with a 10-mm Plössl eyepiece in my telescope?
- During the next hour I would like to point my telescope at all the nebulae visible inside the constellation Uma and view them using my 20-mm Nagler eyepiece.

Astromist was designed to help provide a simple, but complete list of objects to observe for beginning and serious astronomers, plus powerful sky charts. It can also indicate the best time and date to see an object and recommend what eyepiece might give the best view. All astronomers, regardless of their level of experience, will be amazed by Astromist and how it can calculate the accurate position of objects, including

corrections for precession, nutation, refraction and light aberration. Astromist can also correct for telescope-mount errors using several advanced pointing models and can pinpoint your observing location using an auxiliary GPS system, which you may already own and use for sailing, hiking or traveling in your car. Finally, Astromist will enable some advanced users to wirelessly control their telescopes via Bluetooth communications.

"Everything in a few taps" was the guiding principle behind the design of Astromist.

1.2. Main features

Astromist provides a great set of features unmatched by other Personal Digital Assistant (PDA) software applications:

- Bluetooth (and infrared) control of a telescope (a special rebate is available for Astromist's registered users for the complete Bluetooth hardware solution).
- Up to 2.5 million stars and 18,400 deep sky objects using full catalogs.
- A library of more than 9,000 images (all NGC, Moon atlas, Mars atlas, etc.)
- High-resolution screen support displays beautiful and comprehensive sky charts (four variations available) with the following features:
 - 320x320, 320x480 / 480x320 resolution modes on Palm or 240x320 / 480x640 on Pocket PC,
 - Dynamic scroll,
 - Chart rotation,
 - Object size, shape and orientation
 - Stars colors and sizes
 - Optional eyepiece field of view
 - Optional CCD field of view
 - Several zoom levels
 - Grid with fine graduations
 - Star magnitude legend
 - Optional Telrad overlay
 - Several telescope utilities to control GoTo, improve pointing, etc.
- Supports a wide variety of telescope drivers including LX200, Autostar, NexStar, Losmandy, Takahashi, as well as most of the Dobsonian DSC's on the market (Intelliscope, DaveEk, Ouranos, NGC-Max, SiderealTechnology, etc.) using dedicated encoder boxes.
- GPS compatible for retrieving observer position and elevation using cradle or Bluetooth port.
- PlanetAssistant displays the planet's path on the sky for long periods, including heliocentric view, quick sky planet positioning, detailed information tables, etc.
- CometAssistant allows you to plot a comet's (or asteroid's) position in the solar system (3-D view), plan observations (ephemeris and sky path for an extended period) or adjust the comet's data.
- EclipseAssistant helps you prepare your trip or just find the best place from which to observe (data includes best place, globe view, simulation, etc.)

- SatelliteAssistant locates the positions made-made Earth satellites in the sky and helps you plan observations (ephemeris and current visible satellite) or adjust data for satellites.
- Image Viewer lets you add and display your own images or just browse through the included image library.
- Dreyers descriptions of more than 14,000 deep sky objects, including a translation of the Dreyers codes.
- TwilightAssistant helps you to determine the best period throughout the year to observe an object or a planet.
- ScopeAssistant helps control your telescope using a Palm handheld.
- MarsAssistant simulates the positions of the planet's satellites, views of the planet and a map of the surface, including more than 900 features.
- JupiterAssistant shows the rotation of the Great Red Spot, the planet's satellites and satellite events ephemerides (i.e., shadows, eclipse, etc.)
- SaturnAssistant simulates ring evolutions and satellite positions.
- Built-in date and time functions generate information specifically for astronomers, including Moon phase per day, local, UT or JD times, a broader year range than is normally available with your Palm handheld, etc.
- AlignmentAssistant helps you to align your equatorial mount.
- CCDAssistant computes your CCD field of view and displays it inside Sky Charts.
- CheckListAssistant (based on the SAC checklist) helps you remember to bring everything with you when you head out for observing.
- LocationAssistant enables you to enter up to three preferred location settings.
- FinderAssistant allows easy browsing of objects.
- High-precision computation algorithms based on the famous Novas library, correct for refraction and topographic position (Earth aberration, precession and nutation) and also take into consideration temperature and atmospheric pressure.
- 2-star alignment enables quick GoTo to an object even if you don't polar align your mount.
- N-stars alignment enables telescope pointing better than one arc minute resolution.
- A large selection of Messier and planet photos.
- More than seven selection criteria to sort and select sky objects within the provided databases (Messier, Caldwell, Herschel, SAC, SAO, IC, NGC, Planets, Bright Stars, and user defined).
- A multiple-stage selection process helps refine your selected-objects list.
- Visual charts show rise and set times.
- A visual chart showing the best observation period during the year.
- A visual scale showing if an object is easy or difficult to see, considering its size and magnitude and telescope dimensions and sky brightness.
- Rise, transit and set times are calculated with adjustable horizon constraints.
- Displayed data includes magnitude, object type and constellation for planets and deep-sky objects.
- Planet and object positions are given in equatorial and alt-azimuth coordinates.

- The handheld display brightness can be controlled with multiple night modes.
- And much more!

1.3. Limitations

1.3.1. Scope drives

Meade (LX200), Celestron (4GT, CGE, new GT and GPS) and Takahashi telescope drives have been certified for full telescope control using Astromist as a virtual hand controller. NexStar 5 and 8 drives are also certified but currently do not allow telescope control (slew).

Furthermore most of the current Dobsonian DSC encoder boxes available are supported like DaveEk, Ouranos, NgcMax, SkyCommander and SiderealTechnology.

1.3.2. Photos

Messier objects and the planets have “real” photos, but Caldwell, Herschel, SAC and Multiple-Stars have images that only represent the “type” of the object. These photos are extracted from Messier catalog photos.

All the NGC images and part of the IC object photos are available for registered users as well as a library of 900 Mars features and a library of 1200 Moon feature images.

These libraries are available in two resolutions:

- 319x319 pixels for high-resolution pda (Palm and Pocket PC)
- 150x150 pixels for earlier Palm models.

Note: The low resolution set of images will reduce the memory space required and speed up the display of the images.

You can add any additional images that you want provided you follow these rules for naming the image so that Astromist can find it:

- Name of the object/planet/feature + .jpg. As an example, an image of M31 should be named “M31.jpg” or an image of crater Copernicus on the Moon should be named “copernicus.jpg”.

To display an image from the ObjectChooser, SkyChart, NightTripper, FinderAssistant or MarsAssistant, just click on the camera icon and the image will be displayed full screen.

2. Installation

2.1. Pre required

2.1.1. Version of the Operating system

2.1.1.1. Palm OS

Astromist requires has minimum version 4.0 of the system PalmOS and 256 colors. Version 5.0 or higher of Palm OS is recommended.

2.1.1.2. Mobile Windows/Pocket PC

Astromist requires Windows Mobile 2003 or higher.

2.1.2. Material supported on Palm OS

2.1.2.1. Model of assistant

In term of material, Astromist is developed and tested on the following models:

- Palm 505c,
- Tungsten T3
- Palm T5.

The models former to Palm 505c (Palm IIIx, Palm Vx, etc) do not lay out internal dynamic storage (512Ko minimum) and programs it cannot be used.

You will fully benefit from all the functionalities of Astromist with the assistants profiting from high resolution screens (Palm E2 and Treo 650 for example) and from great dimension (320x480 like palms T3, T5, Tx, LifeDrive, Sony TH55, Garmin 3600, Zodiac, etc).

2.1.2.2. Control of the peripherals

The control of peripherals such telescopes, GPS or cameras, require an operational serial port or a function bluetooth on your personal assistant. Some Palms of entry of range has neither port series nor of possibility of extension (SD slot). They are thus to avoid for this type of use. It is the case of Palm Z21.

Note: Control by Infrared of the peripherals is available on an experimental basis. It was tested with a converter serial/infra-red Actisys 1000SL. It is the only one which is compatible with the protocol serial/infra-red of Palm and which remains accessible in terms of price. The converters series/Bluetooth are less expensive and are more powerful: it is not necessary to face the sensor so that the communication functions. Note: The WIFI is not supported for the moment.

2.1.3. Material supported on Windows Mobile.

2.1.3.1. Model of assistant

Every personal assistant of type Pockect PC with at least 32Mo of memory can run Astromist.

The minimum resolution of screen is 240x320 or 320x240. With lower resolution, the display of certain screens could be strongly degraded and in certain cases the software will not be usable satisfactorily.

Astromist uses fully the screens of high resolution (480x640 or 640x480) on PDA. However the most been worth of this type of resolution remains limited, the smoothness of the pixels obliging most of the time to double the graphic size of the objects to keep a satisfactory visibility.

2.1.3.2. Control of the peripherals

The control of peripherals such telescopes, GPS or cameras, require an operational Bluetooth port on your pocket PC (port COM5 under Windows Mobile 2003 or COM6 under Windows Mobile 2005). The use of the serial port (on COM1:) is also possible if you have the adequate cable.

Note: Infrared control of the peripherals has not been tested on Pocket PC.

Note: The WIFI is not supported for the moment.

2.1.4. Memory card and card reader

To install the totality of the libraries and provided databases (230Mo necessary for the images in high resolution, 150Mo in low resolution), an external memory card is mandatory (except for the palms Life Drive which have a space of sufficient storage).

To profit from satisfying response time, a rate of transfer of 9Mo (or superior) in reading per second is recommended (equivalent at a speed x66).

2.1.5. Software extensions specific to PALM OS

Two complementary libraries are used by Astromist under Palm OS:

- A mathematical library,
- A library for displaying of image JPEG.

They is two libraries are "freeware" and freely usable.

2.1.5.1. Mathematical library: MathLib

All calculations in double precision are made using this mathematical library. This library is free and it is distributed under licence GNU GPL. It is included by default with the Astromist files. If you wish, you can get it with the following links:

- <http://www.probe.net/~rhuebner/mathlib.html>
- <ftp://ftp.rahul.net/pub/rhn/mathlib11.zip>

2.1.5.2. Library of loading of images JPEG

Two libraries are used according to your type of Palm OS to display JPEG images. These two libraries are free and also distributed under GNU GPL licence.

They are both provided by default and the selection of one or the other depends on the type of processor of your assistant:

- If your processor is of type ARM (the case on all posterior the Palm models in Palm 505c), you can use the ProJpegLib library. Its principal advantage is an almost instantaneous loading of the images even in high resolution.

- In contrary case where if you have problems of compatibility with this first library, the JpegLib library will carry out this work. It functions on very model of palm.

2.2. Differences between the versions free and complete

The free version of Astromist has the following limitations:

- Not more than 5 selectable objects at the same time in the lists,
- Only 1000 deep sky objects available,
- Only the last 100 craters of the list available in complete version (more than 900) for the Moon. While clicking on the chart you will be thus brought back to the crater nearest to this list and not inevitably that which you had pointed,
- None complementary star catalogues.
- Only the 1600 most brilliant stars are available,
- It is not possible to save your user preferences nor the characteristics of your place of observation,
- There is no possibility of modifying the date in many screens,
- The functions of control in Bluetooth are missing, and, finally,
- None tools for creation of specific catalogues is provided.

The complete version does not have any of these limitations:

- More star catalogues are available (HR, Hipparcos, Tycho)
- The full libraries of images are provided,

Several complementary tools are provided for:

- to create specific catalogues of objects,
- to update information relating to satellites, comets or asteroids,
- to create your own list of sites of observation.

2.3. Preparation of the installation and emergency backup

The distribution of the software being made without physical support, it is advised to make a backup of the whole of the Astromist files if a physical problem would occur on your PDA or your hard disk.

With this intention, the simplest method consists:

- to create a Astromist directory on your hard disk,
- to download there all the files which you received during your registration,
- to extract all the files downloaded there in order to have a tree structure ready for a new installation.

Once made, you can then make a CD-ROM with the contents of this directory.

2.4. Description of the available files

2.4.1. Main Catalogues

Several additional catalogues are available. For some they replace those provided in the free version:

- Astromist_24_reg.prc on Palm OS or Astromist_24_reg.exe on Windows Mobile - the program,

Note: Extension xxx of the catalogues under PALM OS is "pdb", that under mobile Windows is "ppc".

- astromist_brightstar.xxx - This catalogue contains 200 of the most brilliant stars with their common names. It requires 12K of memory.
- astromist_constellation.xxx - the catalogue for the lines of the constellations,
- astromist_comet.xxx - the complete catalogue of the asteroids and comets. This catalogue can be adjusted by an external tool (cometdb.exe).
- astromist_default_stars.xxx - the default catalogue of the stars (1600 stars magnitude lower than 5)
- astromist_eyepiece.xxx - It is about the catalogue of the eyepieces by default. This catalogue must ideally be filtered (using the tool eyepiecedb.exe) to keep only your eyepieces.
- astromist_location.xxx - This catalogue contains the coordinates (longitude, latitude) of almost 400 localities. It is possible to create your own list of locality thanks to the tool locationdb.exe.
- astromist_mars.xxx - This catalogue contains the remarkable points of the surface of Mars. More than 800 are referred. This catalogue requires 44K of memory.
- astromist_moon.xxx - This catalogue contains the remarkable points of the surface of the Moon. More than 900 craters, lake and sea are referred. This catalogue requires 92Ko of memory.
- astromist_obj_1k.xxx - the default catalogue of the deep sky objects (DSO), limited to 1000 objects,
- astromist_obj_18k.xxx - the complete catalogue of the objects of the deep sky. It contains more than 19000 objects and requires 830Ko of memory.
- astromist_obj_cross_ref.xxx - the cross index that enable Astromist to find the most well know identifier of objects or stars if any.
- astromist_obj_1k_idx.xxx - It is about index of research used in the sky charts to display the visible objects. This index is limited to the 1000 most brilliant objects of the sky. It is used for the fields of vision of 180° with 45°.
- astromist_obj_2k_idx.xxx - Similar to the preceding catalogue, this index contains the 2000 most brilliant objects of the sky (magnitude lower than 12). It is used for the fields of vision of 30° with 10°. It requires the presence of the catalogue of 18k objects.
- astromist_obj_18k_idx.xxx - It is about the index of the complete catalogue (on the 19000 DSO). It is used in the sky charts representing a field of vision lower than 10°. It requires the presence of the catalogue of 18k objects.
- astromist_obj_18k_desc.xxx - This catalogue contains descriptions with the Dreyer format of more than 14000 DSO. It requires 875Ko of memory.
- astromist_satellite.xxx - It is about the catalogue by default of the artificial satellites. It contains the 100 most brilliant. This catalogue must be updated regularly to allow a precise calculation of the position of the satellites. This update is done using a provided tool and while following the procedure described further in this document. The catalogue requires 28K of memory.

- `astromist_user_object.xxx` - It is about an example of custom catalogue created using the tool `userobjectdb.exe`. The size of this catalogue depends on the number of records knowing that 100 objects require approximately 10Ko of memory. The catalogue by default contains the 50 most well known objects and their common name.

Note: On Palm OS it is possible to add up to 100 specific external catalogues. On Pocket PC there is no such limitation.

2.4.1.1. Additional Star Catalogues

Several complementary catalogues are accessible for the registered users:

Note: Extension xxx of the catalogues under PALM OS is "pdb" that under mobile Windows is "ppc".

- `astromist_hr.xxx` - This catalogue (HR) takes the "Yale" list of stars visible with the naked eye. There is 9100 at a magnitude lower or equal to 7.0. It requires 120K of memory.
- `astromist_hr_idx.xxx` - It is about the index of research of the preceding catalogue.
- `astromist_hip_16k.pdb` - It is about an extraction of the Hipparchos catalogue of stars having a magnitude between 5 and 7.2. This catalogue contains 16680 stars and requires 230Ko of memory,
- `astromist_hip_32k.xxx` - It is about an extraction of the Hipparchos catalogue of stars having a magnitude between 5 and 7.8. This catalogue contains 31600 stars and requires 410Ko of memory,
- `astromist_hip_64k.xxx` - It is about an extraction of the Hipparchos catalogue of stars having a magnitude between 5 and 8.6. This catalogue contains 63300 stars and requires 900Ko of memory.
- `astromist_hip_110k.xxx` - It is about complete the Hipparchos catalogue (118000 stars). It requires 1,600Ko of memory.
- `astromist_hip_110k_idx.xxx` - It is about the index of research of the preceding catalogue.
- `astromist_tycho_390K.xxx` - This catalogue contains all stars of the Tycho catalogue until a magnitude 10.1 (390000 stars). It requires 5Mo of memory.
- `astromist_tycho_2500K.xxx` - This catalogue contains all the Tycho catalogue i.e. 2.5 million stars a lower magnitude or equal to 13. This catalogue requires 30Mo of memory.
- `astromist_tycho_idx.xxx` - It is about the index of research of the preceding catalogue.

Note: Astromist selects the best catalogue automatically to be used according to the level of zoom chosen in the sky charts. Thus, it is advised to copy all these catalogues from the memory card in the Astromist directory and to let the program only manage which it must charge in such or such situation.

2.5. Procedures of installation under Palm OS

Note: For a new installation of the complete version, it is strongly advised to remove the version of demonstration to avoid keeping catalogues partial. To do that:

- Use the function "delete" of your PALM to remove Astromist,

- *Make a synchronization to also erase the files of Astromist saved on your computer,*
- *Then you can begin the complete installation of the software.*

2.5.1. Installation without a memory card

This type of configuration does not make it possible to use the many libraries of images provided with Astromist. Moreover, it is not possible to have simultaneously several catalogues of stars. Only one must be selected. Lastly, only one specific catalogue of star could be charged in memory.

For this kind of installation, synchronize on your personal assistant the following files:

- astromist_24_reg.prc,
- astromist_comet.pdb,
- astromist_constellation.pdb,
- astromist_default_stars.pdb,
- astromist_eyepiece.pdb,
- astromist_hr.pdb,
- astromist_hr_idx.pdb,
- astromist_location.pdb,
- astromist_moon.pdb,
- astromist_mars.pdb,
- astromist_obj_1k.pdb or astromist_object_18k.pdb,
- astromist_obj_1k.pdb or astromist_obj_2k_idx.pdb if the catalogue astromist_object_18K.pdb is installed,

Note: In this type of configuration it is misadvised installing the index 18K because it would strongly slow down the display of the sky charts for the fields of vision from 180° to 20°.

- astromist_obj_18k_desc.pdb,
- astromist_obj_cross_ref.pdb,
- astromist_satellite.pdb,
- astromist_user_object.pdb,
- Only one of the complementary star catalogues.

Note: In this type of configuration, it is advised to install the catalogue astromist_hip_110K.pdb if your palm is fast enough. If not astromist_hip_32K is a good compromise.

2.5.2. Installation with a memory card

- ➡ **A MEMORY CARD OF 1GB IS A MINIMUM TO INSTALL THE WHOLE OF THE PHOTOS LIBRARIES AND CATALOGS OF ASTROMIST. AN EXTERNAL CARD READER (USB) IS NECESSARY TO COPY THE FILES IF YOU DO NOT HAVE A PALM T5 OR LIFE DRIVE. IF YOU DECIDE TO BUY A MEMORY CARD OF HIGH CAPACITY, CHECK YOUR ASSISTANT CAN SUPPORT IT. THE PALMS 505 FOR EXAMPLE, CANNOT MANAGE CARDS OF A CAPACITY HIGHER THAN 256MB.**

Astromist 2.4 User Guide

The simplest method is to extract all zip archive files at the same place to create an up and ready directory tree. Once done you should have the following tree:

Name	Size	Type
data		File Folder
img		File Folder
mars		File Folder
moon		File Folder
shots		File Folder
small_moon		File Folder
To be Hotsync JpegLib		File Folder
To be Hotsync MathLib		File Folder
To be Hotsync ONLY on T3		File Folder
usercatalogs		File Folder
astromist_241_reg.prc	2 179 KB	Palm Application
Install.txt	2 KB	Text Document
License.txt	5 KB	Text Document
Readme First.txt	6 KB	Text Document

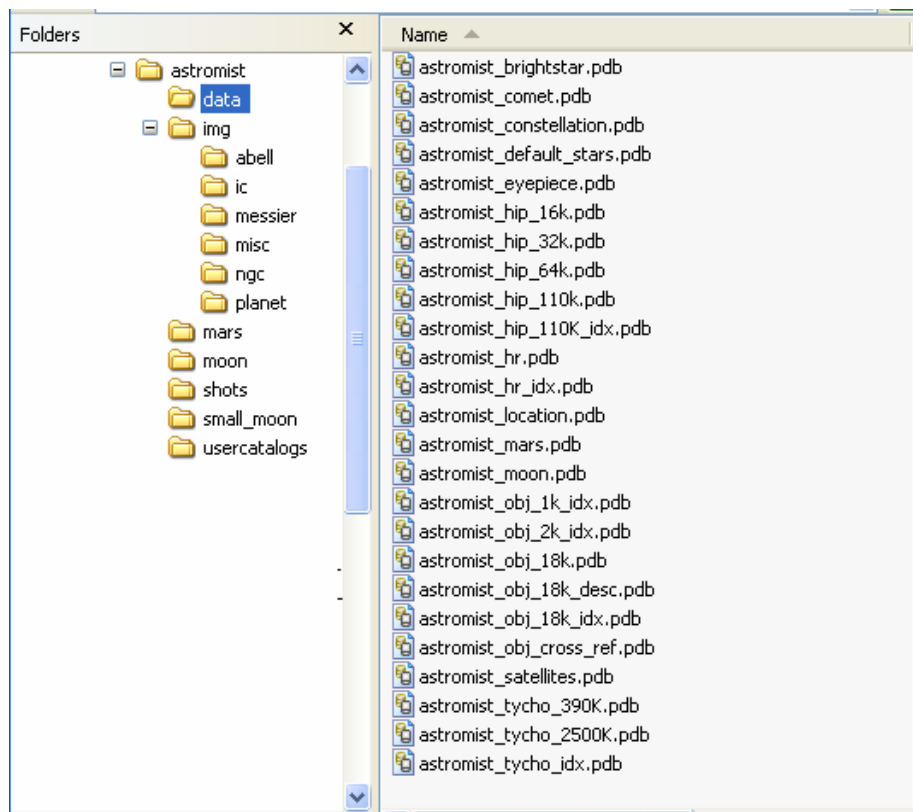
You can make a backup of the Astromist folder at this stage on a 700MB CDROMM.

Then, proceed to the following hotsyncs:

- The main programs astromist_24x_reg.prc (where x is equal to 1 in the picture above),
- The additional libraries provided inside « To Be Hotsync ... » folders. Beware, the hotsync must be done according your Palm device and Palm OS configuration.

Then, you can remove from astromist directory the « .txt » files, the « .prc » program and the folders « To be Hotsync... ». These files are not required on the memory card.

You must have at this stage the following structure (data folder is open below to list all the databases inside):



To finish the installation, just do a Drag&Drop of the astromist folder from your computer to your memory card. 700MB will be required for a full install with all the photos.

Once the copy is finished (it might take several hours on slow memory cards) you can then launch the program and register.

2.6. Procedures of installation under Mobile Windows

Note: For a new installation of the complete version, it is strongly advised to remove the version of demonstration to avoid keeping catalogues partial. To do that removes the Astromist directory with its contents.

Note: The use of an external memory card of at least 256Mo is strongly recommended to profit from a complete installation. The performances of the card (reading rates mainly) will have a major impact on the fluidity of some assistants of the program. Also do not hesitate to take card with "high performance" (x66 or more).

To install Astromist on your Pocket PC you must just copy the Astromist directory containing the tree structure of reference to the place where wish it to you.

The contents of the directory are as follows:

- The directory "data" contains the whole of the catalogues .ppc
- The directory "img" contains the whole of the images to format JPEG of Messier, planets, NGC and IC,
- The directory "mars" contains the whole of the images to format JPEG for March,
- The directory "moon" contains the whole of the images to format JPEG for the moon,

- The directory “small_moon” contains the whole of the reduced images to format JPEG of the Moon,
- The directory “usercatalogs” contains your catalogues possible personnel,
- The directories “userlists” and “userlogs” are created by the program if need be. No catalogue is to be placed inside for a first installation.

This tree structure can be prepared on your hard disk then copied in your PDA or on your memory card. For an installation without memory board you will have, according to the space of which you lay out on your pocket PC, to remove whole or part of the images of their associated repertories and to remove the largest complementary star catalogues of the directory “data”.

2.7. Updates of version

To each new major version of the software, an email is sent to the users to indicate to them how to profit from the update.

After each major update, intermediate versions can be placed at the disposal for free to correct the errors which would have passed through tests. In this case, it is enough to again download the version recorded to profit from it. Generally only the archive containing the main program (.prc or .exe) has to be installed.

3. Functionalities

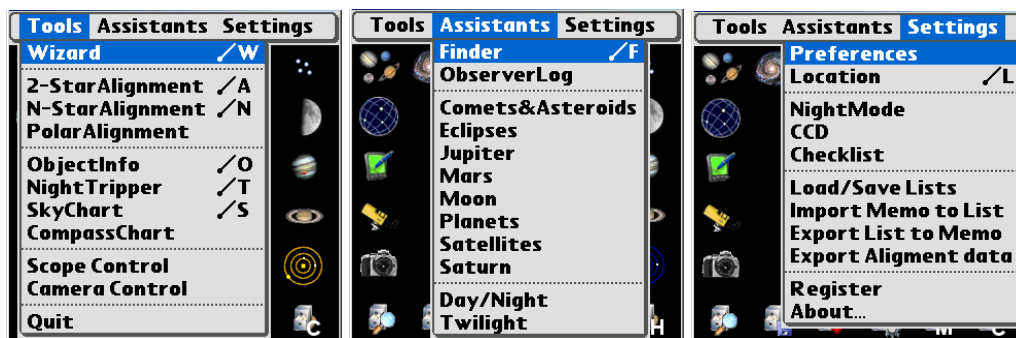
3.1. Principles

Astromist provides a great set of functionalities split into several domains:

- Object seeking and information gathering.
- Sky charts and planetarium views.
- Forecasts and simulations.
- Ephemeris and object positions.
- Telescope control.

Each domain is covered by major tools and assistants.

Note: Anywhere in the program to reach the menu, it is enough to click in the bar of title of the screen concerned.



Astromist menus

Major **Tools** constitute the heart of Astromist:

- **Astromist Wizard** is the central point and gathers in one place the major tools and assistants. Its goal is to provide access, in one tap, to the most used functions or objects.
- **Alignment tools** let you align your mount using several different scenarios (polar align, usual two-star alignment and multiple star alignment to correct mount errors).
- **ObjectInfo** lets you browse the most common objects in the sky and easily learn their positions and characteristics.
- **NightTripper** is a unique and powerful tool that lets you prepare in advance for your observing sessions. Numerous selection criteria are available as well as unique object selection.
- **SkyChart** provides detailed sky maps and planetarium views to help you to observe and learn the sky.
- **CompassChart** provides a compass view where the objects are displayed. It helps you to locate North with the Sun to quickly see where an object is or to find when the object will be higher in the sky.
- **Scope Control** helps you control your telescope using a serial or wireless link.
- **Camera Control** will control a Canon DSLR using a serial or wireless link.
- **Quit** exits Astromist (mandatory on Pocket PC and on Palm T|X models that have no Home icon in their toolbar).


For a deeper analysis of the sky, **Assistants** provide visual as well as detailed information on a variety of topics:

- **Finder** Assistant easily browses the huge object catalog (more than 19000 objects provided).
- **ObserverLog** lets you preserve all the thoughts that come during an observing session.
- **Comet&Asteroid** Assistant simulates and forecasts a comet's trip (or asteroid) across the sky and solar system.
- **Eclipse** Assistant simulates and forecasts all solar eclipse events.
- **Jupiter** Assistant simulates and forecasts all of Jupiter's events.
- **Mars** Assistant simulates and forecasts Mars' events.
- **Moon** Assistant provides a Moon phase calendar, Moon map, rise and set ephemerides, darkest hours planning or browsing through images of features (more than 1100 included).
- **Planet** Assistant anticipates all events (eclipses, conjunctions, oppositions, etc), shows a planet's relative position in the solar system, illustrates planet movements across the sky during a particular period, provides ephemerides and more.
- **Satellite** Assistant simulates and forecasts Earth (man-made) satellite positions and visibilities.
- **Saturn** Assistant simulates and forecasts Saturn's satellite positions as well as ring orientation.
- **Day/Night** Assistant visualizes day and night on Earth as well as day length depending on your location.
- **Twilight** Assistant forecasts the best periods to observe an object or a planet over the course of a year.

Finally, the **Settings** section provides:

- **Preferences** tool to let you adjust all of Astromist's settings.
- **Location** tool lets you set your position on Earth and specify the characteristics of your observing sites to enable the powerful Astromist forecast algorithms (visibility of the object, best eyepiece to use, etc.)
- **NightMode selector** is a facility to select the best night mode that fits your current conditions. Three levels of after dark screen illumination are provided.
- **CCD** Assistant computes some useful values linked to your CCD and shows your CCD's field of view inside sky charts and the planetarium.
- **Checklist** Assistant help you remember to take everything you need the next time you go on an observing trip.
- **Load/Save List** Assistant lets you save or load an object list as well user object catalogs that you created using Astromist. This is very handy when you decide to prepare for an observing trip or if you want to have multiple object lists prepared ahead of time.
- **Import Memo to List** Assistant lets you import the data from a Palm text memo and create an Astromist list. This tool is useful if you want to prepare lists that do not include Astromist objects but objects from an external source.
- **Export List to Memo** Assistant lets you export your current list of objects into one or several text memos.

- **Export Alignment Data** lets you export your current alignment data into one text memo. This function must be used if you have alignment issues and would like some support to help you.

On top all theses functions and to help the end user be more comfortable with Astromist, numerous setup panels are available as well as local help at the top of each screen (use the information icon  to read the main tips for each screen).

