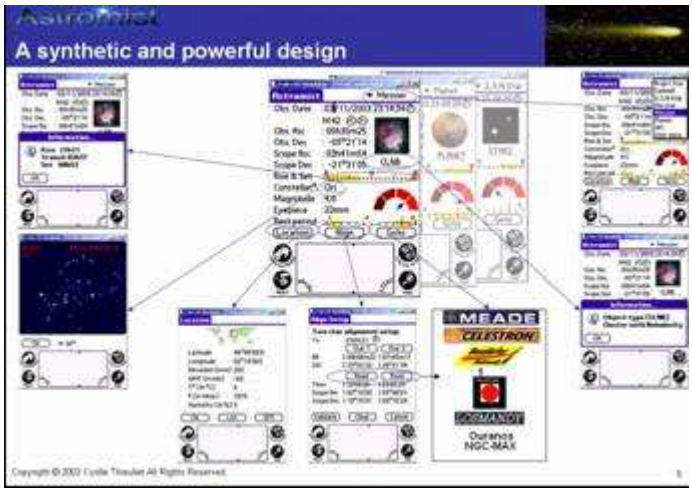
Astromist 2.6
User Guide

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 the user interface is rarely easy to use due to the small screen display. 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 allow an enthusiast to view powerful interactive “sky charts” and select an object simply by clicking on it. Most of these software applications 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 answer some common questions:

- 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 a one hour observation session. What objects can I see during this time frame?
- Are these objects easy to see?
- 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, and create powerful sky charts. It can also indicate the best time and date to see an object and recommend the appropriate eyepiece to give the best view. All astronomers, regardless of their level of experience, will be amazed by the accurate positioning of objects including corrections for precession, nutation, refraction and light aberration. Astromist can correct for telescope-mount errors using several advanced pointing models. In addition, Astromist can pinpoint your observing location using an auxiliary GPS system which you may already own and use for sailing, hiking or travelling in your car. Finally, Astromist enables 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 large feature set unmatched by other Personal Digital Assistant (PDA) software applications:

- Bluetooth (and infrared) telescope control. 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
  - Star 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.

- Support for 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 plots a comet (or asteroid) 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 position of made-made Earth satellites in the sky and helps 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 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 position of the planet's moons, views of the planet, and a surface map including more than 900 features.
- JupiterAssistant shows the rotation of the Great Red Spot, the planet's moons, 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 normally available with your Palm handheld, etc.
- AlignmentAssistant helps 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 allows entry of up to three preferred location settings.
- FinderAssistant allows easy browsing of objects.

- High-precision computation algorithms are based on the famous Novas library. These algorithms correct for refraction, topographic position (Earth aberration, precession and nutation), temperature, and atmospheric pressure.
- 2-star alignment enables quick GoTo to an object even without polar alignment of your mount.
- N-stars alignment enables telescope pointing better than one arc minute resolution.
- A large selection of Messier and planet photos is included.
- More than seven selection criteria are available 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 whether an object is easy or difficult to see considering its size, magnitude, 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, including 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, a library of 1200 Moon features images and a library of 70 images of constellations.

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 image set will reduce the memory space required and speed up image display.

You can add any additional images by 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. Prerequisites

2.1.1. Version of the Operating system

2.1.1.1. Palm OS

Astromist requires at a minimum version 4.0 of PalmOS, with 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. Equipment supported on Palm OS

2.1.2.1. Model of assistant

Astromist has been developed and tested on the following Palm OS models:

Palm 505c

Tungsten T3

Palm T5

Palm models earlier than the 505c (Palm IIIx, Palm Vx, etc) do not provide sufficient internal dynamic storage (512Kb minimum) to run Astromist.

To fully benefit from the Astromist assistants, you will want higher resolution screens (Palm E2 and Treo 650 for example) and larger screens (i.e., 320x480 screens in Palm models T3, T5, Tx, LifeDrive, Sony TH55, Garmin 3600, Zodiac, etc).

2.1.2.2. Peripheral Control

The control of peripherals such as telescopes, GPS units, or cameras requires a serial port or Bluetooth on your personal assistant. Some entry level Palms (for example the Palm Z21) have neither port, nor the possibility of memory extension through an SD slot. These models should be avoided for peripheral control.

Note: *Peripheral control by Infrared is available on an experimental basis. It has been tested with a serial/infrared Actisys 1000SL converter. It is the only unit compatible with the Palm serial/infrared protocol, and is accessible in terms of price. The serial/Bluetooth converters are less expensive and are more powerful: they do not require the receiver to face the sensor to allow communication.*

WIFI is not supported for the moment.

2.1.3. Equipment supported on Windows Mobile.

2.1.3.1. Model of assistant

Any Pocket PC running Windows Mobile 2003 or later, with at least 32Mb of memory can run Astromist.

*Note: Astromist will **NOT** run on WM 2002.*

The minimum screen resolution supported is 240x240. Better results are achieved with 240x320 or 320x240 resolution. With lower resolution, the display of certain screens can be unsatisfactory.

Astromist fully supports the high resolution screens (480x640 or 640x480) found on some PDAs.

2.1.3.2. Peripheral Control

Control of peripherals such as telescopes, GPS units, or cameras requires an operational Bluetooth port on your Pocket PC (port COM5 under Windows Mobile 2003 or COM6 under Windows Mobile 5 or 6). The use of a serial port (COM1:) is also supported with the appropriate cable.

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

Note: WIFI is not supported for the moment.

2.1.4. Memory card and card reader

To install all of the libraries and provided databases (600MB required for the images in high resolution), an external memory card is mandatory.

For reasonable response time, a minimum transfer rate of 9Mb readings per second is recommended (a “high performance” x66 memory card).

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 image JPEGs.

These 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 license 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 for loading JPEG images

Two libraries are used based on the Palm OS to display JPEG images. These two libraries are free and also distributed under GNU GPL license.

They are both provided by default, and their selection depends on the processor type of your assistant:

- If your processor is of type ARM (the case on all Palm models after “Palm 505c”), you can use the PnoJpegLib library. Its principal advantage is almost instantaneous image loading even in high resolution.
- In the event of compatibility problems with the first library, the JpegLib library will work. It functions on all Palm models.

2.2. Differences between the free and complete versions

The free version of Astromist has the following limitations:

- No more than 5 selectable objects may be placed at the same time in the lists
- Only 1000 deep sky objects are available
- Only the last 100 Moon craters (of the complete set of 900) are available. Clicking on the chart will select the crater nearest to this subset, rather than the intended crater
- No complementary star catalogues.
- Only the 1600 most brilliant stars are available
- It is not possible to save your user preferences, or your observation location
- Modification of the date in many screens is disabled
- Bluetooth control functions are missing
- No tools for the creation of custom catalogues are provided

The complete version does not have any of these limitations.

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

The complete version also provides tools to

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

2.3. Installation and Emergency Backup

Since the software is distributed by download rather than physical media, it is advisable to backup the Astromist files in case a problem occurs on your PDA or hard disk.

The simplest method of preparing a backup entails the following steps:

- create an Astromist_Backup directory on your hard disk
- download the files received during your registration into this directory
- extract the files, creating a tree structure ready for a new installation.

The contents of this directory may then be copied to a CD-ROM for backup.

2.4. Description of the available files

2.4.1. Main Catalogues

Several additional catalogues are available, replacing the files provided in the free version:

- Astromist_25x_palm_reg.prc on Palm OS or Astromist_25_ppc_reg.exe on Windows Mobile - the program,

Note: *Extension xxx of the catalogues under Palm OS becomes "pdb", while under mobile Windows it becomes "ppc".*

- astromist_brightstar.xxx - This catalogue contains the 200 brightest stars with their common names. It requires 12Kb of memory.
- astromist_constellation.xxx - the catalogue for the constellation lines.
- astromist_comet.xxx - the complete catalogue of the asteroids and comets. This catalogue can be modified with an external tool (cometdb.exe).
- astromist_default_stars.xxx - the default catalogue of the stars (1600 stars magnitude lower than 5)
- astromist_eyepiece.xxx – This catalogue describes available eyepieces. This catalogue should 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 locations. It is possible to create your own location list using the tool locationdb.exe.
- astromist_mars.xxx - This catalogue contains more than 800 significant locations on the surface of Mars. This catalogue requires 44Kb of memory.
- astromist_moon.xxx - This catalogue contains more than 900 craters, lakes, and seas on the surface of the Moon. This catalogue requires 92Kb of memory.
- astromist_obj_1k.xxx - the default catalogue of deep sky objects (DSO), limited to 1000 objects,
- astromist_obj_18k.xxx - the complete catalogue of deep sky objects. It contains more than 19000 objects and requires 830Kb of memory.
- astromist_obj_cross_ref.xxx - the cross reference index enabling Astromist to find objects with more well known identifiers.
- astromist_obj_1k_idx.xxx – the search index used in the sky charts to display the visible objects. This index is limited to the 1000 brightest objects in the sky. It is used for fields of view from 180° down to 45°.
- astromist_obj_2k_idx.xxx - Similar to the preceding catalogue, this index contains the 2000 brightest objects (magnitude lower than 12). It is used for fields of view from 30° to 10°. It requires the 18K object catalogue.

- astromist_obj_18k_idx.xxx - the index of the complete catalogue (the 19000 DSO). It is used for a field of view lower than 10°. It requires the 18K catalogue.
- astromist_obj_18k_desc.xxx - This catalogue contains descriptions with the Dreyer format of more than 14000 DSO. It requires 875Kb of memory.
- astromist_satellite.xxx – This catalogue contains the 100 brightest artificial satellites. This catalogue must be updated regularly to allow a precise calculation of the position of the satellites. This process is described later in this document (See *Update the Comet and Asteroid database*). The catalogue requires 28Kb of memory.
- astromist_user_object.xxx – This custom catalogue is created using the tool userobjectdb.exe. Its size depends on the number of records; 100 objects require approximately 10Kb 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 custom external catalogues. On Pocket PC there is no such limitation.

2.4.1.1. Additional Star Catalogues

Several complementary catalogues are available to registered users:

Note: Extension xxx of the catalogues under Palm OS becomes "pdb"; under Mobile Windows it becomes "ppc".

- astromist_hr.xxx - This catalogue includes the "Yale" list of stars visible with the naked eye. There are 9100 stars with a magnitude lower or equal to 7.0. It requires 120Kb of memory.
- astromist_hr_idx.xxx - the index for the preceding catalogue.
- astromist_hip_16k.pdb - an extraction of the Hipparchos catalogue of stars with magnitudes between 5 and 7.2. This catalogue contains 16680 stars and requires 230Kb of memory
- astromist_hip_32k.xxx - an extraction of the Hipparchos catalogue of stars with magnitudes between 5 and 7.8. This catalogue contains 31600 stars and requires 410Kb of memory
- astromist_hip_64k.xxx - an extraction of the Hipparchos catalogue of stars with magnitudes between 5 and 8.6. This catalogue contains 63300 stars and requires 900Kb of memory.
- astromist_hip_110k.xxx – the complete Hipparchos catalogue (118000 stars). It requires 1,600Kb of memory.
- astromist_hip_110k_idx.xxx - the index for the preceding catalogue.
- astromist_tycho_390K.xxx - This catalogue contains all stars of the Tycho catalogue to magnitude 10.1 (390000 stars). It requires 5Mb of memory.
- astromist_tycho_2500K.xxx - This catalogue contains all the Tycho catalogue (2.5 million stars) to magnitude 13. This catalogue requires 30Mb of memory.
- astromist_tycho_idx.xxx - the index for the preceding catalogue.

Note: *Astromist automatically selects the best catalogue to be used according to the zoom level chosen in the sky charts. It is best to copy all catalogues onto the memory card in the Astromist directory and to let the program select the catalogue based on the situation.*

2.5. Installation Procedure under Palm OS

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

Use the “delete” function of your Palm to remove Astromist,

Sync to erase the Astromist files saved on your computer,

Then begin the complete installation of the software.

2.5.1. Installation without a memory card

This type of configuration does not allow use of all the image libraries provided with Astromist. Moreover, it does not allow simultaneous use of multiple star catalogues; only a single catalogue can be selected. Lastly, only one custom star catalogue can be loaded in memory.

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

- astromist_25_palm_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 NOT advised to install the 18K index because it significantly slows the display of sky charts for fields of view from 180° to 20°.*

- astromist_obj_18k_desc.pdb
- astromist_obj_cross_ref.pdb
- astromist_satellite.pdb
- astromist_user_object.pdb

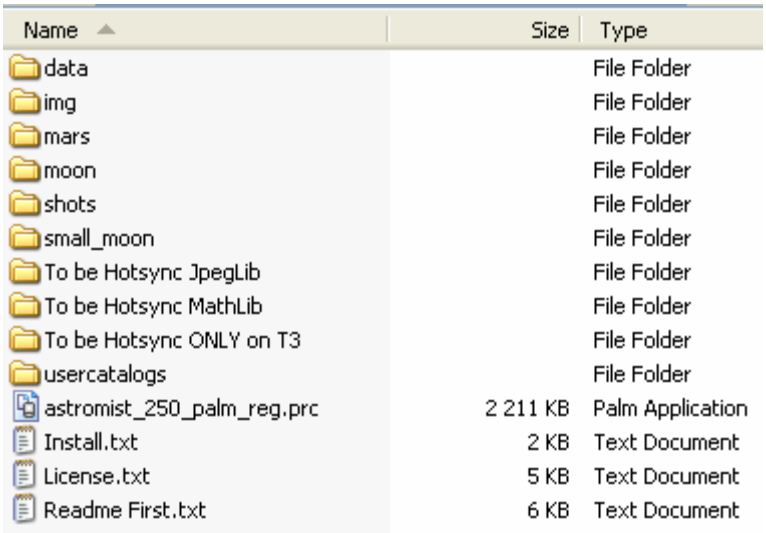
Only one of the provided star catalogues.

Note: *In this type of configuration, it is advised to install the catalogue astromist_hip_110K.pdb if your Palm is fast enough. Otherwise, astromist_hip_32K is a good compromise.*

2.5.2. Installation with a memory card

➲ **A 1GB MEMORY CARD IS THE MINIMUM NEEDED TO INSTALL ALL OF THE PHOTO LIBRARIES AND CATALOGS. AN EXTERNAL CARD READER (USB) IS NECESSARY TO COPY THE FILES IF YOU DO NOT HAVE A PALM T5 OR LIFEDRIVE. IF YOU DECIDE TO BUY A MEMORY CARD OF HIGH CAPACITY, CHECK WHETHER YOUR ASSISTANT CAN SUPPORT IT. THE PALM 505, FOR EXAMPLE, CANNOT MANAGE CARDS WITH CAPACITY HIGHER THAN 256MB.**

The simplest method is to extract the zip archive files into the following directory tree:

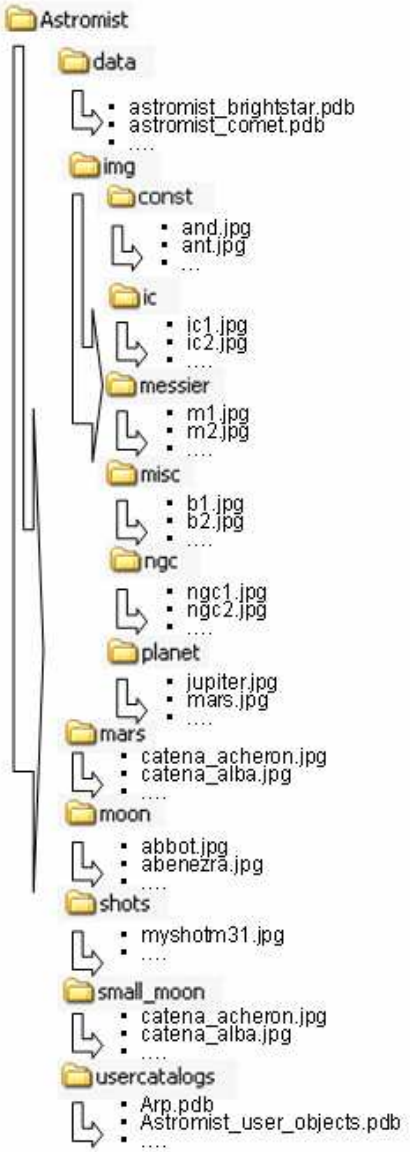


You can make a backup of the Astromist folder at this stage onto a 700MB CD-ROM.

Then, proceed to the following hot syncs:

- The main program astromist_25x_reg.prc (where x is equal to 0 in the picture above),
- The additional libraries provided inside « To Be Hotsync … » folders. Beware; the hot sync must be done according your Palm device and Palm OS configuration.
- Then, you can remove the « .txt » files, the « .prc » program and the folders « To be Hotsync… » from the Astromist directory. These files are not required on the memory card.

At this stage you should have the following directory structure (folders are open below to display their contents):



To finish the installation, drag the Astromist folder from your computer onto your memory card. 700MB will be required for a full install including 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. Installation Procedure under Mobile Windows

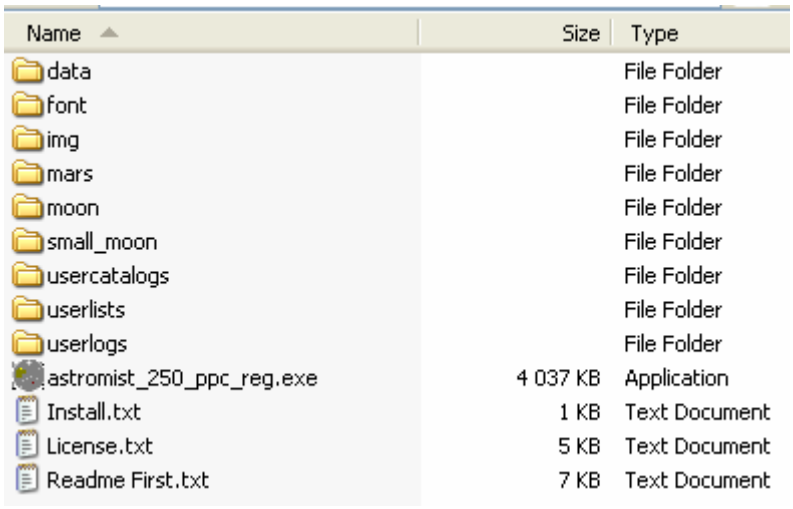
Note: *For a new complete version installation, it is strongly advised to remove the demonstration version to avoid partial catalogues. To accomplish this, delete the Astromist directory and its contents.*

Note: *The use of an external memory card of at least 1GB is strongly recommended to profit from a complete installation. The card performance (reading rate) will have a major impact on the speed of some of the program assistants. Do not hesitate to use a "high performance" card (x66 or more).*

To install Astromist on your Pocket PC just copy the Astromist directory tree structure from the PC to the Pocket PC.

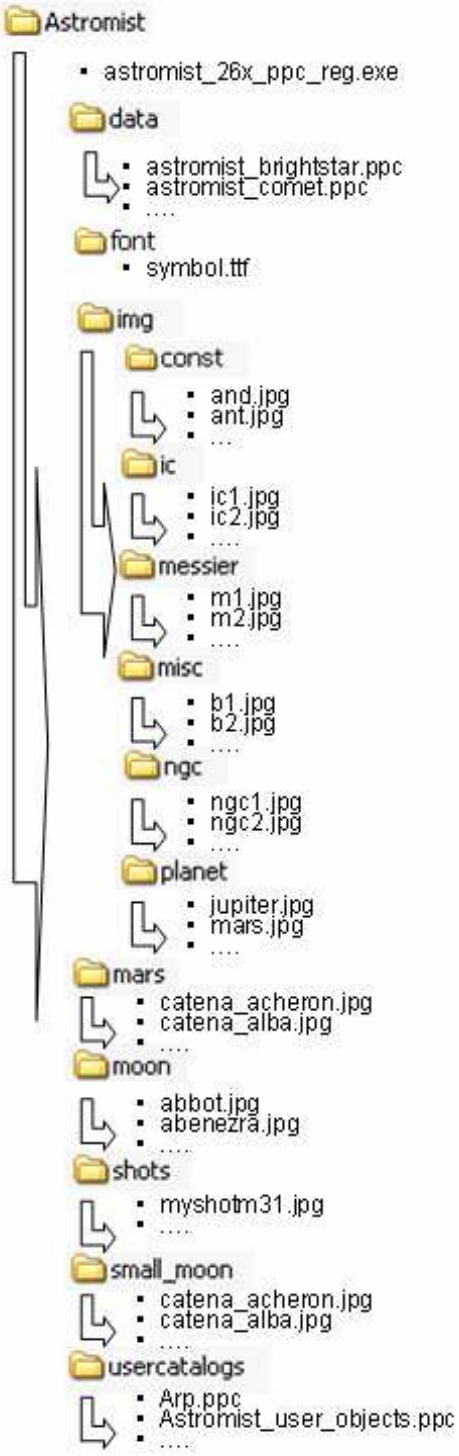
The contents of the directory are as follows:

- The directory "data" contains all of the .ppc catalogues
- The font directory contains the symbol font. This font is mandatory to use the SkyChart.
- The directory "img" contains all of the Jpeg images of Messier, planets, NGC and IC and Abell objects
- The directory "mars" contains all of the Mars Jpeg images
- The directory "moon" contains all of the Jpeg Moon images
- The directory "small_moon" contains the reduced size Moon Jpeg images
- The directory "usercatalogs" contains your optional personal catalogues
- The directories "userlists" and "userlogs" are created by the program if need be. No catalogue is present after initial installation.



Contents of the Astromist folder once the zip archive is extracted.

This tree structure can be prepared on your hard disk then copied to your PDA or your memory card. For an installation without a memory card, you will need to remove all or part of the images from their directories and remove the largest provided star catalogues from the directory "data". The number of files needing to be removed depends on the space available on the Pocket PC.



Note: Tycho catalogs are not shown in the above image, but should be present in the data folder.

2.7. Version Updates

With each new major version of the software (i.e. 2.5.7 to 2.6.0 for example), an email is sent to users to indicate the benefits of the update.

Between major updates, intermediate versions (i.e. from 2.6.0 to 2.6.1) can be obtained for free to correct the program errors. In this case, simply download the full version reusing the registered link you received at purchase or from the upgrade mail. Generally only the main program (.prc or .exe) has to be hot sync/installed.

3. Functionality

3.1. Principles

Astromist provides a large set of functions covering 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: *To reach the Main Menu from anywhere in the program, click on the title bar of the current screen.*

Astromist menus

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

Astromist Wizard is the center point of Astromist, gathering in one place the major tools and assistants. Its goal is to provide access, in one tap, to the most used functions.

Alignment tools let you align your mount using several different scenarios (polar align, 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 for advance preparation of observing sessions. Numerous selection criteria are available as well as unique object selection.

SkyChart provides detailed sky maps and planetarium views to help you observe and learn the sky.

CompassChart provides a compass view where objects are displayed. It helps 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 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 thoughts during an observing session.

Comet&Asteroid Assistant simulates and forecasts a comet or asteroid's trip across the sky and solar system.

Eclipse Assistant simulates and forecasts all solar eclipse events.

Jupiter Assistant simulates and forecasts Jupiter 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 images of Moon features (more than 1100 included).

Planet Assistant forecasts events including eclipses, conjunctions, oppositions, etc. It also 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 and predicts 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 adjust all of Astromist's settings.

Location tool sets your position on Earth and specifies the characteristics of your observing sites to enable powerful Astromist forecast algorithms (visibility of the object, best eyepiece to use, etc.)

NightMode selector selects the best night mode that fits your current conditions. Three levels of after dark screen illumination are provided.

CCD Assistant computes useful values associated with your CCD and shows your CCD's field of view inside sky charts and the planetarium.

Checklist Assistant helps 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 as user object catalogs created using Astromist. This is very handy when you prepare for an observing trip or if you want multiple object lists prepared ahead of time.

Import Memo to List Assistant lets you import 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 object list into one or several text memos.

Export Alignment Data lets you export your current alignment data into a text memo. This function is used if you have alignment issues and would like some support to help you.

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

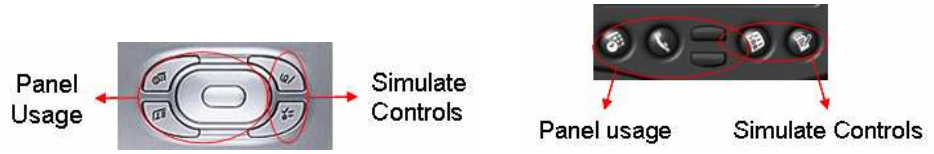
All screens benefit from larger screen sizes (320x480 on Palm and 480x640 on Pocket PC) when displaying additional information and graphs. Astromist also functions in landscape mode.

320x480 *480x320*

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 stylus inputs as much as possible and to promote predefined lists. This feature lets you control almost all panels and screens within Astromist without a stylus, 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 rightmost button lets you activate the control. Specifically, clicking while on:

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

The other buttons (left, up and down and navigation pad) link to panel related functions. The leftmost button usually activates the OK button (including message popups), to avoid having to use the stylus.

3.3. Astromist Wizard

The Astromist wizard gives fast access to the main functions of the application and provides shortcuts to functions using selected objects.

Wizard shown on HiRes and LowRes Screens

Several data are displayed in the center of the screen:

- The observation location,
- The current date,
- The current hour (standard time),

Note: Pressing the icon accesses the date and hour selection module. This date can be set to a different value than the current date.

- Rise and set times for the Sun for the current date, as well as the time of beginning of “astronomical” night i.e. when the Sun is 18° below the horizon. All times are local.
- Rise and set times for the Moon for the current date. The phase is represented with an icon on high resolution screens.

Available buttons on the wizard allow quick access to the powerful Assistants within Astromist:

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

-  Selects the planets.
-  Selects galaxies.
-  Selects nebulae.
-  Selects globular clusters.
-  Selects comets and asteroids.
-  Selects bright stars.
-  Launches the "MoonAssistant" to view ephemeris, map, etc.
-  Launches the JupiterAssistant.
-  Launches the SaturnAssistant.
-  Launches the PlanetAssistant.
-  Selects Caldwell objects.
-  Selects Messier objects.
-  Launches NightTripper.
-  Selects objects from your preferred custom objects database.

-  Loads and saves custom object lists, allows selection of 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 to display the sky using your location and current date and time. If no objects have been selected the planets are selected by default; otherwise the current object list is used.

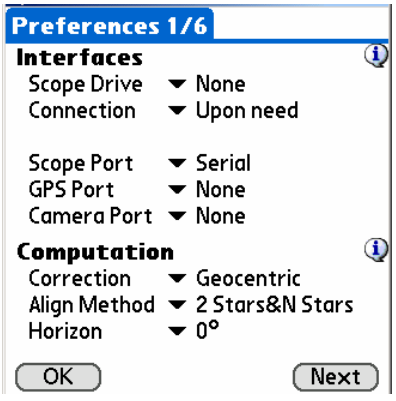
3.4. General Set-up

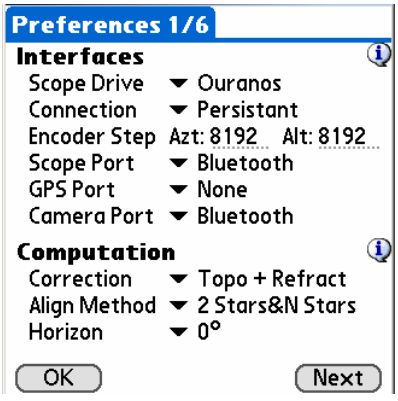
Astromist has a broad set of configuration options.

Pressing the OK, Next, or Prev buttons automatically saves the values of the current panel.

Each panel's information button provides localized help information.

3.4.1. Preferences 1/6





3.4.1.1. Interfaces

Before connecting Astromist with peripherals, you must set the following values:

- **Scope drive** - Choose the driver corresponding to your telescope or encoder. If your scope is not listed, the nearest compatible model can be selected.

Note: *Users of mounts like Astrophysics, Losmandy, or SkySensor must choose driver LX200.*

- **Connection** - This option indicates whether the connection to your telescope remains active (persistent) while Astromist is open, or whether it is opened and closed as needed by the program.

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

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

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

Tip: *To know if you must enter a negative value, once your encoder is connected to Astromist launch ScopeAssistant:*

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

- If turning the base of your telescope from left to right (clockwise) causes the value encoder for the azimuth to decrease, it is necessary to change the sign.

- **Drive port** selects 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 connection is expensive; Bluetooth is recommended for a wireless connection.

If no telescope is connected to Astromist, leave this value to “None”. If a scope is selected:

On Palm, it is sufficient to choose the type of connection. The program will find the appropriate means of communication.

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

- COM1: is reserved for the serial port.
- 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** is set to “None” if you do not have a GPS. Otherwise select one of the connection modes supported by Astromist and your GPS. Only GPS devices using the NMEA standard are supported.

On Palm, model IQ3600 with built in GPS is supported, as well as external GPS units connected by serial port or Bluetooth.

On Pocket PC, the communication port to the GPS must be selected based on your configuration. In the case of an external GPS you can choose the active serial or Bluetooth port of your PDA (COM6: for example).

- **Camera port** must be set if you wish to control your camera using Astromist. Either of the two connection modes (serial or Bluetooth) are available. The Bluetooth mode represents a practical alternative to the infrared case of controlling the Canon.

3.4.1.2. Computation

These parameters enable adjustment of several computation parameters.

- **Correction:** Astromist can calculate the position of objects for an observer placed at the center of the Earth (Geocentric), placed at your location (Topocentric), and by taking into account the atmospheric refraction of the object's image (in particular when close to the horizon) resulting in the image appearing a little higher in the sky.

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

- Align Method: Astromist allows two methods for alignment:
  - The first is completely autonomous. Astromist carries out the alignment of your telescope using 2 stars and can thus replace 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),
  - In the second, 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 lowered to less than 15 minutes of arc.

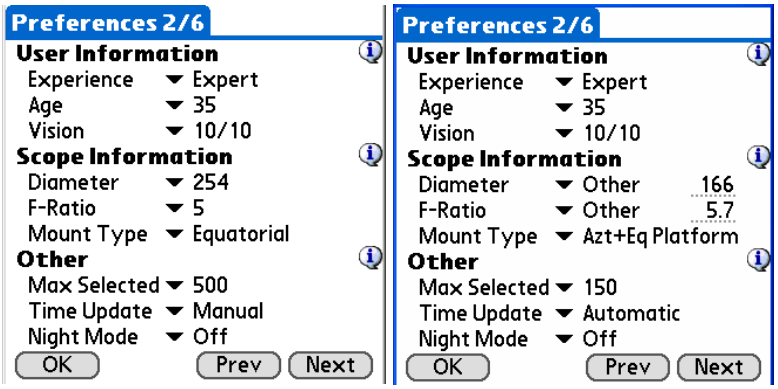
Note: If you have Dobson and/or you use encoders, the first method is necessary and will allow you to obtain an excellent precision of pointing.

If you use a computerized mount, it can be simpler to initially carry out external alignment using your mount's routine, then apply the alignment improvement functions available in Astromist (Alignment N-Star).

The pointing errors due to flexion of the telescope tube 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 is more than 2 meters long and where significant mass is located at the head of telescope. This is often the case for large Dobsons. In this case, on request a special version of the program can be provided to correct these anomalies.

- **Horizon** is used for calculations of rise and set of objects. The default value of 0 is used to compare the results of Astromist with other software if desired. With a value other than 0, the rise and set time for a star will be calculated for the selected horizon.

3.4.2. Preferences 2/6



3.4.2.1. User Information

Astromist is able to estimate what objects are visible to the naked eye depending on the presence of the Moon, the Sun and the following three parameters:

- **Experience**: A Beginner is not familiar with the technique to see dimmer deep-sky objects, and is unfamiliar with night vision. As an example, a beginner might see only four stars inside the Pleiades, while a hobbyist with more experience can see about seven. An Expert may see more than ten stars inside the Pleiades.
- **Age:** As you age, your eyes are less sensitive to light. This is used along with other information to compute your naked eye visual limit magnitude
- **Vision**: If your visual acuity 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, the available field of view for a specific eyepiece, and the best eyepiece to use to view an object:

- **Diameter** is the diameter in millimeters of your telescope. You must select "Other" if your diameter is not in the list.

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. You must select "Other" to input the specific focal ratio 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, Azimuth or Azimuth plus an Equatorial platform.

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 allows the addition of some personal objects.

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

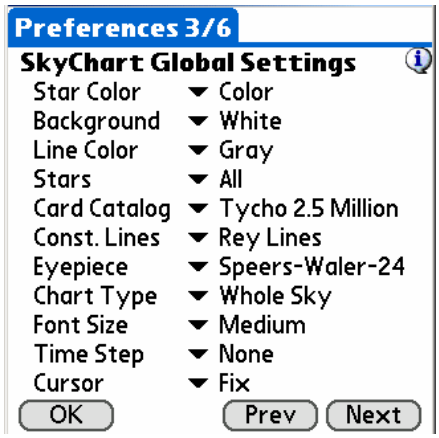
- **Time Update** is used to indicate if you prefer that Astromist manages time updates or if you want to be able to manually control the time updates. This value is managed automatically using DateTime Assistant: if you press "**now**" the automatic mode is activated, otherwise manual mode is selected.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

Tip: 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 display only constellation stars, or the default stars. 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 will be used (even at a lower field of view). If you don't want to use an external catalog, 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, this setting requires installation of all of the star catalogues on a memory extension card (placed in the PALM/Programs/Astromist directory). If you do not choose any, only the catalogue in memory, if 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 detailed according to the field of view 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** are more recent and try to represent each constellation better. 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 displayed list can be modified to reflect your collection using the eyepiecedb.exe tool.
- **Chart Type** lets you select the kind of SkyChart:
  - SkyMap provides a planar view of the visible sky within a circle, similar to the view in most astronomy magazines. Only objects above the horizon can be viewed in this mode.
  - Horizon view displays the visible horizon. The chart is distorted for altitudes above 60°. Only objects above the 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 the visible half of the sky sphere.
  - Equatorial Sky displays the sky as a sphere, but without any rotation to reflect your position on the earth and the 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 is selected, the step will be added using the left Palm keys. This function is not enabled on Pocket PC for the moment.

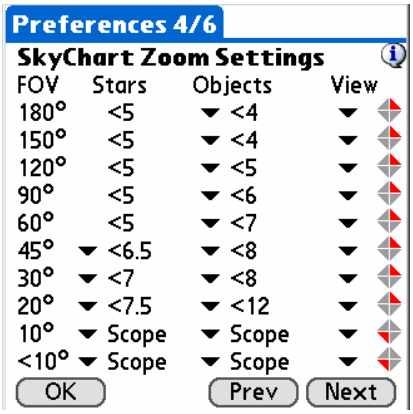
➲ **THIS STEP IS NOT LINKED TO THE AUTOMATIC REFRESH RATE OF THE SKY MAP WHICH IS 5 MIN.**

- **Cursor** lets you control whether the chart cursor blinks. Blinking mode can be useful at night when the entire screen is red.

3.4.4. Preferences 4/6

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

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

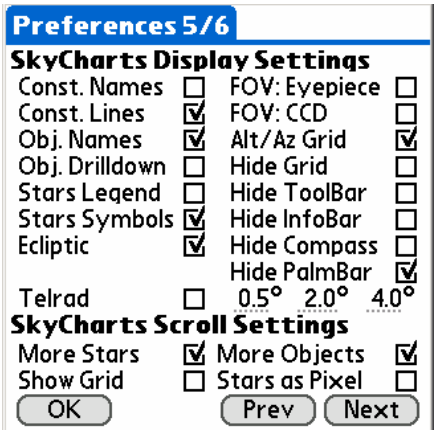


The Objects magnitude limit applies to the object list you create, and to objects dynamically loaded when changing zoom level (drill down function.)

The View column lets you adjust the sky-view orientation to match the type of telescope you are using. For example, you can select naked eye sky views for wide fields of view, and reversed sky views (as seen through the eyepiece) with smaller fields of view. In any case, this setting can be changed within the sky chart view using a specific button.

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 checked displays/does the corresponding information/action in the sky chart and planetarium views.



3.4.5.1. SkyCharts Display Settings

This section lets you adjust the display preferences within 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. Exception: names are not displayed for the 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 will be displayed.
- **Star Legend** displays star sizes and equivalent magnitudes on the left of the chart. 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 less than 30° all symbols are displayed.

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

Note: Numbers associated with the Bayer or Flamsteed codes are not displayed, but are available (if they exist) when you tap on the star.

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

Note: Due to internal limitations, the Telrad display is not currently moved when you select another object or star until the chart is 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** toggles display of the grid shown in the SkyChart.
- **Hide ToolBar** toggles display of the toolbar in the SkyChart.
- **Hide InfoBar** toggles display of the current position and time in the SkyChart.
- **Hide Compass** toggles display of the small compass at the bottom left of the screen. This icon allows switching to the compass view by tapping on it.
- **On Palm OS, Hide PalmBar** lets you decide whether to display the Palm status bar, allowing you to get wider chart displays in the SkyChart Screen.

Note: ***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, allowing those with slower or older handhelds to keep chart rendering times short:

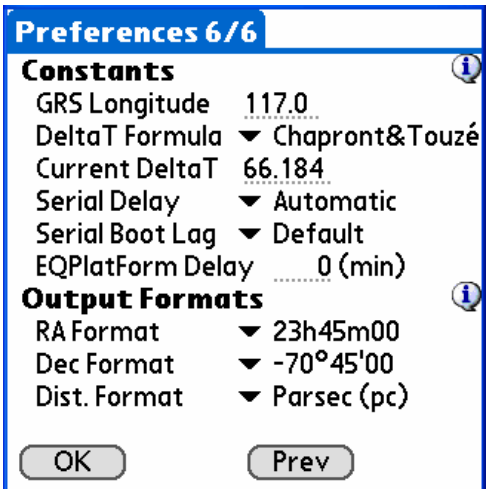
- **More Stars –** check this if you want to display all the default stars during scrolling. If unchecked, only constellation stars will be displayed.
- **More Objects –** check this if you want to display all the objects found by the drilldown feature.
- **Show Grid –** if checked, displays the sky grid during scrolling. This option only works with the Local Sky and Equatorial views, as the 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 choices 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 2008) is about 122°.

Note: To compute the current value of this setting, use the JupiterAssistant.

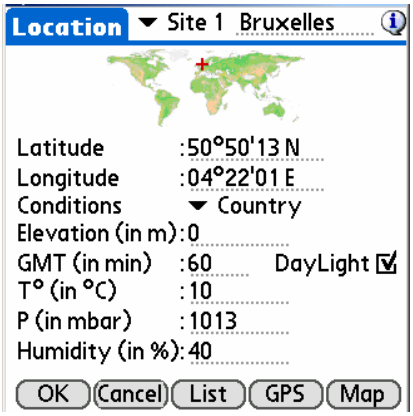
- **DeltaT Formula** (difference between terrestrial time TT and universal time UT), lets you select the approximation formula to estimate DeltaT in the past (before 1600) or in the future. Chapront & Touzé use a more recent approximation; JPL Horizon is the model used by NASA for eclipse computation.
- **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.
- **Palm only: Serial Delay** lets you adjust the delay between two consecutive commands sent to a device. Most of the time it should stay at the default setting.
- **Serial Boot Lag** lets you adjust the delay before the RS232/Bluetooth device is up and running after it boots. Some presets are available for Aircable and Bluestar device.
- **EQPlatformDelay** defines the running time for your equatorial platform. After doing a 2 StarAlignment and activating Equatorial Platform Mode, Astromist will warn you a few minutes before the end of this time to let you reset your platform. See Section 3.6.1.2 for operation with an equatorial platform.

3.4.6.2. Output Format

- **RA format** allows you to specify how right ascension information (RA) is displayed inside Astromist.
- **Dec format** allows you to specify how declination information (Dec) is displayed inside Astromist.
- **Dist. format** allows you to specify how distance information is displayed inside Astromist. Two units are available: Parsec and Light Year.

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 default screen

The following fields need to be populated:

- **Latitude –** the latitude of your observing location. Values between -90° and 90° are accepted. Positive values indicate Northern latitudes, while negative indicate Southern.
- **Longitude –** the longitude of your observing location. Values between -180° and 180° are accepted. Positive values indicat e West longitude, negative values indicate 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 ObjectInfo and NightTripper. The brighter your sky the more difficult it is 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. Just 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 difference between Universal Time (Greenwich Time) and your local Time Zone in minutes. 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.
- **T°** is the temperature at the time of your observing session in degrees Celsius (℃). This information is used to compute a ccurate refraction correction. Values between -60℃ and 50℃ are accep ted.

- **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 correct this pressure for altitude and enable accurate refraction compensation.

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

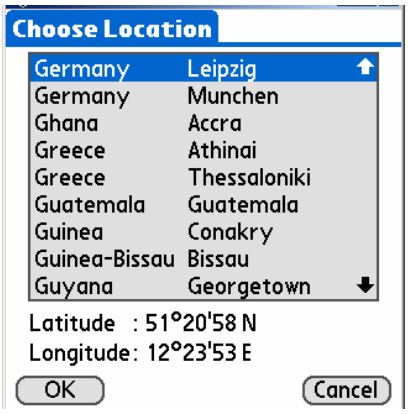
- **Humidity** is the percent concentration of water vapor in the air during your observing session. This information is used to compute the naked-eye visual magnitude limit. Values between 0 and 100 are accepted.

Tip: *You can use a portable weather station attached to your mount plate to get this information.*

Once this information is 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 provides access to the location database. Registered users can create their own database with their preferred observation sites. Select a location from the list and then press OK to go back to the main screen.

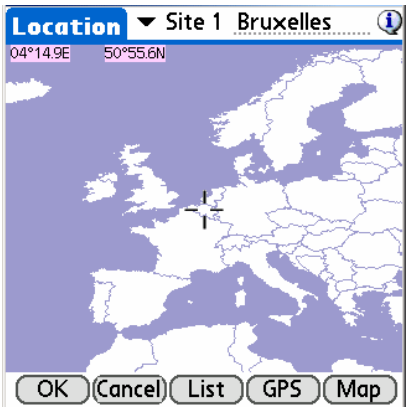


Location database explorer

- **GPS** button reads your GPS unit to gather 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 selects your position on earth without a GPS with a precision better than one degree in longitude or latitude. Drag the map to move to the country where you are located, then tap the screen to get the longitude and latitude of the point selected. Once the selected value is correct press OK. Use Cancel to go back to the initial location values.



Extended world 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.

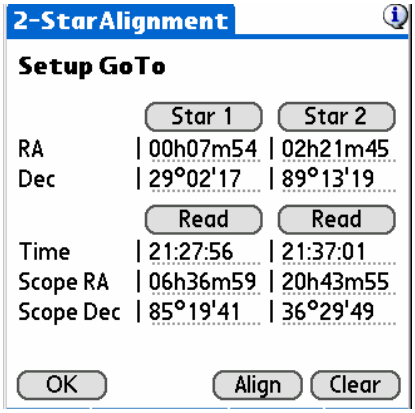
3.6. Pointing Set-up

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 formula for two-star alignment is based on the excellent work of M. Toshimi Taki (http://www.asahi-net.or.jp/~zs3t-tk/)*



Two-star alignment quickly allows accurate pointing to any object, without performing an accurate polar alignment or leveling your mount. This method works for equatorial or Alt/Az mount types.

With this method, you can expect (without mount error compensation) a pointing precision between 0.5° and 1° depending on your mount's precision and/or 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: USERS WITH ENCODERS NEED TO ADJUST THE SLEW SPEED OF THEIR TELESCOPE WHEN GOING FROM ONE STAR TO ANOTHER, OR PERFORMING A GOTO. SLEWING YOUR TELESCOPE MANUALLY AT HIGH SPEED CAN CAUSE SOME ENCODERS TO LOSE ENCODER TICKS, RESULTING IN ERRONEOUS POINTING RESULTS.**

3.6.1.1. 2-star alignment method description

The Two-star alignment process is quite simple:

- 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 return to the 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 update telescope information by clicking on **Read** button under position information. If Astromist is connected to the scope, it will read the position from your telescope. If not, you will have to manually input 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**.

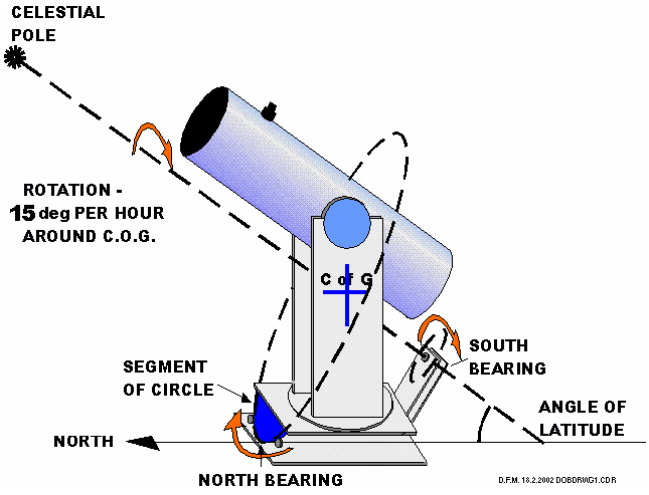
Some tips on choosing the two stars:

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

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

3.6.1.2. Using an Equatorial Platform

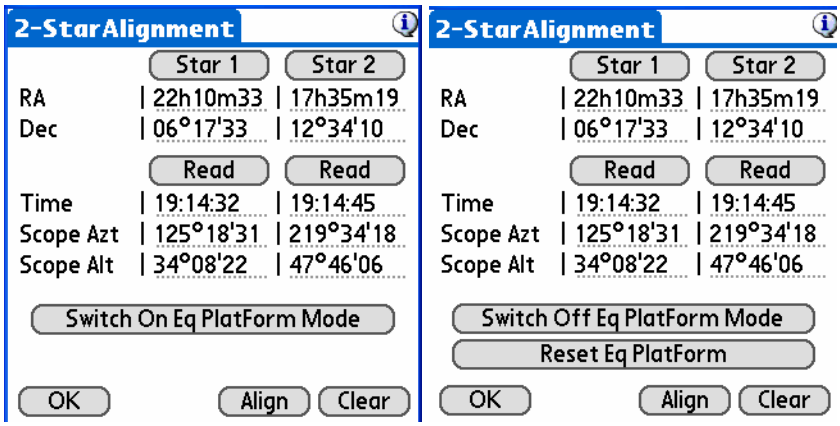
An equatorial platform is a rolling base holding a Dobsonian style telescope. It tracks the sky for a period of time (perhaps 40 minutes) before the platform needs to be reset to the beginning of its track.



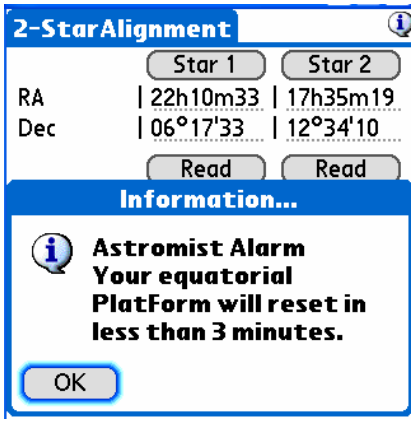
Astromist is able to keep an accurate alignment when using an equatorial platform. Plus, it will warn you when you need to reset the platform so you can maintain alignment.

To activate Equatorial Platform mode, you must:

- Choose Azimuth+EqPlatform in the Mount Type selector in the Preference 2/6 panel.
- Set the correct running time for your platform in EqPlatformDelay in the Preference 6/6 panel.
- You will now have access to new buttons to manage the platform mode within 2-StarAlignment assistant.



In this case the alignment procedure is:

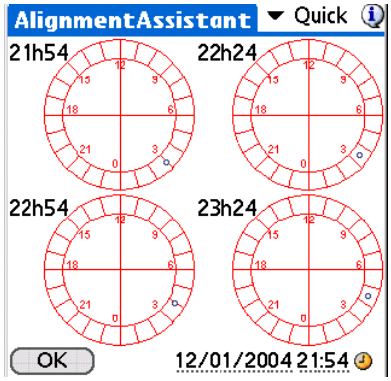
- Reset your platform and put it at the beginning.
- Switch Off the power to your platform.
- Do the 2 Star alignment using Astromist instead of using the mount alignment.
- Press align in Astromist.
- Switch On the power to your platform and press the Switch On Eq Platform button.
- Astromist will now control moving the equatorial platform and keep alignment accurate.
- Three minutes before your platform reaches the end of its travel, Astromist will warn you regarding the reset. After the reset is done, press the “Reset Eq Platform” Button to synchronize Astromist with the new position of your platform.
- 

3.6.2. Polar Alignment

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

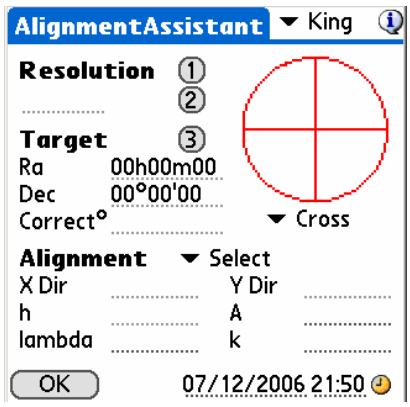
3.6.2.1. Quick Alignment Assistant

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).