Lastly, all the screens benefit from the screens large size (320x480 on Palm and 480x640 on Pocket PC) while placing at the disposal of additional information and graphs. Astromist functions also in landscape mode.



3.2. Overall screen control using Palm Keys

Because using your stylus in the dark is not always easy, Astromist has been designed to avoid, as much as possible, stylus inputs and to promote predefined lists. This feature lets you control almost all panels and screens within Astromist without a stylus, even including tapping on a button, activating a popup or selecting an object from a list.

This is possible by using the right side buttons of your Palm. The first button lets you jump from one button, list or checkbox to another. In each case a red box will highlight the control to let you see where the focus is.



The right-most button lets you activate the control, specifically:

- a button – you will execute the action of the button,
- a list – you will select the item,
- a popup list – you will open the popup to let you browse this list,
- a checkbox – checks or unchecks the box.

The other buttons (left ones, up and down and navigation pad) link to panel related functions. The left-most button usually simulates the OK button, even in message popups, to avoid your having to use the stylus.

3.3. Astromist Wizard


The wizard of Astromist gives you a fast access to the main functions of the application and proposes shortcuts parameterized on certain functions of selection/search for objects to you.



Wizard on HiRes and lowRes Screens

Moreover, several data are displayed in the center of the screen:



- The place of observation chosen,
- The current date,
- The current hour (standard time),


















Note: While pressing on the icon  you will have access to the module of selection of the date and hour. This date can be different from the current date.

- Hours of rising and set of the Sun at the current date as well as the hour of beginning of the “astronomical” night i.e. when the Sun is lower than the horizon of 18°. All these hours are local.
- Hours of rising and set of the moon like its phase at the current date (symbolized by an icon on the assistants with high resolution screens).

Available buttons on the wizard allow you to quickly access some of the powerful Assistants within Astromist:

Note: According to the type of sky chart (display of only the visible sky or not), the selection of the objects is adjusted to keep only those which are “visible” in the chart. Moreover, the selections are made according to the current date and hour. Lastly, the researches can be parameterized to look at from 25 up to 500 objects at a time (see in the Preferences 2/5).

-  Selects only the planets.
-  Selects only the galaxies.

-  Selects only the nebulae.
-  Selects only the globular clusters.
-  Selects only the comets and asteroids.
-  Selects only the bright stars.
-  Launches the “MoonAssistant” to let you see ephemeris, map, etc.
-  Launches the JupiterAssistant.
-  Launches the SaturnAssistant.
-  Launches the PlanetAssistant.
-  Selects Caldwell objects.
-  Selects Messier objects.
-  Launches NighthTripper.
-  Selects objects of your preferred custom objects database.
-  Loads and saves custom object lists, select your default custom database.
-  Launches the FinderAssistant.
-  Launches CameraControl Assistant to control your Canon DSLR camera over a serial or Bluetooth link.
-  Launches ScopeAssistant to control your telescope over a serial, Bluetooth or infrared link.
-  Launches the ObserverAssistant to type an observation log for a specific object.



- Launches SkyChart Assistant that will display the sky using your location and current date and time. If no object selection was done before, the planets are selected by default. Else, the current object list is reused.

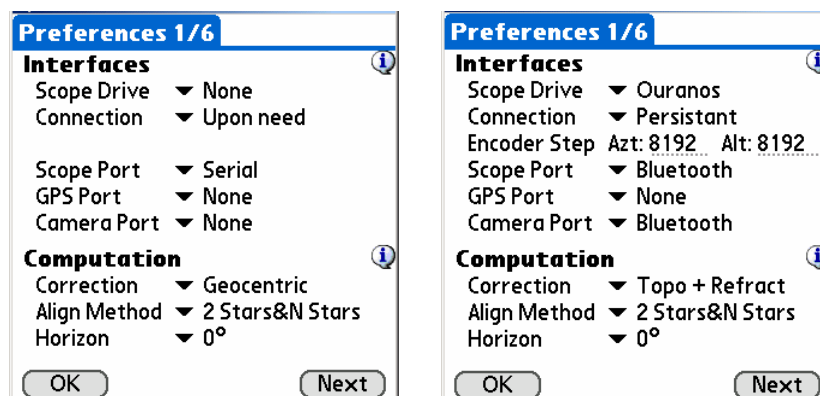
3.4. General Set-up

Astromist has a broad set of configuration options.

Each time you press the OK, Next or Prev buttons, the values of that panel are saved.

Each panel's information buttons provide you with localized help information.

3.4.1. Preferences 1/6



3.4.1.1. Interfaces

Before being able to connect Astromist with the one of your peripherals, you must adjust the following values:

- **Scope drive** - This option enables you to choose the pilot corresponding to your telescope or encoder. Failing this, the model nearest or compatible can be selected.

Note: The users of mounts like Astrophysics or Losmandy, or the users of SkySensor must choose pilot LX200.

- **Connection** - This option enables you to choose if connection with your telescope remains active (persistent) as long as Astromist is open, or, if it is open then is closed according to the needs (upon need).

Note: The first mode avoids the regular posting of the messages of connection Bluetooth system on the other hand it is a little bit more demanding in energy.

- **Encoder step** is displayed only if the selected pilot is an encoder box. You must inform here the resolution of your encoders. A negative value in this field indicates that the encoder is reversed.

➡ **CAUTION: IF YOU HAVE IMPORTANT PROBLEMS OF PRECISION FOR POINTING, IT IS PROBABLE THAT ONE OF THE TWO VALUES OR BOTH MUST CHANGE SIGN.**

Tip: To know if you must enter a negative value or not, once your encoder connected to Astromist, launch ScopeAssistant:

- If by increasing altitude the value of the encoder altitude decrease, it is necessary to change the sign.

- If while turning the base of your telescope from the left to the right (in the direction of the needles of a watch), the value encoder for the azimuth decrease, it is necessary to change sign.

- **Drive port** can be positioned on one of the 3 types of connections supported by Astromist: serial cable, infrared or Bluetooth. The infrared mode was tested successfully with only one cable (Actysis 100SL). This case is expensive and, for a connection without wire, the Bluetooth is advised.

If no telescope is connected to Astromist, leave this value to "None". If not:

On Palm, it is enough to choose the type of connection, the program will find without further information the good wearing of communication,

On Pocket PC, the ports of communication from COM1 up to COM9 are available to the selection. The user will have to refer to his adjustments and the version of Windows Mobile to determine the use of each port. Generally:

- COM1: is reserved for the port serial cables,
 - COM3: is reserved for the infrared,
 - COM5: is reserved for the Bluetooth communications under Windows 2003,
 - COM6: is reserved for the Bluetooth communications under Windows 2005.
- **GPS port** can be positioned on "None" if you do not have a GPS or on one of the modes of connection supported by Astromist and compatible with your GPS. Only the GPS respecting standard NMEA are supported.

On Palm, PDA IQ3600 integrating a GPS are supported thus that all the external GPS connected by serial port or Bluetooth compatible,

On Pocket PC, the port of communication with a GPS must be adjusted on a case-by-case basis according to your configuration. Nevertheless in the case of an external GPS you can choose by default the active serial or Bluetooth port of your PDA (COM6: for example).

- **Camera port** must be adjusted if you wish to control your camera since Astromist. There still, the two modes of connection (series, or bluetooth) are proposed. The Bluetooth mode represents a practical alternative to the infrared case of control Canon.

3.4.1.2. Computation

This part of the parameter setting enables you to adjust several computation parameters.

- **Correction:** Astromist can calculate the position of the objects for an observer placed at the center of the Earth (Geocentric), placed at your place of observation (Topocentric), and by taking account or not of the refraction of the image of the objects (related to the atmosphere) which reveals the objects (in particular those close to the horizon) a little higher than they are not in the sky actually.

Note: Whatever the parameter of correction chosen, the positions of the objects used during the alignment of a telescope all are calculated in Topocentric+Reflexion mode.

- **Align Method:** Astromist proposes two manners to carry out the alignment:
 - The first is completely autonomous. Astromist carries out the alignment of your telescope using 2 stars and can thus replace for the alignment function of your telescope. It is possible by adding other stars to the first two to obtain excellent precision of pointing (<15 minutes of arc),

- The second, where Astromist reuses your Telescope alignment. In this case, you can also improve the pointing using several other points of alignment. The precision can still be there lower than 15 minutes of arc to the final one.

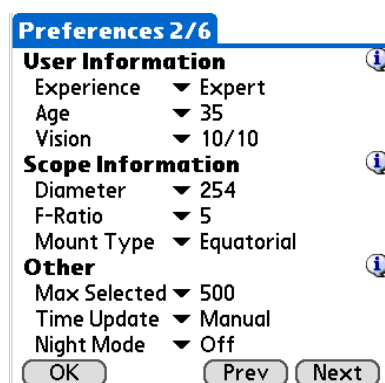
Note: If you have Dobson and/or you use encoders, the first method is necessary and will allow you to obtain an excellent precision of pointing.

If you use an already computerized mounting, it can be simpler to initially carry out alignment since your mounting (external) then to use the functions of improvement of alignment available (Alignment N-Star).

The pointing errors due to the inflection of the tube of your telescope are not taken into account in the standard version of Astromist because they would require at least 6 stars to be able to be calculated. This type of error can be particularly awkward on large telescopes where the principal tube makes more than 2 meters and where the mass located at the head of telescope could be important. It is the case of large Dobsons. In this case and on request, a special version of the program can be produced to correct this kind of anomalies.

- **Horizon** is used for calculations of rise and set of objects. By default value 0 is used to enable you to compare the results of Astromist with other software if you wish it. With a value different from 0, the hours of rise and set of a star will be calculated for the selected height.

3.4.2. Preferences 2/6



3.4.2.1. User Information

Astromist is able to estimate what objects you can see with the naked eye depending on the presence of the Moon, the Sun and the following three parameters:

- **Experience:** A Beginner who doesn't know the technique to see dimmer deep-sky objects and is not familiar with night vision. As an example, a beginner could see only four stars inside the Pleiades, while a hobbyist has more experience and can see about seven. An Expert may see more than ten stars inside the Pleiades.
- **Age:** depending on age, eyes are less sensitive to light. This is used along with other information to compute your naked eye visual limit magnitude
- **Vision:** If your acuteness of vision is 2/10 in each eye without your glasses on it will be more difficult to detect faint objects :-)).

Note: The mathematical model used inside Astromist is similar to the one defined to represent human eye capabilities over time.

Note: This calculation doesn't take into account the light behind you and thus is more effective when observing in the countryside.

Note: 10/10 in European rankings is equivalent to 20/20 in the US.

3.4.2.2. Scope Information

The following information is used to compute telescope magnitude limit, field of view available with a specific eyepiece and the best eyepiece to use to view an object:

- **Diameter** is the diameter in millimeters of your telescope.

Tip: If you have the diameter in inches, multiply it by 25.375 to obtain the measure in millimeters. Then choose the diameter from the menu that is the closest to the product of this multiplication.

- **Focal** is the focal ratio (f-stop) of your telescope.

Tip: If you only have the focal length of your telescope, you can estimate focal ratio by dividing this length by your telescope diameter (in millimeters). Then choose the focal ratio from the menu that is the closest to your estimation.

- **Mount Type** is the type of your telescope mount, Equatorial or Azimuthal.

Note: If you are using Astromist 2 stars alignment method this value must be correct.

3.4.2.3. Other

- **Max selected** is used to manage the maximum number of objects that Astromist can select at a time in an object list. 150 is a good value which lets you select all the Messier objects and enable you to add some personal objects.

Note: Freeware version of Astromist is limited to five objects at a time.

- **Time Update** is used to indicate if you prefer that Astromist manages time updates or if you want to be able to manually control the time updates. This value is managed automatically using DateTime Assistant: if you press "now" the automatic mode is activated, otherwise manual mode is selected.
- **Night Mode:** Allows you to switch Astromist's display to red to preserve night vision using red. Three night mode are available. This value is managed using NightMode Assistant.

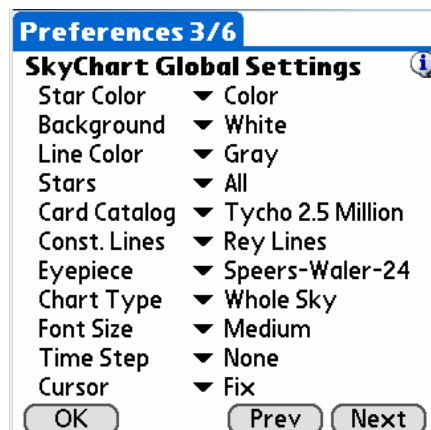
On Palm OS, The keyboard illumination on Treo models is disabled as well. Keyboard illumination can be re-enabled after exiting Astromist by using the Treo's screen illumination slider control.



Astromist with Night Mode, Bright, Medium and Dark

3.4.3. Preferences 3/6

This preference panel lets you adjust the main SkyChart setup values.



- **Star Color** lets you select the color of stars (colored or back and white)
- **Background** lets you select the background color of the sky chart. Depending the background selected you might have to adjust the line color.

Tips: *White background and Star color set to Color is a good starting set.*

- **Line Color** lets you select the color of the constellation lines.
- **Stars** lets you select the option to display only constellation stars or default ones. This may improve display update speed.
- **Card Catalog** lets you select which files stored on your expansion card you want to use as the more detailed one. For example if you select Hipparchos 110K, the catalogs 16K, 32K and 64K will be used too and must be there on your card (else an error message will be displayed) but none of the Tycho Catalogs even at the lower field of view will be used. If you don't want to use an external catalog just set this value to no expansion card.

Note: *Remember that files must be stored on the card in the correct path with their original names*

On Palm, to use this selector it is necessary that you installed on a memory extension card the whole of the star catalogues (to be placed in the PALM/Programs/Astromist directory. If you do not choose any, only the catalogue in memory, so present, will be used.

Note: *Only one stellar catalog may be installed at a time in memory.*

On Pocket PC, the catalogues must be placed in the "data" directory. Astromist will select the intermediate catalogues then the most adapted according to the field of vision of the chart. If no selection is made, only the default stars will be visible.

- **Const. Lines** lets you choose what kind of constellation lines are displayed:
 - **Classic** representation,
 - **Rey lines** which are more recent and try to represent better each constellation. Rey lines are more detailed and can take more time to display on slower CPU's.



Leo constellation: Classic lines



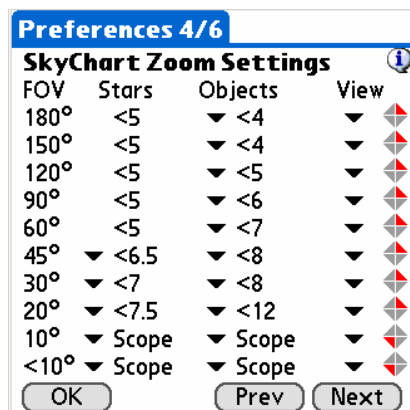
Leo constellation: Rey Lines

- **Eyepiece** lets you select your current eyepiece to display its field of view inside sky chart. The list displayed can be adjusted to reflect your collection using the eyepicedb.exe tool.
 - **Chart Type** lets you select the kind of SkyChart:
 - SkyMap provides a planar view of the visible sky within a circle: like the view you have in most of astronomy magazines. Only objects above horizon can be viewed in this mode.
 - Horizon view displays the visible horizon. The chart is distorted for altitude above of 60°. Only objects above horizon can be viewed in this mode.
 - Whole Sky displays the sky as a sphere. This mode lets you locate any object (visible or not.)
 - Visible Sky displays half of the sky sphere (only the visible part.)
 - Equatorial Sky displays the sky as a sphere but without any rotation to reflect your position on the earth or your current date and time.
 - **Font Size** lets you choose the size of the object-label font used in sky chart. Medium is a good setting. Small requires good eyes. Large can be useful at night. This function is not enabled on Pocket PC for the moment.
 - **Time Step** lets you choose a time step increment to add to the current time of the chart if you press the left keys under skychart. If one selected, the step will be added using the left palm keys. This function is not enabled on Pocket PC for the moment.
- ➡ **THIS STEP IS NOT LINKED TO THE AUTOMATIC REFRESH RATE OF THE SKY MAP WHICH IS 5 MIN.**
- **Cursor** lets you control if the cursor of the charts blinks or not. Blinking mode can be useful at night because the entire screen is red colored.

3.4.4. Preferences 4/6

This preference panel lets you adjust the magnitude limit at each zoom level for objects and stars. Star magnitudes are adjustable from 45° to 5°. Above the 45° field of view, only default stars brighter than magnitude 5 are displayed (this is due to rendering speed issues).

You can select your eye's magnitude limit, the telescope's limit or a fixed value.

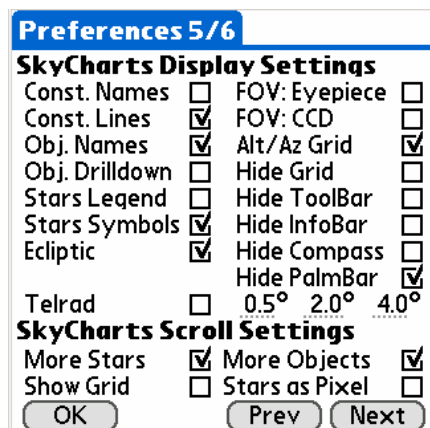


Objects magnitude limit applies to the object list you created and to objects dynamically loaded upon you zoom level (drill down function.)

The View column lets you adjust the sky-view orientation to match the type of telescope you are using. So, you can decide to have sky views like you see naked eye for a wide fields of view or sky views reversed like you see through your eyepiece with smaller fields of view. In any case, this last setting can be adjusted using a specific button inside the sky chart view.

3.4.5. Preferences 5/6

This panel lets you select those features you want displayed in the sky chart and planetarium views. Each item that is checked displays/do the corresponding information/action in the sky chart and planetarium views.



3.4.5.1. SkyCharts Display Settings

This section lets you adjust you display preferences when you use SkyCharts.

- **Const. Names** displays the abbreviated name in the middle of each constellation.
- **Const. Line** displays the constellation lines.
- **Obj. Name** displays the object name, except names are not displayed for widest field of view settings (180° and 150°).
- **Obj. Drill down** activates the dynamic selection of objects within skycharts. The more you zoom the more objects you will discover.
- **Star Legend** displays, at the left of the chart, star sizes and equivalent magnitudes. This legend doesn't take into account the star colors on the chart.

- **Star Symbol** displays the Bayer Greek letter designations, if they exist, of bright stars. For fields of view wider than 45°, only Alpha and Beta are displayed. For fields of view equal to or narrower than 30° all symbols are displayed.

On Palm OS, Star Symbols are disabled on low resolution PDA's.

Notes: Numbers associated to the Bayer or Flamsteed codes are not displayed, but are available, if they exist, when you tap on the star.

- **Telrad** displays the circle of a Telrad around the selected object. The default settings for the three circles displayed are 4°, 2° and 0.5°, but can be changed to match other zero-power finder brands.

Note: Due to some internal limitation, the Telrad display is not currently moved when you select another object or star in the chart and the chart is not redrawn.

- **Ecliptic** displays a circle that represents the path of the planets in the sky.
- **FOV: Eyepiece** displays a circle that represents the field of view of your currently selected eyepiece. This feature uses the scope information you input in preferences. To use this feature you need to select an eyepiece in the 3/5 preferences panel.
- **FOV: CCD** displays a rectangle that represents the field of view of your current CCD description (see CCD Assistant).
- **Az/Alt Grid** displays circles to represent the particular altitude in the SkyChart. This grid is much faster to draw than the equatorial one. This option has no effect in the Horizon SkyChart. If you activate Alt/Az Grid, RA and Dec position will be replaced by Altitude and Azimuth in the information bar.
- **Hide Grid** hides, if checked, the grid on top of the SkyChart.
- **Hide ToolBar** hides, if checked, the toolbar on top of the SkyChart.
- **Hide InfoBar** hides, if checked, the current position and time on top of the SkyChart.
- **Hide Compass** hides, if checked, the small compass at the bottom left of the screen. If you hide the compass you will no longer be able to switch to the compass view by tapping on it.
- **On Palm OS, Hide PalmBar** lets you decide to display or not the Palm status bar thus allowing you to get wider chart displays in the SkyChart Screen.

*Note: The **Hide PalmBar** only works with Palm models with a wide screen (320x480).*

3.4.5.2. SkyCharts Scroll Settings

Scroll settings allow the user to selectively reduce the number of details displayed during scrolling thus allowing those with slower or older handhelds to keep chart rendering times short:

- **More Stars** – check this if you want to display all the default stars during scrolling. If unchecked constellation stars will be displayed.
- **More Objects** – check this if you want to display all the objects found by the drilldown feature.
- **Show Grid** – once checked, lets you display the sky grid during scrolling. This option only works with the Local Sky and Equatorial views as other views do not display grids.

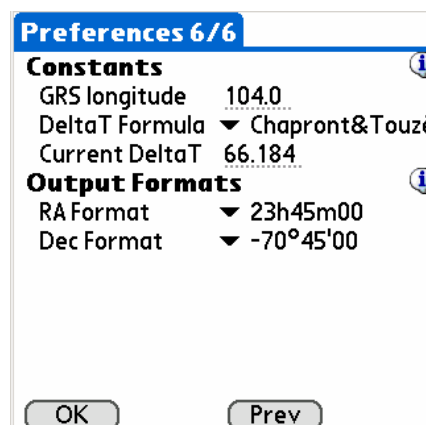
- **Stars as Pixel**– check this to display the stars as colored pixels instead of colored bitmaps.

Note: As an example, Palm 505 users could activate Pixel Stars (display stars as pixels instead of bitmaps) and uncheck More Stars, More Objects and Grid.

The users of Treo 650/680, T5/Tx or LifeDrive under Palm OS or of Pocket PC having a CPU with 200Mhz or more will be able to activate all except "Star as Pixel".

3.4.6. Preferences 6/6

This preference page groups some of the constants used by Astromist's algorithms and allows the user to define output formats used.



3.4.6.1. Constants

- **GRS Longitude** allows you to adjust the longitude of Jupiter's Great Red Spot. The current value (June 2006) is about 104°.

Note: To compute this value for the present, use the JupiterAssistant.

- **DeltaT Formula** (difference between terrestrial time TT and universal time UT), lets you select the approximation formula to estimate DeltaT in the past (before 1600) or in the future. Chapront & Touzé use a more recent approximation; JPL Horizon is the model used by NASA for eclipse computation.
- **Current DeltaT** (difference between terrestrial time TT and universal time UT), required to adjust the annual value of delta T. This value provided by astronomical almanacs is used to compute arc second precision for object topographic positions as well as planet and Moon positions. The value of this field is used for the current year.

3.4.6.2. Output Format

- **RA format** allows you to specify how right ascension information (RA) is displayed inside of Astromist.
- **Dec format** allows you to specify how declination information (Dec) is displayed inside of Astromist.

3.5. Location Set-up

Location setup lets you save information for up to three different observing sites. If you need more locations, a custom location database can be created.



Location Site 1 Bruxelles

Latitude : 50°50'13 N

Longitude : 04°22'01 E

Conditions ▼ Country

Elevation (in m): 0

GMT (in min) : 60 DayLight ☒

T° (in °C) : 10

P (in mbar) : 1013

Humidity (in %): 40

OK Cancel List GPS Map

Location default screen

The following fields need to be populated:

- **Latitude** – the latitude of your observing location. Values between -90° and 90° are accepted. Positive value indicates North latitude and negative indicates South.
- **Longitude** – the longitude of your observing location. Values between -180° and 180° are accepted. Positive value indicates West longitude, negative indicates East.

Note: This information is mandatory to obtain accurate position data.

- **Type** – Sky brightness of your location. This value is used to compute values displayed with the object visibility indicators available in the ObjectInfo and NightTripper. The brighter your sky the more difficult it will be to see faint objects.

Note: The Moon's brightness is added on top of this value and is computed using Moon Phase. There is no need to calculate it further. Only set a value that describes your overall sky condition and let Astromist do the rest.

*Note: The **List** button allows you to select your own locations from a pre-defined list. Registered users can create their own location catalog.*

Tip: If your town is not in the list, select the closest one and then adjust latitude and longitude.

- **GMT** is the minutes difference between Universal Time (Greenwich Time) and your local Time Zone. This number could be positive ("East" for India) or negative ("West" for a US location). Values between -720 and 720 are accepted. When you tap on it a search box will be displayed to let you select your time zone. Once done the field will automatically be updated.

Note: The GPS button will automatically populate the three previous fields when a GPS receiver is properly attached.

- **DayLight** lets you indicate whether you are using Daylight Savings Time (a checked box) or not.
- **T°** is the temperature at the time of your observing session in degrees Celsius (°C). This information is used to compute accurate refraction correction. Values between -60°C and 50°C are accepted.
- **P** is the pressure at the time of your observing session in millibars. This information is used to compute accurate refraction correction. Values between 900 and 1100 millibars are accepted. If you input a default value, topographic algorithms take care of altitude to correct this pressure and to enable accurate refraction compensation.

Tip: Generally when the sky is clear, sea level pressure is around 1010 mb.

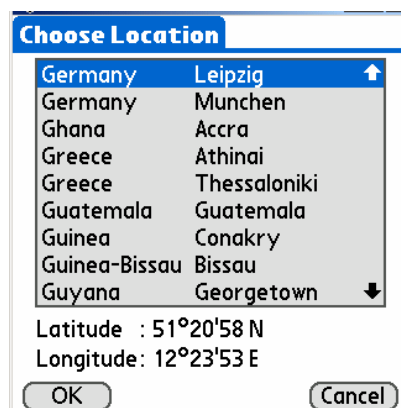
- **Humidity** is the percent concentration of water vapor in the air during your observing session. This information is used to compute the naked-eye visual magnitude limit. Values between 0 and 100 are accepted.

Tip: You can use a portable weather station that can be attached to your mount plate to get all of this information.

Once all these informations are set, press OK to validate your inputs or cancel to go back to the previous values.

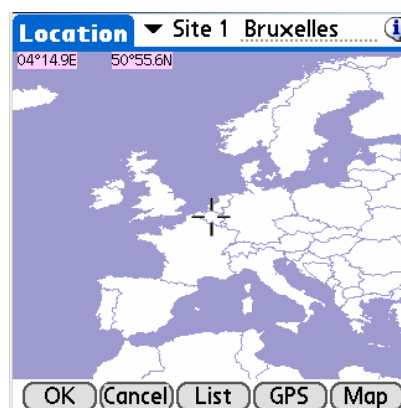
Other actions can be done using the buttons at the bottom of the screen:

- **List** button lets you access to the location database. Registered users can create their own database with their preferred observation sites. You have to select a location from the list and then press OK to go back to the main screen.



Location database explorer

- **GPS** button starts to read your GPS data to gather your position information (Longitude, latitude, elevation, gmt).
- ➡ **ATTENTION:** YOU NEED TO SET **GPS PORT** IN **PREFERENCE 1/6** TO THE CORRECT VALUE BEFORE USING THIS FEATURE.
- **Map** button lets you locate you position on the earth without a GPS with a precision better than one degrees in longitude or latitude. You can drag the map to move to the country where you are, then tap on the screen to get the longitude and latitude of the point you selected on the earth. Once the selected value is correct press OK. Use Cancel to go back to the initial lication values.



Extended worl map to find your location

Note: The map tools do not set the GMT. You need to adjust it manually after going back on the main screen.

3.6. Pointing Set-up

Note: If you have a GoTo mount, it is recommended that you perform your usual mount alignment setup even if Astromist is able to supersede it. In both cases, once done, you can use N-Star Alignment to improve pointing accuracy.

3.6.1. 2-Star Alignment

Note: The method described here is relevant regardless of your mount type.

Note: Astromist's formulae for two-stars alignment is based on the excellent work of M. Toshimi Taki (<http://www.asahi-net.or.jp/~zs3t-tk/>)

	Star 1	Star 2
RA	00h07m54	02h21m45
Dec	29°02'17	89°13'19
	Read	Read
Time	21:27:56	21:37:01
Scope RA	06h36m59	20h43m55
Scope Dec	85°19'41	36°29'49

OK Align Clear

Two-stars alignment enables you to point to any object within a very short time without leveling your mount to perform an accurate polar alignment. This method works for equatorial or azimuthal mount types.

You can expect with this method, without mount error compensation, a pointing precision between 0.5° and 1° depending on your mount's fabrication precision and/or your encoder resolution. If you don't want to do N-stars alignment refinement, you should use a wide field eyepiece (greater than 25 mm) to find the alignment stars.

Mount error compensation, involving several stars, may allow you to obtain a pointing precision of 7 arcminutes.

⚠ ATTENTION: PEOPLE USING ENCODERS NEED TO TAKE CARE OF THE SPEED OF SLEW OF THEIR TELESCOPE WHEN THEY GO FROM ONE STAR TO ANOTHER OR JUST DO A GOTO. IF YOU SLEW YOUR TELESCOPE MANUALLY BUT TOO FAST, SOME ENCODER BOXES CAN LOSE ENCODER TICKS AND THE POINTING RESULT COULD BE WRONG.

3.6.1.1. 2-star alignment method description

Two-stars alignment process is quite simple:

- You have to choose two bright stars using the **Star1** and **Star2** buttons (first Star1 then star2); then the sky chart with the current visible bright stars is displayed. Tap on the star you want, move your telescope and center it at the middle of your eyepiece then tap . You will go back to alignment screen and your current telescope position will be updated.

Note: You can manually input the telescope positioning information from the setting circles of your mount.

*Note: You can read again telescope information by clicking on **Read** button under position information. If Astromist is connected, it will read the position from your telescope. If not, you will have to input manually the star positions by reading your encoder or setting circles.*

- Once two stars have been selected, you can proceed with the alignment process by clicking on **Align**.

Some tips on choosing the two stars:

- Avoid stars lower than about 25° elevation because atmospheric refraction will distort their real position.
- Don't choose a star that is higher than 70° in elevation.
- The two stars should ideally be about 90° apart in Azimuth.