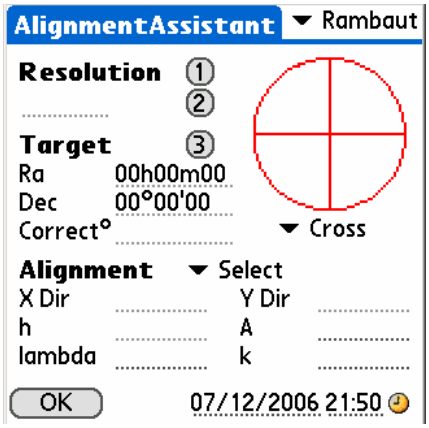
3.6.2.2. King Alignment Assistant

This assistant aligns 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 astrophotographers.



King Assistant main screen

3.6.2.3. Rambaut Alignment Assistant



Rambaut Assistant

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

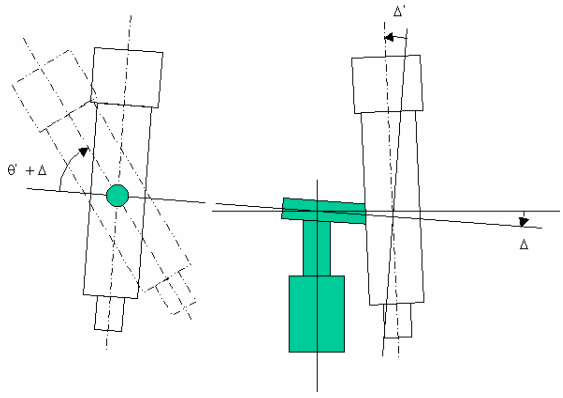
This assistant aligns your equatorial mount to the refracted pole position with a precision better than one arc minute. Using the Rambaut method you should be able to do a precision polar alignment in less than 30 minutes.

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.

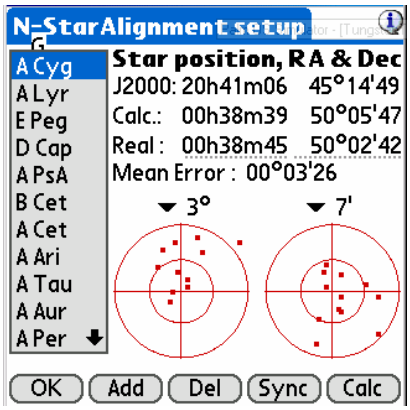
3.6.3.1. First Method

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 the 2-Star alignm ent stars),
- If Astromist is connected to your telescope, use the GoTo menu to slew to the star, then adjust it or center it manually in the field of your eyepiece using the ScopeAssistant.
- Press the OK button. 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, 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 complete, the remaining **mean error** is displayed. For example, in the screen shot below (an example 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 see where the stars you used during the alignment process are in relation to each other.

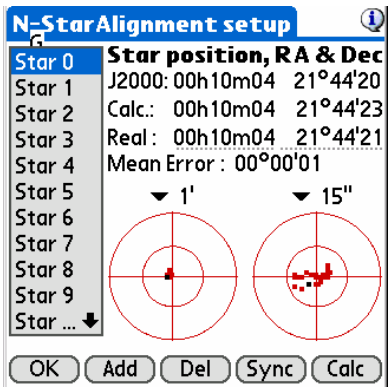
*Note: By clicking on a star or using the **up** and **down buttons to cycle through the stars in the list**, you can see the before and after correction positions for each star.*

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 use of sample data from an observatory resulted in pointing precision better than 10 arcseconds after correction.*

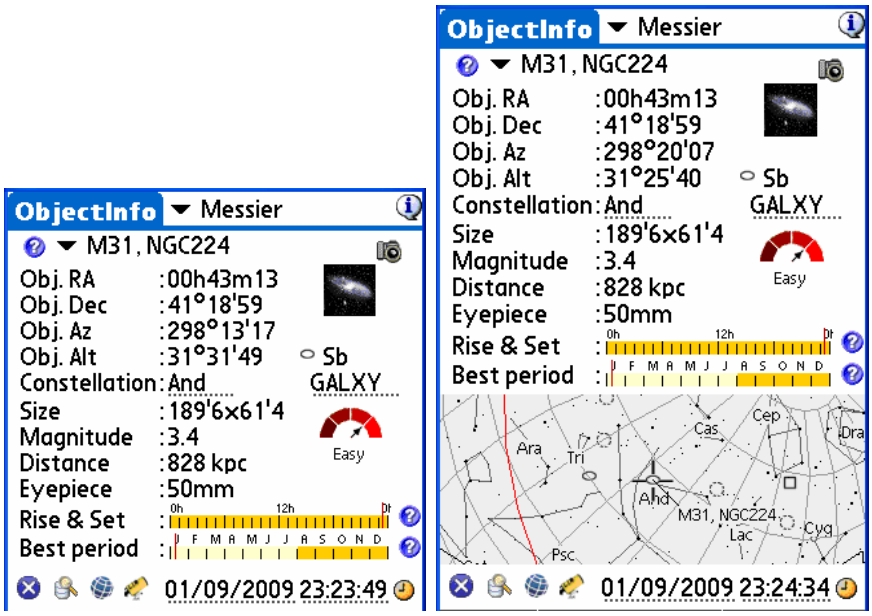
The procedure to add a star and compute compensation in this model is similar to the one described in the first method.

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

ObjectInfo lets you access well known objects, stars, constellations or 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:

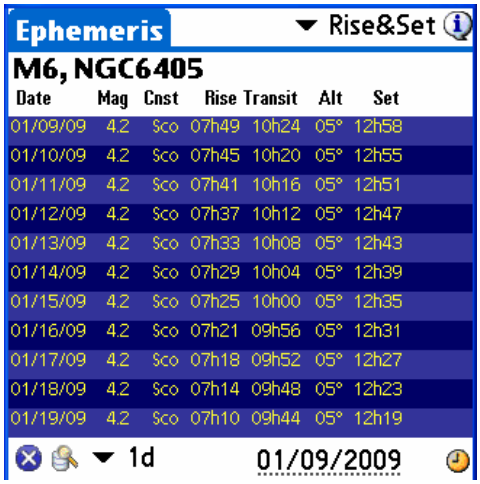
- At the upper right of the screen an object filter allows you to select the kind of objects to browse. By default the Messier catalog is selected.
- Selecting the Information icon button beside the object name provides the Dreyer description of the object, or switches to the relevant assistant if associated with the object (Moon, Mars, Jupiter, Saturn, Comet&Asteroïds, …),
- **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. Correction rules are similar to those for **Obj. RA**.

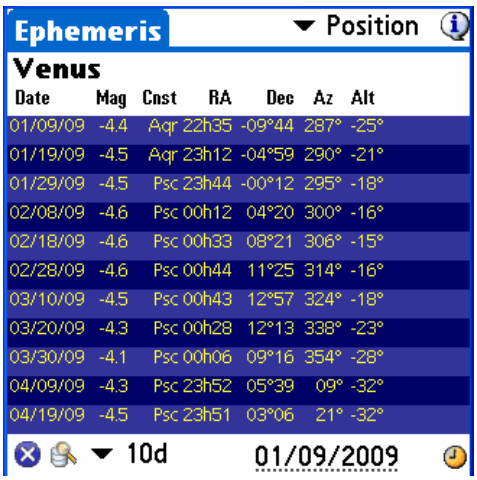
- **Obj. Alt** and **Obj. Az.** Same as previous, but for Altitude and Azimuth of the object.
- Under the photo is the object type. Tap to display a readable description.

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.
- **Distance** is the estimation of the distance of the object from the earth. Values are accurate for planets, comets and asteroids and are expressed in AU or Km. Deep sky objects distances are more approximated. Value for Messier and Caldwell are the most common ones. Values for NGC and IC Galaxies are deducted from their red shift estimation. For other object the distances came from different sources from the web and might be subject to change upon more up to date researches.
- **Eyepiece** is the eyepiece recommendation for viewing the object, 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. Selecting the Information icon button beside the bar will open the Ephemeris Assistant.





- **Best period** is a bar graph that displays the best dates during the year to observe an object at the beginning of night. Selecting the Information icon  button beside the bar will open the Twilight Assistant.

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

- On handhelds supporting wide displays, a sky view centered on the object is displayed at the bottom (or at the right 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.) Tap on this value to open the Date/Time selector.

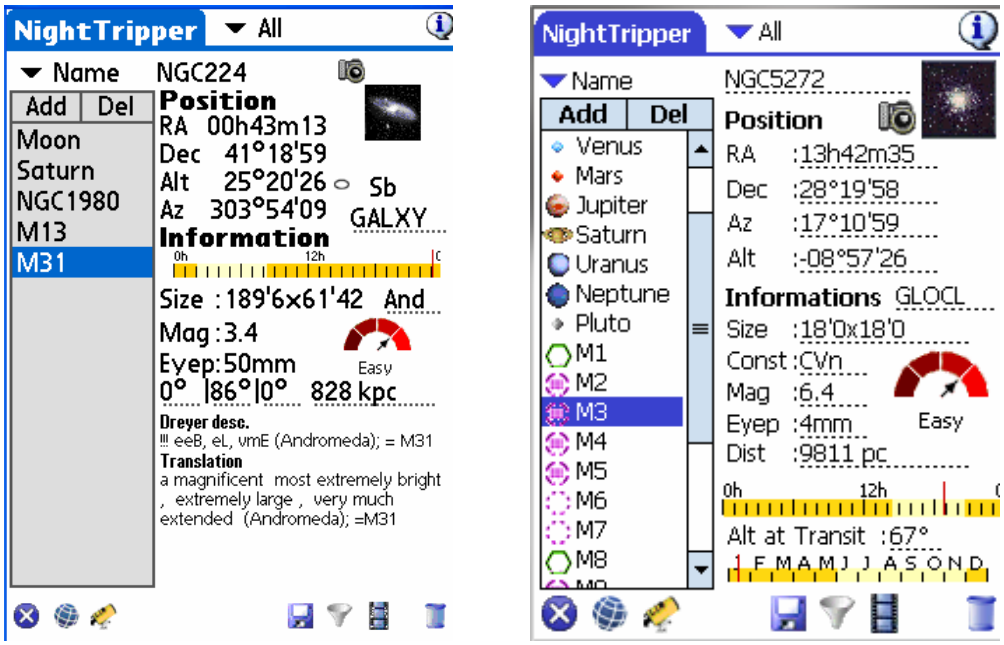
3.8. Preparation of observation sessions (NightTripper)

The NightTripper module enables you to quickly select objects from the catalogues to prepare one or more observation sessions. The process is done in several stages:

- The first stage consists of selecting the objects using the selection module  . You can then create, modify and filter the initial list according to additional selection criteria. Work on the list is done in an algebraic way: concatenate or remove portions of the list with the additional selection criteria using the addition  or subtraction  functions.
- Once the list is created, adjustment of objects is possible (addition or removal) from the main screen to finalize the list of objects to be studied and to visualize the objects chosen,
- You can save  the list to re-use it as desired,
- If desired, your lists can be exported using the provided tools into a catalogue of shareable objects for use by other Astromist users (for example, to prepare for an astronomy class). These exported lists might also be used by additional program outside Astromist.

3.8.1. Main screen (NightTripper)

Entering this module displays the information of each object in the list, and allows slewing of the telescope to each object.



NightTripper on Palm and on Pocket PC

To select an object, click in the list or use the Up and Down keys of your PDA to move among the objects. Once an object is selected, most of the information displayed is identical to that available in ObjectInfo (described in 3.7 ObjectInfo).

For PDAs having larger screens (Palm only), the Dreyer description of the selected object (if it exists) is displayed at the bottom of screen.

Several actions can be performed through this screen:

- At the top of the list, a selector allows sort the list of objects by Name, Magnitude, Size, Time of Transit, RA, Altitude or Constellation.
- You can modify the list of objects by removing ("**Del**" button) or adding objects ("**Add**" button). In this case, the FinderAssistant module is called to help select the new object.
- At the top right of the screen, a filter allows selection of object types from the major lists (to 500 objects). If this filter is used, the objects in the list not corresponding to the selection criteria are masked rather than being removed.
- calls the sky chart by centering it on the star chosen,
- allows slewing of the telescope to the selected object,
- allows you to save and load the lists,
- allows creation of a new list using multiple selection criteria,

-  prepares a presentation from the available images of the list objects and allows you to visually traverse the list using the up and down keys.

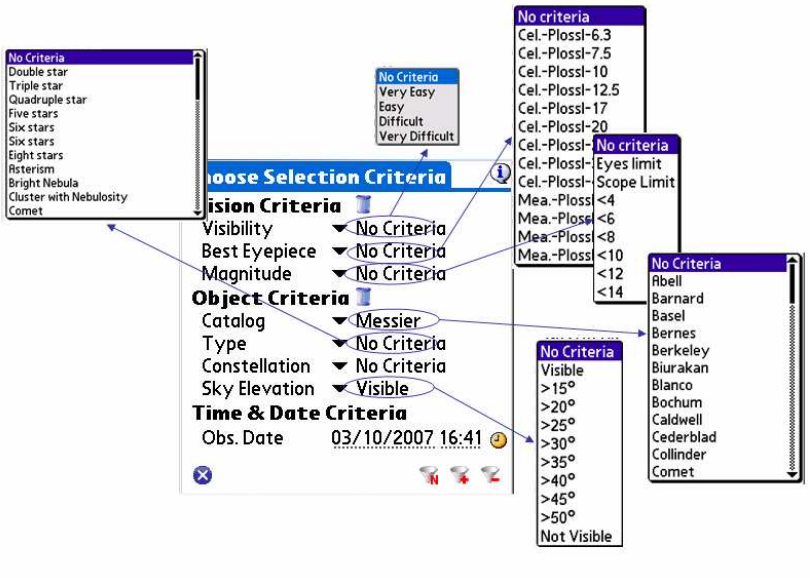
Note: ***On Palm OS**, to leave this presentation, simply press the key on the left of your assistant ("home touches"). **On PocketPC**, use the central button of the navigation pad,*

Note: *Certain objects of the list do not have images. In this case moving between images can take a little time, while Astromist seeks the next available object image.*

-  clears the current list.

3.8.2. Multiple selection criterion (Criteria Selection)

The use of the button  from NightTripper accesses the Multiple Selection Criteria module in Astromist.



Astromist NightTripper Object Map Selection

Note: *To reset the criteria to the default values, use the button*  *.*

The selection criteria are divided into several categories:

- Visual criteria (Vision Criteria):
  - **Visibility** allows filtering of the objects according to their visibility. This criterion, calculated dynamically for each object, takes into account the dimensions of your instrument, the size of the object, its magnitude and the luminosity of the sky (luminous pollution, presence of the moon),
  - **Best eyepiece** allows selection of objects which are entirely visible with one of your eyepieces and your telescope (see "Preferences 2/6"),

- **Magnitude** allows filtering of objects according to their magnitudes or the limiting magnitude of your telescope. It is also possible to select only the objects visible with the naked eye, this limit being calculated according to your personal information and the characteristics of your observation site (see “Parameter setting of the places of observation (Location)”).

Note: *If you are in an urban area, it is extremely probable that the criterion of visibility naked eye can give inaccurate results if you are near a source of light pollution such a standard lamp or a lighted building.*

- Criteria related to the objects (Objects Criteria):
  - **Catalog** allows selection of objects from a custom catalogue. The available list depends on the installed catalogues as well as registration of the product (catalogue list is limited for the free version).
  - **Type** allows filtering of objects according to their type (i.e galaxy, nebula, cluster, etc).
  - **Constellation** allows selection of objects from the specified constellation.

Note: *Only the abbreviations of the constellations are available.*

  - **Sky Elevation** allows filtering of objects according to their altitude in the sky. By default, if “No criteria” is selected, the values specified in the screen “Preferences 1/6” are used. This function is particularly useful if you have trees, buildings or a mountain in front of you.

Tip: *To estimate an altitude, use your hand: an extended arm’s palm width corresponds to approximately 5°, an inch with 2°.*

Tip: *Use the “not visible” and “Del” function to remove all the objects which are not visible from a list.*

- Time Criteria (Time and Criteria Date):
  - **Obs Date** is used to calculate the height of the objects in the sky. Select the current time by tapping the icon, or choose a particular date/time by clicking on the date/hour field.

Once the selection criteria are defined, you are able:

- To create a new list according to these criteria using the button .
- To add to the current list of objects using the button . In this case, if an object is already in the list it is not duplicated.
- To remove from the current list all objects matching these selection criteria using the button ,

The button returns 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: *List creation can be complex because of the selection criteria, in particular those requiring visibility calculations. You can always stop the selection process by pressing any key on your assistant.*

Tip: *Take the time to create the lists of the easily observable objects with your telescope (or for all your various instruments) and save them. This will very quickly allow you to bring them to hand if you have very little time to observe the sky. Before starting the creation process, remember to:*

- set the maximum size of the list to 500 to ensure enough room to contain all required objects.
- choose a new moon date to avoid any influence of the Moon's luminosity in visibility calculations.

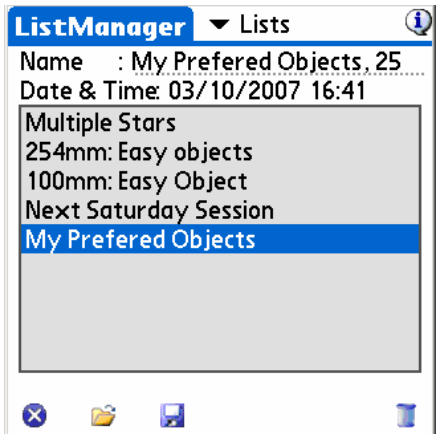
3.8.3. Save your work (List and user catalogs manager)

It is possible to save and re-use the created object lists. Up to 100 lists can be saved on Palm OS. There is no limitation on the Pocket PC. You can also select one of your personal catalogues as your preferred catalogue.

Note: *For the creation of custom catalogues, refer to the paragraph « 4.7 Customizable Catalogs».*

3.8.3.1. Management of object lists

Activate this module from the Wizard (icon ) or from the menu. The ListManager screen is displayed.



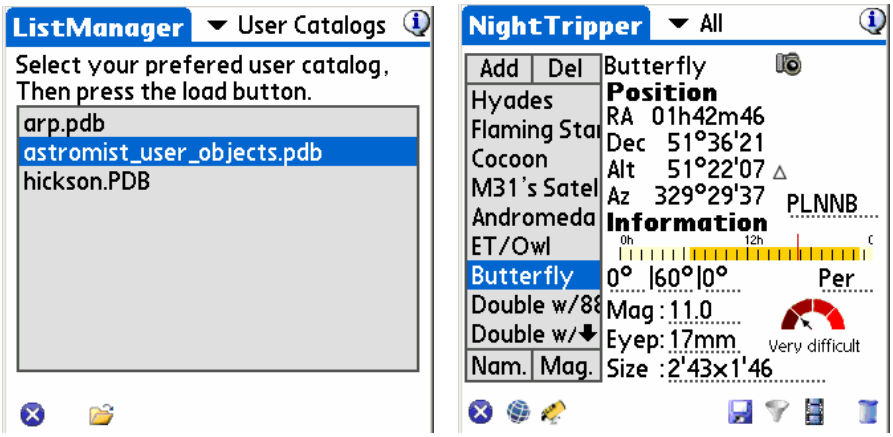
The following information is displayed:

- **Name** allows entry of the list name. For a previously saved list the size of the list is displayed.
- **Date & Time** indicates the date of creation or last modification of the list.
-  replaces the current list with the chosen list. When loaded, NightTripper is automatically launched to display the new list.
-  permanently saves the current list (under the name indicated in the field "Name").

-  Clears the list of objects which you no longer need. Note - no confirmation is required.
- Using the drop-down list at the top right of the screen allows you to load a user created object catalogue.

3.8.3.2. To define your preferred custom catalogue

This screen displays the list of user-created object catalogues 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 the catalogue

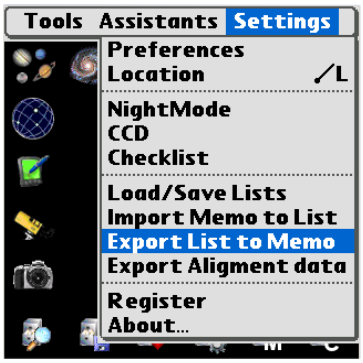
This action loads the selected catalogue, then opens NightTripper to display its contents.

You can also load this catalog using the button  from the wizard.

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

You can save your object list in a text file (Memo text on Palm OS) which can then be moved to your computer or other device. Use the menu selection “Export List To Memo” to create as many text memos as necessary to save your object list in text files.

On Palm OS, after the export completes you must synchronize your personal assistant to save these memos from the PDA to your computer.



You can then concatenate or add to these files to create a custom catalogue as described in the paragraph « 4.7 Customizable Catalogs ».

3.9. Sky charts

3.9.1. Principles

Astromist has 5 different views of the sky to allow you to study the objects you chose under the best conditions, or to simply learn the sky.

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

Each chart requires initialization before being usable with optimal performance. This phase of initialization can take a few seconds depending on the number of current list objects or the speed of your memory card.

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

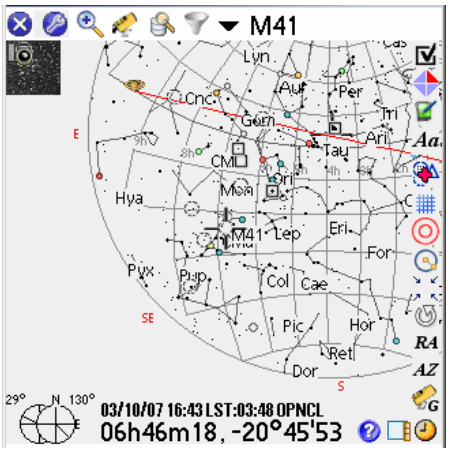
You can always change the date and hour of the chart by using the icon.

All the charts can be moved in real time using your stylus to seek an object or to change the view. The parameters described in the paragraph “3.4.5.1 SkyCharts Scroll Settings” critically impact the performance and smoothness of the view. Do not hesitate to adjust them.

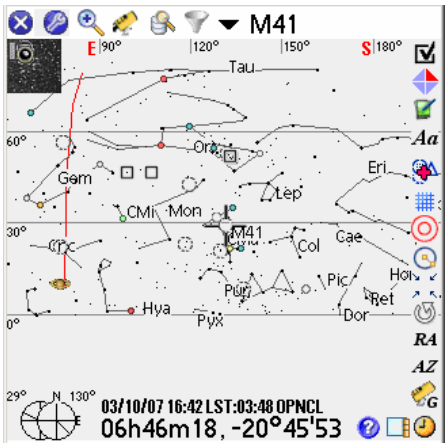
All the sky charts take into account your observing location. Ensure you have correctly entered this information as described in paragraph « 3.5 Location Set-up ».