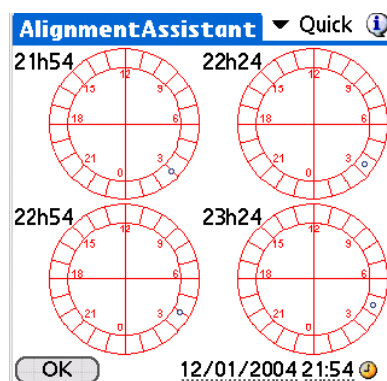
After your two-stars alignment is complete you can choose to add more stars to the process with an N-star alignment set-up to get more accurate pointing.

3.6.2. Polar Alignment

Polar alignment will be required if you want to do accurate object following on an equatorial mount. Many polar alignment procedures are available and described in books and on the Internet. Use the procedure provided with your mount documentation first. Once complete, Astromist will help you to obtain greater pointing precision using several stars.

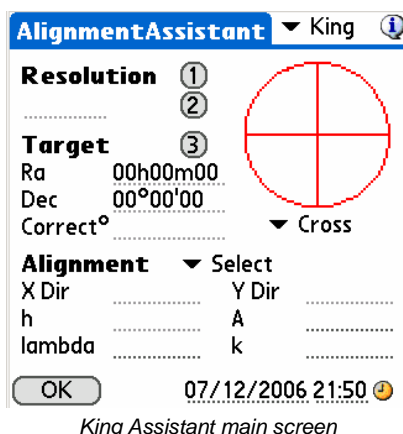
3.6.2.1. Quick Alignment Assistant

To help you polar align your telescope use the AlignmentAssistant. This assistant shows you how "Polaris" should look into your mount's polar finder. Several different alignments for different times are displayed representing about a three hour period. This assists you in adjusting your mount while taking into account the movement of Polaris around the NGC (North Galactic Pole).

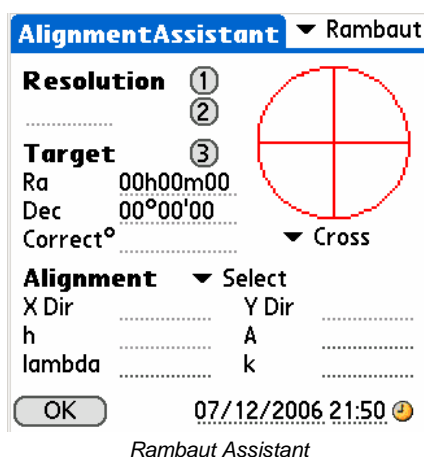


3.6.2.2. King Alignment Assistant

This assistant enables you to align your equatorial mount to the refracted pole position with a precision better than one arc minute. Using the King method you should be able to do a precise polar alignment in less than 30 minutes. This is useful for astro-photographers.



3.6.2.3. Rambaut Alignment Assistant



➡ **CAUTION: THIS PART OF THE PROGRAM IS STILL IN THE ALPHA STAGE OF DEVELOPMENT.**

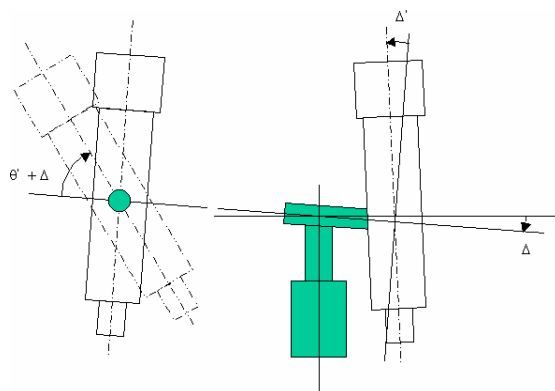
This assistant enables you to align your equatorial mount to the refracted pole position with a precision better than one arc minute. Using the King method you should be able to do a precision polar alignment in less than 30 minutes.

3.6.3. N-Star Alignment

Astromist implements two methods to do multiple star alignments. The first one is linked to the two-stars alignment procedure and relies on M. Toshimi Taki's work. The second method uses a mathematical model to correct for your mount's errors. In both cases the look and feel remains the same. Only the algorithms behind the methods differ.

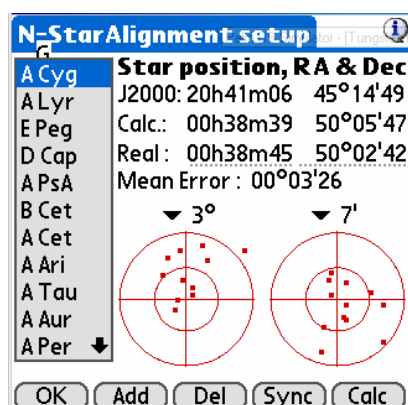
3.6.3.1. First Method

Drawings from M. Toshimi Taki show three mount-error types, which need to be compensated for with the two-stars alignment method:



Mount error to be compensated

To estimate these errors, Astromist needs the position information for several stars with their computed and real positions. An example extracted from Mr. Toshimi Taki's Excel file points out that precision was around 2 degrees before correction; after correction the remaining error was approximately 3 arcminutes.



N stars correction map for 2 stars alignment.

Computed positions are calculated automatically once the two-stars alignment procedure is complete. Real positions may be obtained from the telescope's drive (read information) or manually entered after reading setting circle information from the mount. The procedure to add a star is as follows:

- Choose a bright star from the sky chart using the **Add button** (elevation between 15° and 70°, do not reuse 2-Star alignment stars),
- If Astromist is connected to your telescope, use the GoTo menu time to center the star in the field of your eyepiece, then adjust it or center it manually using the ScopeAssistant.
- Press OK button, then Astromist will go back to N-Star panel and will read the current position of your telescope.

Tip: If you want to remove a star (or more than one) that is not relevant, just select the star by clicking on it and press the **Del button**.

Tip: Use of an illuminated reticule eyepiece will simplify the alignment process considerably.

You will have to repeat this procedure for a minimum of four stars to obtain any significant improvement. Best results can be obtained with a minimum of eight stars.

Tip: To obtain good pointing precision throughout the sky, you need to choose bright stars from all over the sky and not just from a single region.

Tip: If you plan to explore objects from a specific constellation (Ursa Major for example, which contains many galaxies), do this procedure with the main stars of the constellation. You will obtain very good pointing precision using just a few stars, but only within this region of the sky.

Once enough stars have been added, press the **Calc button** and Astromist will estimate the mount compensation errors.

Note: This estimation is CPU intensive and may take more than 3 minutes on slower Palm handheld units. Astromist is able to find errors between -5° and 5° on each axis.

Note: Astromist's results are similar to those obtained with M. Toshimi Taki's Excel spreadsheet.

Once compensation is completed, you will have the remaining **mean error** after the correction indicated. For example, in the screen shot below (that takes an example extracted from M. Toshimi Taki) final precision pointing accuracy with correction is around 3 arc minutes, which is very good. The two pointing circles enable you to see this improvement graphically. The left one shows pointing precision before compensation, the right one after compensation.

Note: You can adjust the scale of each circle to better see where the stars you used during the alignment process are in relation to each other.

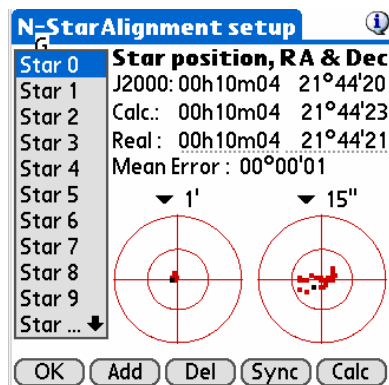
*Note: By clicking on a star or using the **up** and **down buttons** to cycle through the stars in the list, you can see the before and after correction positions for each star.*

Later, you can do the following to synchronize your telescope's position with Astromist either using a direct connection (Serial or Bluetooth) or manually:

- Press the **Sync button** if Astromist is linked to your telescope mount. This will cause your telescope to send its positioning information to Astromist.
- Input your mount's positioning information by hand into Astromist's **Real field** position and press the **Sync button**.

3.6.3.2. Second method

Astromist also implements standard correction models like those used in most professional observatories. It is based on a number of compensation parameters.



Note: *Astromist implements an equatorial model similar to TPoint, which is the reference model most commonly used today.*

Astromist takes into account the following parameters for equatorial pointing accuracy:

Right Ascension Pointing Terms		
TPOINT Term	Functional Form	Physical Meaning
IH	1	ra index error
CH	Sec(Dec)	Collimation error
NP	Tan(Dec)	Ra/Dec non perpendicularity
-MA	Cos(Ra)Tan(Dec)	Polar axis left-right misalignment
ME	Sin(Ra)Tan(Dec)	Polar axis vertical misalignment

Declinaison Pointing Terms		
TPOINT Term	Functional Form	Physical Meaning
ID	1	dec index error
MA	Sin(Ra)	polar axis left-right misalignment
ME	Cos(Ra)	polar axis vertical misalignment

Depending on the quality of your mount, precision better than 1 arcminute can be obtained.

Note: *During tests, the reuse of sample data from an observatory resulted in pointing precision better than 10 arcseconds after correction.*

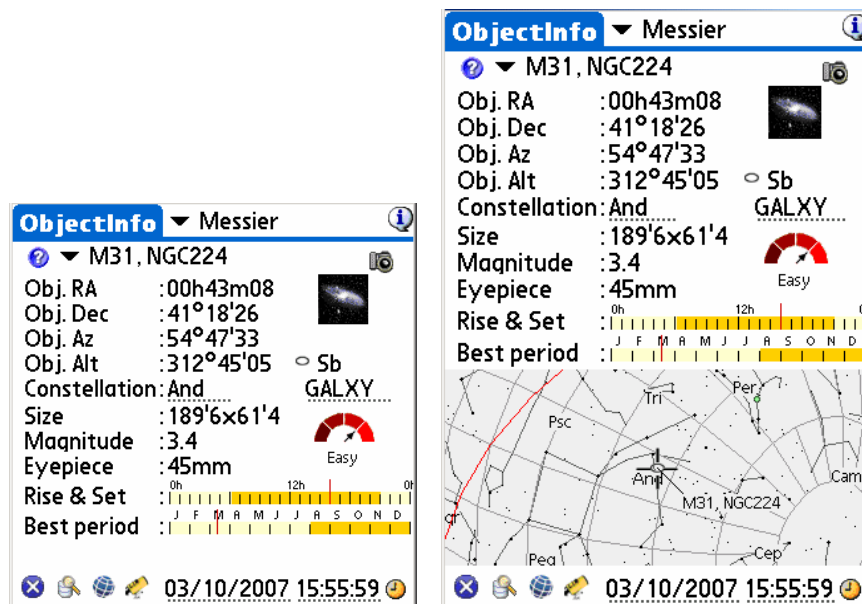
The procedure to add a star and compute compensation in this model is similar to the one described in the first method.

As this method is fast to compute, real time error correction computation is done each time a star is added.

Finally, this algorithm enables pointing accuracy improvement from the very first star.


3.7. ObjectInfo

The ObjectInfo lets you access well known objects, stars, constellations or even comets. Objects are available through a drop down list where you can easily select those that interest you.



ObjectChooser sample screens in 320x320 and 320x480 resolutions


An abundance of information and links are available from this panel:

- At the upper right of the screen an object filter allows you to select the kind of objects you want to browse. By default the Messier catalog is selected.
- Selecting the Information icon  button beside the object name provides the Dreyer description of the object or switch to the relevant assistant if any associated to the object (Moon, Mars, Jupiter, Saturn, Comet&Asteroids, ...),
- **Obj. RA** is the right ascension of the object including corrections selected in the Preferences menu settings (Computation/Correction); the J2000 position is adjusted with the chosen correction. If no correction is selected, the J2000 position is displayed.
- **Obj. Dec** is the declination of the object. Management rules are similar to those for **Obj. RA**.
- **Obj. Alt** and **Obj. Az**. Same as previous, but for Altitude and Azimuth of the object.
- Under the photo there is the object type. Tap on it and you will have a readable description.

Note: Actual photos are only available for planets and Messier objects. All other objects have photos of similar Messier objects that are representative of the same type of object, if any.





- **Constellation** is the constellation of the object.
- **Object type** is the type of the object. The icon used in the sky chart is displayed.
- **Size** is the size of the object in arcminutes.
- **Magnitude** is the magnitude of the object. Magnitudes of planets are also computed except for Pluto, which is fixed. The magnitude of the Moon depends on its phase.
- **Eyepiece** is the eyepiece recommendation for seeing the object while taking into consideration your telescope's diameter, focal length, the object dimension, sky brightness and a default field of view of the eyepiece that is approximately 60°.



- **Object visibility chart**  is dynamically calculated and takes into account object size and magnitude as well your telescope size and your location's sky brightness.
- **Rise&Set** is a bar graph showing the period of visibility of the object (in orange) during 24 hours. Tap on it for more detailed information on rise, transit and set times for the given object.
- **Best period** is a bar graph that displays the best dates during the year to observe an object at the beginning of night.





Tips: To get a twilight view of the current selected object, just tap on the best period chart.

Note: This information is not relevant for the Sun and Moon.

- On handhelds that support wide displays, a sky view centered on the object is displayed at the bottom or at the right (while in landscape mode),
-  will send you to the previous screen.
-  allows you to easily locate an object inside Astromist's database using its catalog number.
-  adds the current object in the object list and allows you to access the sky chart.
-  takes telescope-position field information calculated by Astromist and sends that to the telescope.
- At the bottom, the **Date** field displays the date and time. This information is dependent on the Preferences menu setting (Other/Time update.) Just tap on this value to open the Date/Time selector.

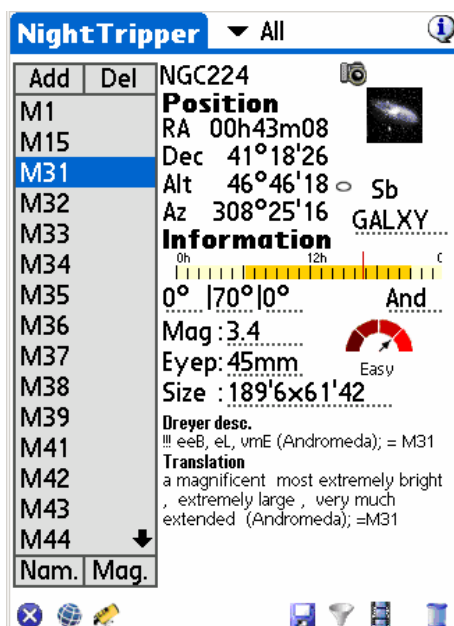
3.8. Preparation of the sessions of observation (NightTripper)

The NighthTripper module is a function impossible to circumvent of Astromist which enables you to quickly select according to advanced research all types of objects in the catalogues available in order to prepare one or more sessions of observation. The process is done in several stages:

- The first stage consists to select the objects using the module of selection . You can then create, modify and filter a first list of objects according to criteria's of selection of mass. Work on the list is done in an algebraic way: it is possible to concatenate or to remove portions of list with the same criteria of selection, but while using, the functions of addition  or suppression ,
- once this made list, an adjustment on a case-by-case basis is possible (addition or suppression) since the principal screen in order to finalize the list of objects to be studied and to visualize the objects chosen,
- you can save  the list to use it as many time as necessary thereafter,
- finally, if need be, your preferred lists can be exported to be converted outside the program (using the provided complementary tools) into catalogue of shareable objects with other Astromist users (to prepare for example a class of astronomy).

3.8.1. Main screen (NightTripper)






It is about the entrance point of this module which makes it possible to consult the information of each object of the list for, if necessary, making point your telescope towards each one of them.



To select an object, it is enough to click above in the list or to use the keys Up and Down of your personal assistant to pass from an object to another. Once made; the majority of the information available in this screen is identical to those available in ObjectInfo (described in the paragraph 3.7 ObjectInfo).


For the personal assistants having a screen of great dimension (Palm only), the Dreyer description of the selected object (if it exists) is displayed at bottom of screen like its translation.

Several actions can be made through this screen:


- First of all, it is possible to finely adjust the list of object while removing ("Del" button) or adding new objects using the "Add" button. In this case, the FinderAssistant module is called to enable you to select your new object.
- It is also possible to sort the list according to the names ("Nam." button) of the objects or according to the increasing magnitude of the objects ("Mag." Button).
- At the top right of the screen, a filter makes it possible to reduce the list according to certain types of objects in order to facilitate the consultation of important lists (to 500 objects). If this filter is used, the objects of the list not corresponding to the criteria of selection are masked and not removed,
-  calls the sky chart by centering it on the star chosen,
-  enables you to point your telescope on the object chosen,
-  activates you the module to save and load the lists,
-  enables you to create a new list and to call the multi criteria module of selection,
-  prepares a presentation of all the images of the objects of the list (available) and enables you to visually traverse the list using the keys up and down.

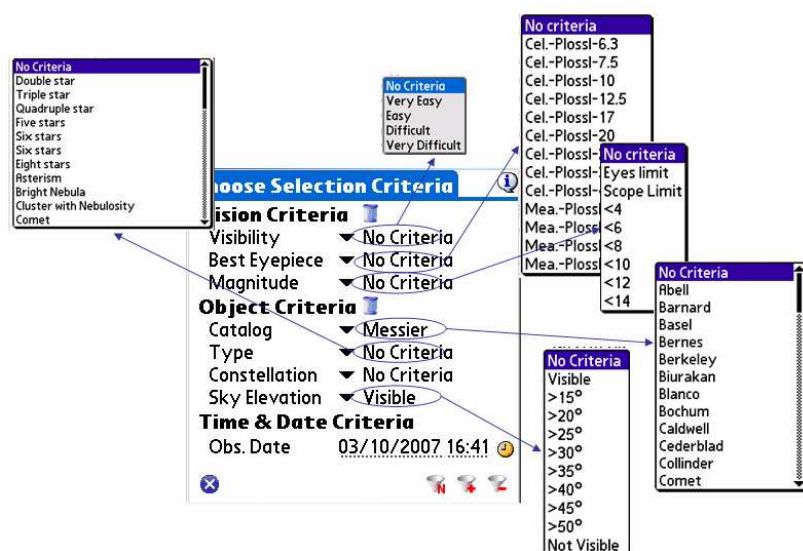
Note: **On Palm OS**, to leave this presentation, it is enough to press the key on the left of your assistant ("home touches"). **On PocketPC**, it is necessary to use the central button of the paving stone of navigation,

Note: Certain objects of the list do not have images, it may be in this case that the passage of an image to another can take a little time, Astromist seeking next (or preceding according to direction's by selected displacement) the object of the list having an image available.


-  makes it possible to empty the current list.

3.8.2. Multi criterion processes of selection (Criteria Selection)

The use of the button  from NightTripper gives access to you the module of selection multi criterion of Astromist.



Astromist NightTripper Object Map Selection

Note: Constantly for resetting to default values of one of the categories of criteria, you can use the button .

The criteria of selection are divided into several categories:

- Visual criteria (Vision Criteria):
 - **Visibility** makes it possible to filter the objects according to their visibility. This criterion, calculated dynamically for each object, takes into account dimensions of your instrument, the size of the object, its magnitude and the luminosity of the sky (luminous pollution, presence or not of the moon),
 - **Best eyepiece** makes it possible to select only the objects which are entirely visible with one of your eyepieces and your telescope (see "Preferences 2/6"),
 - **Magnitude** makes it possible to filter the objects according to their magnitudes or according to the limiting magnitude of your telescope. It is possible also to select only the objects visible with the naked eye, this limit being calculated according to your personal information and the characteristics of your site of observation (see "Parameter setting of the places of observation (Location)").

Note: If you are downtown, it is extremely probable that the criterion of visibility naked eye can give inaccurate results if you are near a source of specific luminous pollution such a standard lamp or an enlightened building.


- Criteria related to the objects (Objects Criteria):
 - **Catalog** makes it possible to choose only the objects of such or such catalogue. The list available depends on the catalogues and indices installed as well as registration or not on the product (list limited for the free version).
 - **Type** makes it possible to filter the objects according to their type (i.e galaxy, nebula, cluster, etc).
 - **Constellation** makes it possible to select only the objects of such or such constellation.

Note: Only the abbreviations of the constellations are available.




- At last **Sky Elevation** makes it possible to filter the objects according to their altitude in the sky. By default, if "No criteria" is selected, the value limits well informed in the screen "Preferences 1/6" is used. This function is particularly useful if you have in front of you trees, buildings or a mountain.


Tip: To estimate an altitude, you serve as your hand: a width of palm, tended arm, corresponds approximately to 5°, that of an inch with 2°.

Tip: Use, "not visible" and function "Del" if you wish to withdraw from a list all the objects which are not visible.

- Temporal Criteria (Time and Criteria Date):
 - **Obs Date** is used to calculate the height of the objects in the sky. You can take the current hour while pressing on the icon  or to choose a particular date while clicking indifferently on the fields dates or hour.

Once the defined criteria of selection, you are able:

- To create a new list according to these criteria with the button .
- To add to the current list of new objects corresponding to the criteria of selection with the button . In this case, if an object had already been chosen, it is not reintegrated,
- To remove current list all the objects answering the criteria of selection with the button .

Lastly, the button  makes it possible to return to the NightTripper screen.

Note: As soon as the list is created or modified, you return to the NightTripper screen to display the result.

Note: The creation of the lists can be complex because of the criteria of selection, in particular those requiring of calculations for the visibility. Constantly, it is possible to stop the process of selection while pressing on a key of your assistant.

Tip: Take time to create the lists of the easily observable objects with your telescope (or for all your various instruments) and save them. That will very quickly enable you to have them under the hand if you have little time to observe the sky. Before launching you in his creation, think:


- to pass the maximum size of the list to 500 to be certain to select all the possible objects,
- to choose a date of new moon to avoid any influence of the luminosity of the Moon in calculations of visibility.

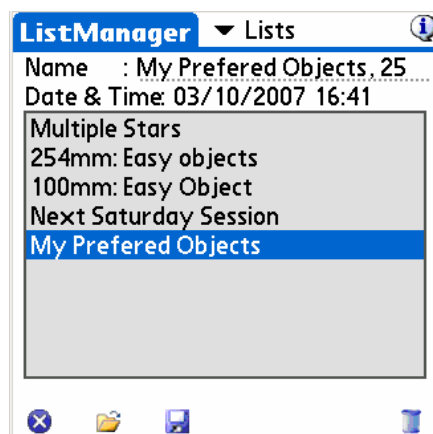
3.8.3. Save your work (List and user catalogs manager)

It is possible to save and re-use the lists of objects which you designed. Up to 100 lists can thus be saved on Palm OS. There is no limitation on Pocket PC. You can also select one of your catalogues personnel as catalogues preferred.




Note: For the creation of specific catalogues, you defer to the paragraph « 4.7 Customizable Catalogs».

3.8.3.1. Management of lists of objects

By activating this module since Wizard (icon ) or, by the menu, the screen of management of the lists is displayed.




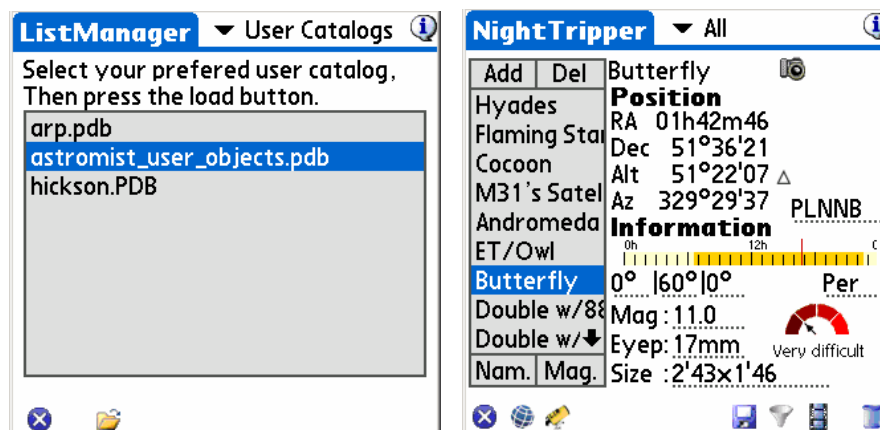
Following information is accessible:

- **Name** makes it possible to type the name of the list, for a list previously saved, the size of the list is displayed at the end.
- **Date & Time** indicates you the date of creation or validity the list.
-  makes it possible to charge the list chosen in replacement of the current list. Once done, NightTripper is systematically launched so that you can consult the contents of the list.
-  saves in a permanent way the current list (under the name indicated in the field "Name"),
-  makes it possible to remove a list of objects which would not be useful any more for you. Attention no confirmation is required.

Lastly, by using the drop-down list in top on the right screen you can rock in the module of selection of your catalogue of preferred object.

3.8.3.2. To define your preferred specific catalogue

This screen displays you the list of the specific catalogues of objects which you placed in the directory "userobject" of your memory card. To activate a catalogue, click above then press on the button "Load" .



Before and after loading of the catalogue

This action will charge the catalogue and NighTripper will be then open so that you can consult its contents.

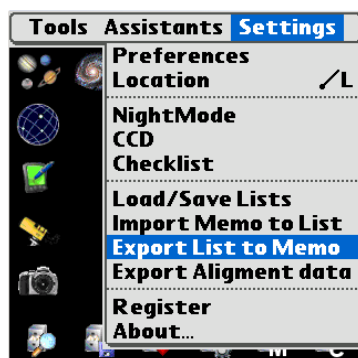


Later you will be able to load this catalog by using the button from the wizard.

3.8.3.3. To export your list of objects in a text file

Lastly, it is possible to save your list of objects in a text file (Memo text on Palm OS) which you will be able to recover then to store on your computer or any other support. It is necessary for that to use small "the Export List To Memo" which will create as many memos text than necessary to save all your list of objects in textual files.

On Palm OS, once made, you must synchronize your personal assistant to be able to recover these memos since the Palm manager of your computer.



You will be able thereafter concatenate these files or to supplement them to create a specific catalogue as described in the paragraph « 4.7 Customizable Catalogs ».

3.9. Sky charts

3.9.1. Principles

Astromist has 5 different views from the sky to enable you to study under the best conditions the objects than you chose or to learn the sky quite simply.

All the sky charts of Astromist display stars according to their magnitude and their colors.

Each chart requires an initialization before being usable with optimal performances. This phase of initialization can take a few seconds according to the number of objects of your current list or the speed of your memory card if you use one of them.

The sky charts are refreshed automatically if you modify one of the parameters of display or every five minutes if no action is made.

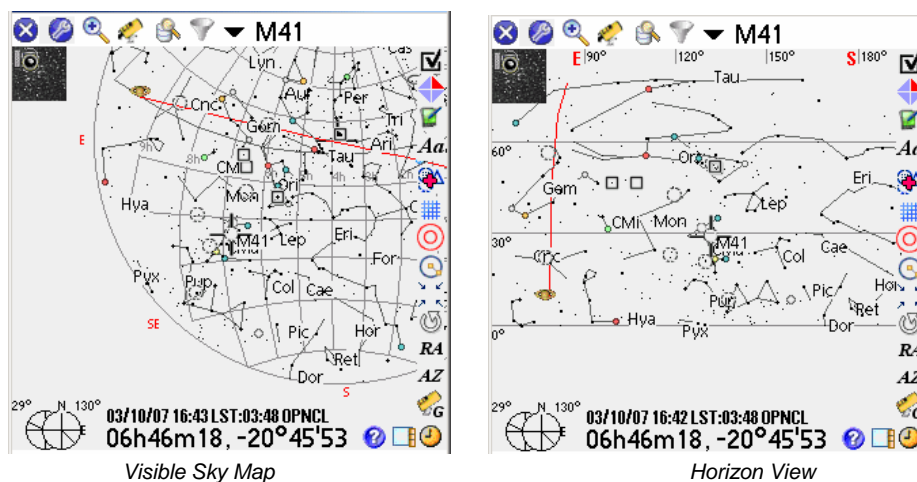
Constantly, you can change the date and hour of the chart by using the icon.

All the charts can be moved in real time using your stylus to seek an object or to change view. The parameters described in the paragraph “3.4.5.1 SkyCharts Scroll Settings” can have an important impact on the performances and the fluidity of displacements. Also, do not hesitate to adjust them.

Lastly, all the sky charts take account of the position on the earth of your place of observation. Also, ensure you to have correctly parameterized this information as described in the paragraph « 3.5 Location Set-up ».


3.9.2. Five views different from the sky

Several types of sky charts are available:



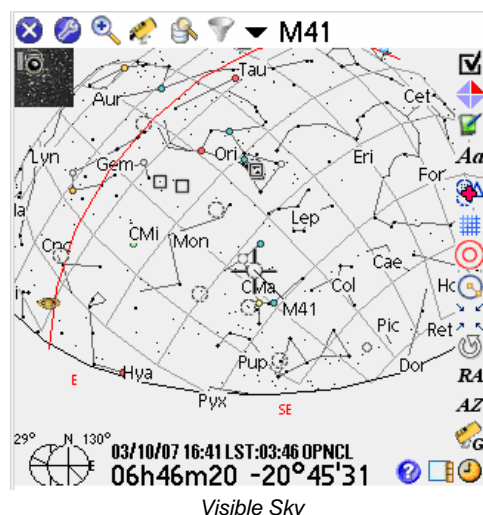
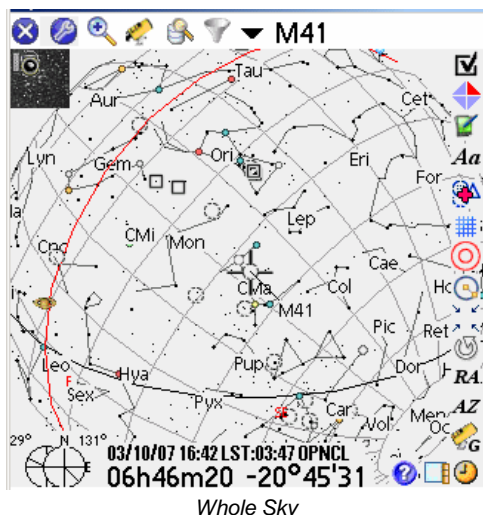
- The view “Sky Map” makes it possible to see the visible sky in entirety for one moment and a given place. This view corresponds to that published in the specialized magazines of astronomy where the sky of the month is presented in the form of a disc. The edges of this chart (the peripheral circle) represent the horizon, the center of the chart the zenith. Only the objects visible with the top of the horizon can be seen in this chart.

Each time you change object chosen by the list, the chart is turned to put the object with the perpendicular of the horizon as you actually see it. If not, the object is just selected without rotation. If you wish to make swivel the chart, it is necessary for

you to press on the button  making it possible to center the objects.

This chart deforms very little the forms of the constellations.







- The view “Horizon view” presents the horizon such as it is in front of you. This view is ideal to discover the objects in front of oneself until a height of 60°. Beyond, the sky is deformed and it will be difficult for you to recognize the constellations. Only the objects visible with the top of the horizon can be seen in this chart.





- The view “Whole Sky” is conceived to enable you to find any object of the sky, whether it is above or in lower part of the horizon. The sky is represented by a sphere which you can turn in all the directions to find the best orientation to observe an object. This view is particularly useful in phase of preparation or at the time of the constitution of a list of objects. The yellow line in this chart represents the horizon.
- The view “Visible Sky” is similar to the preceding one, but it is restricted with the visible sky for a place and moment given. It is the fastest view to display and to move and it will be probably your preferred view at the time of your observations.
- Lastly, an equatorial view of the sky is available. This view is interesting to learn the position from the objects in the sky starting from their equatorial co-ordinates.











3.9.3. Operation








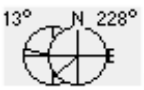
The selected object is always indicated by a red cross. According to the adjustments, it can flicker or not. The objects are represented by a symbol according to their type:

-  Galaxies,
-  Opened Clusters,
-  Globular Cluster,
-  Nebulas,
-  Planetary Nebulas,
-  Multiple Stars (double or more)

Several functionalities are available in the charts:

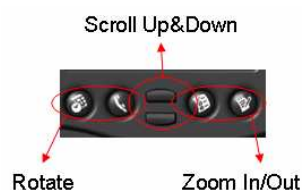
-  makes it possible to choose the type of sky chart, but also gives you shortcuts towards various functions or small.
-  makes it possible to change the level of zoom of the chart. The values of this list represent the field of vision resulting from the level of zoom in question. Fields of vision of 180° with 0.5° are available. The star catalogues wide (Hipparchos and Tycho) are used in on this side field of vision of 60°. The size of the objects and their orientation are represented for the fields of vision lower than 20°.

-  provides several functions of control of your telescope:
 - The accesses to the modules for alignment are available.
 - The function “**Goto Object**” makes it possible to point your telescope on the current object.
 - “**Get telescopes RA&Dec**” makes it possible to display the current position of your telescope.
 - “**ScopeAssistant**” launches the module to control of your telescope.
 - “**Skychart Control**” enables you to follow in real time the position of your telescope in the sky chart and automatically to follow it. This function is particularly used for the users with encoders. It makes it possible to point visually on a star by moving the telescope manually.
 - The option “**Improve Pointing**” adds the object running in the list of the objects used to improve the pointing of the telescope. For using this function, it is necessary that you center perfectly in your reticule eyepiece the selected object.
 - The option “**Changes Scope**” is reserved to the users Bluetooth and allows them to change case of control to control another telescope. This function perhaps useful for the organizers of meeting of astronomical observation.
 - Finally the option “**Sync Coord**” enables you to synchronize your telescope on the current position of the sky. This function is available only for telescopes compatible Meade or LX200.
-  launches the module “FinderAssistant” to enable you to select a precise object and to repatriate it in the sky chart.
-  makes it possible to filter the current list of objects according to several criteria (Cluster, Planet, Star, etc.). Other options are possible:
 - “**ClearList**” erases the contents of the current list.
 - “**Edit List**” launches the NightTripper module to enable you to create a modify the current list
 - “**Load/Save List**” launches the ListManager module to enable you to charge a preset list or to save the current list,
 - “**Load Catalog**” makes it possible to change your preferred specific catalogue and to charge it in the list of objects.
-  Enables you to open the main panel settings of the sky chart.
-  Launches the ObserverLog tools to let you create an observation log about the current selected object.
-  Lets you flip the sky chart to reflect what you see through your telescope. This setting can be adjusted for each zoom level.
-  Lets you control the display of object names.
-  Lets you activate or deactivate the object drill down feature.
-  Lets you turn the grid and constellation lines in the sky charts on and off.
-  Lets you turn the Virtual Telrad included in Astromist on and off. The diameters of the circles can be set in Preference 5/6 panel.

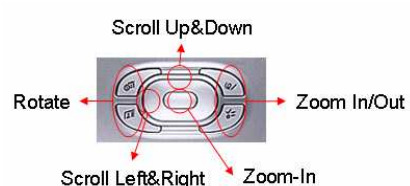
-  Lets you control the angular measure mode. The angular separation is displayed on the right of the cross. To estimate the angular separation between two objects, click on the first, then on the second. The angular separation will be displayed.
-  Lets you center the sky chart on the current red cross position. This feature is most useful if you set "Tap Response" to "Select Object" in Preference 3/6 panel.
-  Lets you rotate the chart in a particular direction.
- **RA** and **AZ** let you input a particular position (equatorial or azimuth position) to center the sky chart on. A mnemonic can be given to retrieve this position later in the current object list.
-  **G** Commands your telescope to go to the current selected object and opens the ScopeControl assistant. For Dobsonian users, this button activates or deactivates the "SkyChart Control" mode to follow the moves of the telescope over the sky with your PDA.
-  Launches the Date&Time selector to let you change the date and time of the sky chart.
-  Opens ObjectChooser on the selected object to give you more details about it.
-  Enables you to hide or show the tools bar.
-  Displays the current altitude and azimuth. If you tap on this diagram once an object is selected, it opens the CompassAssistant on this object. You can hide this diagram using the display settings.

Furthermore at any time you can drag the chart using a stylus (or even your fingernail). Alternatively you may use the Palm keys to center an object, scroll the sky display or zoom in/out.

On Palm OS the other PDA keys can be used do extra function:



Key Control on classic Palms

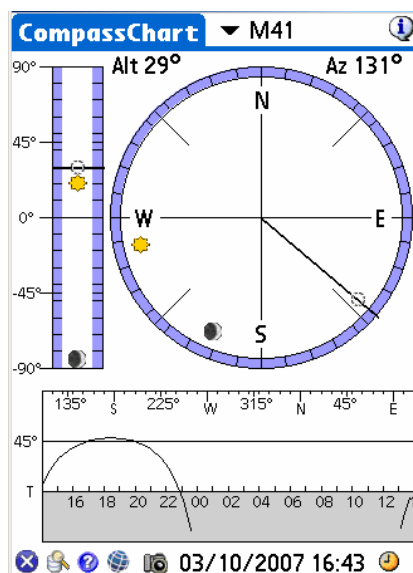


Key Control using Navigation Pad

3.10. CompassChart

This module lets you see the position of a particular object in the sky using a compass and an elevation slider. Any of the objects of your current objects list as well as new ones (using FinderAssistant) can be **displayed**.

On 320x480 handhelds, the altitude of the selected object in the coming hours is displayed too.



Finally, this tool can be used to find North:

- During the day, put your pen vertically on the sun icon and align the shadow with the black line that crosses the center by rotating you palm and/or your body. Once done, N direction indicates North.
- At night if you do not see Polaris, by selecting a visible star or planet and by rotating your palm and/or body to point to one of the objects of the CompassChart in the same direction as the sky position where you are observing it. North can be found immediately.

3.11. Camera Control

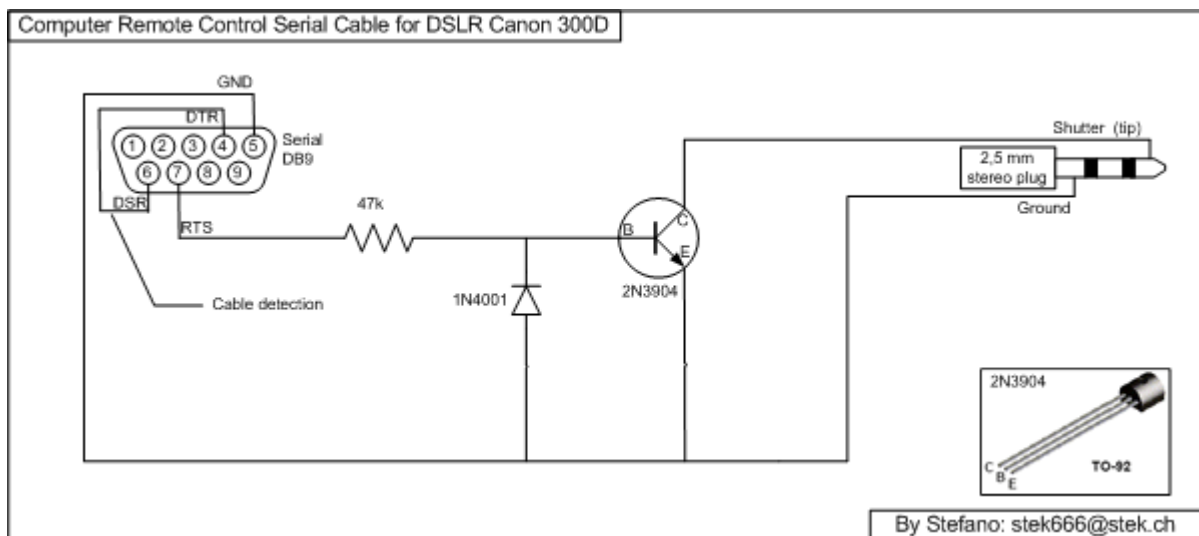
This tool lets you control Canon DSLRs. It was created at the request of John Burt and Anat Ruangrassamee in the Yahoo PalmAstro forum. They also beta tested PalmDSLR, the free version of this tool. Many thanks to them.

Camera Control screen

To connect your Canon to your handheld, you will need to build a dedicated cable and connect it to your PDA using a serial cable or by using a Bluetooth converter.

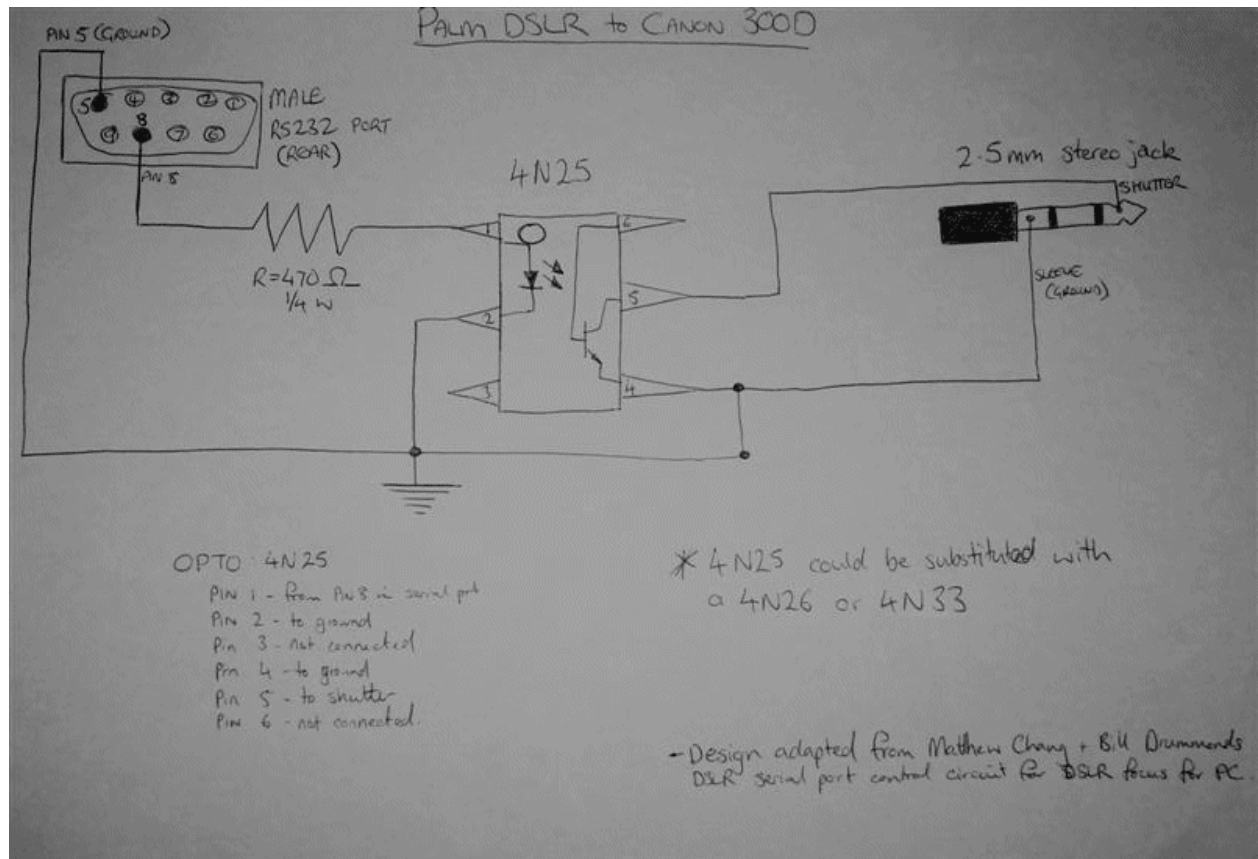
You can:

- Buy the cable already made. Several providers are available but I recommend Hap Griffin's (which are certified to work with Astromist and PalmDslr and Palm PDA's) see <http://www.hapg.org/astrocables.htm>. In this case you will have to add a null modem adaptor between your Palm serial cable and Hap's cable. When using this cable with your PC, no null modem adaptor is required.
- Do-it-yourself (DIY); you can find full details at http://www.stek.ch/users/stefano/html/dslr_serial_cable.html if you want to build a cable compatible with your PC. You will either need a null modem adaptor or "roll" the signal pins to connect it to your Palm.



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- You can also use John's plan (the best for Palm handhelds) which includes an opto-circuit to isolate the camera from your handheld (more secure). In this case we chose to avoid using a null modem adaptor; we used the eighth pin instead of the connector so you can plug this cable directly into your Palm serial cable. You will need a null modem adaptor if you want to use this cable with your PC.



Wiring plan involving an opto-circuit



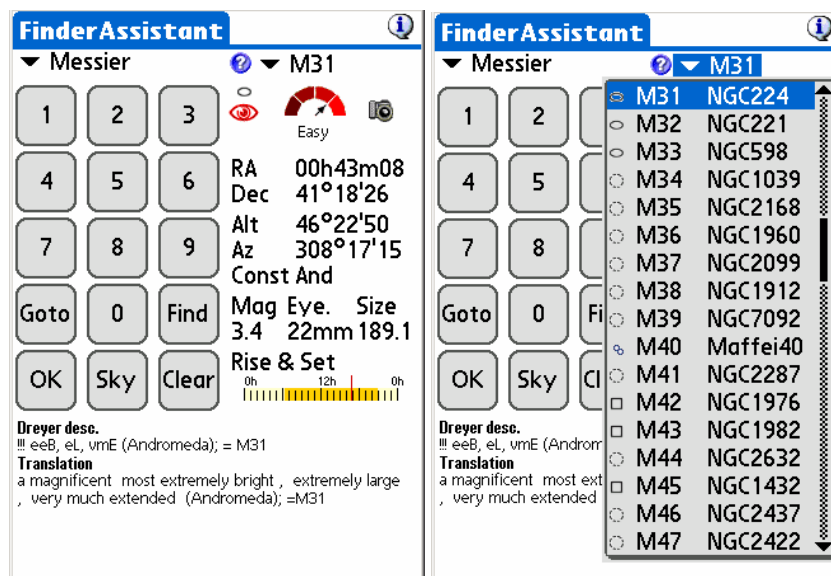
Sample shots of John's DIY cable



Results with a Canon 300D! These images are copyrighted John Burt.

3.12. FinderAssistant

This assistant enables you to quickly find any object inside Astromist's Catalogs.





The list of available catalogs depends of the catalogs you have installed. Especially:


- **HR** (the Yale bright star catalog) is available only if astromist_hr.pdb is installed.
- **Hiparchos** catalog is available only if astromist_hip_110K.pdb is installed.
- **Tycho** catalog is available only if astromist_tycho_2500k.pdb **AND** astromist_tycho_index.pdb are installed.
- **Comet&Asteroid** catalog is available only if astromist_comet.pdb is installed.
- **User Catalog** is available only if the preferred User Catalog selected with ListManager is found.

To get the full list of catalogs, an expansion card (Or LifeDrive) is mandatory due to the overall space required.

To find a particular object just select the catalog of your object, then type in the object ID using the numeric keypad and press **Find**. Otherwise you can just browse the object list and select the item you are looking for.

Once done, the icon  will be displayed to indicate if the selected object is above the horizon.

A camera icon  is displayed if an object image is available in the /PALM/Programs/Astromist/img folder. Tapping on this icon will load and display the object's image full screen. Tapping the screen again will return you to the previous screen.

On 160x160 or 320x320 resolution handhelds, the Dreyer description of the object and its translation are available using the information icon  beside the object's name (e.g., M31 in the previous screen shot). On Palm handhelds that support 320x480 resolution or Pocket Pc with 240x320 resolution, this description is displayed by default.

Sky button will open SkyChart. If an object is not visible then the Local Sky view will be selected as default. If the object is visible then the end user's preferred sky view (set in preference 3/6) will be used.

Goto button lets you send the object's position information to your telescope to slew it to the desired position.

Finally, the **Clear** button clears all the data displayed.

3.13. ObserverLog

This assistant helps you create and manage your observation logs.

It is split into two parts:

- The first part lets you manage your logs.
- The second lets you fill your logs with notes and even link your own images to the logs. Images to be linked must be placed in the /PALM/Programs/Astromist/Shots/ folder. Just tap on the camera icon to get the required filename of the image you wish to link to.




3.13.1. ObserverLog management

This panel lets you manage your observer logs.



Main ObserverLog screen

Once you have selected a log you can:

- **Create** a new log using the  button.
- **Edit** an existing log to modify or adjust it using .
- **Delete** an existing log. In this case, just select the log and press the  button.

Finally, Astromist lets you save your logs as Palm **Memo** files. First a dialog will warn you that all the logs will be exported in memos. As a Palm memo can not contain more than 32Kb of text, several memos will be created if needed.



First step of the export process



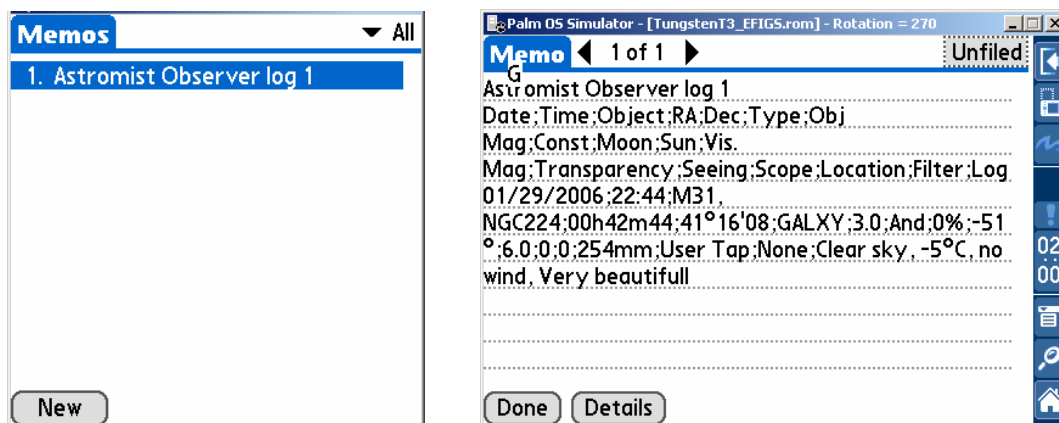
Final step of the export process

Cancel will stop the export process. **OK** will create the memo.

The number of observer logs exported will be displayed at the end.

On Pocket PC, you can use the text file placed in the userlog directory with any text editor or excel,

On Palm OS, To see the result, open the Palm Memo tool. The new memos will have been added at the end of the list.

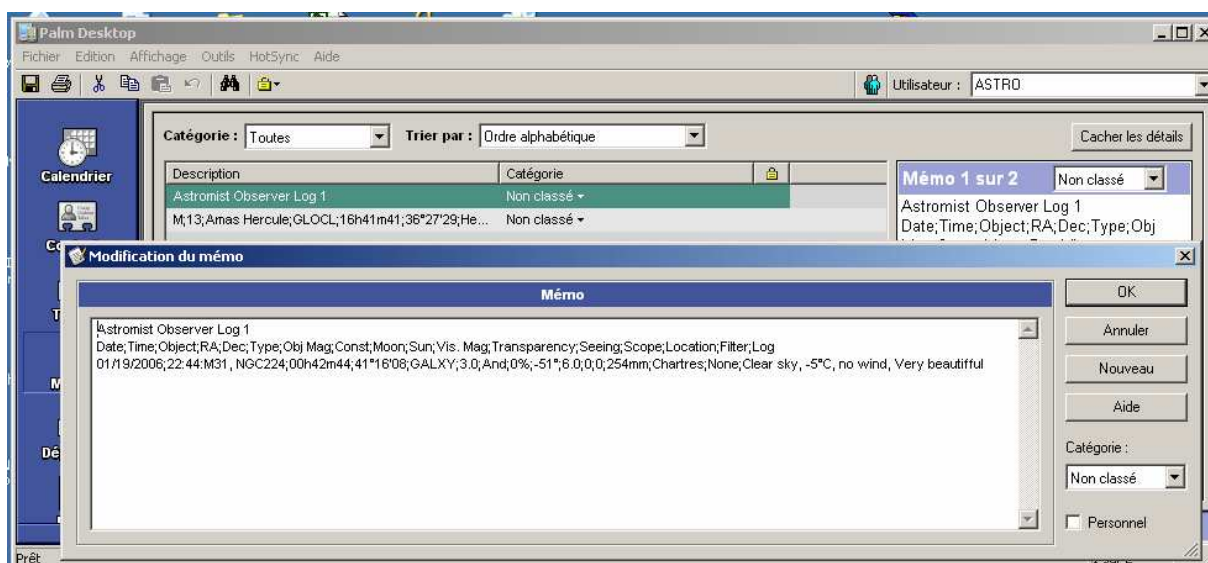


The format of the export is as follows:

- First line – the name of the saved file (Astromist Observer Log 1)
- Second line – the CSV format. Each column is separated by a comma. You will retrieve all the information of the Edit Log screen.
- Third line and all others – one line per log.

To save this information on your computer, just **HotSync** your handheld.

Once done, **open the Palm Desktop application**. You will be able to edit the memo with your computer and then do a copy/paste of the exported data to place it in your preferred spreadsheet application. People syncing with Outlook will be able to find their memos in the usual Outlook Memos folder.



Result under PalmDesktop

3.13.2. Edit ObserverLog

This Panel lets you input log information. Several fields are provided to easily track such specifics as Moon phase, Sun position, estimated visual magnitude limit, location, etc. You can then type any notes to remind you about the observation or object.



ObserverLog input screen

Date&Time displays the log's date of creation. You can either set the date by tapping on the text field to open the Date and Time selector or tap on the clock icon to grab the current date and time.

Location contains by default your current location, but you can modify it if desired.

Transparency lets you describe the Transparency conditions during your observation. By default transparency is set to excellent.

Seeing lets you describe your seeing conditions. By default this selector is adjusted according to the Sun's position and the Moon phase.

Visual Limit contains the visual limit computed according to your site information as well as the Sun and Moon positions.

Filter lets you type the name of any light filter you may have been using during your observation.

Scope contains the telescope's diameter set in Preferences.

Object/Event enables you to grab an object name from Astromist's catalogs or lets you fill in an object using a description of your own choosing.

Comments lets you describe your observation or input any useful information like exposure, number of shots, etc. This is a good way to track the shots you are taking with your astronomical camera.

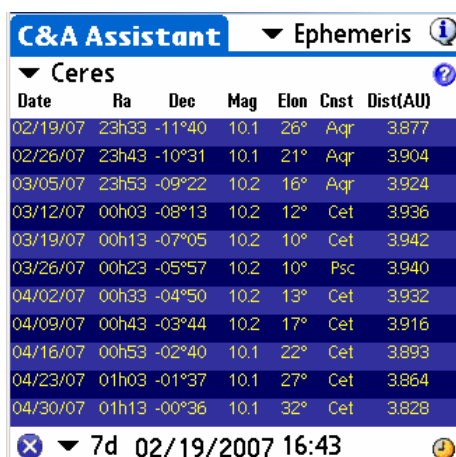
3.14. Comet and Asteroid Assistant

This assistant is designed to provide comprehensive data and graphical views that allow you to understand a comet's (or Asteroid's) position in the sky or its position in the solar system.




Registered users receive a dedicated tool (see cometdb.exe) that can be used to create a custom comet/asteroid database as well as a way to sort and manipulate the list as they like. Finally, registered users can edit the comet and asteroid list and customize as they see fit.

3.14.1. Ephemeris

The Ephemeris provides useful data to help organize an observing session or just provides info for a quick glance at a comet.

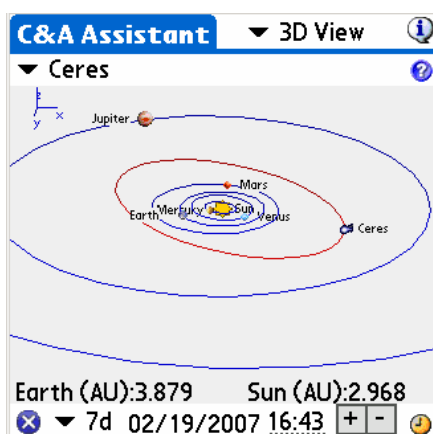


Date	Ra	Dec	Mag	Elon	Cnst	Dist(AU)
02/19/07	23h33	-11°40	10.1	26°	Aqr	3.877
02/26/07	23h43	-10°31	10.1	21°	Aqr	3.904
03/05/07	23h53	-09°22	10.2	16°	Aqr	3.924
03/12/07	00h03	-08°13	10.2	12°	Cet	3.936
03/19/07	00h13	-07°05	10.2	10°	Cet	3.942
03/26/07	00h23	-05°57	10.2	10°	Psc	3.940
04/02/07	00h33	-04°50	10.2	13°	Cet	3.932
04/09/07	00h43	-03°44	10.2	17°	Cet	3.916
04/16/07	00h53	-02°40	10.1	22°	Cet	3.893
04/23/07	01h03	-01°37	10.1	27°	Cet	3.864
04/30/07	01h13	-00°36	10.1	32°	Cet	3.828

- The information button  to the right of the comet name takes you to the ObjectInfo. Once there you can select to do a GoTo  with your telescope or just add the comet into your current list of objects.
- Several ranges of dates can be obtained by manipulating the day range selector  7d .
- Dates can also be changed using the date field of the clock button.
- Finally, depending on the time of the observation (in the evening for example), you are able to display the date when the comet will be at its highest point in the sky.

3.14.2. Solar 3-D View

This screen presents a three-dimensional view of the solar system, with planets and their orbits; comets/asteroids and their orbits are displayed against this backdrop, thus allowing the user to see positioning info in direct relation to the solar system.



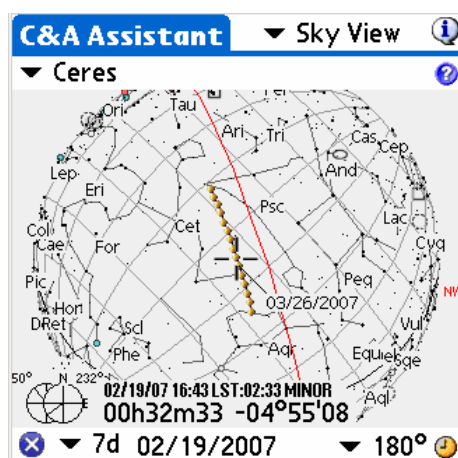
- Earth and Sun distance for the current date are displayed at the bottom.
- Move your stylus on the chart to rotate it and adjust the view to see the data from different view points.
- Pressing the left Palm key will increment the current date by the number of days selected in the drop down menu. By using the left and right keys you may animate the comet/asteroid through its orbit, simultaneously the planets will change their

positions around the Sun as well. The Earth and Sun distance to the comet/asteroid is displayed in astronomical units and will change to reflect the new distance for that day. Using this feature you can find the best day to observe the comet/asteroid (i.e., when its distance to the Earth or Sun is the shortest).

- **Minus** and **Plus** buttons let you zoom your view in and out of the solar system.
- Tap on the **Date Field** to change the date.
- Tapping the **Clock Icon** ⌚ will set the date to the handheld's current date and time.

3.14.3. SkyView

This view lets you see the different positions of the comet/asteroid for a specific period of time. A step selector lets you choose the increment of days the program will add between each displayed comet/asteroid position.