3.9.2. Five different views of the sky

Several types of sky charts are available:



Visible Sky Map



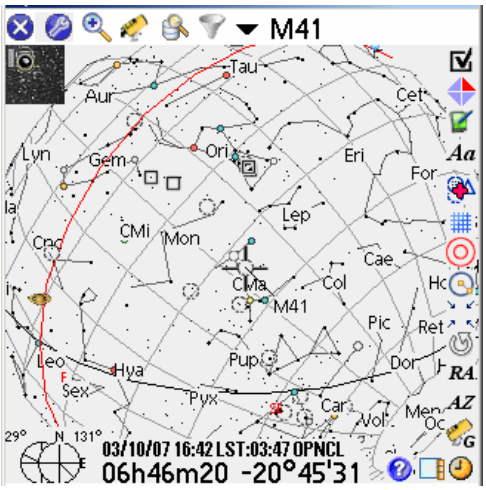
Horizon View

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

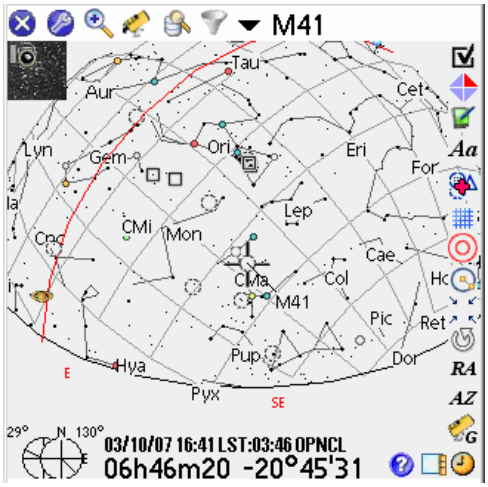
Each time you select e different object from the list, the chart is turned to put the object perpendicular to the horizon as you actually see it. If not, the object is just selected without rotation. If you wish to make the chart swivel, click the button  making it possible to center the objects.

This chart only slightly distorts the shapes of the constellations.

- The “Horizon view” presents the horizon as it is in front of you. This view is ideal to discover objects in front of you up to a height of 60°. Beyond, the sky is distorted and it is difficult to recognize the constellations. Only objects visible above the horizon can be seen in this chart.



Whole Sky



Visible Sky

- The view “Whole Sky” is intended to allow you to find any object of the sky, whether it is above or below 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 during object list creation. The yellow line in this chart represents the horizon.
- The view “Visible Sky” is similar to the preceding one, but is restricted to the visible sky for the time and location specified. It is the fastest view to display and move and will be probably be your preferred view when observing.
- Lastly, an equatorial view of the sky is available. This view is interesting to learn the position of the objects in the sky starting from their equatorial co-ordinates.

3.9.3. Functionality

The selected object is always indicated by a red cross. According to the settings, the cross can flicker. The objects are represented by symbols according to their type:

Galaxies,

Open Clusters,

Globular Cluster,

Nebulas,

Planetary Nebulas,

Multiple Stars (double or more)

Several functions are available in the charts:

 selects the type of sky chart, and provides shortcuts for various functions.

 Changes the chart zoom level. The values in this list represent the field of view resulting from the zoom level. Fields of view from 180° to 0.5° are available. The large star catalogues (Hipparchos and Tycho) are used in fields of view below 60°. The size of the objects and their orientation are represented for fields of view lower than 20°.

 provides several control functions for your telescope:

Access to the alignment modules.

"**Goto Object**" slews your telescope to the current object.

"**Get telescopes RA&Dec**" displays the current position of your telescope.

"**ScopeAssistant**" launches the telescope control module.

"**Skychart Control**" allows the skychart to follow the position of your telescope in real time. This function is particularly useful for users with encoders. It allows the skychart to point visually on a star by moving the telescope manually.

The option "**Improve Pointing**" adds the object selected in the object list to improve the pointing of the telescope. To use this function, it is necessary to center the selected object perfectly in a reticule eyepiece.

The option "**Changes Scope**" is reserved to Bluetooth users and allows them to shift control to another telescope. This function is perhaps useful for the organizers of astronomical observation meetings.

The option "**Sync Coord**" synchronizes your telescope on the current position of the sky. This function is available only for telescopes compatible with the Meade LX200.

 launches the module "FinderAssistant" to select an object and to reposition the sky chart on the object.

 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 create or modify the current list.

"**Load/Save List**" launches the ListManager module to load a preset list or to save the current list.

"**Load Catalog**" changes your preferred custom catalogue and to load it in the object list.

 Opens the main panel settings of the sky chart.

 Launches the ObserverLog tool to 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.

 Toggles display of the grid and constellation lines in the sky charts.

 Toggles display of the Virtual Telrad. The diameters of the circles can be set in Preference 5/6 panel.

 Controls angular measurement 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.

 Centers the sky chart on the current red cross position.

 Rotates the chart in a particular direction.

and  allows input of 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.

 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.

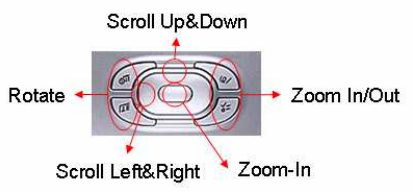
 Toggles display of the tool bar.

Displays the current altitude and azimuth. If you tap on this diagram when an object is selected, it opens the CompassAssistant on this object. You can hide this tool 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 perform extra functions:

Key Control on classic Palms

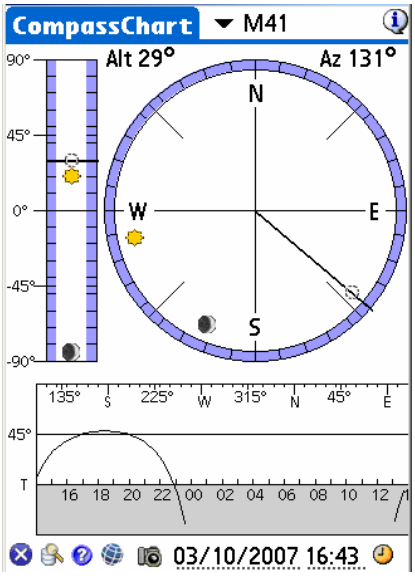


Key Control using Navigation Pad

3.10. CompassChart

This module shows the position of a particular object in the sky using a compass and an elevation slider. Any of the objects in 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.

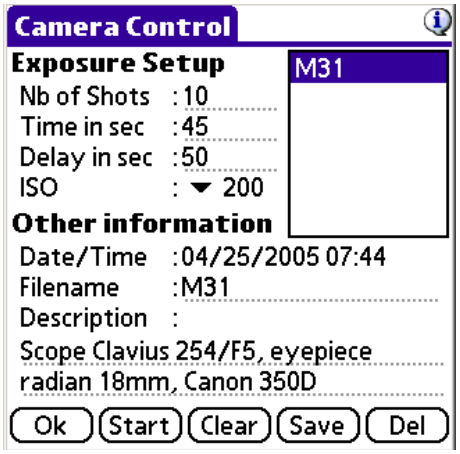


Finally, this tool can be used to find North:

- 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 your hand and/or your body. Once done, the N indicates North.
- At night if you do not see Polaris, select a visible star or planet and rotate your hand and/or body to point the selected object on 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 controls 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.

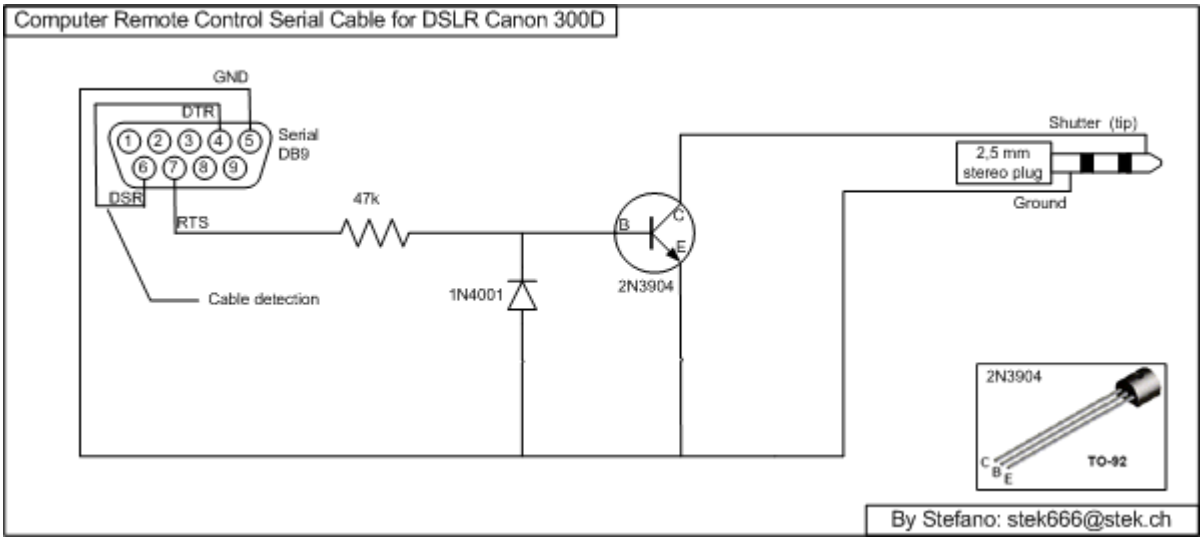


Camera Control screen

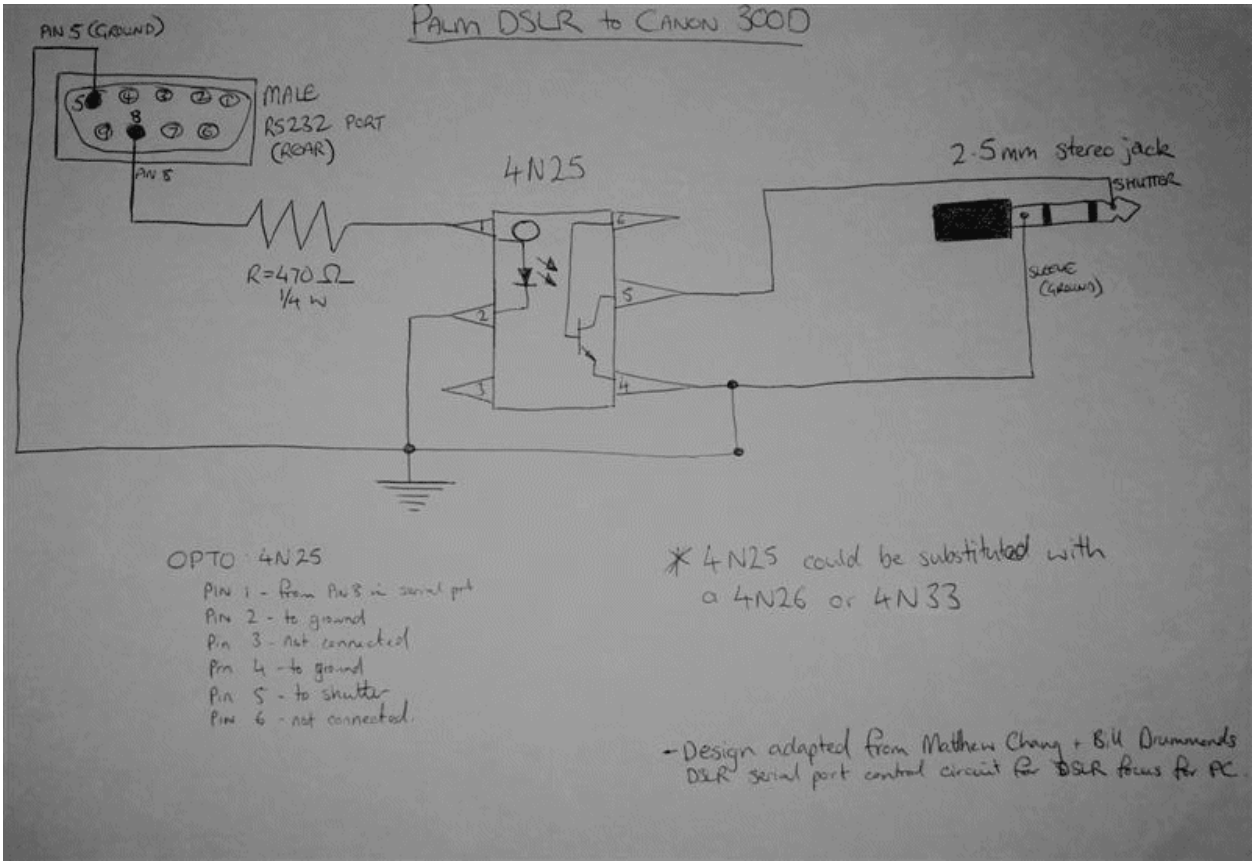
To connect your Canon to your handheld, you will need to build a dedicated cable and connect it to your PDA using a serial cable or by using a Bluetooth converter.

You can:

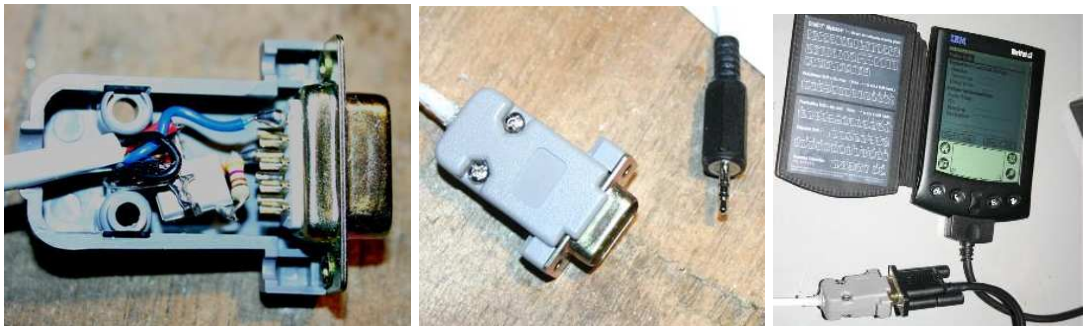
- Buy the cable already made. Several providers are available but I recommend Hap Griffin's (which are certified to work with Astromist and PalmDslr and Palm PDA's) see http://www.hapg.org/astrocables.htm. In this case you will have to add a null modem adaptor between your Palm serial cable and Hap's 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.



- You can also use John's plan (the best for Palm handhelds) which includes an opto-circuit to isolate the camera from your handheld (this is safer). In this case we 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

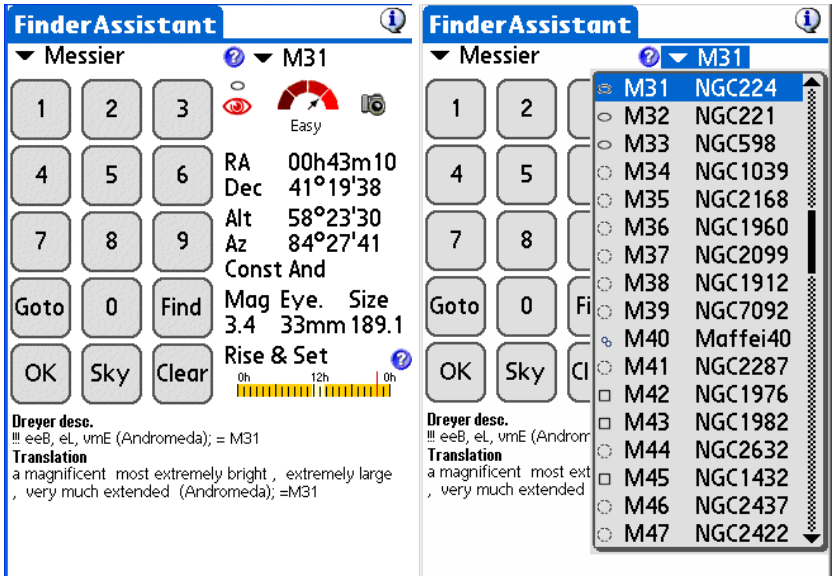


Sample shots of John's DIY cable

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

3.12. FinderAssistant

This assistant allows you to quickly find any object in Astromist's Catalogs.



The list of available catalogs depends on the catalogs installed. Particularly:

- **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 total 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.

When selected, 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 returns 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 resolutions, this description is displayed by default.

- Selecting the information icon  button beside the Rise&Set bar will open the Rise&Set Assistant.
- **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 user's preferred sky view (set in preference 3/6) will be used.
- **Goto** button sends the object's position information to your telescope to slew it to the desired position.
- **Clear** clears all the data displayed.

3.13. ObserverLog

This assistant helps create and manage your observation logs.

It is split into two parts:

- The first part manages your logs.
- The second allows entry of notes and linking of your own images to the logs. Images to be linked must be placed in the /PALM/Programs/Astromist/Shots/ folder. 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 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 cannot contain more than 32Kb of text, several memos will be created if needed.

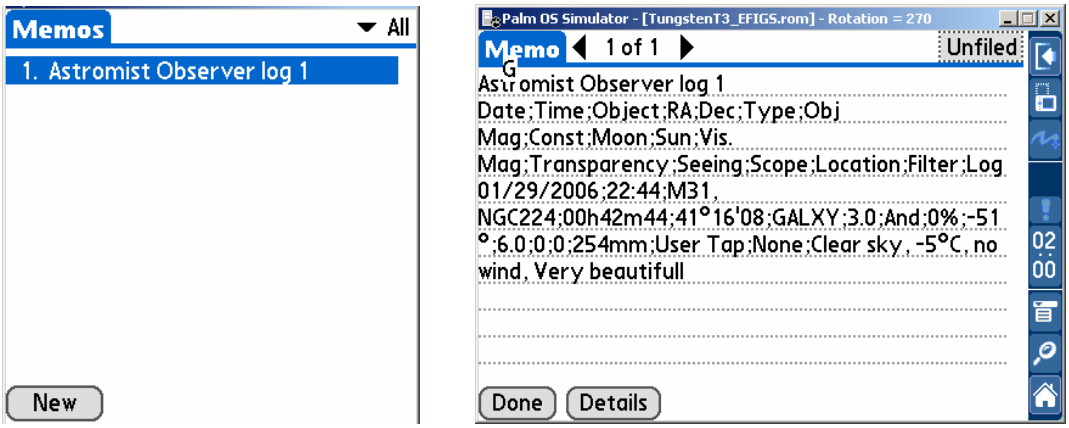
First step of the export process Final step of the export process

Cancel stops the export process. **OK** creates the memo.

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

On Pocket PC, you can open 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:

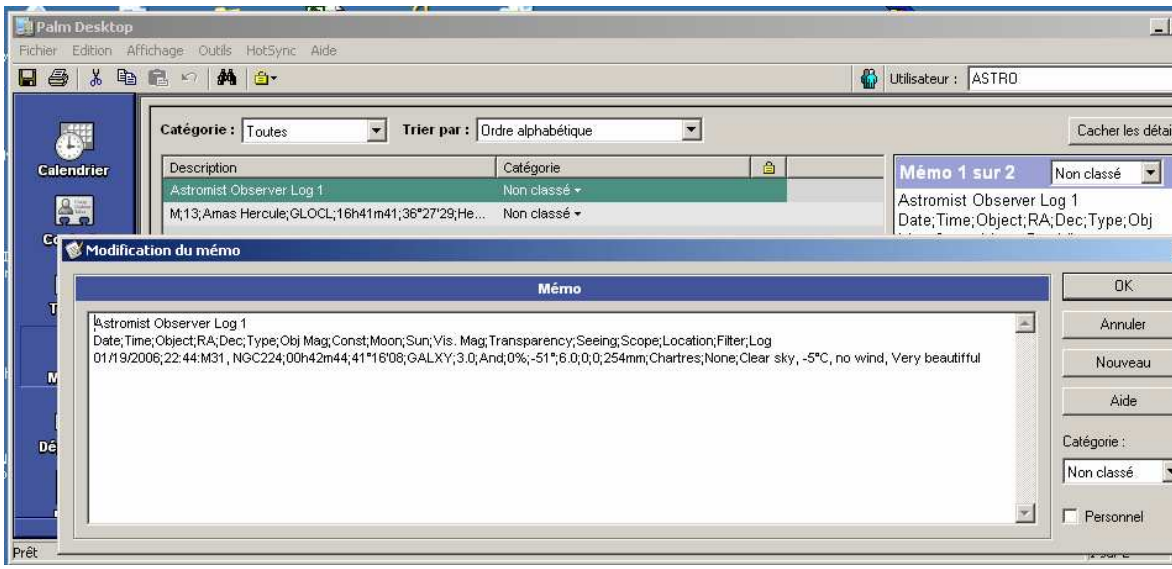
First line – the name of the saved file (Astromist Observer Log 1)

Second line – the CSV format. Each column is separated by a comma. You will retrieve all the information from 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 into your preferred spreadsheet application. People syncing with Outlook will find their memos in the usual Outlook Memos folder.



Result under PalmDestop

3.13.2. Edit ObserverLog

This Panel allows input of 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 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.

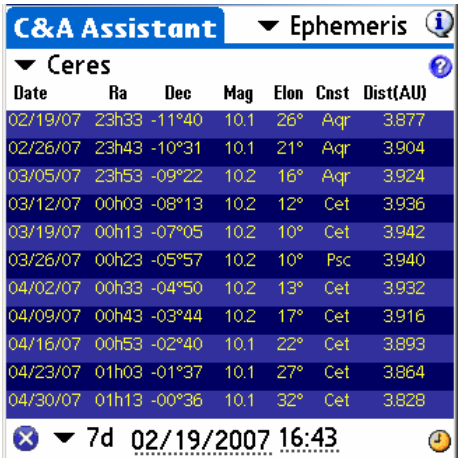
3.14. Comet and Asteroid Assistant

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 desired. Finally, registered users can edit the comet and asteroid list and customize it as they see fit.

3.14.1. Ephemeris

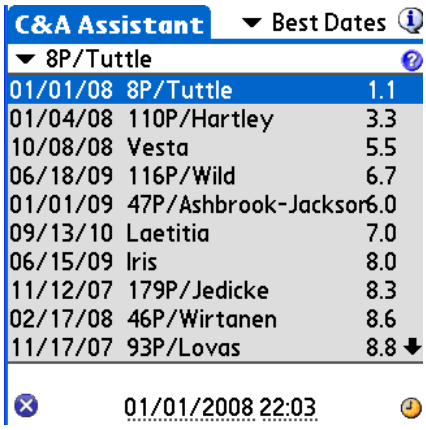
The Ephemeris provides useful data to help organize an observing session, or provides info for a quick glance at a comet.



- The information button to the right of the comet name takes you to ObjectInfo. Once there you can do a GoTo with your telescope or just add the comet to 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.
- Depending on the observation time (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. Best Date

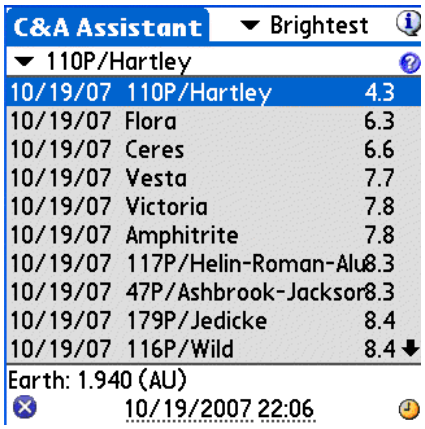
This screen presents best date to observe each comet and asteroid, i.e. the date when its magnitude is the brightest. The greatest magnitude is displayed as well as the distance from earth at this maximum.



Select one comet or asteroid in the list to switch to the sky or Solar 3D view using the popup list at the top of the screen.

3.14.3. Brightest

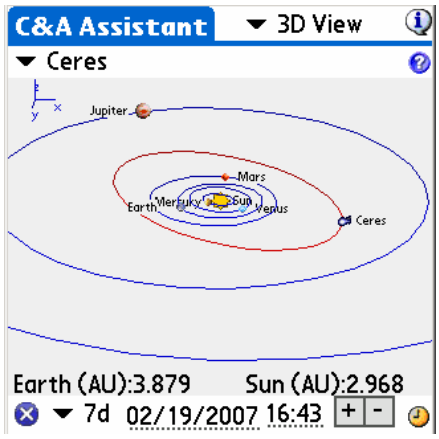
This screen displays comets and asteroids sorted from the brightest to the faintest to help you to find the best comet or asteroid to observe at a particular date.



Select one comet or asteroid in the list to switch to the sky or Solar 3D view using the popup list at the top of the screen.

3.14.4. 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, allowing the user to see positioning 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 and adjust the view to see the data from different viewpoints.

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; the planets will simultaneously 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).

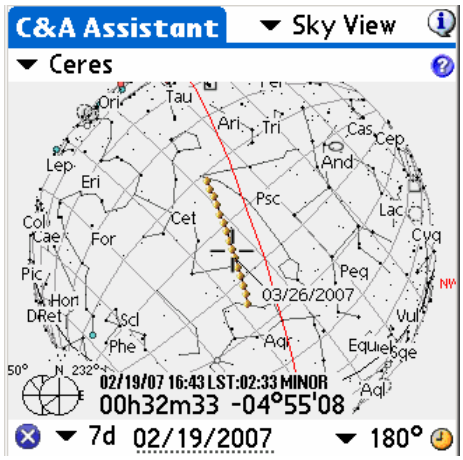
Minus and **Plus** buttons let you zoom your view in and out of the solar system.