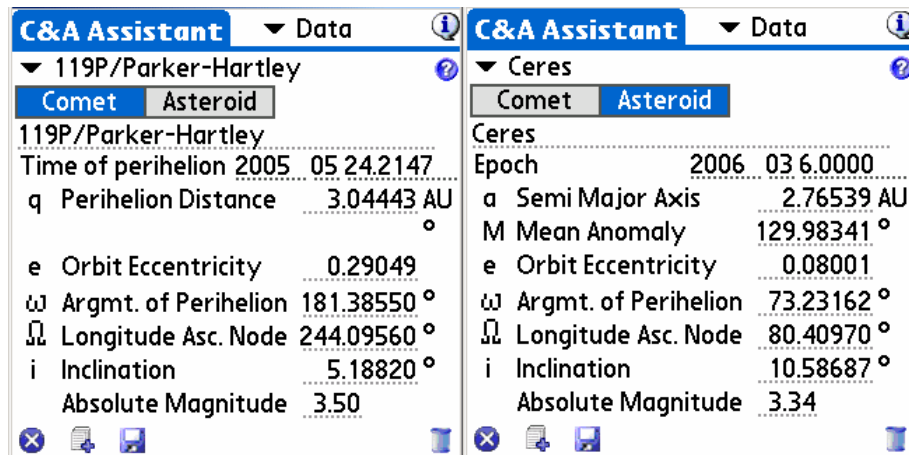
- Move your stylus on the chart to rotate it and adjust the view to be more comfortable for you. When the red cross passes over any comet/asteroid position, its date and time information are displayed.
- **Minus** and **Plus** buttons let you zoom in and out of the chart.
- You can change the date of the chart using the clock button ⌚ or by tapping in the date field to open the date-time selector.

Finally, you can scroll the chart using your stylus or the Palm keys.

3.14.4. Data

This view lets you browse the comet/asteroid database; registered users may also edit it.

- ➡ **CURRENTLY, ASTROMIST USES ONLY J2000 ORBITAL ELEMENTS FOR COMETS.**



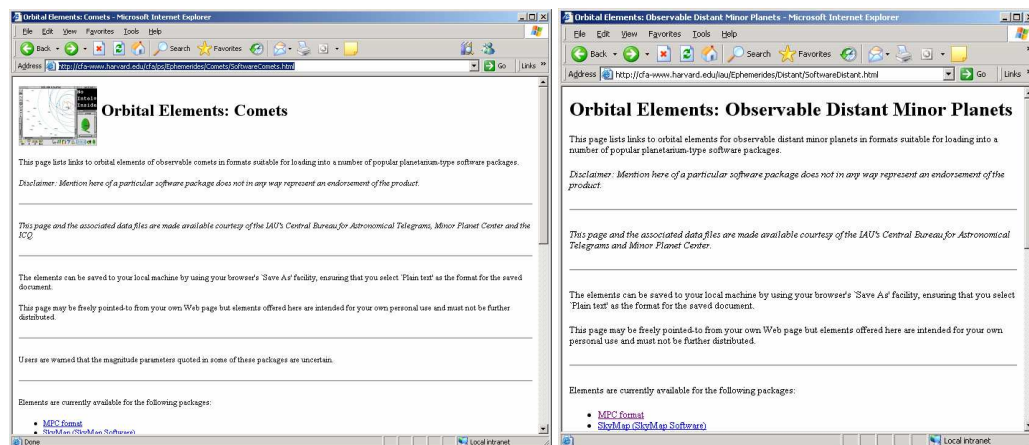
Once you have finished modifying comet/asteroid information, use the save button, otherwise your modifications will be lost!

3.14.5. Update the whole comet and Asteroid database

The organization responsible for coordinating new comet discoveries and producing authoritative orbital elements is the Central Bureau for Astronomical Telegrams (<http://cfa-www.harvard.edu/cfa/ps/cbat.html>).

They make these element sets available in a format directly suitable for use by a number of different astronomy programs. Astromist uses the MPC format available at:

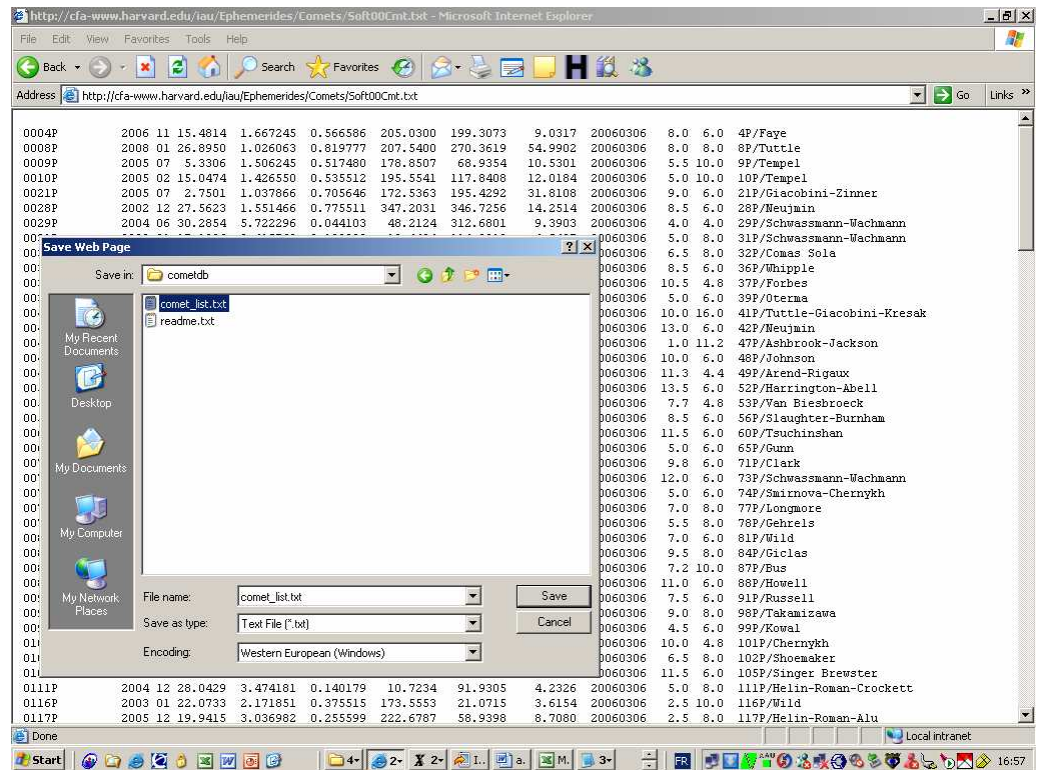
- <http://cfa-www.harvard.edu/cfa/iau/Ephemerides/Comets/SoftwareComets.html> for the comet,
- <http://cfa-www.harvard.edu/iau/Ephemerides/Distant/SoftwareDistant.html> for the asteroids.



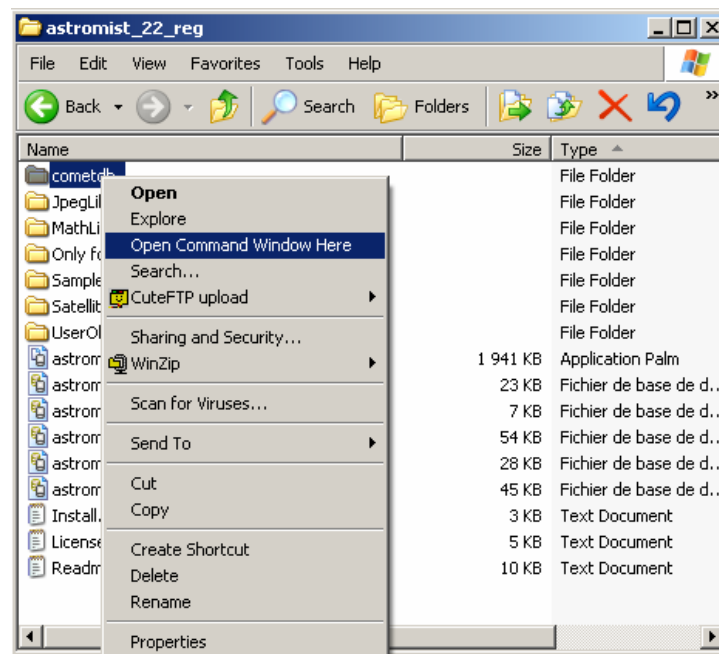
To create a new comet database follow these procedures:

- Using this link for the comet
<http://cfa-www.harvard.edu/cfa/iau/Ephemerides/Comets/Soft00Cmt.txt>
- Using this link for the asteroids
<http://cfa-www.harvard.edu/iau/Ephemerides/Bright/2007/Soft00Bright.txt>
- Concatenate the files as plain text under the name comet_list.txt in the cometdb.exe folder.

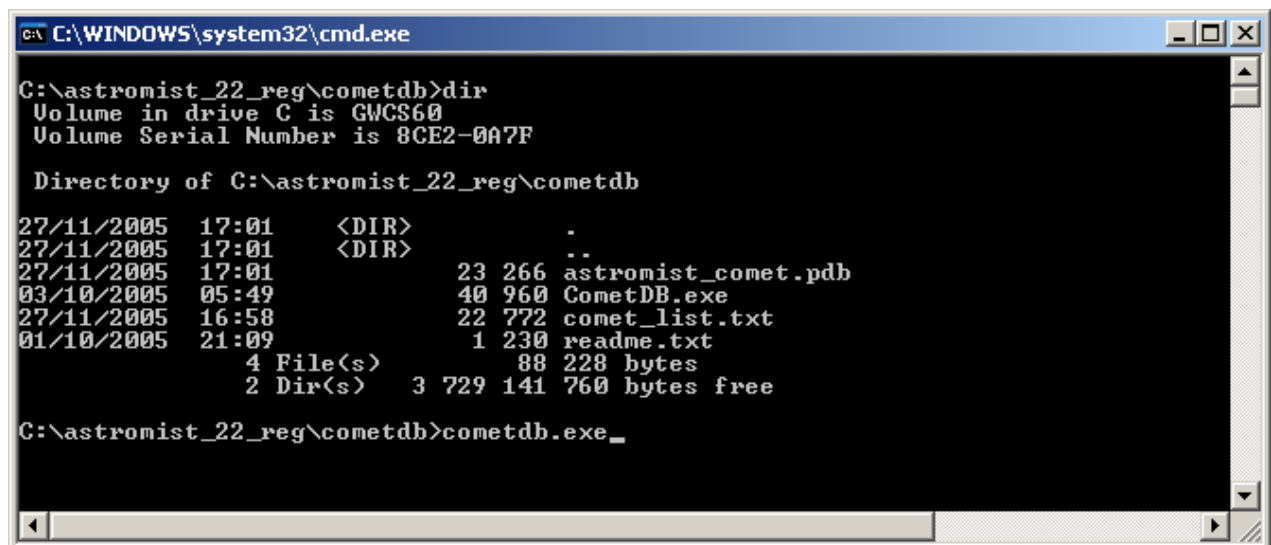
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- If you want to remove some lines, add new ones, sort some lines, edit the file using your preferred text editor.
- Open a DOS session and change the current directory to that of the program CometDB.exe.



- Run CometDB.exe to create the new database.



```
C:\WINDOWS\system32\cmd.exe
C:\astromist_22_reg\cometdb>dir
Volume in drive C is GWCS60
Volume Serial Number is 8CE2-0A7F

Directory of C:\astromist_22_reg\cometdb

27/11/2005  17:01    <DIR>          .
27/11/2005  17:01    <DIR>          ..
27/11/2005  17:01             23 266 astromist_comet.pdb
03/10/2005  05:49             40 960 CometDB.exe
27/11/2005  16:58             22 772 comet_list.txt
01/10/2005  21:09              1 230 readme.txt
               4 File(s)              88 228 bytes
               2 Dir(s)             3 729 141 760 bytes free

C:\astromist_22_reg\cometdb>cometdb.exe_
```

- The file astromist_comet.pdb will be created in the same folder.

Simply install this file into your Palm via a **HotSync** or copy the file to the Astromist folder of your memory card.

3.15. EclipseAssistant

Note: All times displayed in this assistant are Universal Time.

Eclipse Assistant is designed to help you to prepare a trip to see a Solar Eclipse. You will be able to easily find the best location around the world to be there at the right time.

Two methods have been used to get this result for solar eclipse:

- A geometric one, developed by Franck Bouquerel that gives excellent and accurate results.
- A more classic one, based on Bessel elements, obtains very good accuracy, but faster results. The main difference between this custom astromist method and other Eclipse software is that the Bessel elements and approximations are fully computed inside Astromist instead of being provided by external sources.
- Lunar eclipse computation algorithm has been developed only for Astromist and has good accuracy. No external data are required.

Using these three methods any Solar and Lunar eclipses accessible using the date and time selector can be studied.

Some information about the accuracy:

- Moon and Sun positions are accurate to better than one second for our current period (the next 40 years). Geocentric error is up to 4s for the sun and the moon far into the past. The main driver for accuracy is DeltaT estimation. In the past, depending the model you choose (Chapron&Touzé or JPL in preference 6/6) you get a result close to the NASA result but based on the old JPL model or you will get a result using the more recent Delta T estimation model.
- Location computations for the central line of solar eclipse are usually better than 8km for our current period.
- Times of greatest eclipse are correct to the second for the next two upcoming eclipses. Difference may be larger for very old eclipses depending the DeltaT estimation model you selected.

- Finally, please note that currently, paths of Austral solar eclipses are wrong due to Algorithm convergence issues. This will be addressed in a future release.

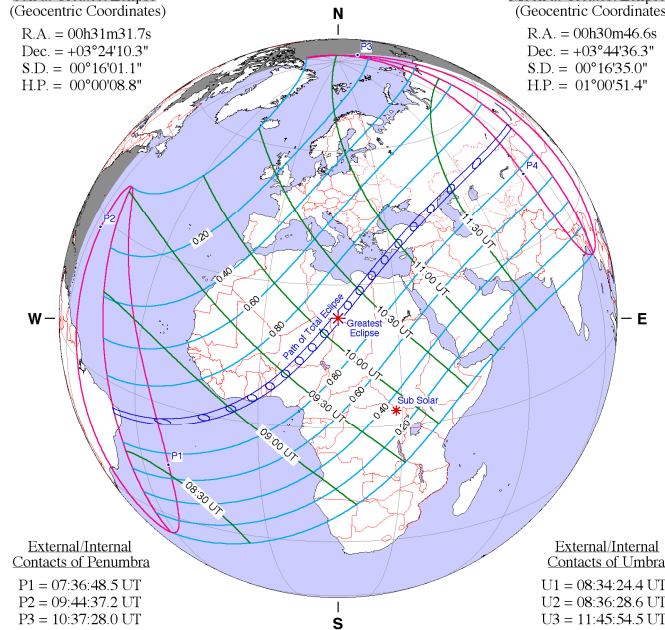
FIGURE 1: ORTHOGRAPHIC PROJECTION MAP OF THE ECLIPSE PATH

Total Solar Eclipse of 2006 Mar 29

Geocentric Conjunction = 10:33:17.4 UT J.D. = 2453823.939784
 Greatest Eclipse = 10:11:17.7 UT J.D. = 2453823.924510
 Eclipse Magnitude = 1.0515 Gamma = 0.3843
 Saros Series = 139 Member = 29 of 71

Sun at Greatest Eclipse
 (Geocentric Coordinates)
 R.A. = 00h31m31.7s
 Dec. = +03°24'10.3"
 S.D. = 00°16'01.1"
 H.P. = 00°00'08.8"

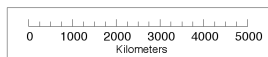
Moon at Greatest Eclipse
 (Geocentric Coordinates)
 R.A. = 00h30m46.6s
 Dec. = +03°44'36.3"
 S.D. = 00°16'35.0"
 H.P. = 01°00'51.4"



External/Internal
 Contacts of Penumbra
 P1 = 07:36:48.5 UT
 P2 = 09:44:37.2 UT
 P3 = 10:37:28.0 UT
 P4 = 12:45:40.6 UT

Ephemeris & Constants
 Eph. = DE200/LE200
 $\Delta T = 64.9$ s
 $k1 = 0.2725076$
 $k2 = 0.2722810$
 $\Delta b = 0.0''$ $\Delta l = 0.0''$

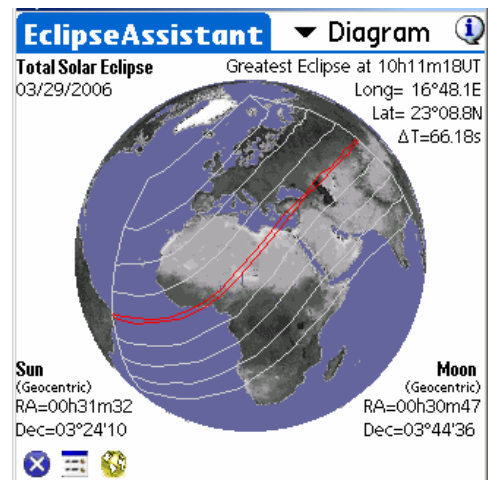
Local Circumstances at Greatest Eclipse
 Lat. = 23°09.1'N Sun Alt. = 67.3°
 Long. = 016°44.9'E Sun Azm. = 148.6°
 Path Width = 183.5 km Duration = 04m06.7s



NASA 2006 Eclipse Bulletin (F. Espenak & J. Anderson)

External/Internal
 Contacts of Umbra
 U1 = 08:34:24.4 UT
 U2 = 08:36:28.6 UT
 U3 = 11:43:54.5 UT
 U4 = 11:47:56.4 UT

Geocentric Libration
 (Optical + Physical)
 $l = 2.18''$
 $b = -0.52''$
 $c = -21.71''$
 Brown Lun. No. = 1030



2006 March 29 Total Solar Eclipse. Nasa and Astromist results

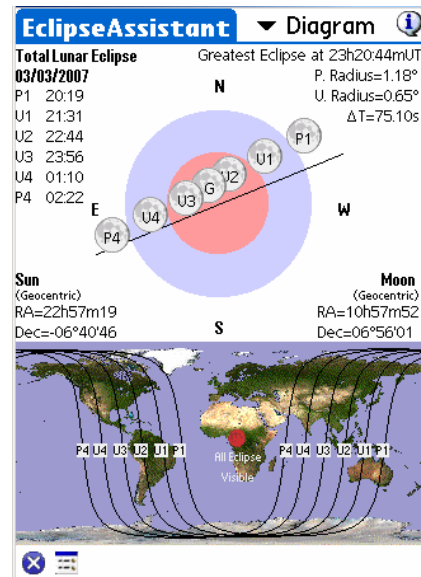
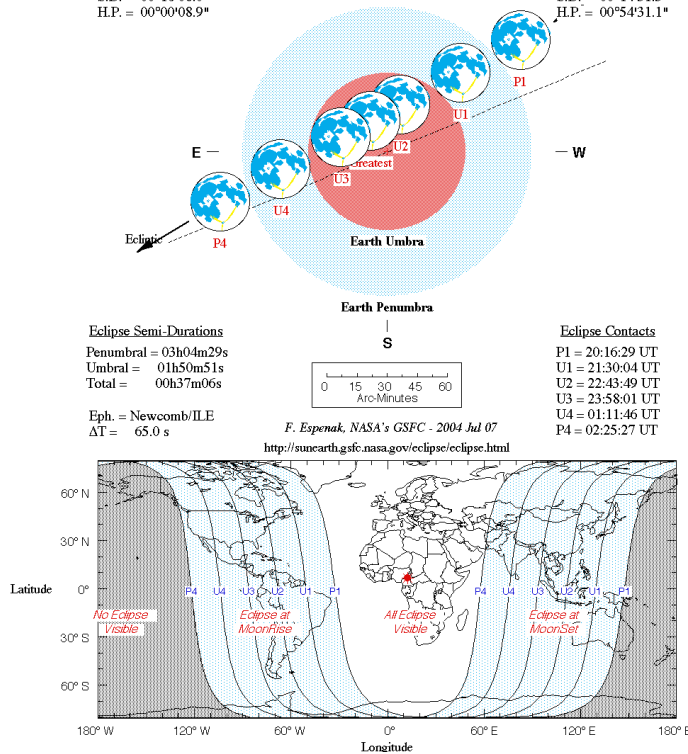
Total Lunar Eclipse of 2007 Mar 03

Geocentric Conjunction = 23:00:47.6 UT J.D. = 2454163.45888
 Greatest Eclipse = 23:20:55.8 UT J.D. = 2454163.47287
 Penumbral Magnitude = 2.3452 P. Radius = 1.2020° Gamma = 0.3174
 Umbral Magnitude = 1.2375 U. Radius = 0.6535° Axis = 0.2883°

Saros Series = 123 Member = 52 of 73

Sun at Greatest Eclipse
 (Geocentric Coordinates)
 R.A. = 22h57m19.1s
 Dec. = -06°40'46.6"
 S.D. = 00°16'08.0"
 H.P. = 00°00'08.9"

Moon at Greatest Eclipse
 (Geocentric Coordinates)
 R.A. = 10h57m52.2s
 Dec. = +06°56'00.6"
 S.D. = 00°14'51.3"
 H.P. = 00°54'31.1"

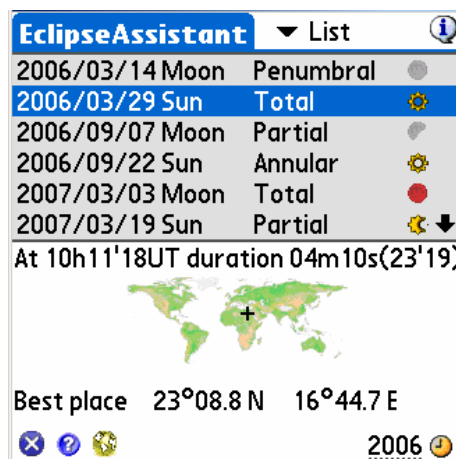


2007 March 03 Total Lunar Eclipse. Nasa and Astromist results

3.15.1. List

This screen lists the next 12 eclipses starting the year defined at the bottom. For each eclipse its date and type are indicated. At the eclipse's maximum, the data provided includes the best place to observe, duration and Sun-Moon angular separation. The best place to observe is also indicated by a cross on the map.

Note: For lunar eclipse the best place to observe is broad and represented by the visible part of the world.



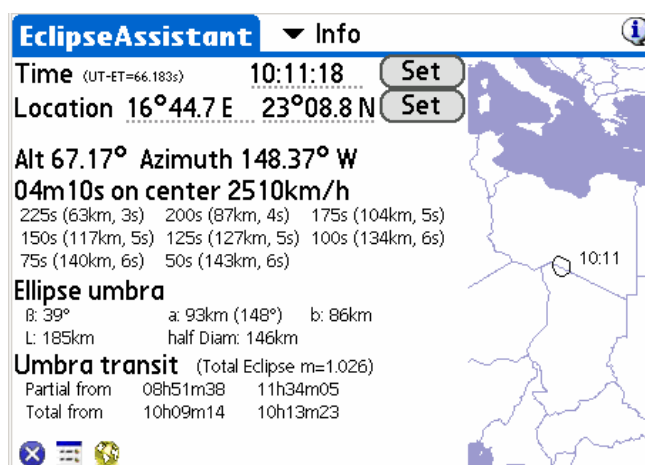
- All EclipseAssistant functions are available using the drop down list at the top of the screen.
- Shortcut buttons are available at the bottom of the screen for access to other EclipseAssistant functions.
- To update the list of eclipses, just tap on the Year field at the bottom of the screen and then choose the year from which you want the search to start.
- The clock icon will reset the list to the current year.

3.15.2. Information

3.15.2.1. Solar Eclipse

This screen allows you to compute local parameters of the eclipse in two ways: by time or by location.

- The time approach lets you compute the best location to be at to see the central eclipse. In this case inputs the universal time requested and presses the set button on the same line.
- The location approach gives you the best time to observe the eclipse from this location. In this case input the location (longitude then latitude) and press the set button on the same line. This approach takes more time to compute than the first method.
- On wide displays (320x480 and 480x320) a map is available at the bottom or at the right to display the shape of the eclipse's umbra at the requested or computed time



Once the calculation is finished, several aspects of the eclipse are available:

- The altitude and azimuth of the Sun at this time,
- The duration of the central eclipse (4m10s in the above example) at this time and location,
- The speed of the umbra across the ground (2510km/h in the above example), and
- The duration of the central eclipse if you go away from the selected location. In the above example, the central eclipse event takes 200s at 63km away from the central point. We see the event takes only 50s at 143km from the central point. This distance is close to half diameter of the eclipse (146km) where the central eclipse can no longer be seen.

Details about the umbra are provided as well:

- The angle of the shadow to the Earth (39°)

- The semi axis of the shadow of the eclipse (93km and 86km) as well as the orientation of the shadow on the ground (148°)
- The length of the shadow on the ground (185km)
- The half diameter of the eclipse (146km) that represents the largest distance (in latitude) from the central point where the central eclipse can be seen. Away, only a partial eclipse is visible. This information lets you know how accurate your final location should be to observe the eclipse. The smaller it is, the more difficult it will be to find the eclipse.

And last, Umbra transit information is provided:

- The coverage of the Sun by the Moon:
 - Always 100% for a total eclipse on the center line (the Moon's apparent diameter is bigger than the Sun's.)
 - Always less than 100% in the case of an Annular eclipse on the center line (90% in the above example, even on the center line.)
 - Under the coverage of the center line for locations where the eclipse is partial.
- The magnitude of the eclipse (1.026)
- The start and the end of the partial eclipse phase at this location.
- The start and the end of the central eclipse (if any) at this location.

3.15.2.2. Lunar Eclipse

This screen allows you to compute some parameters of a Lunar Eclipse:

- The current moon and earth shadow position depending the time and/or location.
- The visual angular separation from the center of the moon to the center of the shadow.
- Penumbral and Umbra Magnitude as well as Penumbra and Umbra radius.
- for each key events of the eclipse (P1, U1, thru U4, P4), its time, the altitude and the azimuth of the moon at this time.

EclipseAssistant Info

Time (UT-ET=75.096s) **23:20:44** Set

Location **12°39.4 E 00°07.5 N** Set

Current Positions (Visual separation 00°17'19")

Moon	10h57m52	06°56'01
Earth Shadow	10h57m19	06°40'46

Eclipse Informations (Gamma 0.320, Axis 0.2883°)

Penumbral Magnitude	3.49	Radius	1.309°
Umbral Magnitude	1.23	Radius	0.716°

Local Circumstances of Eclipse

		Alt	Azt	Axis
Penumbra Start	: P1=20:19 UT	45°	79°	
Umbra Start	: U1=21:31 UT	62°	74°	
Total start	: U2=22:44 UT	78°	52°	
Greatest	23:20 UT	78°	53°	
Total End	: U3=23:56 UT	79°	308°	
Umbra End	: U4=01:10 UT	62°	284°	
Penumbra End	: P4=02:22 UT	45°	278°	

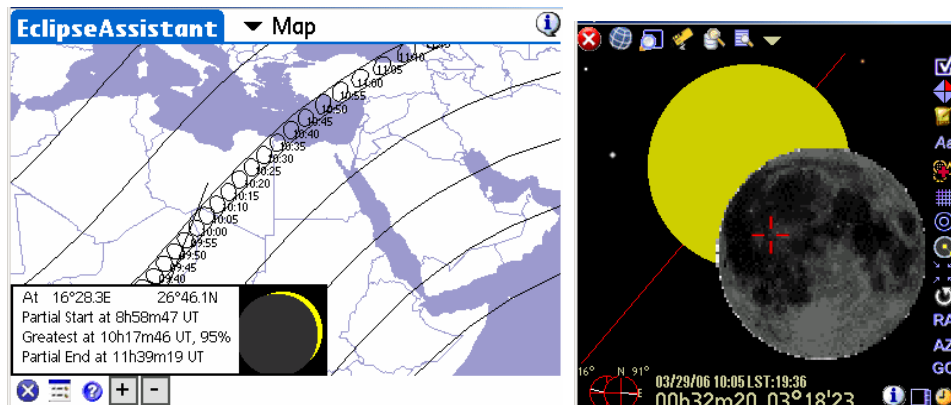
3.15.3. Map view

Note: This module works only for Solar Eclipse.


Note: Due to extensive computations, the first display of this screen for a particular solar eclipse takes a long time to calculate.

This screen lets you find for any location:

- The start and end of the eclipse.
- The best time to observe the eclipse.
- The coverage of the Sun by the Moon at the best time.



2006 March 29 total eclipse Map in wide screen mode (480x320) and a possible skychart view during an eclipse

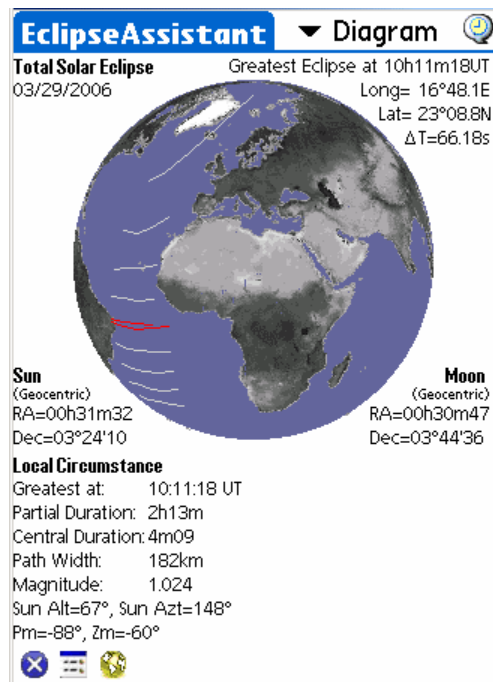
- To get this information, tap with your stylus on the map. A line will be drawn to point out the location and the information will be displayed at the bottom of the screen. The relative position of the Moon and Sun at greatest totality will be displayed.
- The **Info** button  will bring you to the Info panel to get more detailed information of the local circumstances of the eclipse.
- On high resolution handhelds, + and – buttons let you zoom in and out of the map. Only two levels of zoom are provided.

3.15.4. Diagram view

3.15.4.1. Solar Eclipse

This screen shows the projection of the eclipse shadow on the Earth during the eclipse phenomenon. The red lines represent the central eclipse path.