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.

3.14.5. SkyView

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



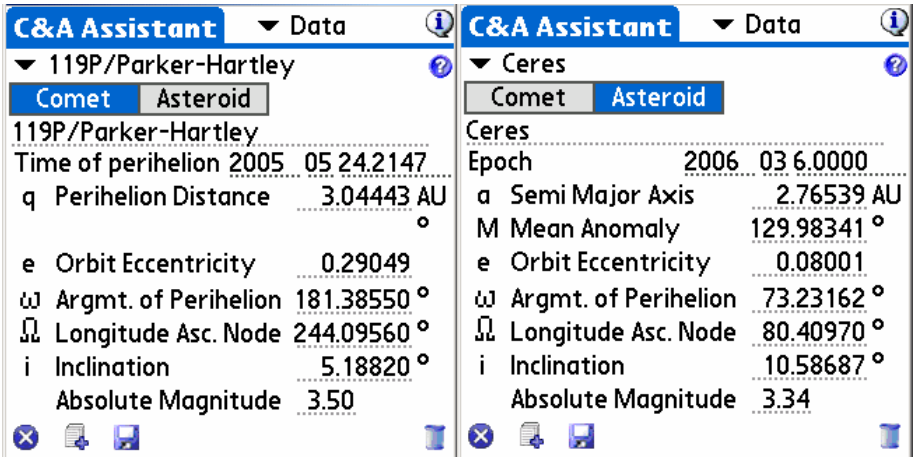
- Move your stylus on the chart to rotate it and adjust the view to be more comfortable for you. When the red cross passes over any comet/asteroid position, its date and time information are displayed.
- **Minus** and **Plus** buttons let you zoom in and out of the chart.
- You can change the date of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

3.14.6. 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.**



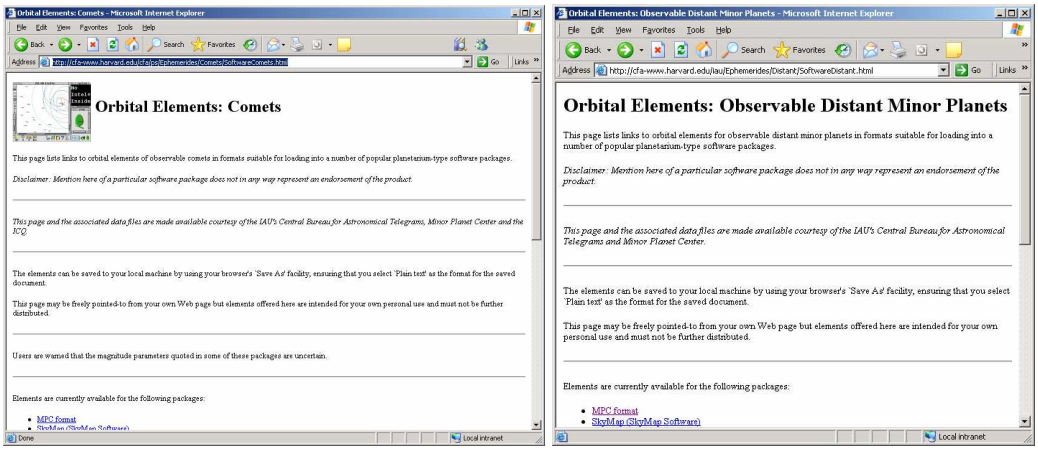
Once you have finished modifying comet/asteroid information, use the save button, otherwise your modifications will be lost!

3.14.7. Update the 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).

These element sets are 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 comets.
- http://cfa-www.harvard.edu/iau/Ephemerides/Distant/SoftwareDistant.html for asteroids.



To create a new comet database follow these procedures:

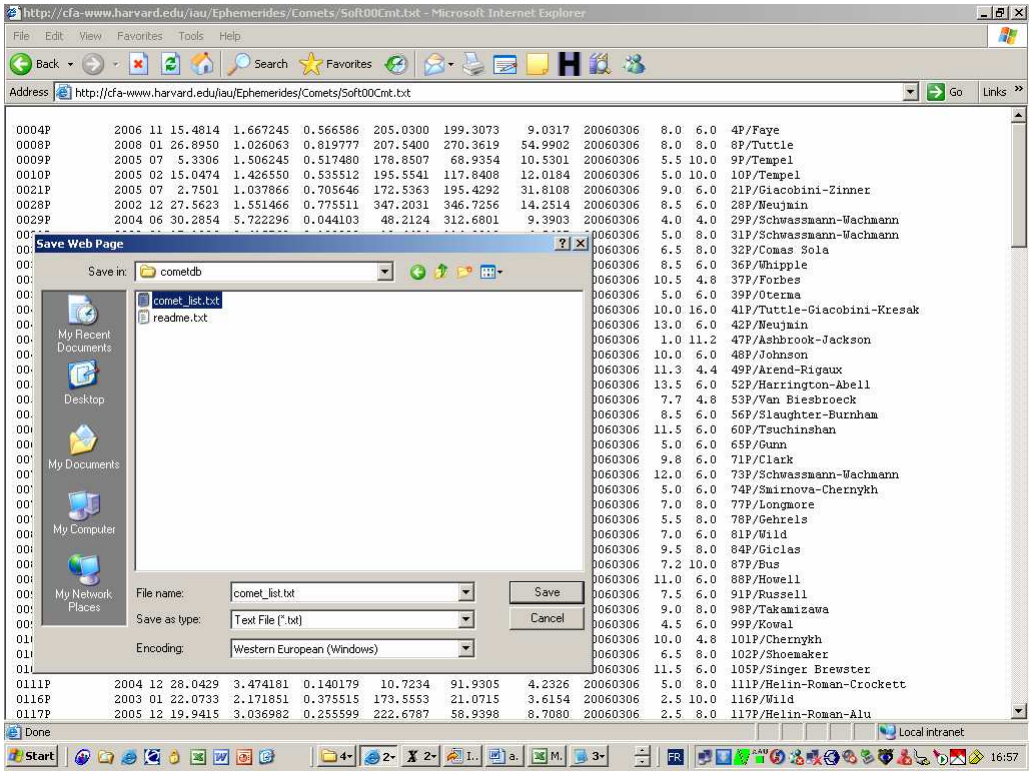
- Use this link for comets

http://cfa-www.harvard.edu/cfa/iau/Ephemerides/Comets/Soft00Cmt.txt

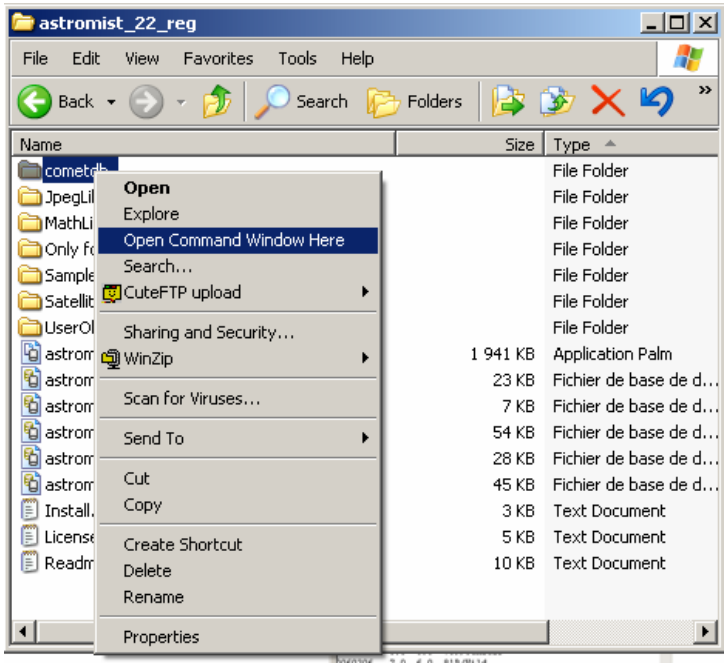
- Use this link for asteroids

http://cfa-www.harvard.edu/iau/Ephemerides/Bright/2009/Soft00Bright.txt

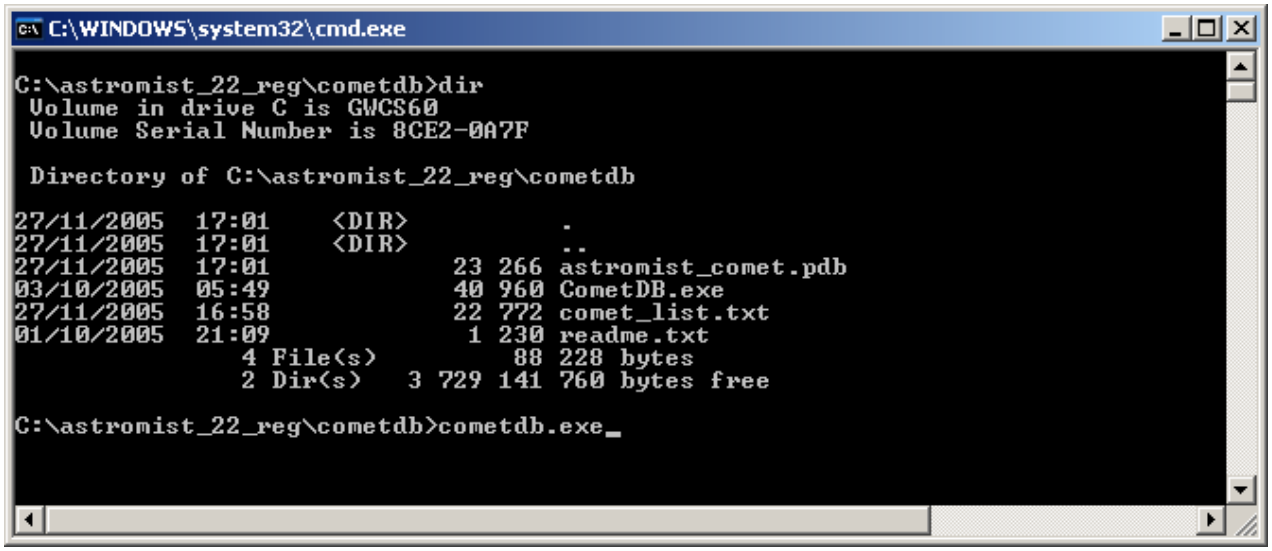
- Concatenate the files as plain text under the name comet_list.txt in the cometdb.exe folder.



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



- Run CometDB.exe to create the new database.



- 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 results for solar eclipses:

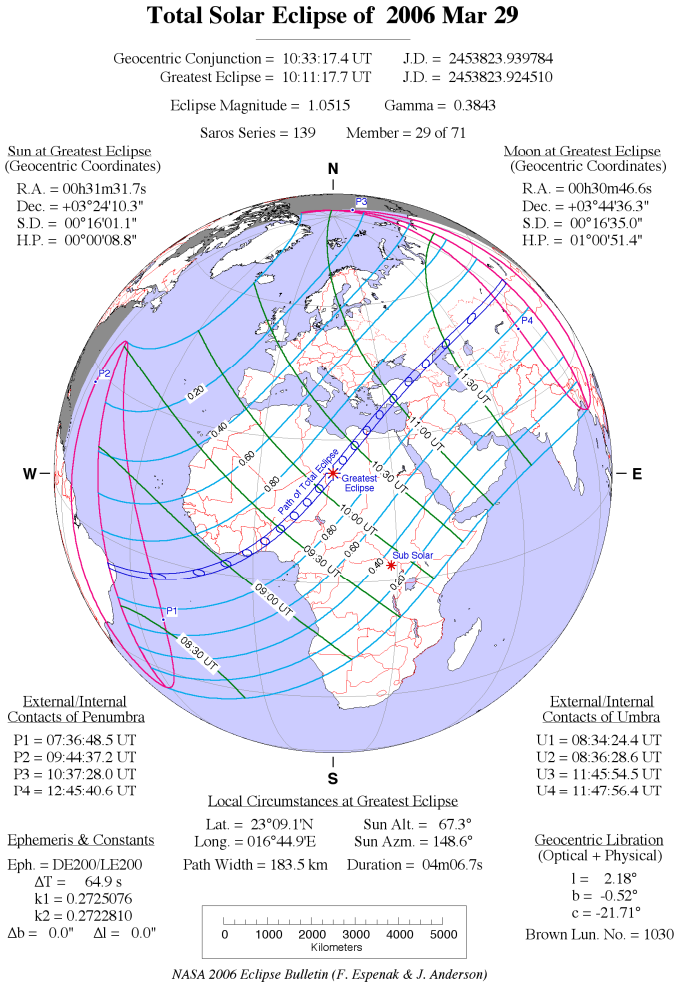
- A geometric one, developed by Franck Bouquerel that gives excellent and accurate results.
- A more classic one, based on Bessel elements, obtains very good accuracy with faster results. The main difference between this custom Astromist method and other Eclipse software is that the Bessel elements and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

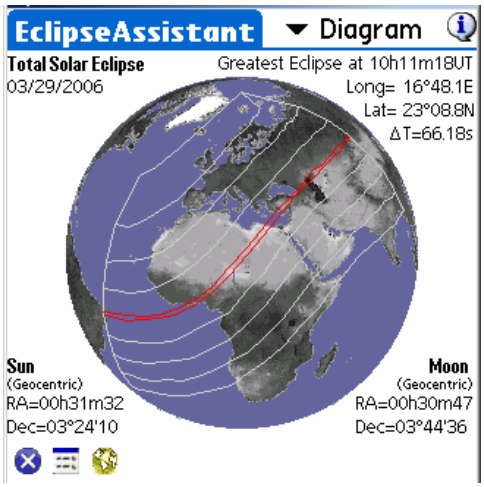
Using these three methods any Solar and Lunar eclipses accessible using the date and time selector can be studied.

Some information about the accuracy:

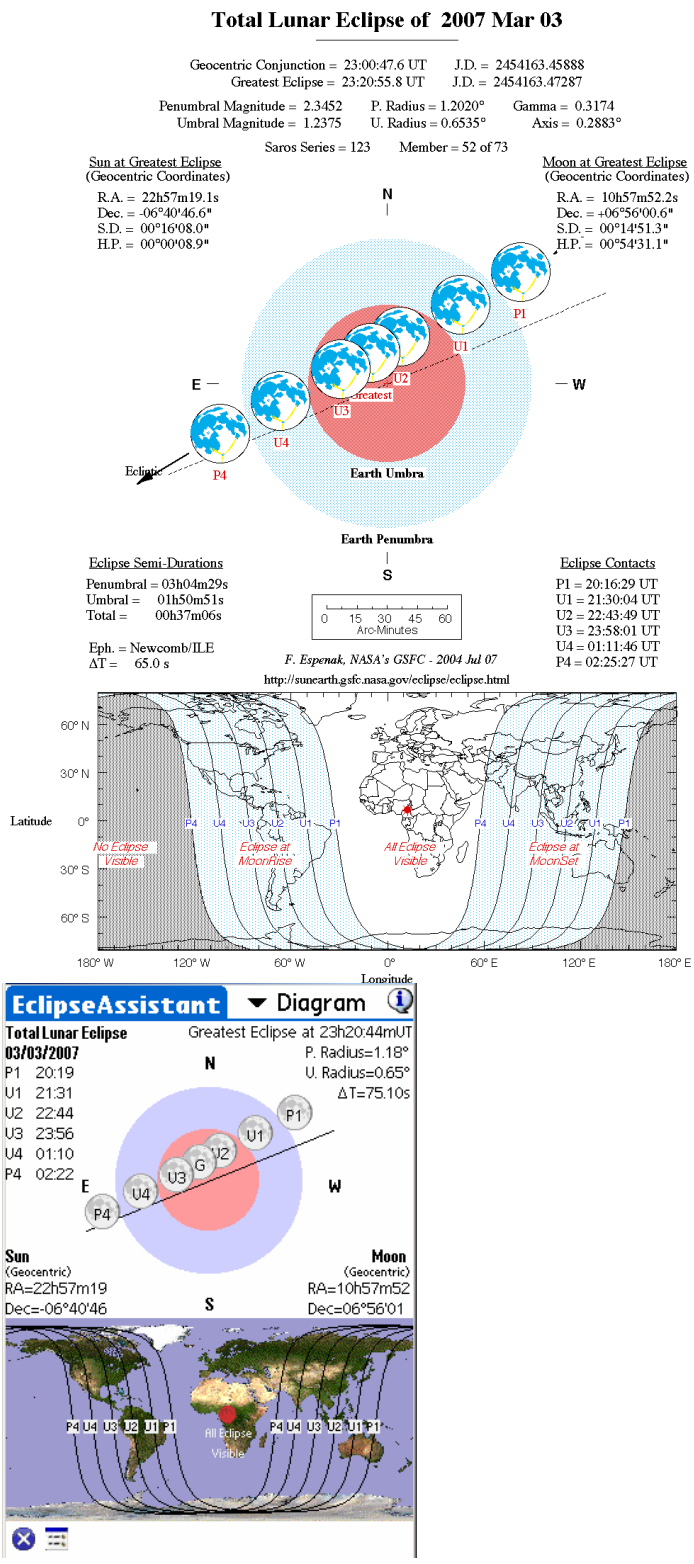
- Moon and Sun positions are accurate to better than one second for our current period (the next 40 years). Geocentric error is up to 4s for the sun and the moon far into the past.
- The main factor driving accuracy is the DeltaT estimation model (Chapron&Touzé or JPL in preference 6/6). NASA uses the older JPL model; the more recent Chapron&Touzé model should be more accurate. However, if you select dates in the past and benchmark against published NASA results, you may notice a slight discrepancy when using the Chapron model. The JPL model will produce closer results.
- 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. Differences may be larger for very old eclipses depending on the DeltaT estimation model you selected.
- 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





2006 March 29 Total Solar Eclipse. Nasa and Astromist results



2007 March 03 Total Lunar Eclipse. Nasa and Astromist results

3.15.1. List

This screen lists the next 12 eclipses starting with the year specified 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 a lunar eclipse the best place to observe is broad and represented by the visible part of the world.*

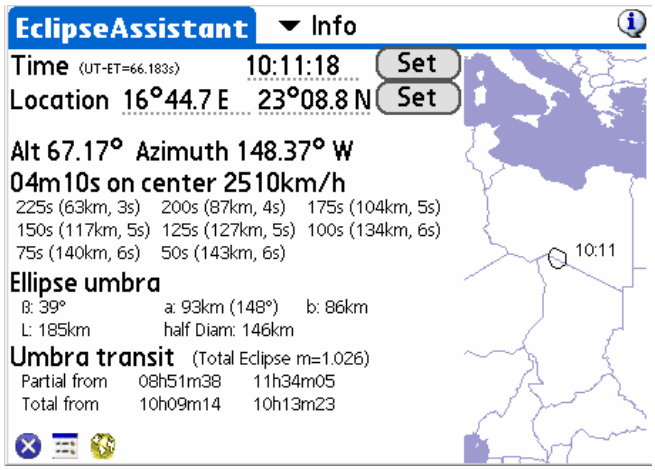
- All EclipseAssistant functions are available using the drop down list at the top of the screen.
- Shortcut buttons are available at the bottom of the screen for access to other EclipseAssistant functions.
- To update the list of eclipses, just tap on the Year field at the bottom of the screen and then 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 from which to see the central eclipse. In this case input the universal time and press 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 displayed:

- 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. Farther 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:

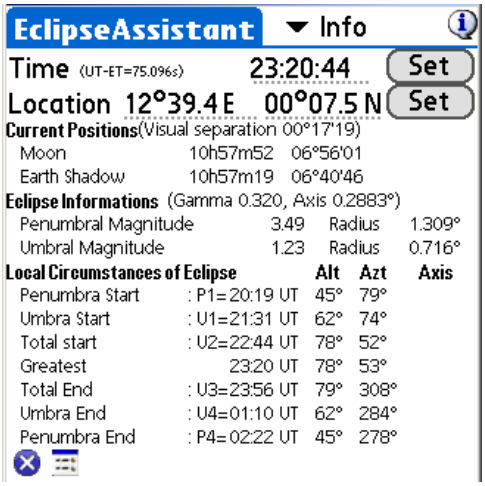
- The coverage of the Sun by the Moon:
  - Always 100% for a total eclipse on the center line (the Moon's apparent diameter is bigger than the Sun's.)
  - Always less than 100% in the case of an Annular eclipse on the center line (90% in the above example, even on the center line.)
  - Under the coverage 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 event of the eclipse (P1, U1, thru U4, P4), its time, the altitude and the azimuth of the moon at this time.



3.15.3. Map view

Note: *This module works only for Solar Eclipse.*

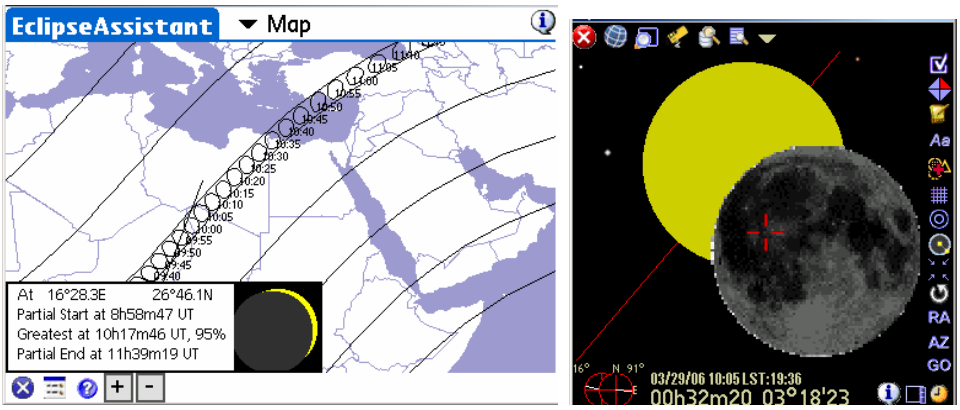
Note: *Due to extensive computations, the first display of this screen for a particular solar eclipse takes a long time to calculate.*

This screen lets you find, for any location:

The start and end time 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.

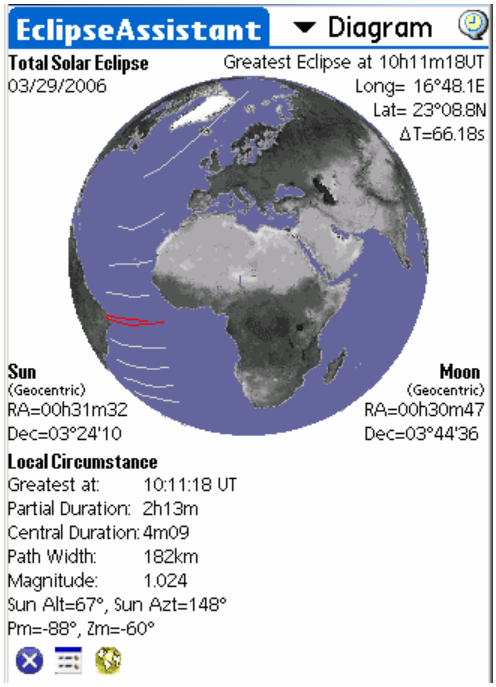
On high resolution handhelds, + and – buttons let you zoom in and out of the map. Only two levels of zoom are provided.

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. 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, 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

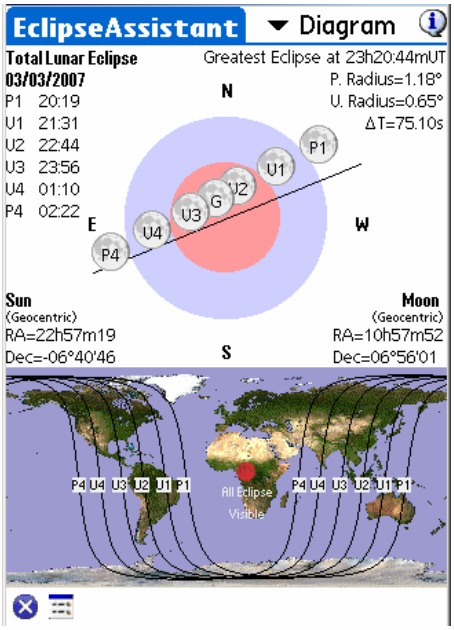
This screen shows the path of the moon through the earth's shadow. The different points of contact (P1, U1, … U4, P4) and the inclination of the moon path is displayed.