Each grey line represents a decrease of 25% in the darkness of the eclipse. To speed up the computation, only 75%, 50%, 25% and 0% (limits of the penumbra on the Earth) are computed.



- To rotate the globe just move your stylus on the screen to find the angle of view you would like.
- Most of the information available is shown in the information section.

3.15.4.2. Lunar Eclipse

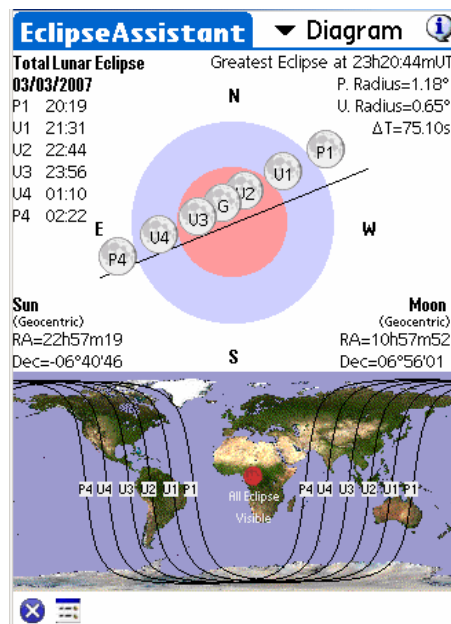
This screen shows the path of the moon through the earth's shadow. The different points of contact (P1, U1, ... U4, P4) and the inclination of the moon path is displayed.

For each point of contact the time (universal time) of the event is displayed. Accuracy is about 1 or 2 minutes due to the approximation of earth shadow size (shape of the earth, atmospheric refraction, etc.) Regarding the duration of this kind of eclipse this has a few consequences for observation.

Other information available:

- The radius of the penumbra (P. Radius) in degrees.
- The radius of the umbra (U. Radius) in degrees.
- The value of DeltaT used for the computation.
- The geocentric position of the moon and the sun.

At the bottom of the screen on Palm 320x480 handhelds, the P1, U1 thru U4, P4 zone of visibility on the earth are displayed.



3.16. JupiterAssistant

This assistant lets you plan all kinds of observations of Jupiter.

3.16.1. Satellites Assistant

Satellites Assistant lets you see in real time the phenomena that can occur between the four main satellites of Jupiter and Jupiter's disk.

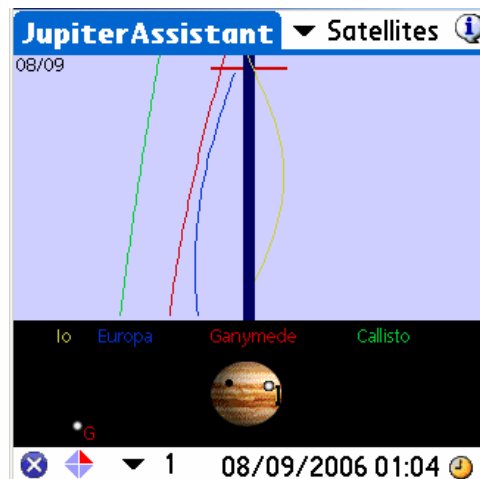
The following phenomena are displayed:

- Jupiter's rotation and Great Red Spot movement.
- Transits of satellites across Jupiter.
- Satellite shadows on Jupiter's disk.
- Eclipses of Jupiter's satellites.
- Occultations of Jupiter's satellites.

The horizontal red line represents the field of view of the image displayed below. The large vertical blue line represents Jupiter's disk size and the curved lines are the relative movements of Jupiter's satellites around Jupiter. A broken line means the satellite is not visible (eclipsed or occulted). All figures are displayed in proportion to actual distances between objects.

To detect events, do any of the following:

- Select a start date by tapping on the date field using 🕒.
- Select a period of days, from 1 to Max (10 days).
- Once the ephemeris is drawn, moving your stylus along the vertical bold blue line moves Jupiter's satellites in real time. Interesting times and dates are when multiple lines cross Jupiter's blue line. To see these events demonstrated move the horizontal red line to a region where you see that satellites are crossing in front of or behind Jupiter's blue line (March 28, 2004 or November 11, 2001 for example).
- Once centered, select the smallest period (one day) and then use the stylus to more accurately approximate the times of the phenomena.
- To get precise start and end times of each phenomenon just switch to the Events Assistant.
- You can swap the view to match you refractor or reflector using the 📡 icon.



3.16.2. Great Red Spot (GRS) Assistant

This assistant displays for upcoming days the hours of transit of the GRS. Only hours displayed in red indicate visible transits. Times in other colors and the associated symbols explain the reason why these transits are not visible (i.e., Jupiter is below the horizon or the Sun is in the sky).

JupiterAssistant		▼ Red Spot	i
Date	Red Spot transit(Local)		
08/09/2006	08h01	17h57	☀
08/10/2006	03h52	13h48	☀ 23h44 ☀
08/11/2006	09h40	19h35	☀
08/12/2006	05h31	15h27	☀
08/13/2006	01h23	11h19	☀ 21h14 ☀
08/14/2006	07h10	17h06	☀
08/15/2006	03h02	12h58	☀ 22h53 ☀
08/16/2006	08h49	18h45	☀
08/17/2006	04h41	14h37	☀
08/18/2006	00h33	10h28	☀ 20h24 ☀
✕		Adjust	08/09/2006

Just tap on the date field to change the start of the ephemeris.

As the GRS position (longitude) can change from year to year, Astromist enables you to compute this value by yourself:

- Observe Jupiter and record your local time of a transit.
- Gather the transit time from an official source (WEB, magazine, <http://members.aol.com/sabiajohn/lasnews.html> , etc.)

Then use the adjust button to select the date of observation, time of transit (Local or UT time) and Astromist will estimate the GRS longitude and store it to enable you to again get accurate ephemerides.

Then predictions will be accurate to one minute around this date and as long as the GRS longitude will stay close to the computed value.

Note: This function can be use to compute past GRS longitude value based on observation.

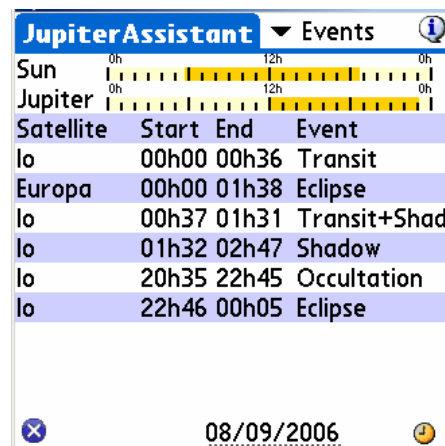
3.16.3. Events Assistant

This assistant computes accurate start and end times of Jupiter's events on a particular day.

Sun and Jupiter rise-and-set times are displayed for your location. If you want to change the date of a simulation, just tap on the date field.

The following events are taken into account:

- **Transit** – a satellite is in front of Jupiter's disk,
- **Shadow** – the shadow of a satellite is visible on Jupiter's disk, but the satellite is not in front of it,
- **Transit+Shadow** – a satellite is in front of Jupiter and its shadow is visible on Jupiter's disk,
- **Eclipse** – a satellite is crossing through Jupiter's shadow and is no longer visible, and
- **Occultation** – a satellite is behind Jupiter's disk and is no longer visible.



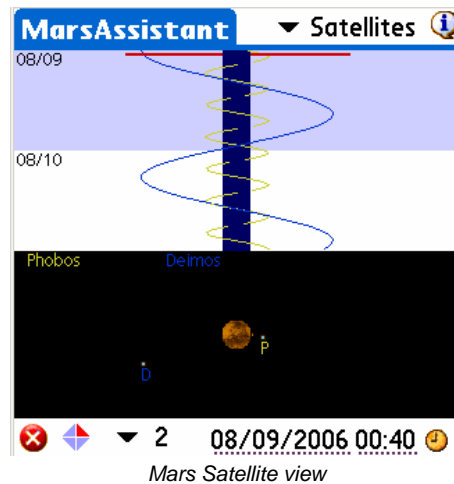
3.17. MarsAssistant

This assistant has been designed to help the observer locate the most prominent features of Mars as well as finding the best period to observe this planet.

3.17.1. Satellites

This screen is similar to the JupiterAssistant. It displays Mars satellite positions during a period of time as well as the Earth-facing side of the planet.

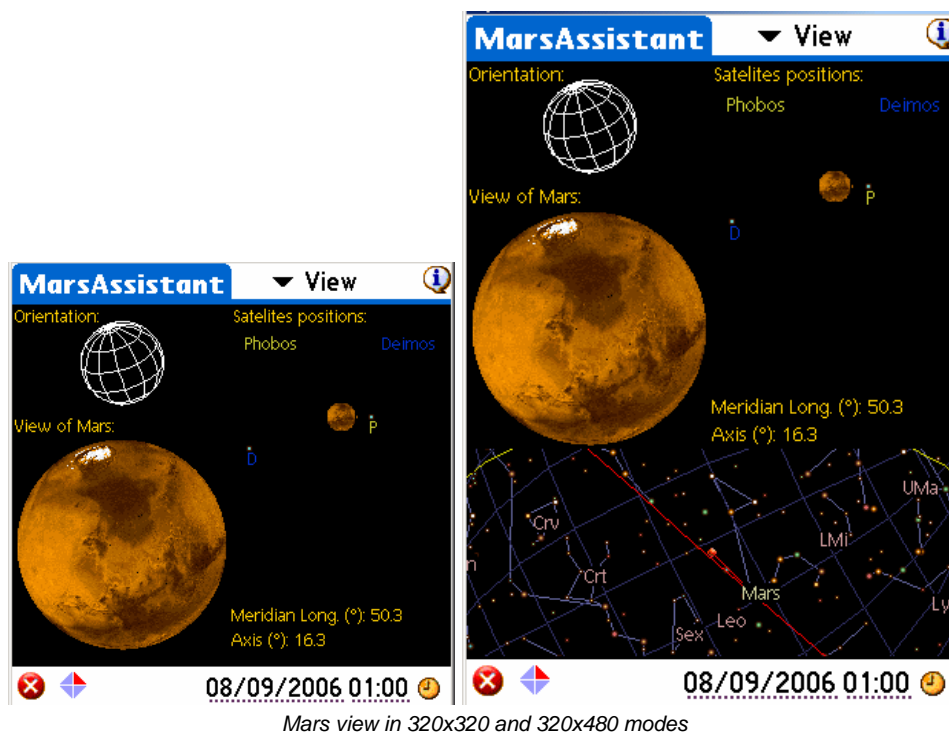
The duration of the period can be changed using the bottom popup list from one day to "n" days, depending on the size of your screen.



- A particular date of observation can be selected using the date and time selector. In this case, tap the date (or time) field. Once done, the display will be updated accordingly.
- Drag your stylus on the blue line to see the movement of the satellites as well as the rotation of Mars. Doing this will help you determine the best time to observe the Hellas and Syrtis Major features.
- Finally, the clock icon resets the date and time to the present.

3.17.2. View

This screen presents the view of Mars as seen from your location on the Earth. Satellite positions are displayed as a reminder as well as a wire-frame orientation of Mars.



- Using the bottom popup list, it is possible to reverse and flip the view to match the view in your telescope.
- The major Mars' features can be found on the Mars view. Just tap on a feature to highlight it.

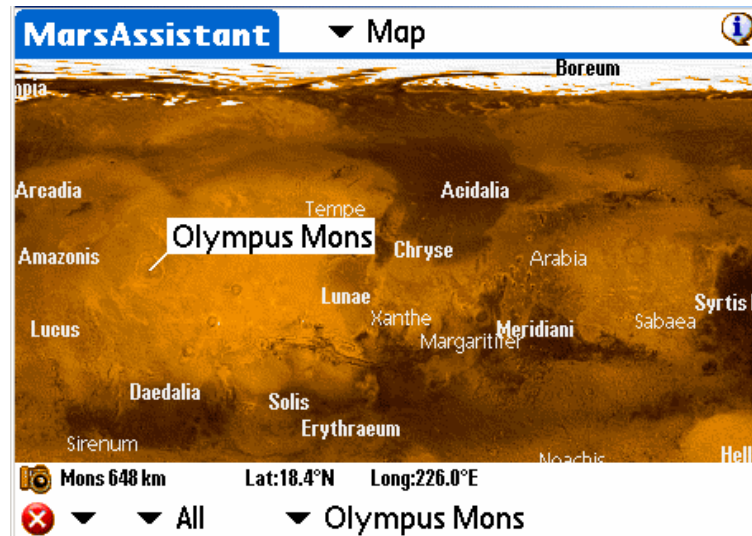
- On wider displays, the position of Mars in the sky is also shown.

Tips: To refresh the view without changing the date, you can press one of the left Palm keys.

3.17.3. Map

This screen is a true Mars Atlas that lets you find features of Mars among a list of more than 950. Most of them have an associated picture, which can be displayed when the feature is selected.

The map can be scrolled in real time using your stylus.



Mars map in wide (480x320) mode

To locate a specific feature you can:

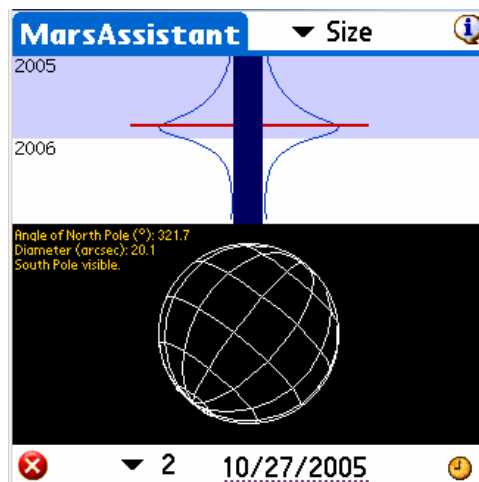
- Tap on the map to find its name, position, size and photo if any (a camera is displayed in this case).
- Browse the list to select a particular feature by name.

Tips: To refresh the view once several features have been selected, use your stylus to scroll the display slightly.

3.17.4. Size

This screen lets you find the best period during the year to observe Mars.

Drag your stylus on the screen to animate the wire sphere and see Mars' apparent diameter and orientation change over the selected period.



To see size and orientation for a particular date, tap on the date field and enter the date of interest. To reset the view to the current date press the clock icon.

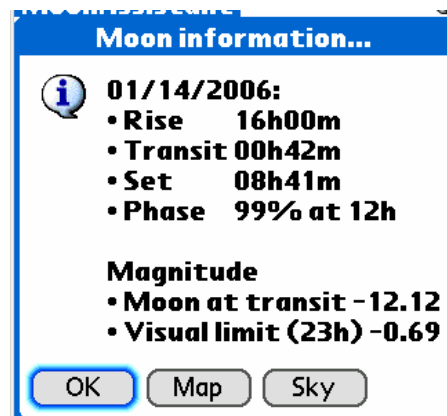
3.18. MoonAssistant

3.18.1. Calendar

This assistant produces a Moon calendar to help you find the best night to observe. Moon phases are indicated and rise and set times can be obtained by tapping on the Moon image of a specific day. You can also tap on the sky button to set the current date to the selected date and open the Sky Chart to see any visible objects. To change the date, just tap on the month field or use the up and down Palm keys



Moon Calendar




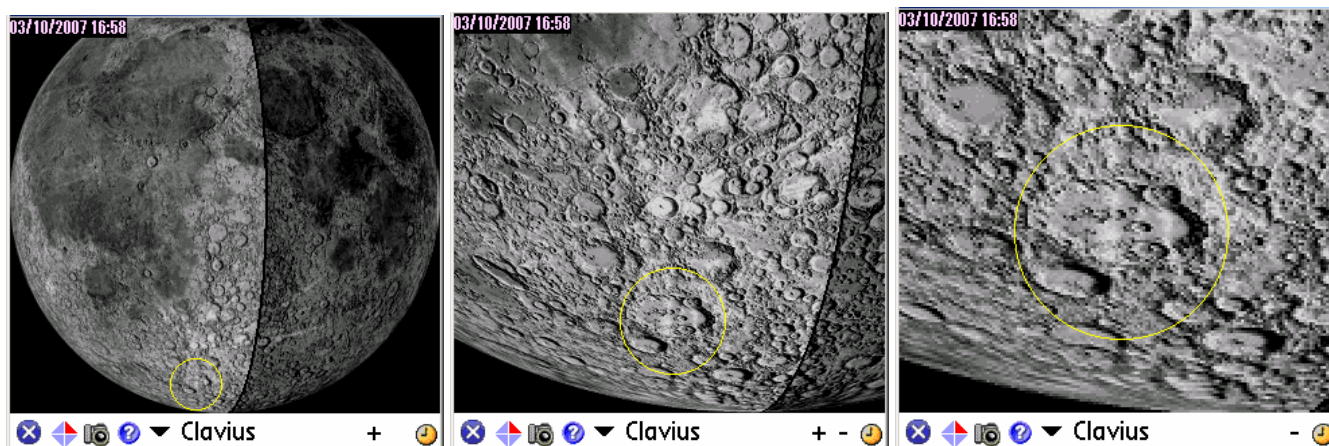
Moon Calendar Information for a particular day.

3.18.2. Map

The map lets you find Moon features among the 950 available with Astromist. The terminator (the line of the shadow on the moon) is represented as a black line. The shadowed part of the moon is darkened but you can still see features. For each feature selected, a circle will point it out. This circle depends of the size of the feature. For the smallest features, a default size is used.

To find features, you can either tap on the map and get the closest referenced feature or you can select the feature from the list.

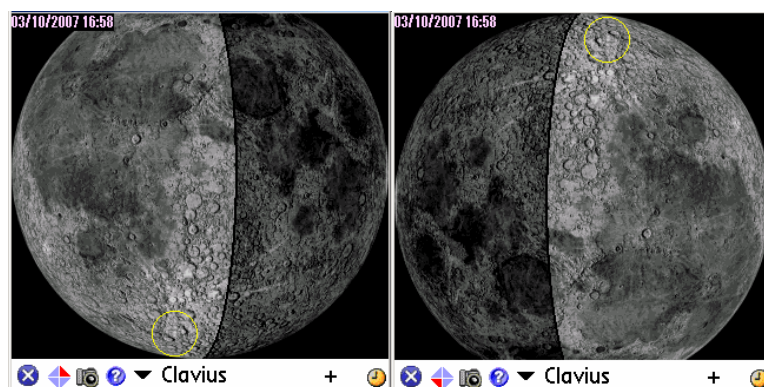
Once done, the information Icon  will give you the feature position on the moon and its diameter in km.






Moon map zoom level 1 to 3 on the Clavius crater

On Palm OS, Three levels of zoom are available on Palms with large program heaps (2Megs required) like model T3 or other new Palm models. On older models, only the first level of zoom will be available. The Moon's terminator display is available, depending on the date of the map, to help you locate the best area to observe. The + and - buttons are available to zoom the map in or out.

On Pocket PC, only one or 2 level are available for the moment.



- Using the swap selector , the image can be swapped to figure out what you will see with your telescope (refractor, reflector, etc..).
-  button indicates a picture is available for the selected crater. Tapping on it will display the picture of the feature.
-  lets you change the date of the map.

3.18.3. Rise&Set

This panel lists the Moon's rise and set times for the coming days. Accuracy is close to one minute.

Dashes replace the time if rise or set do not occur during a particular day.

The dates of the last 3 days of each week are bolded to help you locate them.

Note: Displayed time is local time. So, take care that DayLight Savings settings are correct from March through October as applicable for your location.

MoonAssistant			▼ Rise&Set	
S 10	23h52	09h56	M 26	12h09 01h17
S 11	-----	10h42	T 27	13h09 02h09
M 12	00h48	11h34	W 28	14h06 02h53
T 13	01h44	12h31	T 29	15h00 03h33
W 14	02h38	13h32	F 30	15h52 04h07
T 15	03h28	14h36	S 31	16h41 04h39
F 16	04h14	15h40	S 1	17h29 05h09
S 17	04h57	16h44	M 2	18h18 05h39
S 18	05h37	17h47	T 3	19h07 06h09
M 19	06h17	18h51	W 4	19h58 06h41
T 20	06h56	19h55	T 5	20h50 07h16
W 21	07h38	21h01	F 6	21h45 07h55
T 22	08h24	22h08	S 7	22h41 08h38
F 23	09h14	23h15	S 8	23h36 09h27
S 24	10h10	-----	M 9	----- 10h22
S 25	11h09	00h19	T 10	00h30 11h20

Moon Rise&Set Assistant

Tap on the date field to change the period.

3.18.4. DarkHours

This panel is designed for deep-sky object observers. It gives you the darkest night hours for each day depending on the Sun's rise and set times as well as the Moon's rise and set times for your location on the Earth. Accuracy is close to one minute.

Note: Astronomical sunset and rise are considered to be when the Sun is greater than 18° below the horizon

Note: Displayed time is local time. So take care that DayLight Savings settings are correct from March through October as applicable for your location.

MoonAssistant			▼ DarkHours	
S 10	19h27	23h52	M 26	02h09 04h50
S 11	19h28	00h48	T 27	02h53 04h49
M 12	19h28	01h44	W 28	03h33 04h48
T 13	19h28	02h38	T 29	04h07 04h47
W 14	19h29	03h28	F 30	04h39 04h46
T 15	19h29	04h14	S 31	-----
F 16	19h29	04h57	S 1	-----
S 17	19h30	04h59	M 2	-----
S 18	19h30	04h58	T 3	-----
M 19	19h30	04h57	W 4	19h36 19h58
T 20	19h55	04h56	T 5	19h37 20h50
W 21	21h01	04h55	F 6	19h37 21h45
T 22	22h08	04h54	S 7	19h38 22h41
F 23	23h15	04h53	S 8	19h38 23h36
S 24	00h19	04h52	M 9	19h39 00h30
S 25	01h17	04h51	T 10	19h39 01h20

Moon DarkHours Assistant

If no dark period will occur on a given date, dashes are displayed. Depending on your latitude, it could happen that no dark period occurs once or more in a month.

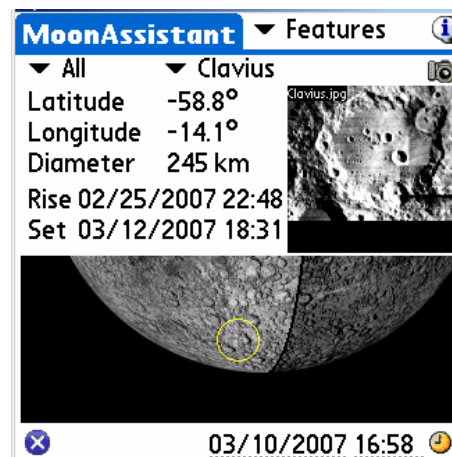
Finally, you can tap on the date field to change the period.

3.18.5. Features

On top of the Moon Map Assistant, Astromist provides the Features Assistant to determine the best date and time to observe a particular Moon feature (e.g., when the Sun will be low enough on the Moon's horizon so the shadow of selected features will be largest to let you see greater detail.) For each Moon cycle there are two periods where viewing is optimal:

- Just after sunrise (in the hours directly after or during the next day.)
- Just before sunset on the Moon.

Dates and times for both occurrences are provided. These times correspond as well to the moment when the Moon's terminator passes over a given feature.



Moon Features Assistant

To browse the large number of features, categories are available to help you to make the list more manageable. You can use them to filter the main list.

Once the desired feature is found, its seleniographic position (latitude and longitude) is displayed as well as its diameter.

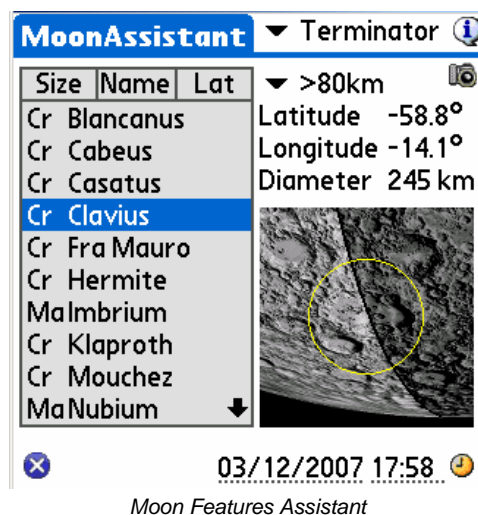
To help you quickly locate the region where a feature is located, a yellow circle is drawn on the Moon map to highlight its location.

Finally, if it is available under /PALM/Programs/Astromist/small_moon/, a small picture of each feature will be displayed instead of a zoom based on the map.

3.18.6. Terminator

Terminator Assistant helps you to find the Moon features close to the terminator (e.g., where the Sun will be rise or set on the Moon's horizon). These features are the best to observe for a particular date and time.

The final list can be sorted by Size of Feature, Name or Latitude (from the top to the bottom of the Moon). Furthermore you can filter the selected feature based on their size to keep only relevant ones considering you are using your telescope or binocular.



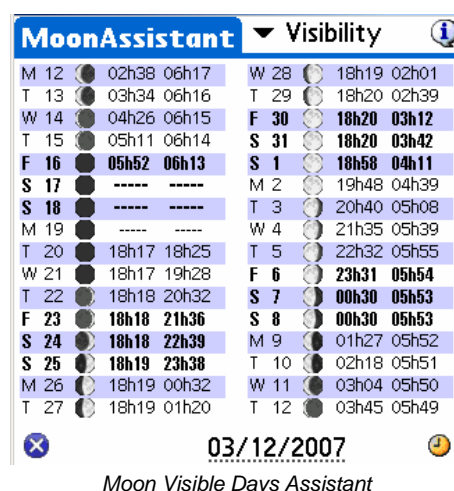
Once the desired feature is found, its selenographic position (latitude and longitude) is displayed as well as its diameter.

Finally, to help you quickly locate the region where a feature is located, a yellow circle is drawn on the Moon map to highlight its location.

3.18.7. Visibility

This panel is designed for Moon observers. It gives you the days and local time when the Moon is higher than 20° in the sky for your selected location.

Note: Displayed time is local time. So take care that DayLight Savings settings are correct from March through October as applicable for your location.



If no visible period will occur on a given date, dashes are displayed.

Finally, you can tap on the date field to change the period.

3.19. PlanetAssistant

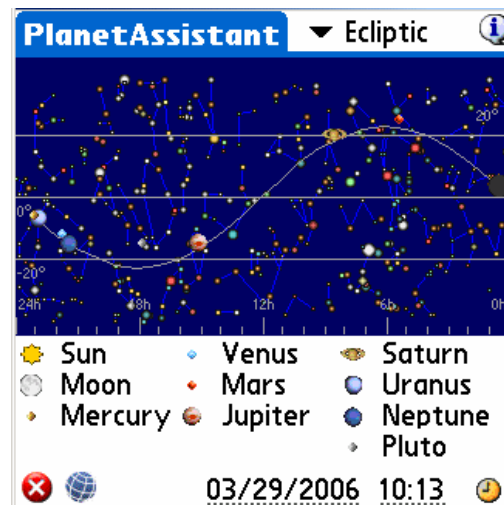
Planet assistants are designed to gather general information about the planets. For more detailed analysis, dedicated assistants are available for the Moon, Mars, Jupiter, Saturn, Eclipses, and Day/Night and Twilight for the Sun.

3.19.1. Ecliptic view

Sky View gives you Planet positions along the ecliptic. In wider displays (320x480) all planet positions are available.

Users can change observation date and time by tapping on the date or time fields.

To synchronize the date and time to local time, just tap on the clock icon.

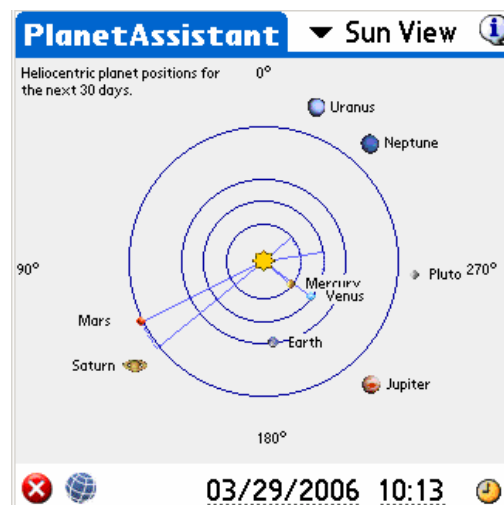


Note: The Sun and Moon are included in the planet list only for ease of selection.

Using the left Palm buttons (to increment the date), you are able to animate the chart and see upcoming or historical conjunctions of planets as well as Moon phases.

3.19.2. Sun View

Sun View displays the heliocentric planet positions for the next 30 days. This will allow you to determine the best time to observe a planet during the next thirty days. The date and time can be changed using the date and time selector.



Using the left Palm buttons (to add or remove days), you are able to animate the chart and in this way find particular oppositions or conjunctions or just see how fast Mercury moves and Pluto doesn't, for example.

3.19.3. Position

The Position panel centralizes the positioning information of each planet while taking into consideration your location, date and time.

PlanetAssistant ▼ Position ⓘ							
	RA	Dec	Az	Alt	eLon	eLat	Cnst
☀	00h31	03°23	92°18	18°20	08°32	00°00	Psc
☾	00h28	03°27	92°27	19°01	07°56	00°19	Psc
♂	23h00	-06°30	112°05	35°47	343°51	-00°10	Aqr
♂	21h36	-12°52	136°00	48°49	322°05	01°20	Cap
♂	05h20	24°50	40°28	-34°58	81°03	01°42	Tau
♂	15h03	-15°54	248°17	13°09	227°55	01°18	Lib
♂	08h27	19°52	343°35	-50°58	124°24	00°44	Cnc
♂	22h55	-07°38	114°02	36°20	342°16	-00°44	Aqr
♂	21h26	-15°16	141°07	48°33	319°03	-00°10	Cap
♂	17h46	-15°47	222°37	45°43	266°42	07°35	Ser

✖ 🌐 03/29/2006 10:13 ⌚

If you tap on the sky button 🌐, a sky chart of the selected date and time will be displayed.

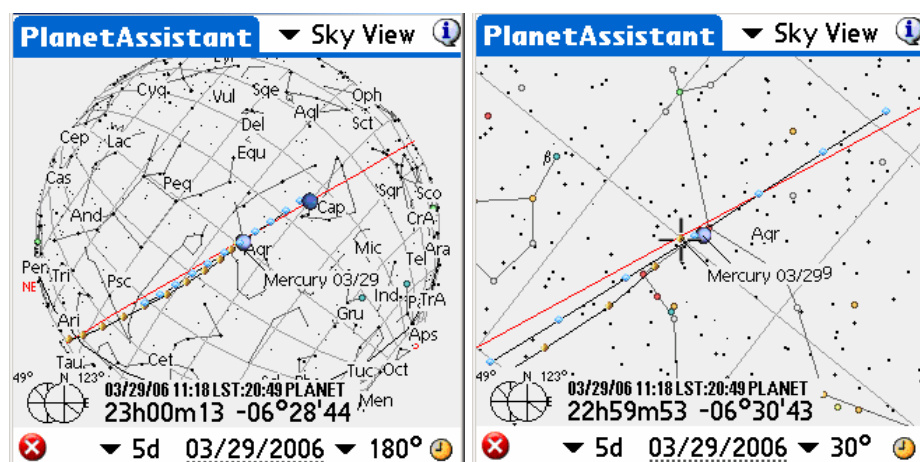
Clock, date and time fields have the same behavior as in the previous panels.

Using the Palm left buttons (to add or remove days); you are able to update the list.

Note: eLon and eLat are Ecliptic longitude and Latitude. The Elongation (Elon) is provided in the Info panel.

3.19.4. Sky View

This view lets you see the different positions of a planet during a specific period of time. A step selector lets you choose the number of days the program must add between each planet's positions.



Planets' positions with a step of 5 days (wide 180° and zoomed to 45° views)

Only planets relevant to the dates selected will be displayed:

- **From 1-to-5 days per step:** Mercury, Venus and Mars positions are displayed. Other planets will be drawn only for a single position.
- **From 7-to-14 days per step:** Mars, Jupiter and Saturn. Other planets will be drawn only for a single position.
- **From 30-to-90 days per step:** Jupiter, Saturn, Uranus, Neptune and Pluto.

The **field of view selector** lets you zoom in and out on the charts.

You can change the date of the chart using the clock button or by tapping in the date field to open the date-time selector.

You can get the name of a particular object of the map by tapping on it.

Finally, you can scroll the chart using your stylus or the Palm keys.

3.19.5. Info

Info provides you the usual information about each planet.

PlanetAssistant Info

	RA	Dec	Cnst	Mag	Diam	Dist	Phase	Elong
☼	00h31	03°24	Psc	-24.6	32.0'	0.0	-	-
☾	00h31	03°46	Psc	-3.9	33.2'	-	0%	-
♂	23h00	-06°30	Aqr	7.9	9"	0.7	30%	25°
♂	21h36	-12°52	Cap	-4.3	24"	0.7	52%	46°
♂	05h20	24°50	Tau	1.2	6"	1.6	91%	73°
♂	15h03	-15°54	Lib	-2.4	43"	4.6	100%	141°
♂	08h27	19°52	Cnc	1.0	19"	8.6	100%	116°
♂	22h55	-07°38	Aqr	5.9	3"	20.0	100%	26°
♂	21h26	-15°16	Cap	7.0	2"	30.7	100%	50°
♂	17h46	-15°47	Ser	13.9	0"	30.9	100%	102°

03/29/2006 11:18

PlanetAssistant Info

	RA	Dec	Cnst	Mag	Diam	Dist	Phase	Elong	Rise	Transit	Set
☼	00h31	03°24	Psc	-24.6	32.0'	0.0	-	-	08h52	15h00	21h08
☾	00h31	03°46	Psc	-3.9	33.2'	-	0%	-	08h51	15h56	21h28
♂	23h00	-06°30	Aqr	7.9	9"	0.7	30%	25°	07h35	13h29	19h23
♂	21h36	-12°52	Cap	-4.3	24"	0.7	52%	46°	06h18	12h04	17h50
♂	05h20	24°50	Tau	1.2	6"	1.6	91%	73°	13h12	19h49	02h26
♂	15h03	-15°54	Lib	-2.4	43"	4.6	100%	141°	23h50	05h31	11h13
♂	08h27	19°52	Cnc	1.0	19"	8.6	100%	116°	16h27	22h56	05h25
♂	22h55	-07°38	Aqr	5.9	3"	20.0	100%	26°	07h31	13h24	19h17
♂	21h26	-15°16	Cap	7.0	2"	30.7	100%	50°	06h12	11h54	17h37
♂	17h46	-15°47	Ser	13.9	0"	30.9	100%	102°	02h33	08h15	13h57

03/29/2006 11:18

3.19.6. Rise&Set

Rise&Set gives you the rise and set times for each planet on a particular day. The red line represents the selected time so you can quickly see which planets is visible and which ones are not.

To modify the date, tap on the date or time field.

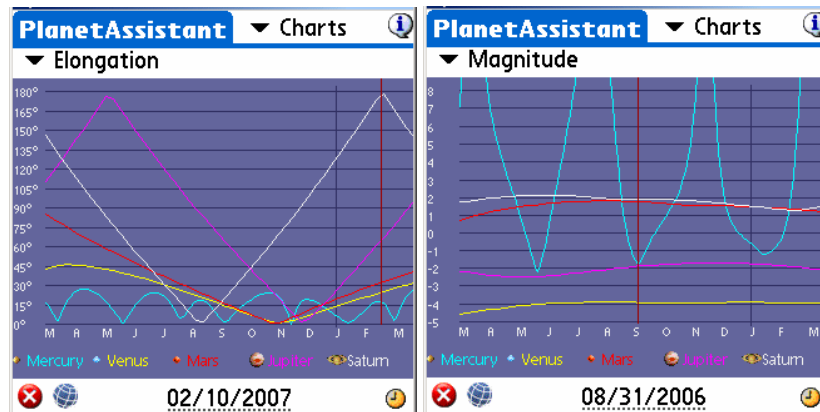
To add or remove one day, use the left keys of the palm. This will refresh the display so you can find for example when the moon is not visible for a given time.

PlanetAssistant Rise&Set										
	Rise	Transit	Set							
☼	08h52	15h00	21h08	0h	12h	0h				
☾	08h51	15h56	21h28	0h	12h	0h				
♂	07h35	13h29	19h23	0h	12h	0h				
♂	06h18	12h04	17h50	0h	12h	0h				
♂	13h12	19h49	02h26	0h	12h	0h				
♂	23h50	05h31	11h13	0h	12h	0h				
♂	16h27	22h56	05h25	0h	12h	0h				
♂	07h31	13h24	19h17	0h	12h	0h				
♂	06h12	11h54	17h37	0h	12h	0h				
♂	02h33	08h15	13h57	0h	12h	0h				
03/29/2006 11:18										

3.19.7. Charts

Charts let you see the evolution of different planet characteristics during the year (elongation, apparent diameter, Magnitude, Phase, Altitude). For each chart you can find the date of a particular event by dragging your stylus to move the vertical red line to any given date.

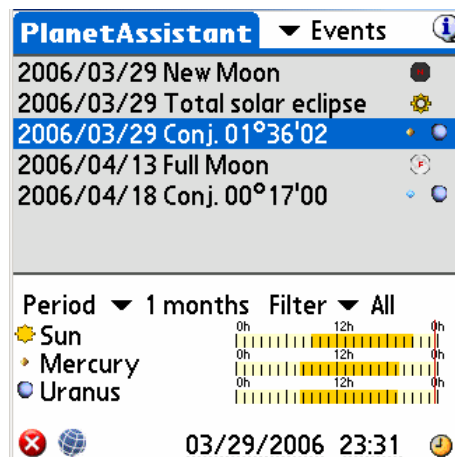
During the screen refresh, pressing any key will stop the computation.



Finally, the start date of the chart can be changed using the date field or the clock button.

3.19.8. Events

This panel is able to forecast major astronomical events over a specified period of time.



None of the events are pre-computed and computations can take a long time on slower or older Palms. Once complete, you are able to filter the list to select only specific events such as conjunctions, lunar events, oppositions and eclipses.

When you select an event its date and time is displayed at the bottom of the screen.

Finally, you can select both the start date of the computation and its duration.

3.20. SatellitesAssistant

⚠ **BEWARE THIS ASSISTANT DOES NOT WORK FOR GEOSTATIONARY SATELLITES.**

Astromist provides a complete set of tools to observe man-made Earth satellites and predict their positions at any time. To achieve this, Astromist uses the usual two-line TLE format provided by several sites and the SGP4 algorithm to compute the satellite information and position.

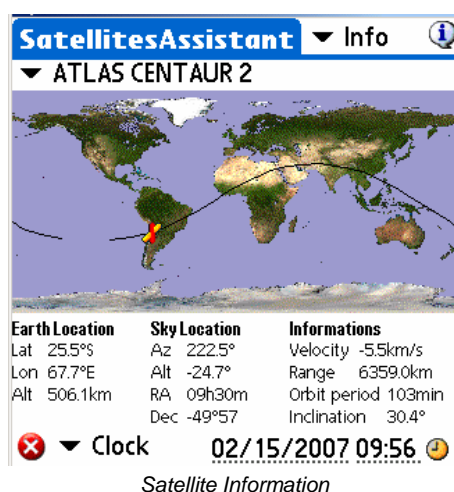
Despite SGP4 being one of the most accurate algorithms currently available to compute satellite positions, the required elements need to be updated regularly to keep accurate results. An update frequency of once a month will guarantee accurate results. After several months the results provided will probably be meaningless.

The default satellite database is built using the information provided by the Celestrak site (<http://www.celestrak.com/NORAD/elements/>) on the 100 or so brightest satellites (<http://www.celestrak.com/NORAD/elements/visual.txt>). See § 3.20.6 Update Satellite Data for more details.

3.20.1. Info

This screen provides information to locate and track any satellite in the database. In addition it provides a visual map to quickly see where the satellite is above the Earth and what its current pass is.

This visual information lets you quickly determine if a satellite should be visible or not from your location in the upcoming time period. If this is the case, the black line should pass over or very close to your selected location.



Several kinds of information are available:

- **Earth Location** updates the current latitude, longitude and altitude above sea level for the satellite. This position is represented by the satellite's icon on the map during the current satellite pass.
- **Sky Location** updates information to locate the satellite in the sky.
- **Information** gives common satellite information.

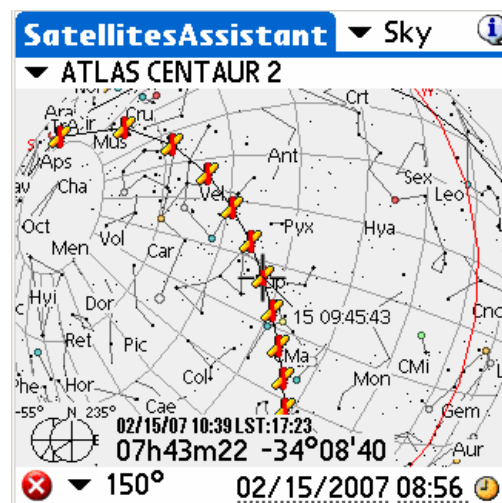
This information can either be computed for the date and time displayed at the bottom of the screen (Clock mode) or simulated using the proposed tracking mode. "Track" should be used if a real time refresh is wanted. Other values from +1' to 1° will add up to ten minutes to the current time at each refresh.

Note: This mode is very CPU intensive and could consume a lot of battery power.

To select a particular date and time, the user can tap in the date and time field. Finally by using the clock icon the user can synchronize the screen to the current Palm system time.

3.20.2. Sky

As a satellite moves very fast in the sky and the sky does not rotate a lot during a usual satellite orbital period (less than 2 hours.) This assistant can help you to predict with good accuracy where the satellite should pass in the sky during the next time interval. In particular the Moon and planets are displayed so you can roughly estimate if an occultation or conjunction could be visible from your location during this pass.



Satellite Sky View

To determine at what time the satellite will pass a particular position, roll the sky sphere and center the red cross on the satellite position. The time of the position will be displayed.

If you see a satellite and a particular sky object are going to pass close enough together, you can use the field of view selector to zoom in on the display of that position.

3.20.3. Pass

This part of the SatellitesAssistant gives you the date and time of the next pass of a particular satellite that will be visible from your location.

Note: A maximum of 30 passes can be displayed at a time. If you need pass information for dates either before or after the displayed period, you should change the start date to calculate a new set of data for that time period.

SatellitesAssistant				▼ Pass	
▼ HST				▼ Visible	
15/02	10:26:15	10:33:33	4°	7m17	
15/02	12:05:15	12:17:44	29°	12m29	
15/02	13:46:40	13:59:48	60°	13m7	
15/02	15:29:18	15:41:32	23°	12m14	
15/02	17:12:03	17:23:53	19°	11m50	
15/02	18:54:06	19:06:44	31°	12m38	
15/02	20:35:51	20:48:58	75°	13m7	
15/02	22:18:26	22:29:38	15°	11m1↓	
AOS : 13h46m40				Az : 254° SW	
Max: 13h53m14				Az : 339° NW Alt: 60°	
LOS : 13h59m48				Az : 63° NE	
				02/15/2007 09:20	

Satellite Passage Assistant

Depending on the **visibility criteria** you choose, it could take a long time to compute the whole list. So, at any time during the search you can stop the process by pressing any key. For example if instead of visible (altitude $\geq 0^\circ$); you select $>30^\circ$, only passes with an altitude higher than 30° will be selected.

Once your pass selection is complete you can access information like time of **AOS** (Acquisition Of Signal, i.e., when the satellite rises over the horizon) and time of **LOS** (Loss Of Signal, i.e., when the satellite sets below the horizon). In this case the azimuth of AOS and LOS are also given. Of course altitudes are 0° in both cases.

Max represents the time when the satellite will be at the highest point in the sky during this pass. In this case altitude is given as well.

Finally, for a particular pass you can tap the **Sky** button to load the sky and the satellite's positions for this pass. This will let you see the whole pass in the sky and quickly determine if during this pass the satellite will pass close to a particular sky object.

3.20.4. Next

This feature lets you determine upcoming visible satellites. Its behavior is very similar to the Pass screen except it is focused on the next hour only.

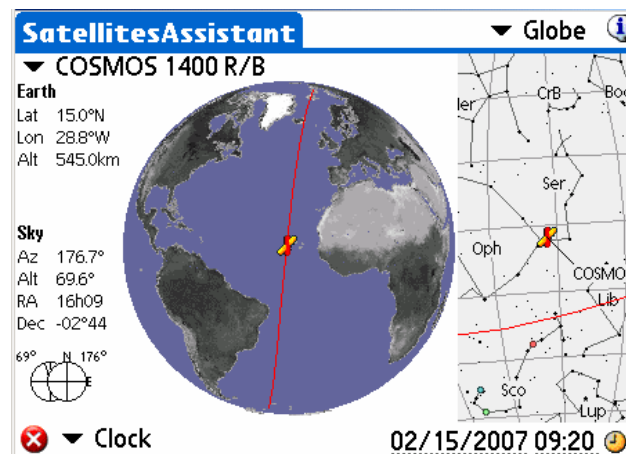
SatellitesAssistant			▼ Next	i
			▼ Visible	
DAO 3 (COPERNICUS)	09:15:34	75°		
COSMOS 1975 R/B	09:18:58	45°		
COSMOS 1400 R/B	09:20:26	87°		
COSMOS 2151 R/B	09:26:15	56°		
DAO 2	09:39:40	11°		
OKEAN 2 R/B	09:45:14	6°		
COSMOS 1400	09:45:40	11°		
DELTA 1 R/B	23:24:05	0°	↓	
AOS : 09h14m18			Az : 185°	S
Max : 09h20m26			Az : 98°	E Alt: 87°
LOS : 09h26m33			Az : 7°	N
			02/15/2007 09:20	🕒

Next visible Satellites Assistant

Once the selection is over, the satellites are sorted by their date and time of pass from the soonest to the latest.

3.20.5. Globe

This feature lets you see the position of a satellite on the globe and in the sky. Tracking can be done but you need to have a fast handheld to make the best use of it.



Satellite position on the Globe

The globe can be rolled using the stylus to get a better angle of view.

This information can be computed either for the date and time displayed at the bottom of the screen (Clock mode) or simulated using the proposed tracking mode. "Track" should be used if a real time refresh is wanted. Other values from +1' to 1° will add up to ten minutes to the current time at each refresh interval.

To select a particular date and time, the user can tap on the date and time field. Finally, by using the clock icon the user can synchronize the screen to the current Palm system time.

3.20.6. Update Satellite Data

Astromist provides two ways to update your satellite data:

- Create a new satellite database using the SatelliteDB.exe tool.
- Update or replace the current database using a Palm text memo.

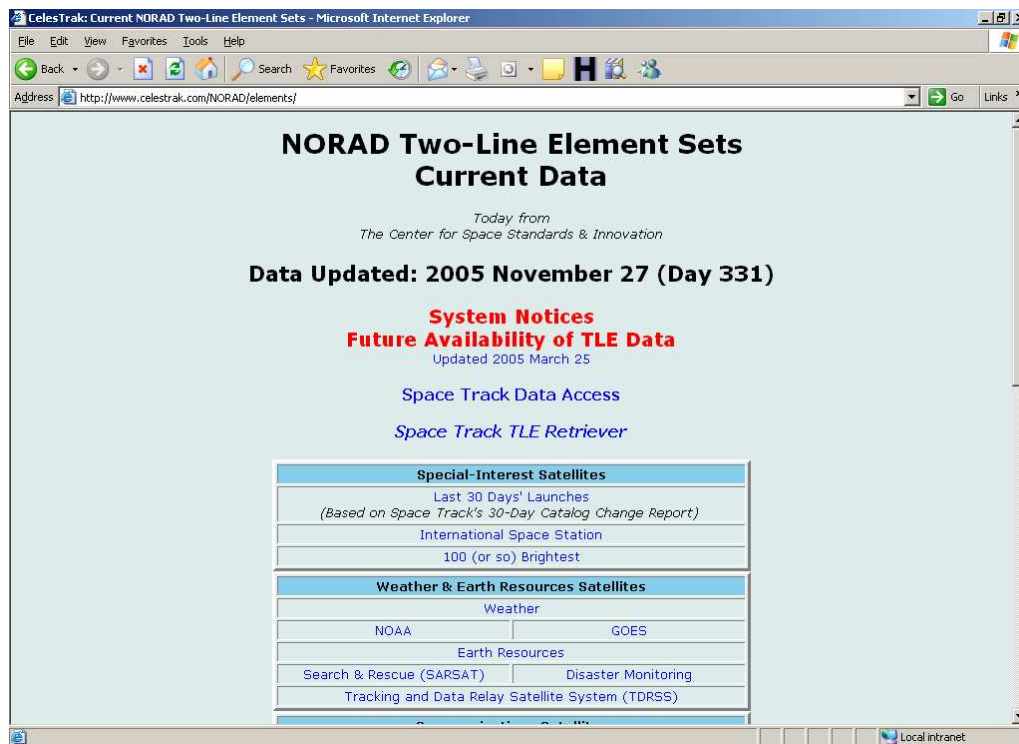
3.20.6.1. SatelliteDB tools

Registered users benefit from the inclusion of the SatelliteDB.exe tool. This application is designed to create the Astromist satellite database using a standard TLE data file.

The following link <http://celestrak.com/NORAD/elements/> provides several TLE lists.

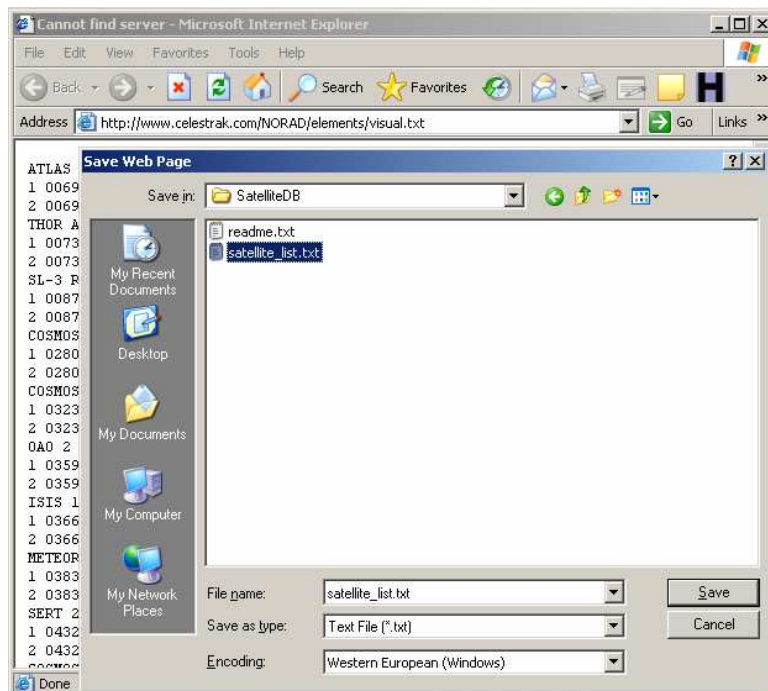
To create a new satellite database follow the instructions below:

As an example using this link <http://www.celestrak.com/NORAD/elements/visual.txt> download the most recent satellite TLE file of visual satellites and save it as satellite_list.txt in the satellitedb folder.

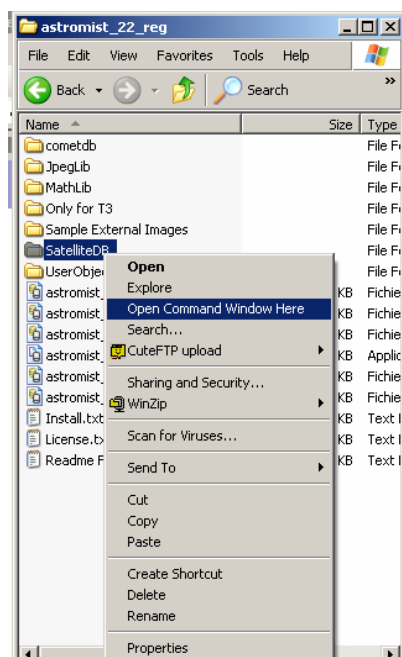


NORAD site which provides TLEs of the 100 (or so) brightest satellites used by Astromist

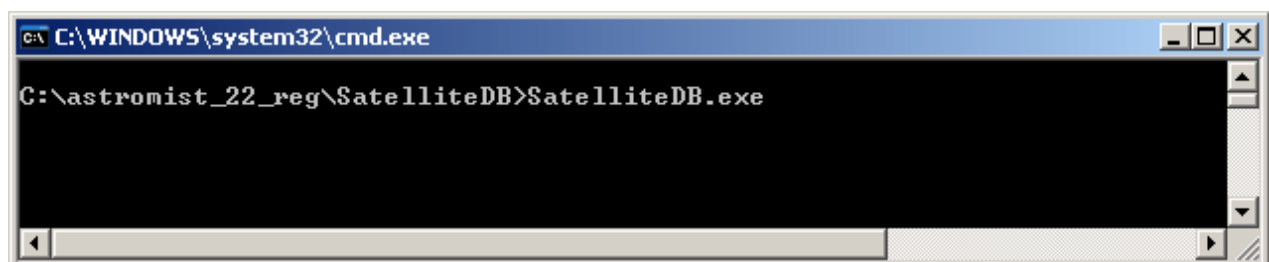
Astromist 2.4 User Guide



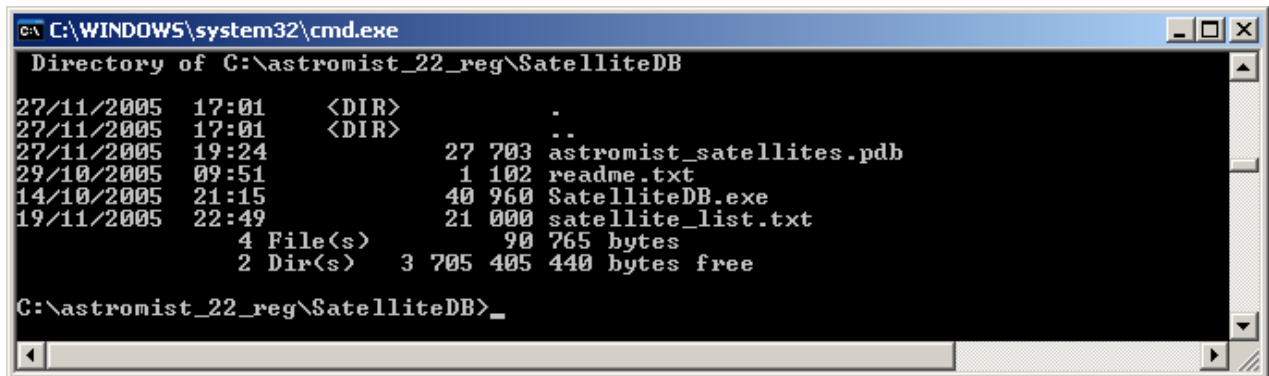
- If you want to remove some lines or add new ones, edit the file using your preferred text editor.
- Open a DOS session and change to the program's directory.



- Run SatelliteDB.exe to create the new database.



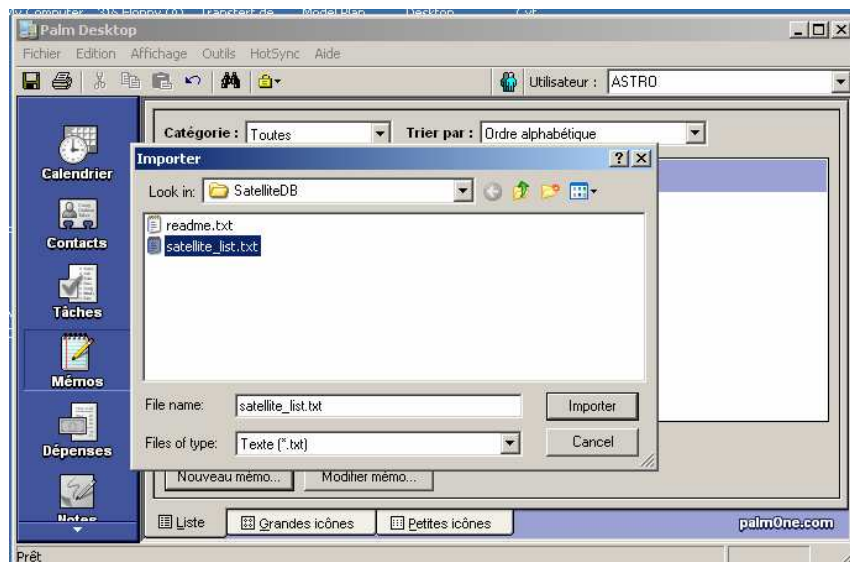
- The `astromist_satellite.pdb` file is created in the same folder.



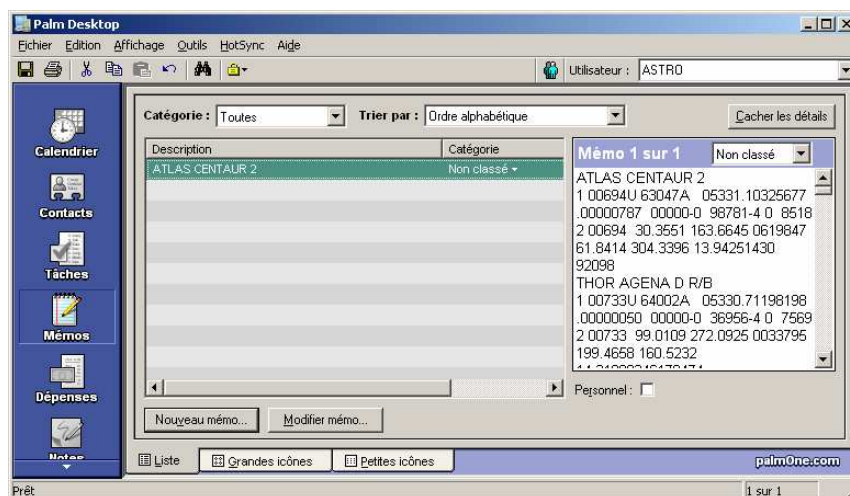
- Now you just have to install the new database file to your Palm.

3.20.6.2. Using the Palm Text memo

Using the `satellite_list.txt` file you uploaded and saved (see §3.20.6.1 SatelliteDB tools), you can import it and create a Palm memo using your PalmDesktop application.



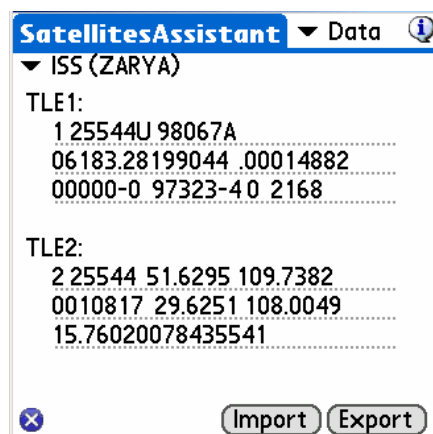
First Import the text file into a new memo



Once imported the new memo is available

- Then, do a **HotSync** to install this new memo into your Palm.

- Once done, launch Astromist and open SatellitesAssistant/Data section.



Astromist Satellite TLE Import/Export screen

- Press the Import button and decide if you will replace or just update your current list.
- Select the new memo then press import.
- The satellite database is updated or refreshed.