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.) The duration of this kind of eclipse 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 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.

Satellite Transits 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).

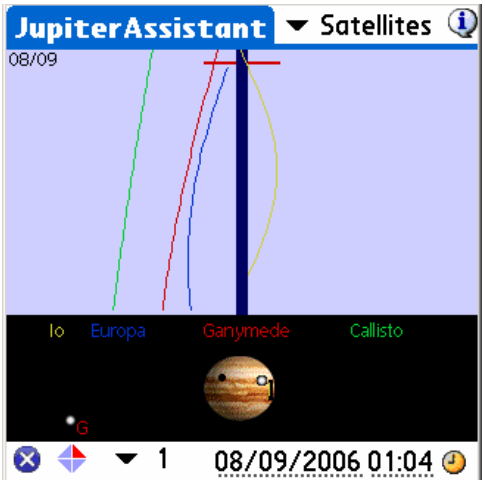
Once the ephemeris is drawn, moving your stylus along the vertical bold blue line moves Jupiter's satellites in real time. Interesting times and dates occur when multiple lines cross Jupiter's blue line. To see these events demonstrated move the horizontal red line to a region where you see that satellites 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), then use the stylus to more accurately approximate the times of the phenomena.

To get precise start and end times for each phenomenon switch to the Events Assistant.

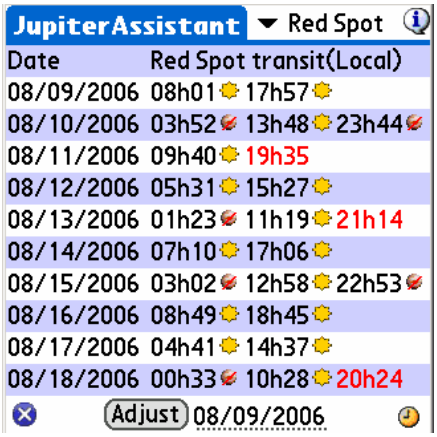
You can reverse and flip the view to match your refractor or reflector using the 

icon.



3.16.2. Great Red Spot (GRS) Assistant

This assistant displays for upcoming days the transit times of the GRS. Only times 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).



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 stays close to the computed value.

Note: This function can be used 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:

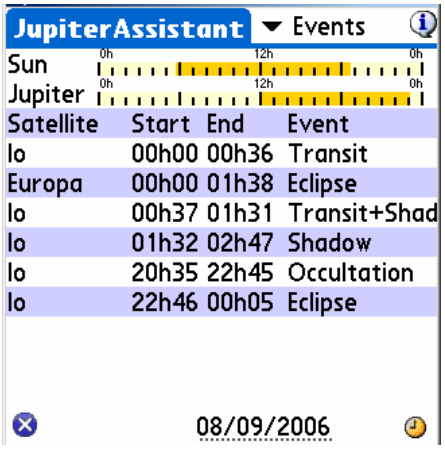
Transit – a satellite is in front of Jupiter's disk,

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.



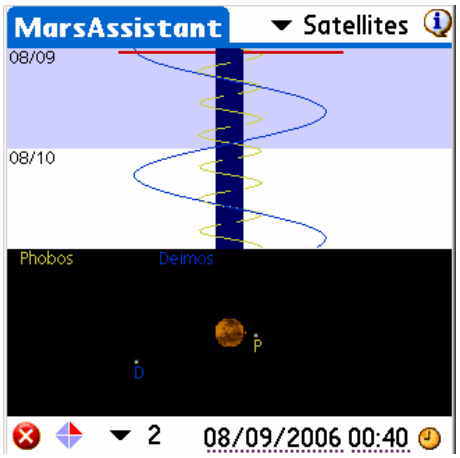
3.17. MarsAssistant

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.

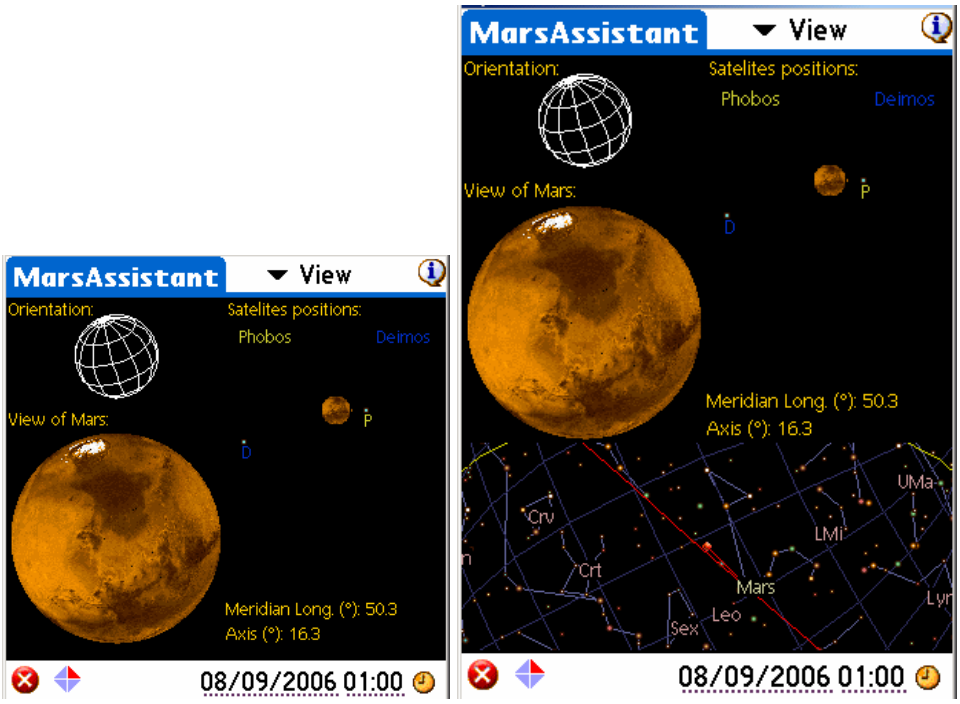


Mars Satellite view

- A particular observation date 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 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 Earth. Satellite positions are displayed as a reminder as well as a wire-frame orientation of Mars.



Mars view in 320x320 and 320x480 modes

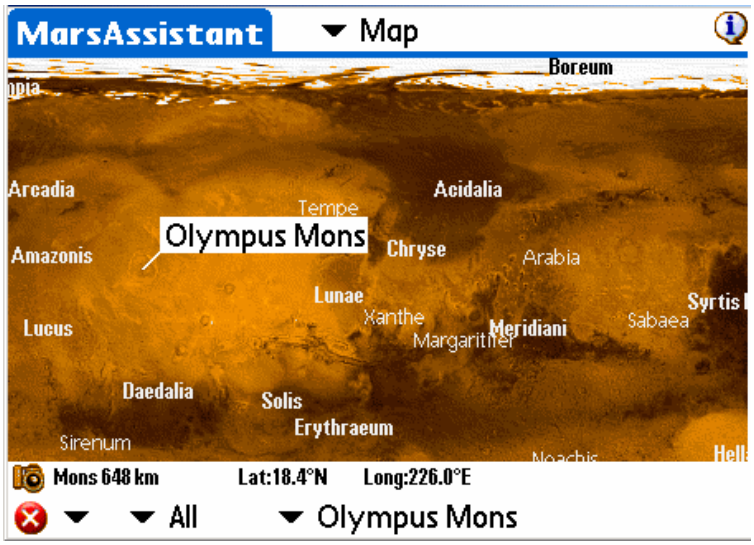
- Using the bottom popup list, it is possible to reverse and flip the view to match the view in your telescope.
- The major Mars features can be found on the Mars view. Just tap on a feature to highlight it.
- On wider displays, the position of Mars in the sky is also shown.

Tip: *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).

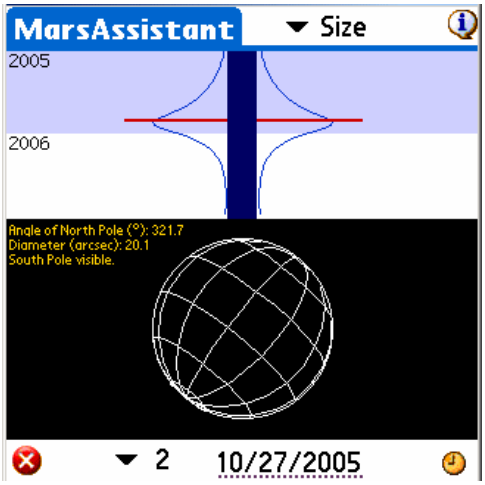
Browse the list to select a particular feature by name.

Tip: *To refresh the view after 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.



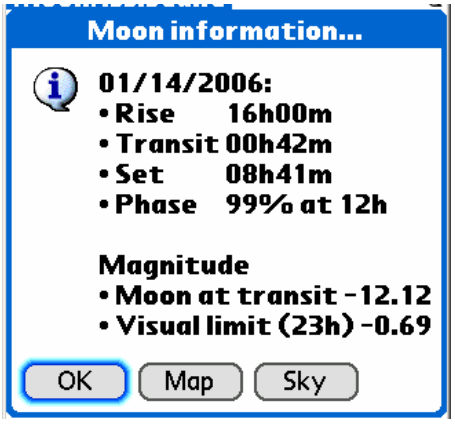
To see size and orientation for a particular date, tap on the date field and enter the date of interest. To reset the view to the current date press the clock icon.

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 for 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



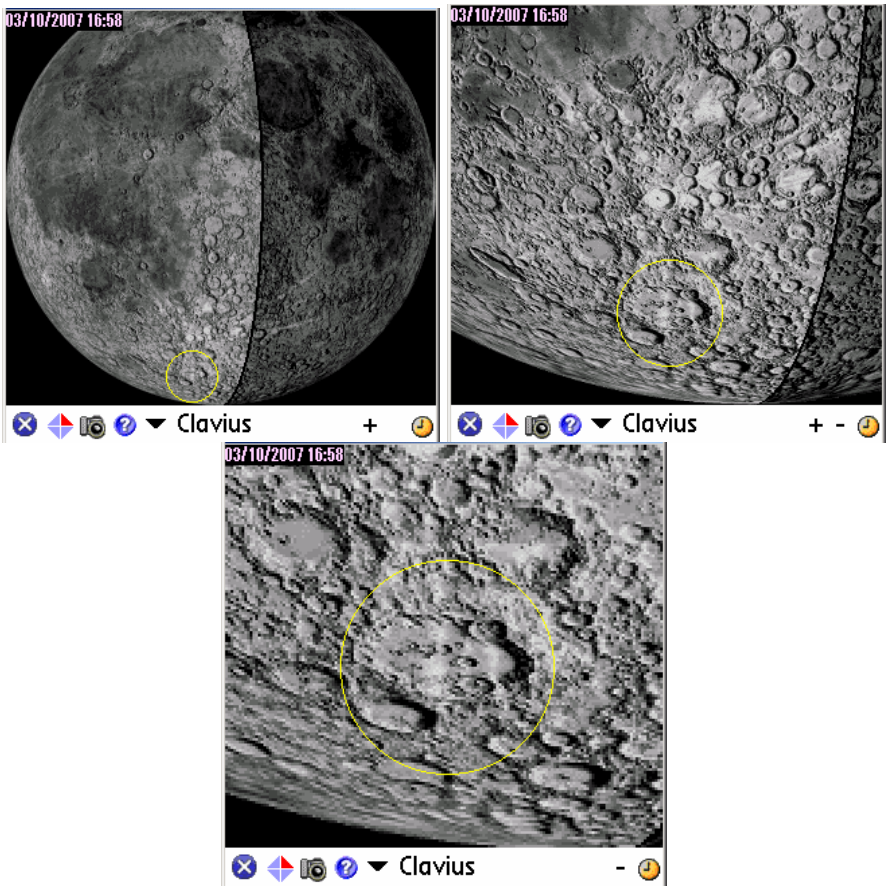
Moon Calendar Information for a particular day.

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. A circle indicates each feature selected. This circle depends on the size of the feature. For the smallest features, a default size is used.

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

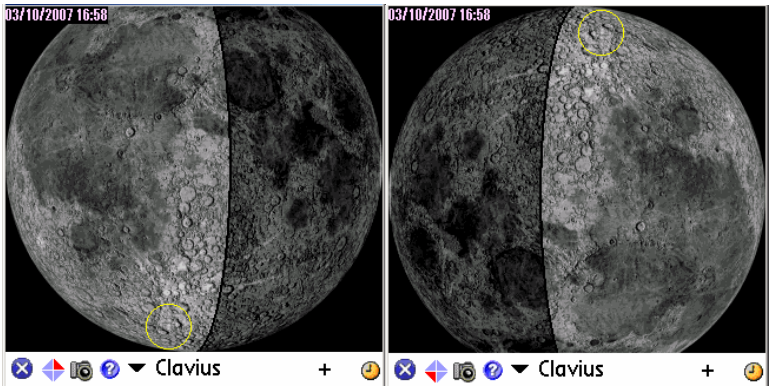
Once done, the information Icon will give you the feature position on the moon and its diameter in km.



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); for example, the T3 or newer Palm models. On older models, only the first level of zoom is 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 levels are available at 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.

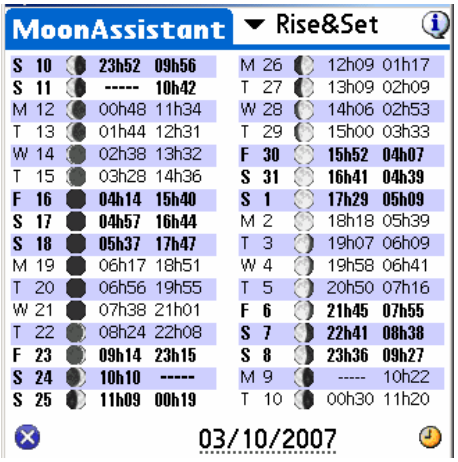
3.18.3. Rise&Set

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. Ensure that DayLight Savings settings are correct from March through October as applicable for your location.*



Moon Rise&Set Assistant

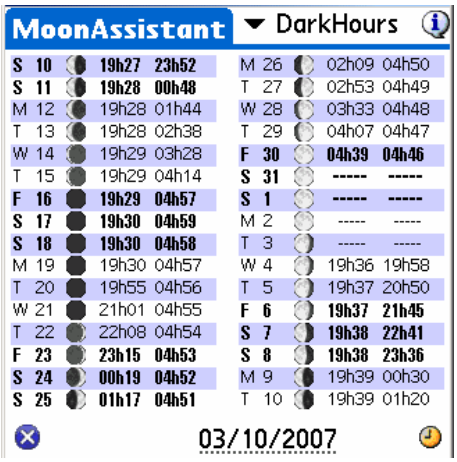
Tap on the date field to change the period.

3.18.4. DarkHours

This panel is designed for deep-sky object observers. It lists 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 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. Ensure that DayLight Savings settings are correct from March through October as applicable for your location.*



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 one or more times in a month.

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

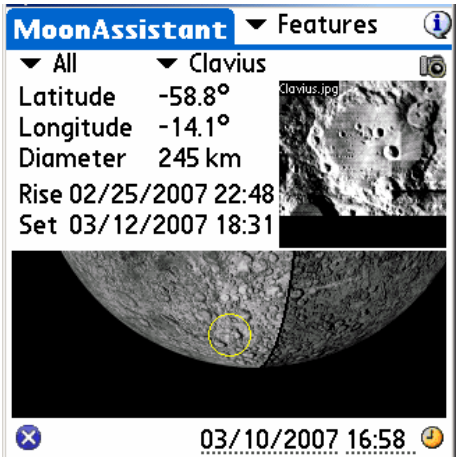
3.18.5. Features

Besides 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.

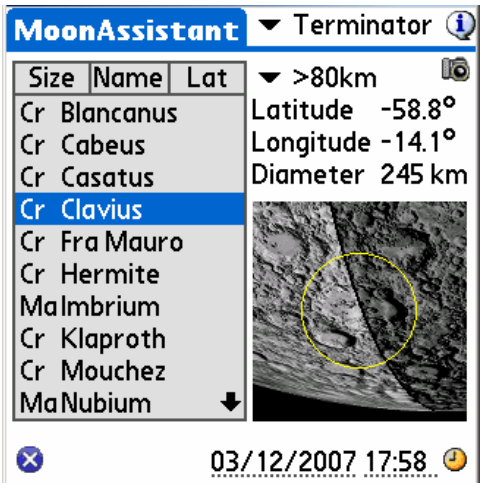
To help you quickly locate the region where a feature is located, a yellow circle is drawn on the Moon map to highlight its location.

If images are 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 locates Moon features close to the terminator (e.g., where the Sun will 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 features by size to keep only those relevant to using a telescope or binoculars.



Moon Features Assistant

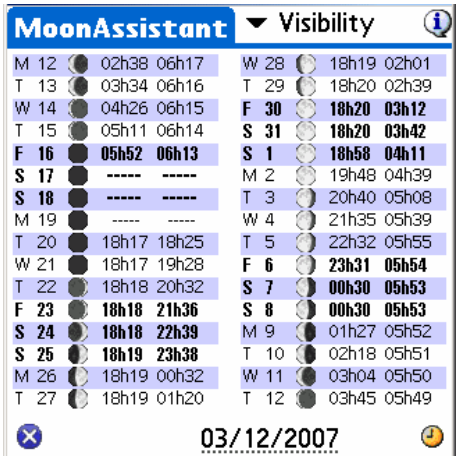
Once the desired feature is found, its seleniographic position (latitude and longitude) is displayed as well as its diameter.

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 lists the days and local time when the Moon is higher than 20° in the sky for your loc ation.

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



Moon Visible Days Assistant

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

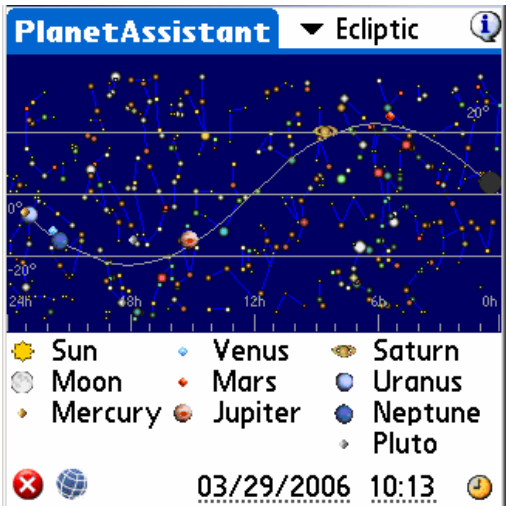
Planet assistants are designed to gather general information about the planets. For more detailed analysis, dedicated assistants are available for the Moon, Mars, Jupiter, Saturn, Eclipses, and Day/Night and Twilight for the Sun.

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.

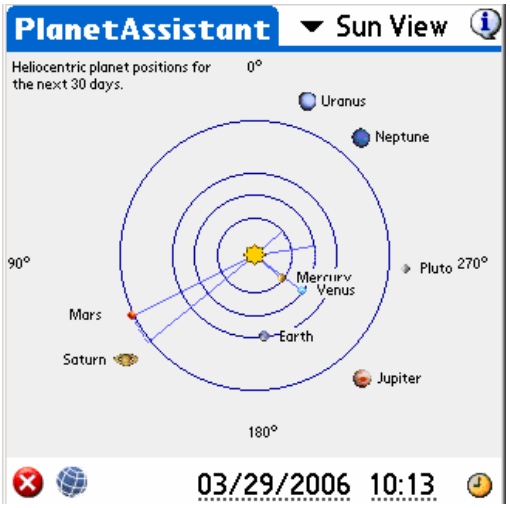


Note: *The Sun and Moon are included in the planet list only for ease of selection.*

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

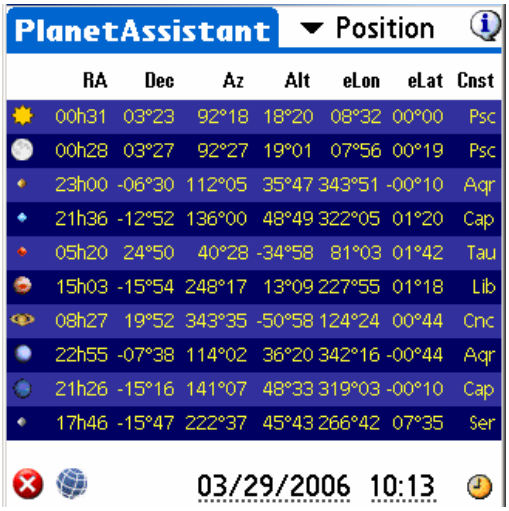
Sun View displays the heliocentric planet positions for the next 30 days. This will allow you to determine the best time to observe a planet during the next thirty days. The date and time can be changed using the date and time selector.



Using the left Palm buttons (to add or remove days), you can animate the chart and find particular oppositions or conjunctions, or perhaps just see how fast Mercury moves and Pluto doesn't.

3.19.3. Position

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



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

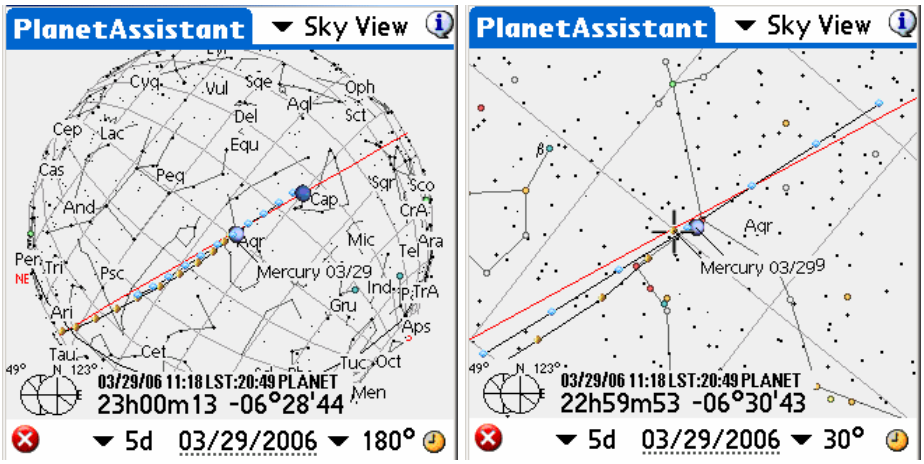
Clock, date and time fields have the same behavior as in the previous panels.

Using the Palm left buttons (to add or remove days) you can 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 selects the number of days the program adds between planet positions.



Planet positions with a step of 5 days (wide 180° an d 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.

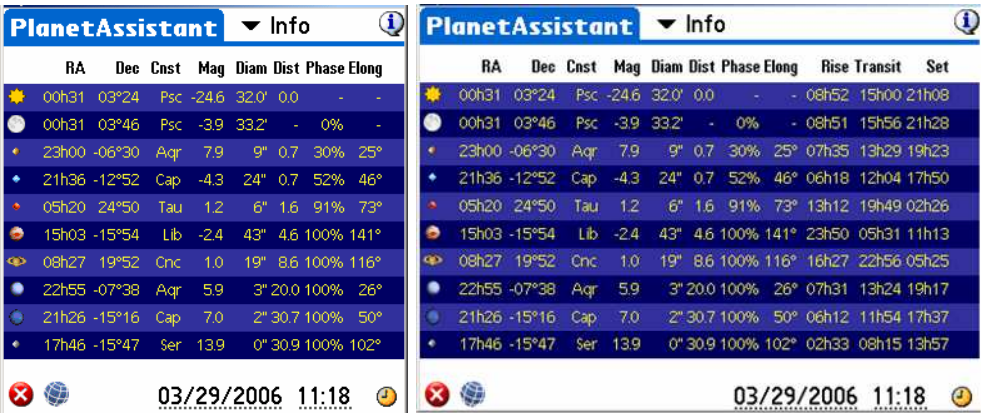
You can change the date of the chart using the clock button or by tapping in the date field to open the date-time selector.

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

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

3.19.5. Info

Info provides the usual information about each planet.