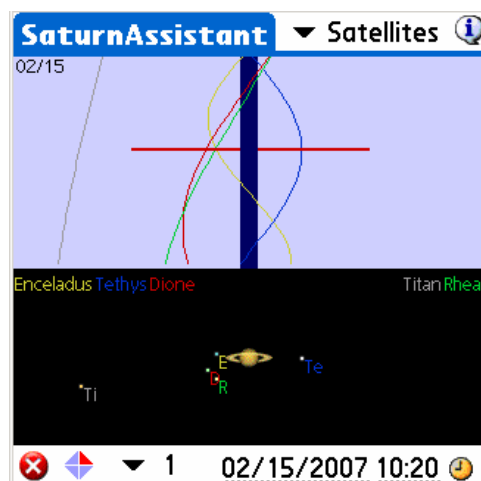
Note: For Mac or Linux users, if you want to create a huge satellite database without the SatelliteDB.exe tools, create several memos. When you import the first one, choose replace and for all others select update.

3.21. SaturnAssistant

This assistant is similar to JupiterAssistant, but focuses on Saturn's events.

3.21.1. Satellites

Satellites lets you see in real time Saturn's satellites positions.

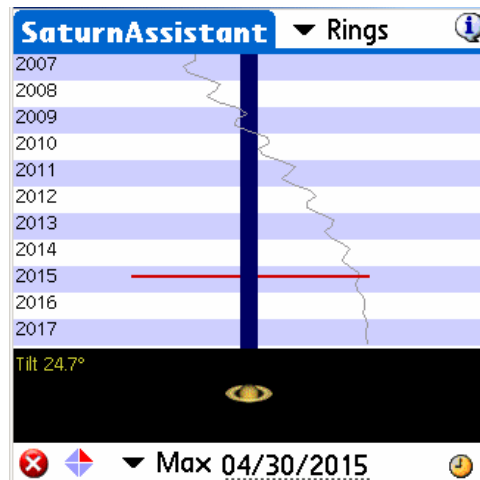


Just select a range of the chart and animate the chart moving your stylus on the screen to reach a particular configuration to find the date and time.

Date and time fields and clock button let you set the start date of the chart.

3.21.2. Rings

Rings lets you see Saturn's ring orientation over a long period.



Just select the range of the observation (in years) and then move your stylus on the screen to reach a particular configuration.

Date and time field and clock button let you set the start date of the chart.

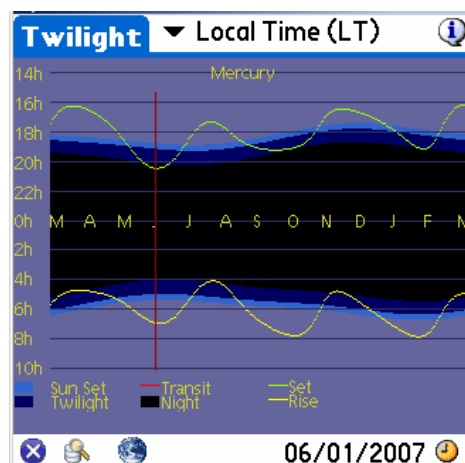
3.22. Day/NightAssistant



Still a work in progress and will be completed in a future Astromist release.

3.23. TwilightAssistant

TwilightAssistant lets you display the sky's darkness over the year to determine the best period to observe an object or planet. To do this, open the assistant and select the desired object or planet. The best period to view will be at the time on the chart where the area between the rise and set lines cross the dark area of the chart.



M42, Orion Nebula best observation period

You may display the Twilight data plot with the following considerations:

- your local time without taking into account Day Light savings time changes,
- your local time taking account Day Light savings time changes, or
- Universal Time.

As an example, for a location close to Greenwich, England, the Orion Nebula will be easy to see in the morning between September and December and easy to see in the evening from January to March. The best period to observe it in the evening will be at the end of February when its transit will be at the beginning of the evening.

3.24. CCDAssistant

This panel lets you configure your CCD information to enable Astromist to display your CCD field of view in the SkyChart.

Just select a predefined CCD camera or fill the information for your particular CCD.

CCDAssistant ▼ Canon 350D

CCD Chip Information
 Width in mm : 22.20
 Height in mm : 14.80
 Pixel Width in μm : 6.42
 Pixel Height in μm : 6.42
CCD Scope Configuration
 Scope Focal in mm : 996
CCD Optical Specifications
 FOV : $01^{\circ}16'37'' \times 00^{\circ}51'05''$
 Diaq FOV : $01^{\circ}32'05''$
 Pixel FOV : 1.32 " \times 1.32 "

CCDAssistant ▼ StarLight MX916

CCD Chip Information
 Width in mm : 8.70
 Height in mm : 6.70
 Pixel Width in μm : 23.20
 Pixel Height in μm : 22.40
CCD Scope Configuration
 Scope Focal in mm : 996
CCD Optical Specifications
 FOV : $00^{\circ}30'00'' \times 00^{\circ}23'08''$
 Diaq FOV : $00^{\circ}37'52''$
 Pixel FOV : 4.79 " \times 4.63 "

3.25. ChecklistAssistant

CheckList Assistant helps you remember to bring all your equipment with you to an observing site. You can also add up to five additional items.

<p>Astronomical Equipment ⓘ</p> <ul style="list-style-type: none"> <input type="checkbox"/> Telescope OTA <input type="checkbox"/> Mount or Base <input type="checkbox"/> Assembly Hardware & Tools <input type="checkbox"/> Drive Battery <input type="checkbox"/> Eyepieces & Filters <input type="checkbox"/> Finderscope or Telrad <p>Observing Equipment</p> <ul style="list-style-type: none"> <input type="checkbox"/> Table <input type="checkbox"/> Observing Chair <input type="checkbox"/> Astromist :-), Charts, Atlas <input type="checkbox"/> Log and Pencils <input type="checkbox"/> Flashlight and Batteries <p>OK Next</p>	<p>Photography</p> <ul style="list-style-type: none"> <input type="checkbox"/> Camera & Lenses, Web Cam <input type="checkbox"/> Cable Release <input type="checkbox"/> Film or Laptop <input type="checkbox"/> Tripod/Mount or T-Adapter <input type="checkbox"/> Guiding Equipment <input type="checkbox"/> Stopwatch <p>Creature Comforts</p> <ul style="list-style-type: none"> <input type="checkbox"/> Water <input type="checkbox"/> Warm Beverage <input type="checkbox"/> Snack Food <input type="checkbox"/> Sleeping Bag and Tent <input type="checkbox"/> Warm Clothes <p>Prev Next</p>	<p>Just in Case</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cell Phone <input type="checkbox"/> Jumper Cables <input type="checkbox"/> Fully Inflated Spare Tire <input type="checkbox"/> Observing Buddy <input type="checkbox"/> Someone knows where you'll be and when you'll back. <p>Personal Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <p>Prev</p>
--	---	--

4. Catalogs

4.1. Messier

A French astronomer named Charles Messier (1730 - 1817) compiled a list of approximately 100 diffuse objects inside a "Catalog of Nebulae and Star Clusters".

The Messier Catalog (110 objects) is well known as a collection of the most beautiful objects in the sky, including nebulae, star clusters and galaxies. Today's version of the catalog usually includes the addition of objects observed by Charles Messier and his friend and colleague, Pierre Méchain, but were not included in his original list.

Tip: To get more information on Messier's Catalog visit the excellent site <http://www.seds.org/messier/>

4.2. Caldwell

The Caldwell list (110 objects) is a recent one done by M. Moore and published by *Sky & Telescope*; it includes several objects in the southern hemisphere. These objects were not observed by Charles Messier, who lived in the Northern hemisphere.

4.3. Herschel

The Herschel catalog is a post-Messier list promoted by the Astronomical League, honoring the first true deep-sky observer, William Herschel, who discovered some 2,500 galaxies, nebulae and clusters. The Herschel catalog includes 400 objects.

4.4. SAC

This list was compiled and is used by members of the [Saguaro Astronomy Club](#) of Phoenix, Arizona. The best 110 NGC objects are included in this list.

4.5. Bright Stars

The following table lists bright stars and their numeric IDs as used by Astromist.

Id	Name	Mag
1	alAnd(Alpheratz)	2.06
2	al-1Cru(Acrux)	1.77
3	al-2Lib(Zubenelgen)	0.96
4	alAql(Altair)	1.25
5	alAri(Hamal)	2.00
6	alAur(Capella)	1.65
7	alBoo(Arcturus)	2.75
8	alCar(Canopus)	1.50
9	alCas(Schedar)	2.23
10	alCen(Rigel)	2.08
11	alCet(Menkar)	0.85
12	alCMa(Sirius)	0.38
13	alCMi(Procyon)	1.86
14	alCrB(Alphecca)	1.92
15	alCyg(Deneb)	1.74
16	alEri(Achernar)	0.46

Id	Name	Mag
17	alGru(Al_na'ir)	2.02
18	alHya(Alphard)	1.79
19	alLeo(Regulus)	2.14
20	alLyr(Vega)	0.77
21	alOph(Rasalhague)	1.85
22	alOri(Betelgeuse)	-1.46
23	alPav(Peacock)	2.39
24	alPeg(Markab)	4.12
25	alPer(Mirfak)	0.12
26	alPhe(Ankaa)	2.39
27	alPsA(Fomalhaut)	5.47
28	alSco(Antares)	2.43
29	alTau(Aldebara)	0.08
30	alTrA(Atria)	1.63
31	alUMa(Dubhe)	2.59
32	alUMi(Polaris)	3.42
33	alVir(Spica)	0.61
34	beCar(Miaplacidus)	1.35
35	beCen(Hadar)	-0.04
36	beCet(Diphda)	2.04
37	beGem(Pollux)	2.21
38	beLeo(Denebola)	1.58
39	beOri(Rigel)	1.64
40	beTau(Elnath)	0.50
41	beUMi(Kochab)	2.23
42	epCar(Avior)	1.68
43	epCMa(Adhara)	1.14
44	epOri(Alnilam)	-0.72
45	epPeg(Enif)	2.49
46	epSgr(Kaus_Aust.)	2.02
47	epUMa(Alioth)	1.86
48	etOph(Sabik)	2.08
49	etUMa(Alkaid)	2.06
50	gaCru(Gacrux)	0.97
51	gaCrv(Gienah)	1.63
52	gaDra(Eltanin)	0.03
53	gaOri(Bellatrix)	1.70
54	laSco(Shaula)	2.23
55	laVel(Suhail)	1.98
56	siOct	1.16
57	siSgr(Nunki)	1.94
58	th-1Eri(Acamar)	1.80
59	thCen(Menkent)	-0.01
60	thPer	2.53

4.6. Double Stars

160 double stars extracted from the SAO catalog have been integrated inside the Astromist catalog. The following list gives you Astromist's ID of the most well known double stars.

Id	SAO Id	Const.	Name
80	SAO216113	ERI	Acamar
38	SAO21732	CAS	Achird
55	SAO98267	CNC	Acubens
50	SAO172676	CMA	Adhara
66	SAO87301	CYG	Albireo
61	SAO157323	CRV	Algorab
29	SAO163422	CAP	Algedi
2	SAO37734	AND	Almach
42	SAO10057	CEP	Alphirk
149	SAO124068	SER	Alya
64	SAO63256	CVN	Cor Caroli
31	SAO163481	CAP	Dabih
161	SAO15384	UMA	Dubhe
134	SAO127029	PEG	Enif
147	SAO159682	SCO	Graffias
74	SAO30447	DRA	Kuma
45	SAO19827	CEP	Kurhah
13	SAO92680	ARI	Mesarthim
128	SAO132221	ORI	Mintaka
135	SAO23655	PER	Miram
162	SAO28737	UMA	Mizar/Alcor
130	SAO132323	ORI	Nair al Saif
163	SAO15384	UMI	Polaris
100	SAO98967	LEO	Regulus
126	SAO131907	ORI	Rigel
88	SAO84951	HER	Sarin
116	SAO67451	LYR	Sheliak
132	SAO132314	ORI	Trapezium

4.7. Customizable Catalogs

Astromist provides several ways to create your own user object catalogs or lists.

- First UserObjectDB.exe tool allows you to create your own catalogs of objects without the usual limitations of Palm Text memos (i.e. only few objects at a time). Furthermore an Excel spreadsheet is provided to help registered users to easily create catalogs and also build their own library of object catalogs. Unfortunately it is a Windows based tool so Macintosh users will have to use one of the other methods or run a Windows emulator.
- Second, the import of Palm Text memos is supported as well. The Excel spreadsheet can be used to produce the object list. Doing it this way, only a limited number of objects can be added at a time (between 20 and 30) so several memos are required.
- Third, using the Astroplaner program. I made a special arrangement with Paul Rodman, the Author of this great program to let him integrate full Astromist object

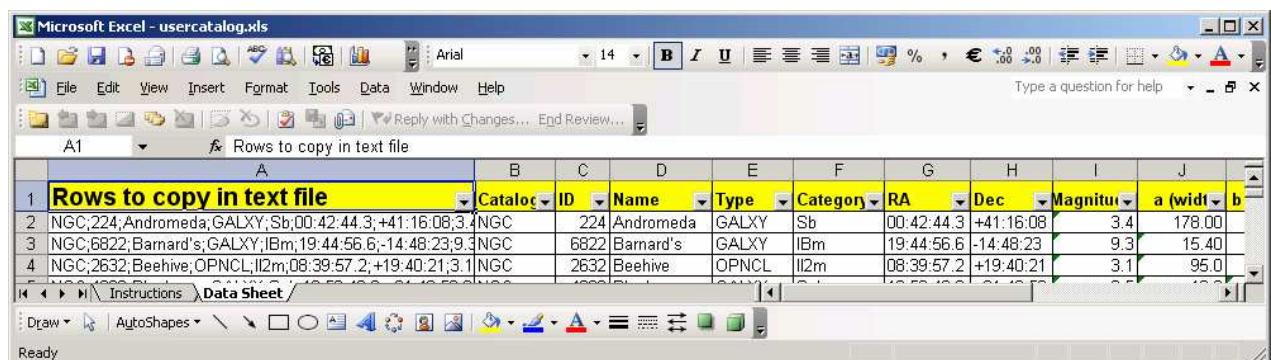
catalog creation ability into his software. This is the easiest method and it works either on Windows or Macintosh.

4.7.1. Prepare the catalog

An Excel spreadsheet is designed to help you to create the text file required by the UserObjectDB.exe program to create your Astromist custom object database.

The following information is required:

Catalog	This column contains the Astromist code of the Catalog. Open Finder Assistant to find the short name to use. If no catalogs match, use the User catalog code.
ID	The id of your object within its catalog. If you are using the User catalog code, just input a unique id starting from 1.
Name	This field contains the name of the object. By default you can just concatenate the catalog code and the id code. For your own objects or if you are using User catalog codes, fill this field with a useful mnemonic.
Type	The type of the object.
Category	This field lets you enter detail about the object category. You can leave it blank if you do not have this information.
RA	The right ascension of the object. Astromist supports one arcsecond precision.
Dec	The declination of the object. Astromist supports one arcsecond precision.
Magnitude	The magnitude of the object. Only a dot is accepted as separator. Example: 8.1
a (width)	The width of the object in arcseconds. For star clusters only.
b (height)	The height of the object in arcseconds.
PA	The angle of the object against True North. This information is in degrees.



Once all the rows are filled, open the user_object.txt file using a text editor and just copy the first column of the data sheet and paste it to the text file then save it.

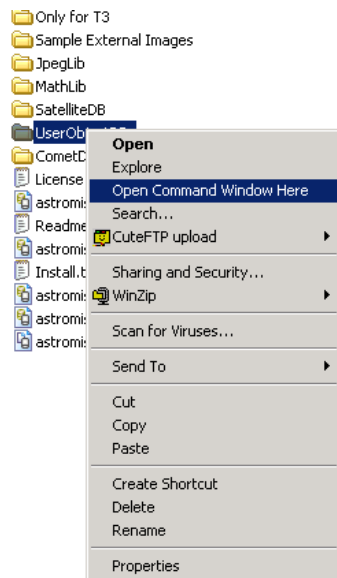
After that you can run the UserObjectDB.exe program or import the text file as a new memo to your palm.

4.7.2. UserObjectDB

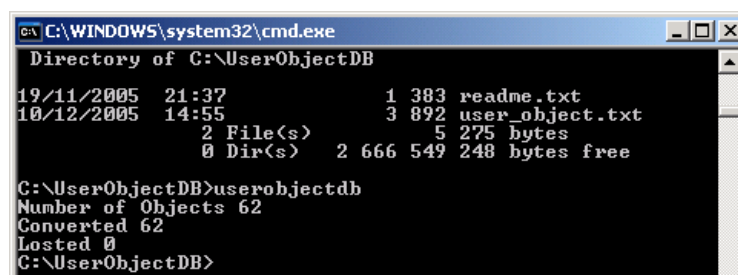
Using this tool you can create catalog of up to 32000 objects. To estimate the final size of your catalog you can use this rule: 100 objects=10Kb.

The procedure is as follows:

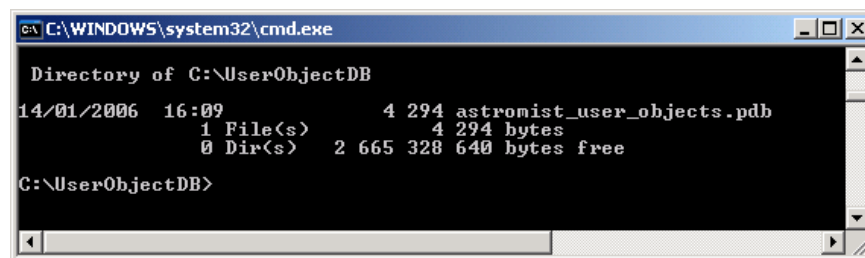
- Open a DOS session and change to the program's directory.



- Run UserObjectDB.exe to create the new database.



- The astromist_user_objects.pdb file is created in the same folder.



- Now you just have to install the new database file to your Palm. Two ways are possible:

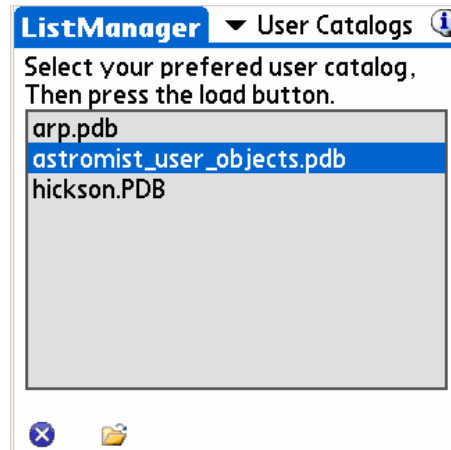
- Into Palm main memory. In this case only one custom catalog can be used

Into the Palm/Programs/Astromist/usercatalogs/ folder of your memory expansion card. In this case you can create as many catalogs as you want (up to 100) and browse them from the program to select the one you want to work with. Doing it this way you will have to rename the file to the name you want but don't change the .pdb extension. In this case in order select a particular catalog, use ListManager and choose User Catalogs filter. Then you will be able to select your preferred catalog. Furthermore you can switch as many times as you want between catalogs and by the way create step by

step (using NightTripper) a unique list of objects involving several different custom made catalogs. This list can be exported once created to create later a new catalog using UserObjectDB tool.



Finally the icons on the wizard will let you select your objects like other Astromist objects. They will be listed under the User Catalog.

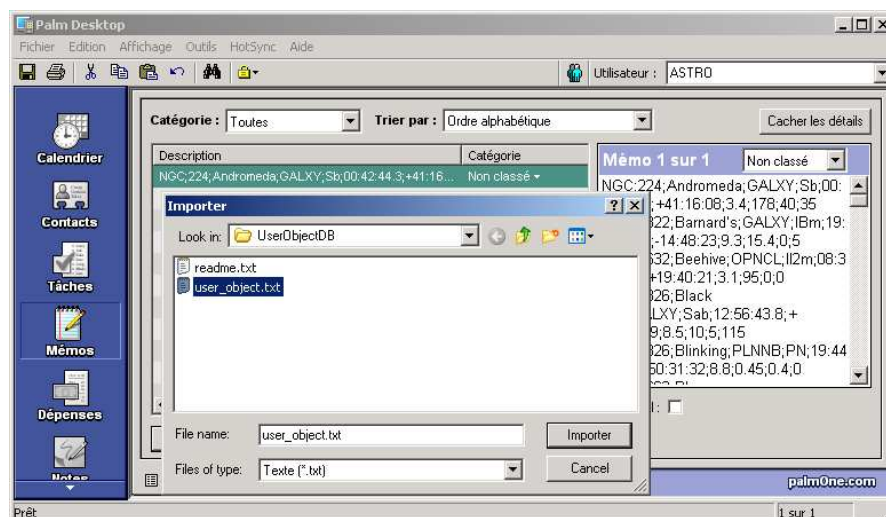


User catalogs management screen

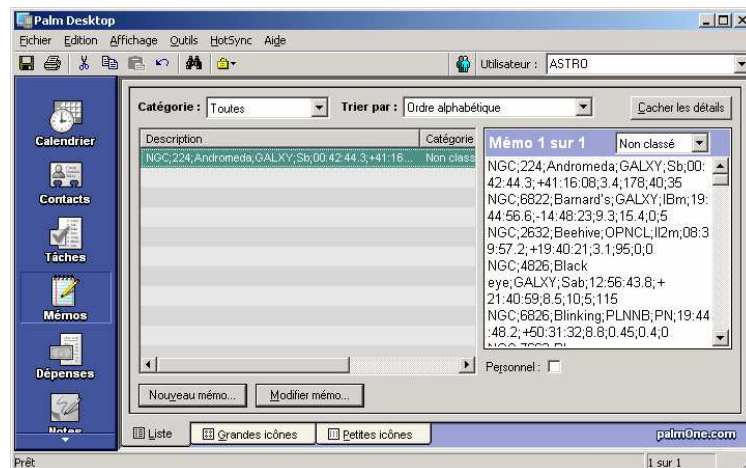
4.7.3. Using the Palm Text memo

Using the user_object.txt file you created, you can import it and create a Palm memo using your PalmDesktop application.

➡ **BEWARE; SET THE FILE TYPE AS TEXT.**



First Import the text file into a new memo



Once imported the new memo is available

- Now do a **HotSync** to install this new memo into your Palm.
- Once done, launch Astromist and open the Import to current List meu item.



Astromist User Object Import screens

- Tap on replace or Update considering the action you would like to do with your current object list.
- Now select the memo and press import.
- The current object list is then updated or refreshed.

Note: For Mac or Linux users, if you want to create a large object list without the UserObjectDB.exe tools, create several memos. When you import the first one, choose replace and for all others select update. In this case pay attention before to set "Max Selected" setting in Preference 2/5 panel to the maximum value (500).

4.7.4. Astroplanner

Note: Please see Astroplanner user documentation for more information on this program.

An arrangement has been made with Paul Rodman, the author of Astroplanner to add an Astromist export function to the program. Astroplanner is now able to produce ready-made astromist user object catalogs.

5. Telescope control

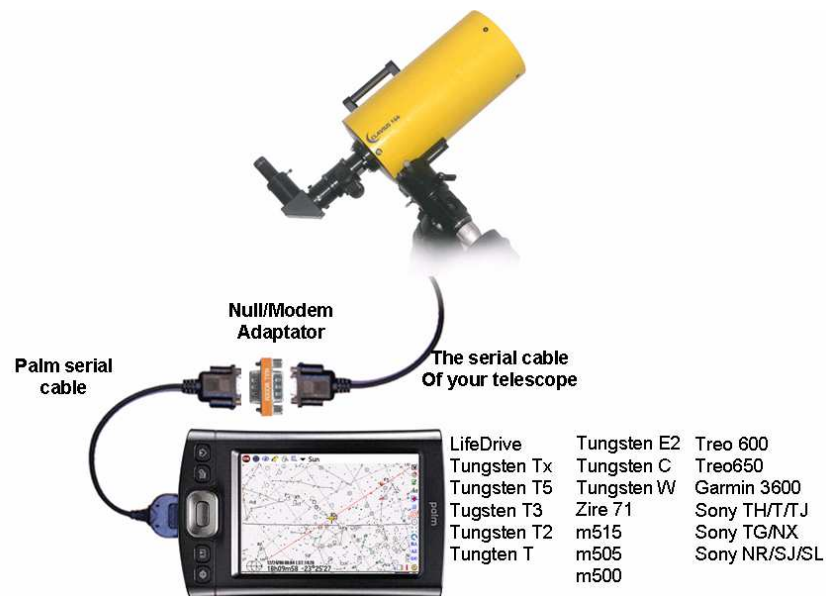
Note: Many cable interfaces may be found at <http://www.atozastro.com/>

Before connecting your PDA to your mount you need to:

- Turn on the power on your mount.
- Proceed with initialization and set-up.
- Connect your Palm.

5.1. Telescope Interface

5.1.1. Serial setup



About the furniture:

- A serial cable for your palm: <http://www.pccables.com> . If you do not find a cable at this place, there is low chance elsewhere other one exists.
- A null/modem DB9 male/male adaptor:

<http://www.cablewholesale.com/cgi-bin/search.cgi?body=Search&text=mini+null+modem>

- A serial cable compatible with your telescope mount. Ask to your usual reseller. On the internet many place are available to get such hardware. Some of them:

- For Celestron cables:
<http://www.atozastro.com/shop/scripts/prodList.asp?idCategory=27>

- For Meade cables:

<http://www.atozastro.com/shop/scripts/prodList.asp?idCategory=10>

The overall cost is estimated to 85\$ (60+5+20).

5.1.2. Bluetooth



About the furniture:

- A male AirCable adaptor+Null/Modem : <http://www.aircable.net/serial.html> .

Note: Astromist registered users will get a special coupon, upon request, for a discount (US\$10) on the Bluetooth-to-serial converter certified to work with Astromist. Wiring plans to build a connector from this device to Celestron and Meade telescopes will be provided as well.

- An external 5V power source to be connected to the AirCable or a 9V battery plug with the correct jack.



- A serial cable compatible with your telescope mount. Ask to your usual reseller. On the internet many place are available to get such hardware. Some of them:
 - For Celestron cables:
<http://www.atozastro.com/shop/scripts/prodList.asp?idCategory=27>
 - For Meade cables:
<http://www.atozastro.com/shop/scripts/prodList.asp?idCategory=10>

The overall cost is estimated to 85\$ too (60+5+20).

Note: Bluetooth is tested at each release with Palm T3 and T5 handhelds using a Celestron GT GoTo mount, a Meade ETX-70 and a Bluetooth GPS device.

5.1.3. Infrared

Infrared protocol is still experimental. It has been basically tested using an Actisys 100M serial-to-infrared converter. The main disadvantage of this kind of link is that you are obliged to be in front of the IR sensor to succeed, which is not always convenient.

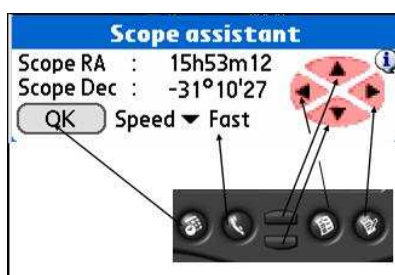
5.1.4. Manual mode

You can use Astromist to find objects even if you are not connected to a telescope. In this case you should select **none** for **scope drive** preference. Then Astromist will display object positions according to your type of mount. If you don't want to use positioning data at all, just use the sky chart and star hop to find your favorite objects.

5.2. ScopeAssistant

ScopeAssistant lets you control your telescope from your Palm. This functionality is available for the following telescope communication protocols:

- Meade LX200
- Meade Autostar
- Celestron Nexstar GPS, GT and CGE series
- Takahashi



Scope Assistant for Computerized mounts



ScopeAssistant for mounts using Encoder Drive

Palm keys can be used instead of a stylus. On Tungsten series units the navigation pad is mapped to hand control keys.

Note: ScopeAssistant is opened on each GoTo. Users can cancel a GoTo by tapping on the stop button or using the equivalent Palm key.

5.3. Scope Drive

5.3.1. Meade

The following models are supported by the driver:

- Magelan I, this drive doesn't support GoTo.
- Magelan II
- Autostar (certified)
- LX200 (certified)

5.3.2. Celestron

The following models are supported by the driver:

- Old GT (certified)
- New GT (certified)
- Nexstar 5 and 8 (certified)
- Nexstar 8i (certified)
- Nexstar GPS (certified)

The same cable works for all NexStar models and you can order one from most Celestron dealers. Plans for Custom cables are available at the following address:
<http://www.nexstarsite.com/PCControl/RS232Cable.htm>.

5.3.3. Losmandy

Losmandy supports LX200 protocol so you have to use the LX200 command set.

5.3.4. Astrophysics

Astrophysics mounts support LX200 protocol so you have to use the LX200 command set.

5.3.5. Takahashi

Temma protocol is implemented following the technical Takahashi specification. This driver is certified.

5.3.6. ServoCat

ArgoNavis ServoCat protocol is implemented. Only the Goto and Get position commands are supported.

5.3.7. Encoder interface

The following encoder protocols are supported:

- Ouranos
- NGC-MAX
- AAM SkyVector
- Dave Ek
- BBox

- SkyCommander
- Intelliscope

The encoder driver can only read information. It has no GoTo capabilities, but an EncoderAssistant screen is displayed to let the User figure out how far or close his telescope is in pointing to the object during a "Push-To" operation.



Encoder Assistant panel

5.3.8. GPS

Astromist supports GPS technology that uses the NMEA protocol. It has been tested with data coming from the following GPS systems:

- Garmin G12 sentences for version 4.57
- Garmin eTrex Summit
- Garmin eTrex Vista
- Garmin basic yellow eTrex, European version
- Magellan GPS Companion
- Magellan 315
- Raytheon RN300
- NavMan 3400
- Earthmate with SiRF chipset
- Evermore GM-305.

Bluetooth GPS's are compatible with Astromist as well as some integrated units (IQ3600 pda).

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