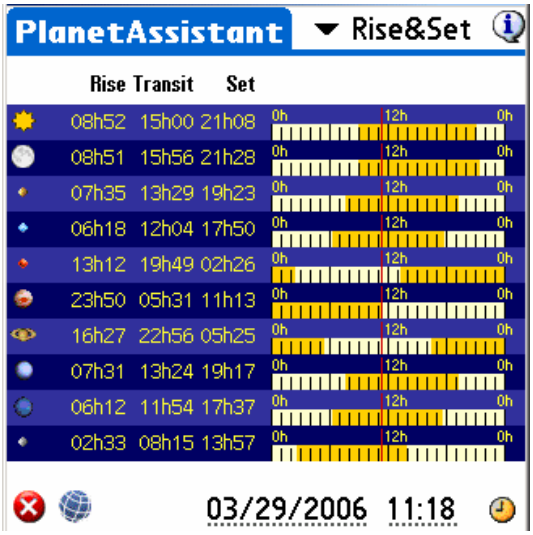


3.19.6. Rise&Set

Rise&Set displays 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 are visible.

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

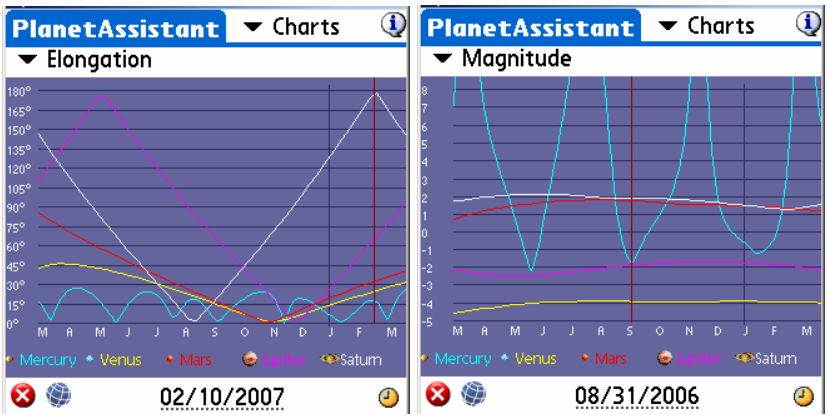
To add or remove one day, use the left keys of the Palm. This will refresh the display so you can find for example when the moon is not visible for a given time.



3.19.7. Charts

Charts shows the evolution of various 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 a given date.

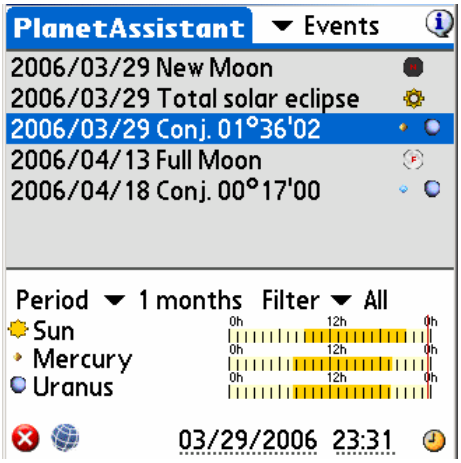
During the screen refresh, pressing any key will stop the computation.



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

3.19.8. Events

This panel forecasts 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 can filter the list to select specific events such as conjunctions, lunar events, oppositions and eclipses.

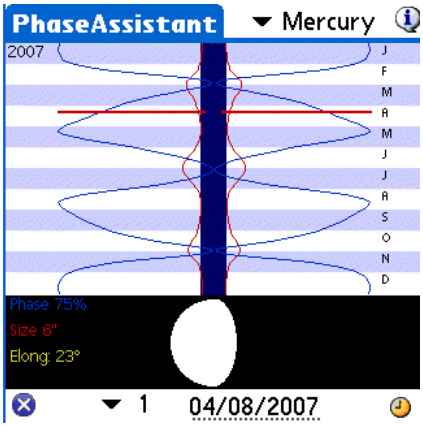
When you select an event its date and time is displayed at the bottom of the screen.

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

3.19.9. Phase

This chart displays the changing planet phase (Mercury, Venus and Mars) over time. For each planet you can find the date of a particular phase by dragging your stylus to move the vertical red line to any given date.

Size of the planet (red line) is displayed to help find the date when the planet is the biggest and the phase is still low enough to let you see most of the planet disk (when red lines cross blue ones for example).



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.

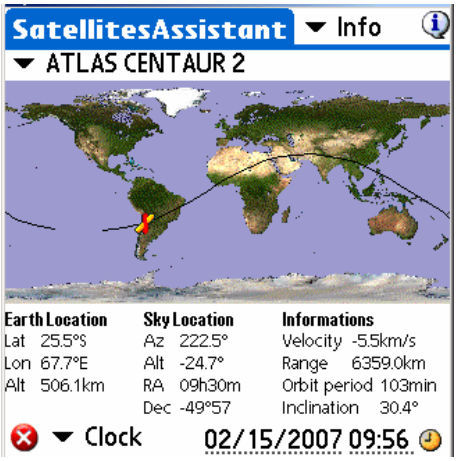
Despite SGP4 being one of the most accurate algorithms currently available to compute satellite positions, the required elements need to be updated regularly to keep accurate results. An update frequency of once a month will guarantee accurate results. After several months the results provided will probably 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 § 3.20.8 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 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.



Satellite Information

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.

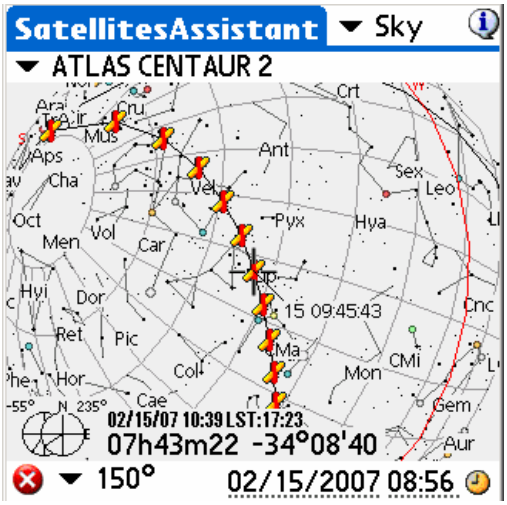
This information can either be computed for the date and time displayed at the bottom of the screen (Clock mode) or simulated using the proposed tracking mode. "Track" should be used if a real time refresh is wanted. Other values from +1' to 1°will add up to ten minutes to the cu rrent time at each refresh.

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 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

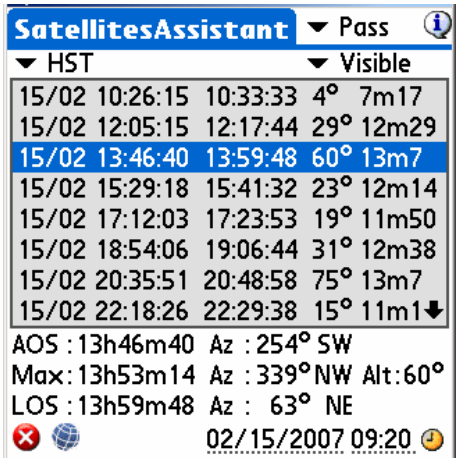
To determine the time when the satellite will pass a particular position, roll the sky sphere and center the red cross on the satellite position. The time of the position will be displayed.

If you see that a satellite and a particular sky object are going to pass close 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 displays 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.*



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 >=0°); you select >30°, only passes with an altitude highe r than 30° will be selected.

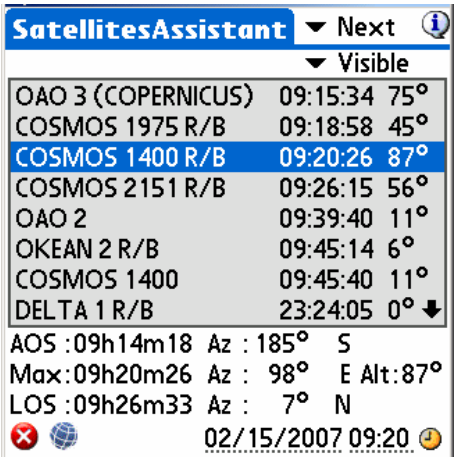
Once your pass selection is complete you can access information like time of **AOS** (Acquisition Of Signal, i.e., when the satellite rises over the horizon) and time of **LOS** (Loss Of Signal, i.e., when the satellite sets below the horizon). In this case the azimuth of AOS and LOS are also given.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



Next visible Satellites Assistant

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

3.20.5. Flare

This feature lets you anticipate the next Iridium satellite Flare visible from your location. An Iridium flare is caused by the sun reflecting from one of the three main mission antennae (MMA) of an Iridium satellite. The MMAs are flat, highly polished aluminum surfaces, and when the angle is just right they reflect the sun just like a mirror. This produces a bright flash in the sky. There are over 80 of these communications satellites in orbit.

Note: *For more information, please see http://www.heavens-above.com/Iridium flare help page.*

Note: *Astromist computes Flare only for Iridium satellites. The other satellites you may have in the list are ignored.*

Most of the time, flares are visible just before sunrise or after sunset. So, Astromist does not search for them between sunrise and sunset for a particular day.

Flare computation requires a huge number of computations so the simulation is limited to one day.

At any time, you can stop the calculation by pressing a key.

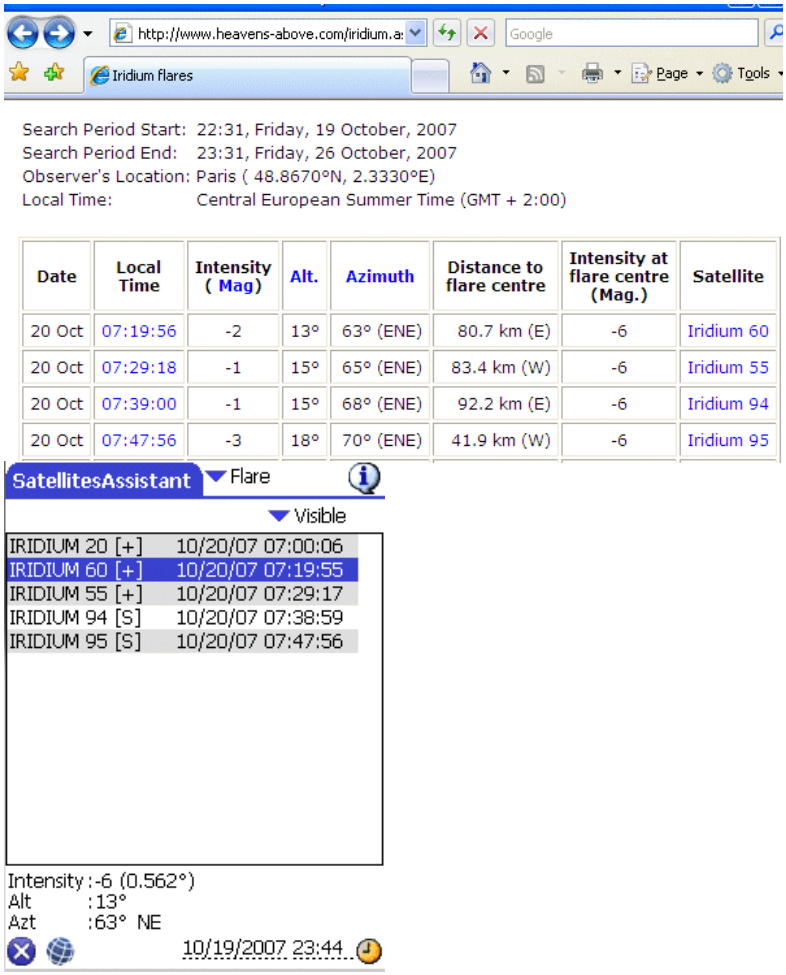
To get accurate results (equal or very close the ones provided by web sites like Heaven-Above) you need:

An up to date Satellite database,

Accurate location position,

Correct GMT and daylight check,

A few minutes and enough battery power to wait for the result!



Heavens-Above site results and Astromist results.

Note: *Sometimes Astromist finds more Flares. Heaven-Above takes into account only Flares above an altitude of 10°, while Astromist starts at 2° (Visible criteria). In addition, Heaven-Above seems to limit the search to one hour before/after rise and set of the sun. Astromist uses 2 hours.*

When a flare is selected, the following data are available:

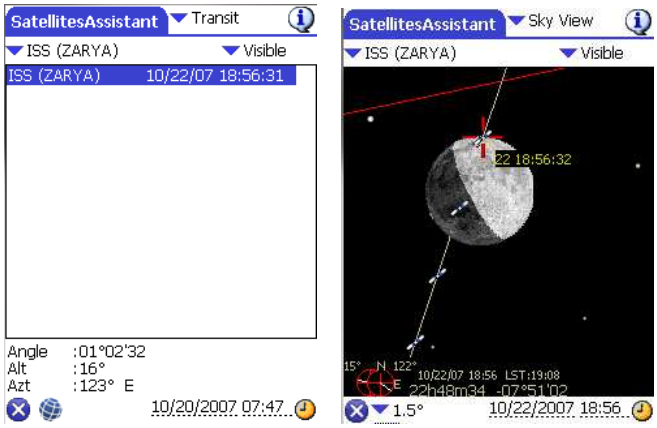
- Its intensity,

- The angular separation between the Flare central path and your location on the earth (the smaller, the closer you are and the brighter will be the flare),
- Its altitude in degrees,
- Its azimuth location in the sky.

Once a flare is selected, you can launch the SatelliteAssistant SkyView with the  icon to see the path of the flare in the sky. This helps locate the event in the sky.

3.20.6. Transit

This feature lets you anticipate the next transit of a satellite over the moon (ISS usually). Transit computation requires a huge number of computations, so the simulation is limited to one day. At any time, you can stop the calculation by pressing a key.



Transit detection and view of the Transit using SkyView

When you select a transit, the following data are available:

The angular separation between the satellite and the center of the moon at the beginning of the event,

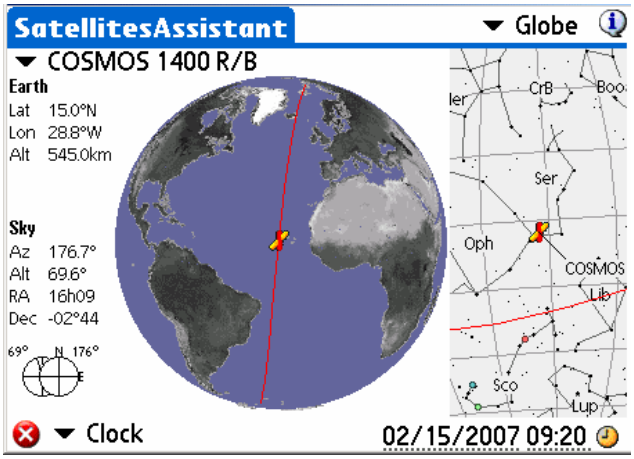
Its altitude in degrees,

Its azimuth location in the sky.

Once selected, you can launch the SatelliteAssistant SkyView with the  icon to see the path of the transit in the sky.

3.20.7. 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 get the best results.



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 cu rrent 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.

3.20.8. 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.

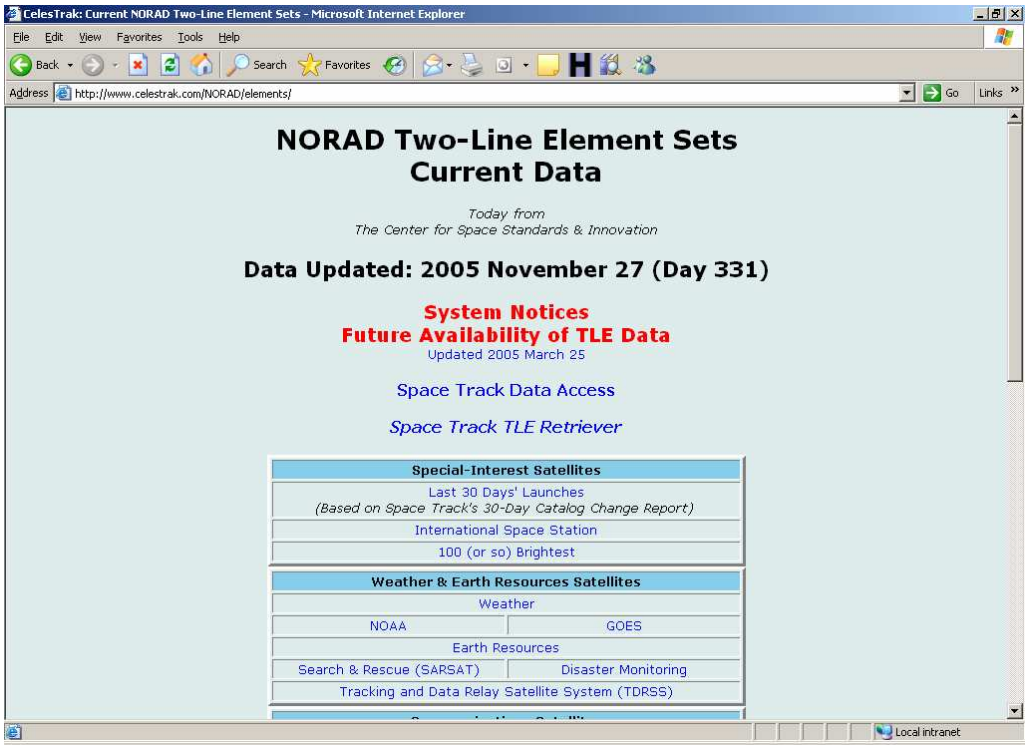
3.20.8.1. SatelliteDB tools

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.

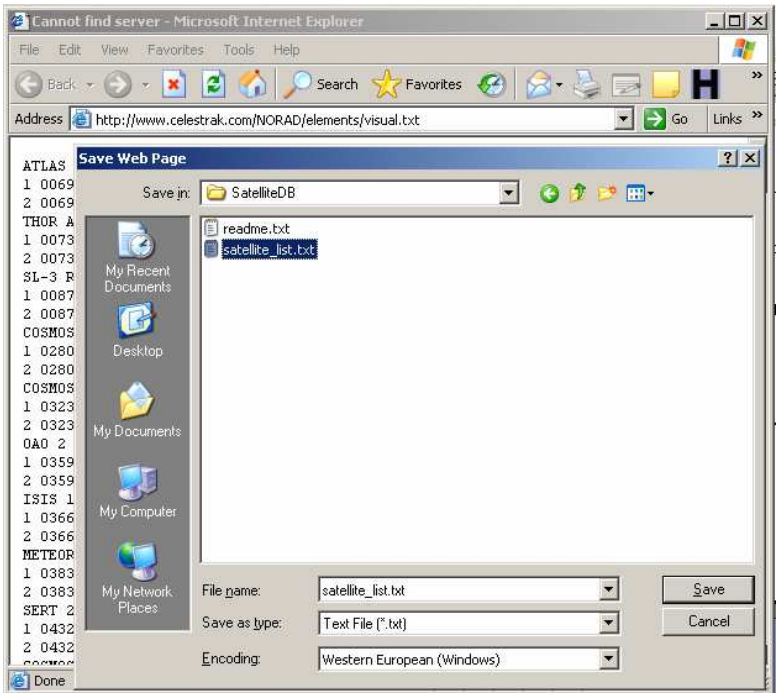
The following link http://celestrak.com/NORAD/elements/ provides several TLE lists.

To create a new satellite database follow the instructions below:

As an example, the link http://www.celestrak.com/NORAD/elements/visual.txt downloads the most recent satellite TLE file of visual satellites. Save it as satellite_list.txt in the satellitedb folder.

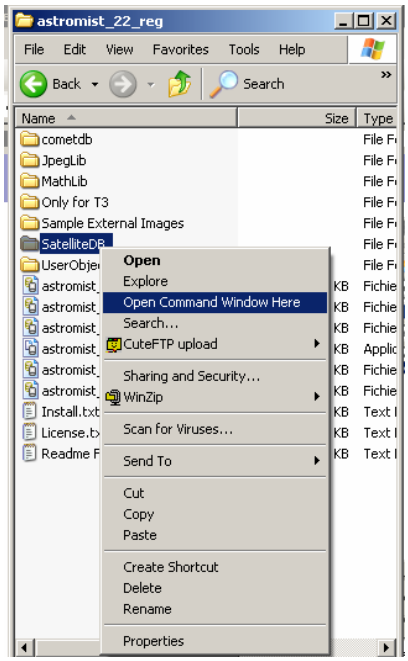


NORAD site which provides TLEs of the 100 (or so) brightest satellites used by Astromist

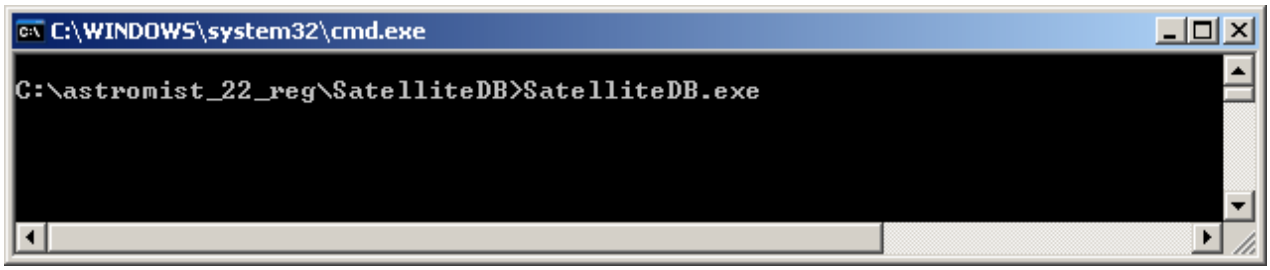


Save as the file in satellitedb folder

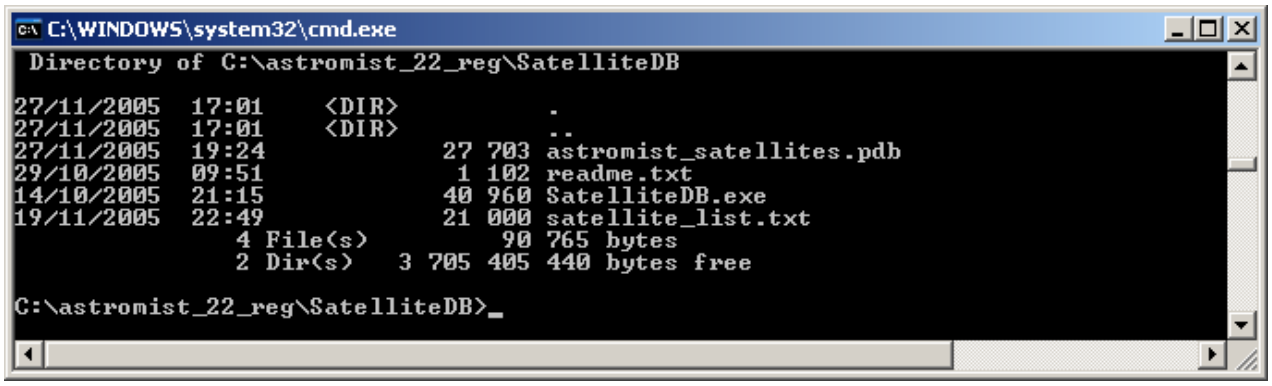
- If you want to remove or add some lines, edit the file using your preferred text editor.
- Open a DOS session and change to the program's directory.



- Run SatelliteDB.exe to create the new database.



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

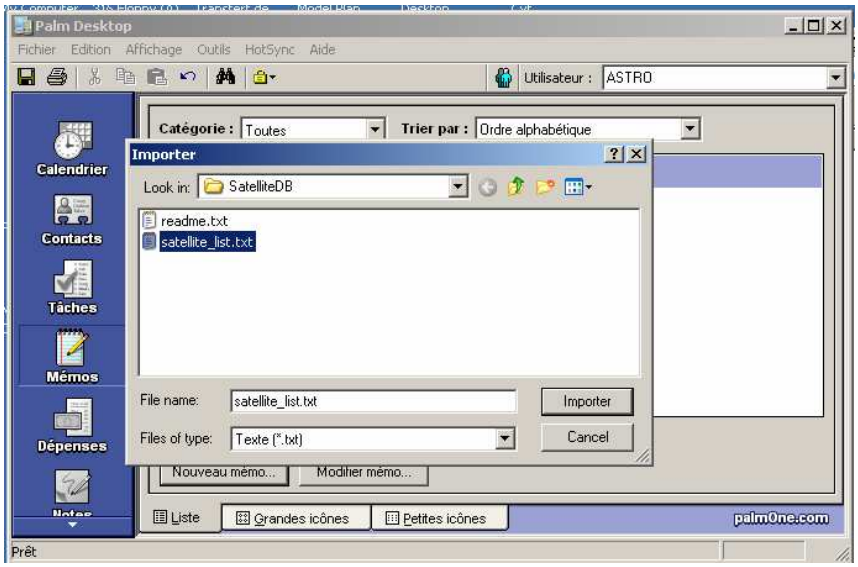


- Now install the new database file to your Palm.

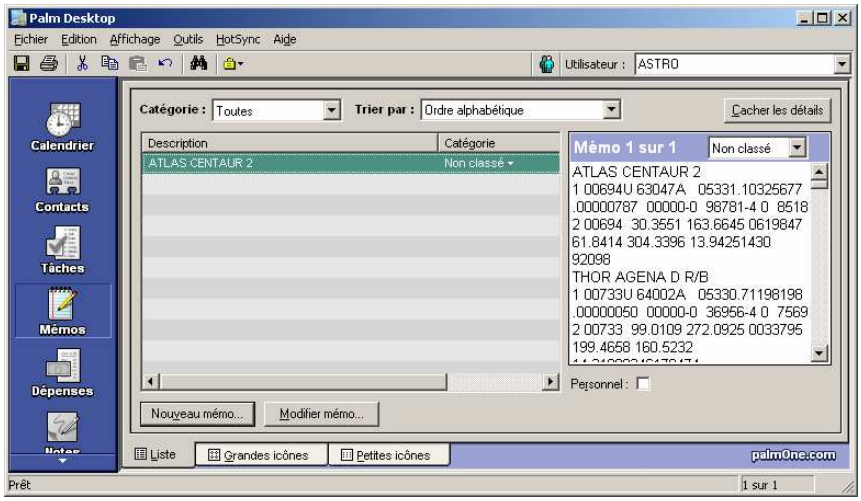
Note: *You must concatenate the IRIDIUM satellite TLEs to your preferred list to be able to compute Flare prediction.*

3.20.8.2. Using the Palm Text memo

Using the satellite_list.txt file you uploaded and saved (see §3.20.8.1 SatelliteDB tools), you can import it and create a Palm memo using your PalmDesktop application.

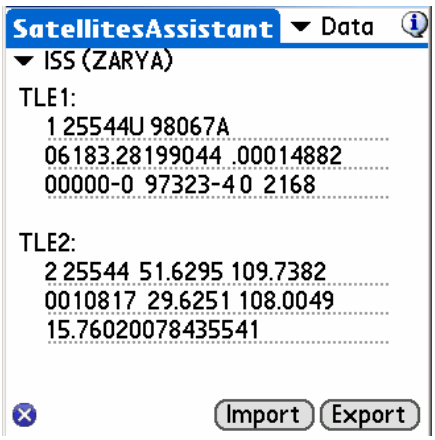


First Import the text file into a new memo



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.

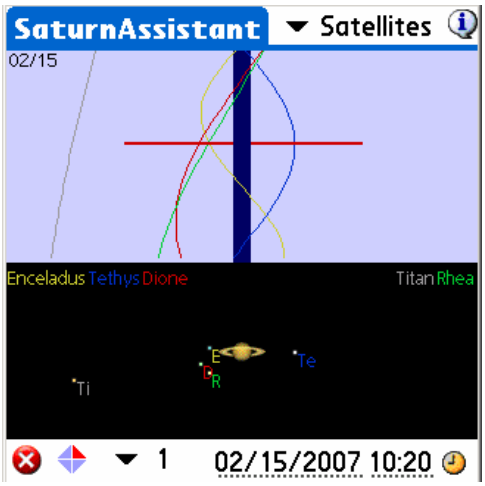
Note: *For Mac or Linux users, if you want to create a huge satellite database without the SatelliteDB.exe tools, create several memos. When you import the first one, choose replace and for all others select update.*

3.21. SaturnAssistant

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

3.21.1. Satellites

Satellites displays Saturn's satellite positions in real time.

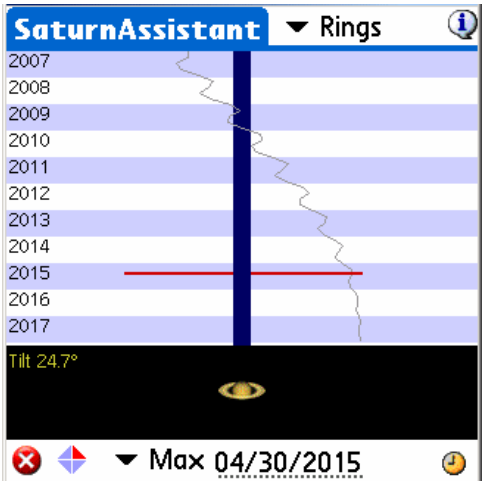


Select a range of the chart and animate the chart moving your stylus on the screen to reach a particular configuration to find the date and time.

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

3.21.2. Rings

Rings displays Saturn's ring orientation over a long period.



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

The Date and time field and clock button select the start date of the chart.

3.21.3. Events

Events assistant lets you predict occultation, transit and eclipse phenomena on the Saturn disk. Such events are visible during the period of invisibility of the ring i.e. whne their tilt is close to 0°. It is the case between 2009 and 2010.

The following events are taken into account:

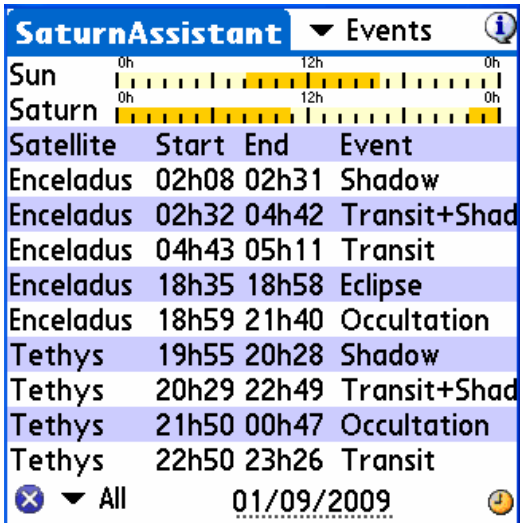
Transit – a satellite is in front of Saturn's disk,

Shadow – the shadow of a satellite is visible on Saturn's disk, but the satellite is not in front of it,

Transit+Shadow – a satellite is in front of Saturn and its shadow is visible on Saturn's disk,

Eclipse – a satellite is crossing through Saturn's shadow and is no longer visible, and

- **Occultation –** a satellite is behind Saturn's disk and is no longer visible.



Some remarks:

- The list is sorted by Satellite's name and not by event's time to easier track events on bigger satellites,
- If there are too much events for one day, a popup message tells you that some of the events are not displayed. In this case, you can use the popup selector at the bottom to display only the event's linked to one satellite.
- If you click on the date, you will be able to change the date of the prediction,
- The clock icon, reset the selected date to the current one.
- Predictions are accurate within one minute. Even if the computations have been highly optimized, a prediction for one day might take half a minute or more on a Palm. On Pocket PC result are faster.

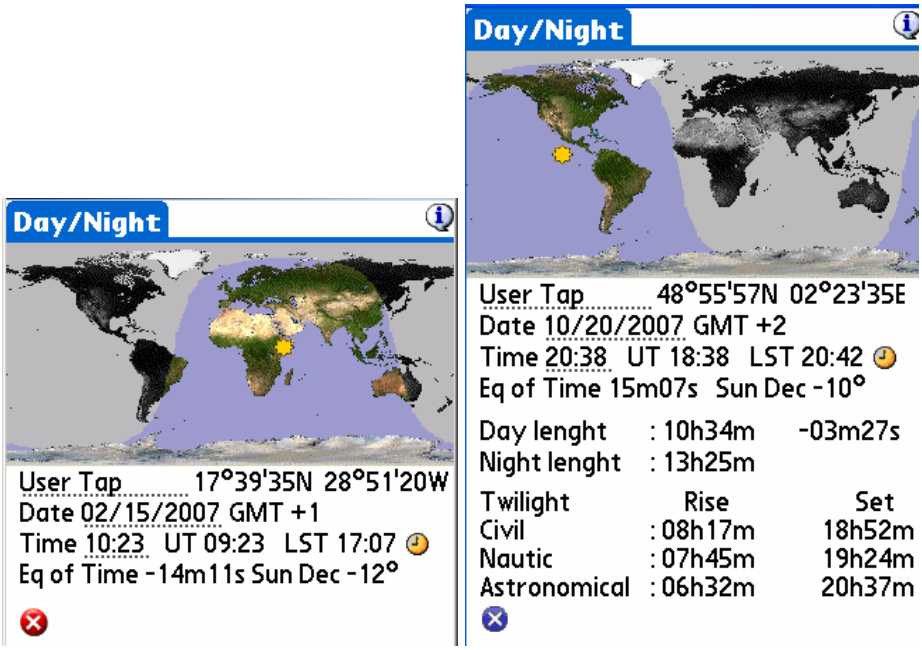
3.22. Day/NightAssistant

This assistant provides information about the day and night on the earth:

Night zone on the earth,

Day or night length,

The different Rise and Set times (civil: sun below horizon, nautical: sun below -6°, astronomical: sun below -18°).

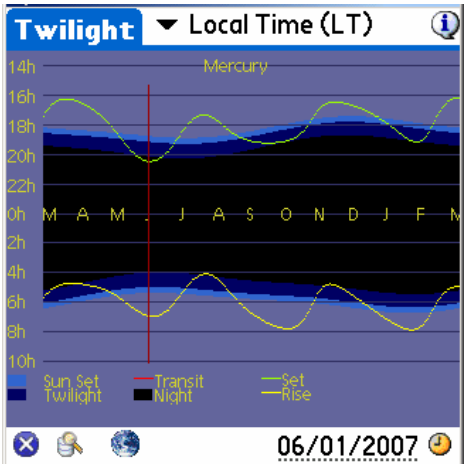


Moving the stylus on the map will move the sun and night zones on the earth.

Using the up and down keys of the PDA, you can change the date so you can see the variation of the night zone throughout the year.

3.23. TwilightAssistant

TwilightAssistant displays 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 viewing period 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:

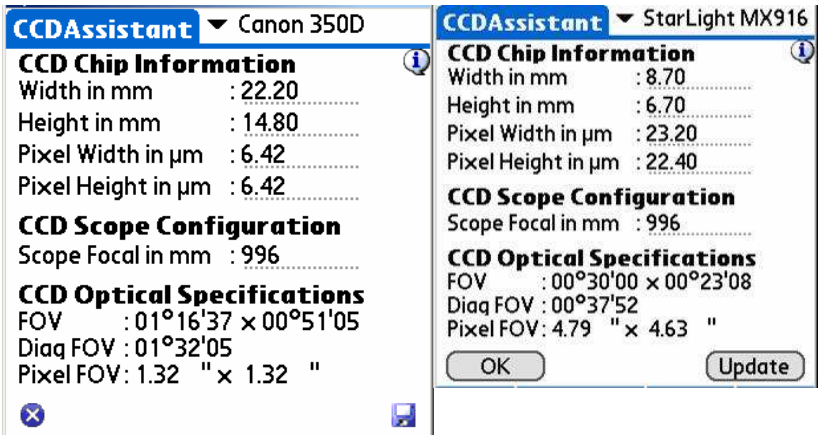
- your local time ignoring Day Light savings time changes,
- your local time taking account Day Light savings time changes, or
- Universal Time.

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

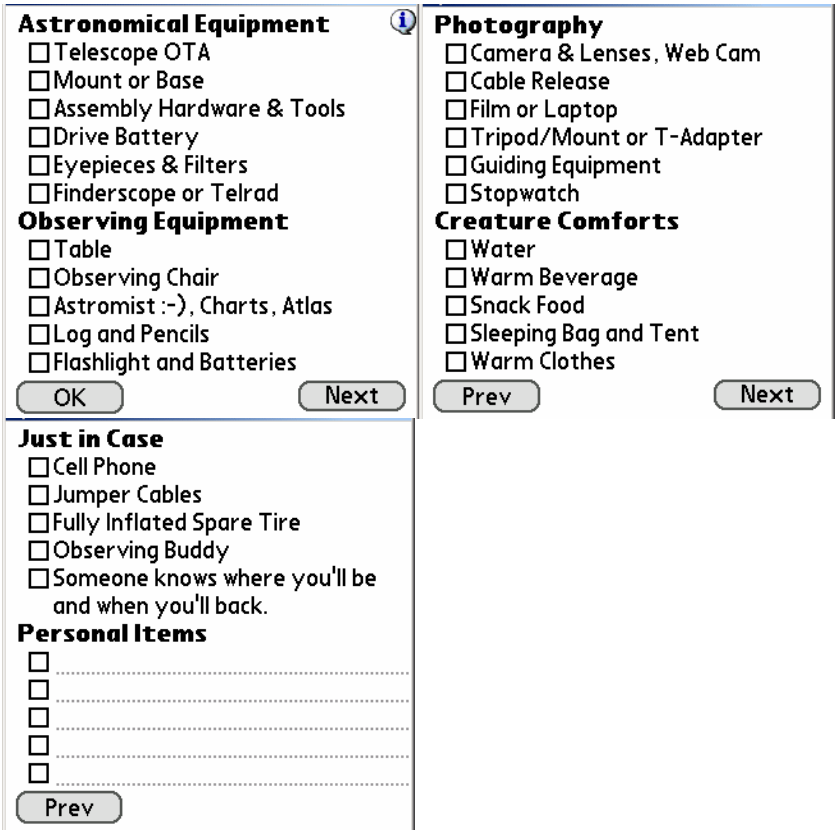
This panel configures your CCD information to enable Astromist to display your CCD field of view in the SkyChart.

Select a predefined CCD camera or supply the information for your particular CCD.



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.



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 objects observed by Charles Messier and his friend and colleague, Pierre Méchain, but 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(Rigil)	2.08

Id	Name	Mag
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
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

Id	Name	Mag
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	Algredi
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, the UserObjectDB.exe tool allows you to create your own catalogs of objects without the usual limitations of Palm Text memos (i.e. only a few objects at a time). Furthermore an Excel spreadsheet is provided to help registered users easily create catalogs and 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. 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, use the Astroplanner 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.

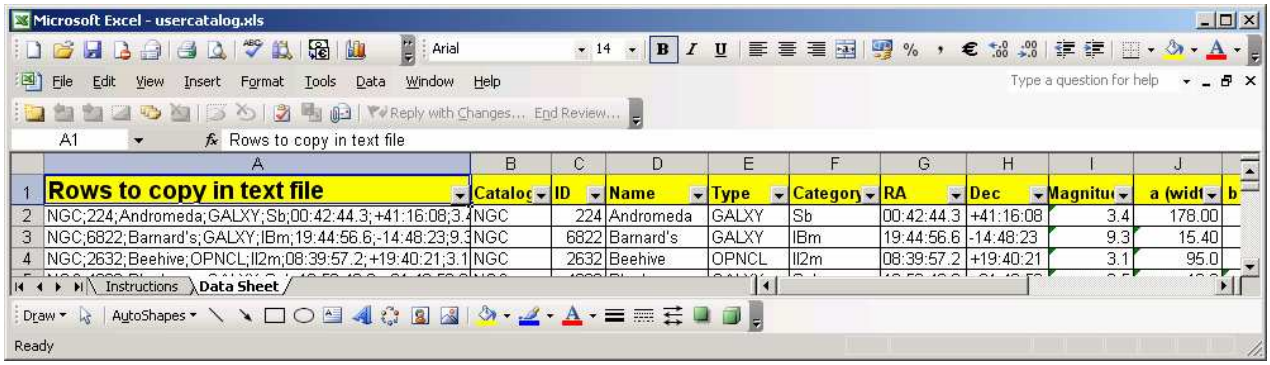
4.7.1. Prepare the catalog

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.

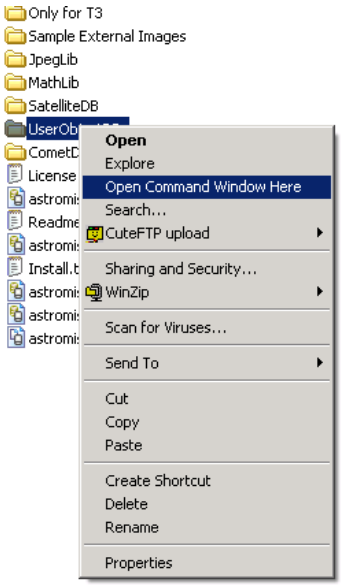
After that you can run the UserObjectDB.exe program or import the text file as a new memo to your palm.

4.7.2. UserObjectDB

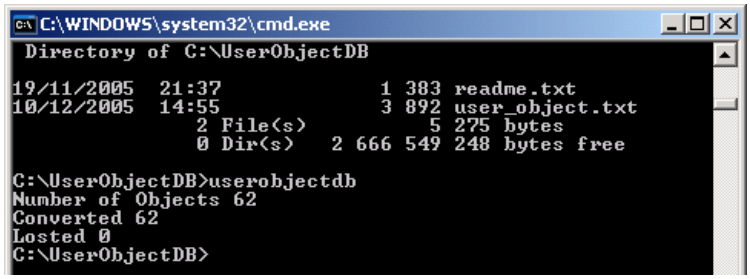
Using this tool you can create catalog of up to 32000 objects. To estimate the final size of your catalog you can use this rule: 100 objects=10Kb.

The procedure is as follows:

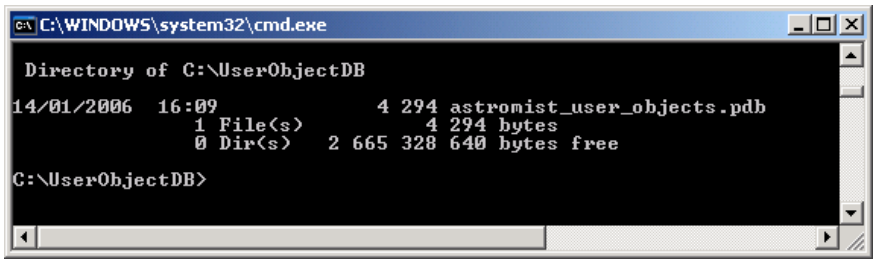
Open a DOS session and change to the program's directory.



- Run UserObjectDB.exe to create the new database.

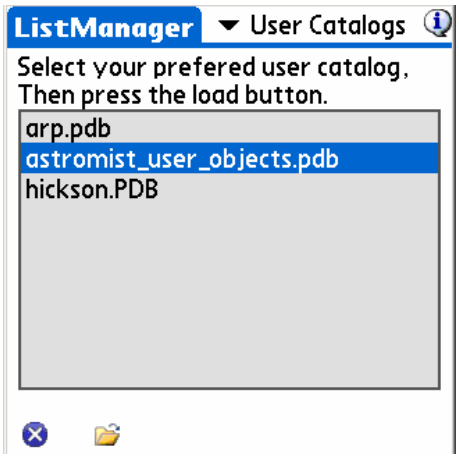


- The astromist_user_objects.pdb file is created in the same folder.



- 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. In this method you need to rename the file as desired, keeping the .pdb extension. To select a particular catalog, use ListManager and choose the User Catalogs filter. Then select your preferred catalog. Furthermore you can switch as many times as you want between catalogs. In addition, you can use NIghtTripper to create a unique list of objects involving several different custom made catalogs. This list can then be exported to create a new catalog using UserObjectDB tool.

Finally the  wizard icon allows selection of your objects like other Astromist objects. They will be listed under the User Catalog.

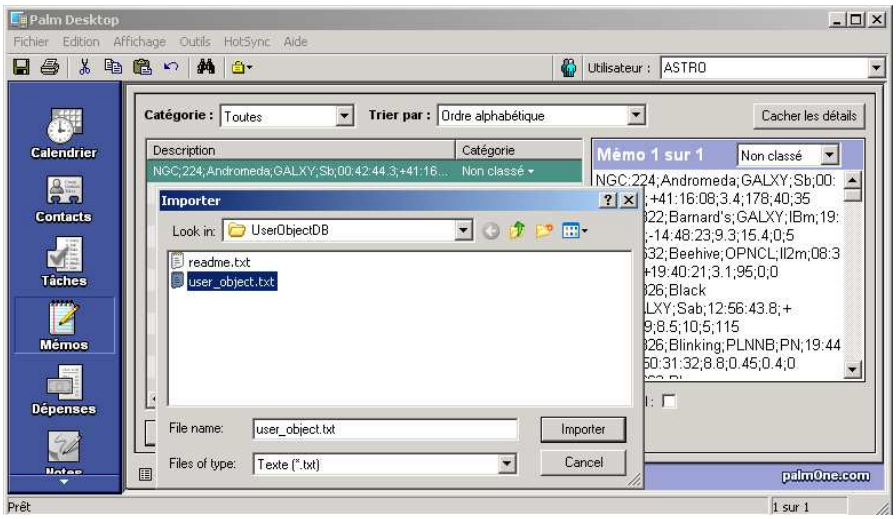


User catalogs management screen

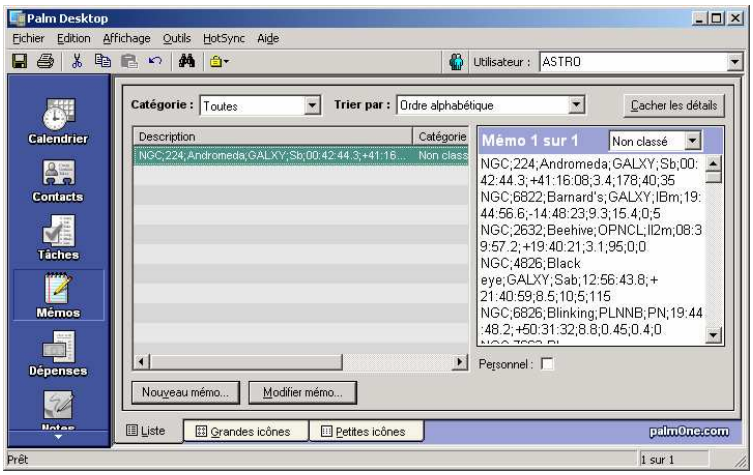
4.7.3. Using the Palm Text memo

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 menu item.

Astromist User Object Import screens

- Tap on Replace or Update indicating the desired effect on the current object list.
- Select the memo and press import.
- The current object list is then updated and 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 be sure to set "Max Selected" in the 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 produces ready-made Astromist user object catalogs.

5. Telescope control

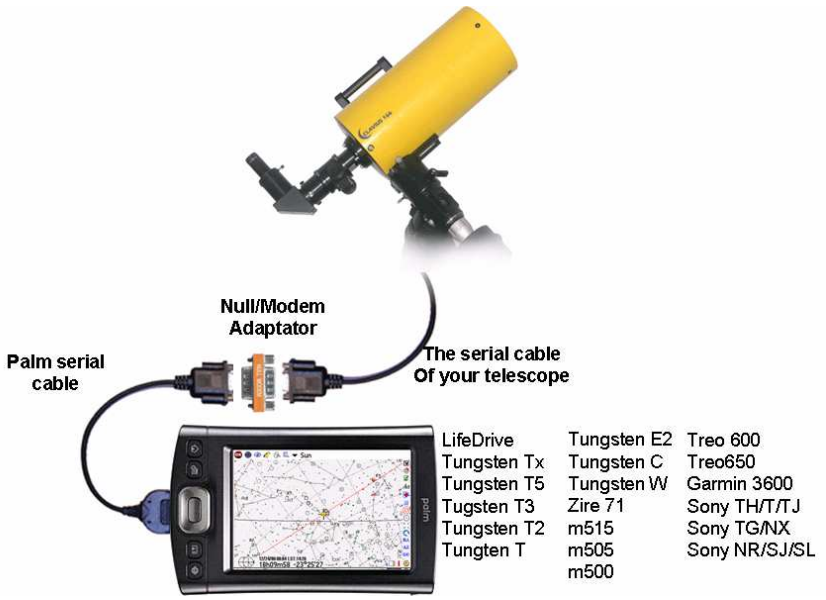
Note: Many cable interfaces may be found at http://www.atozastro.com/

Before connecting your PDA to your mount you need to:

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

5.1. Telescope Interface

5.1.1. Serial setup



About the hardware:

- A serial cable for your palm may be found at http://www.pcables.com. If you do not find a cable here, there is a small chance one exists elsewhere.
- A null/modem DB9 male/male adaptor:

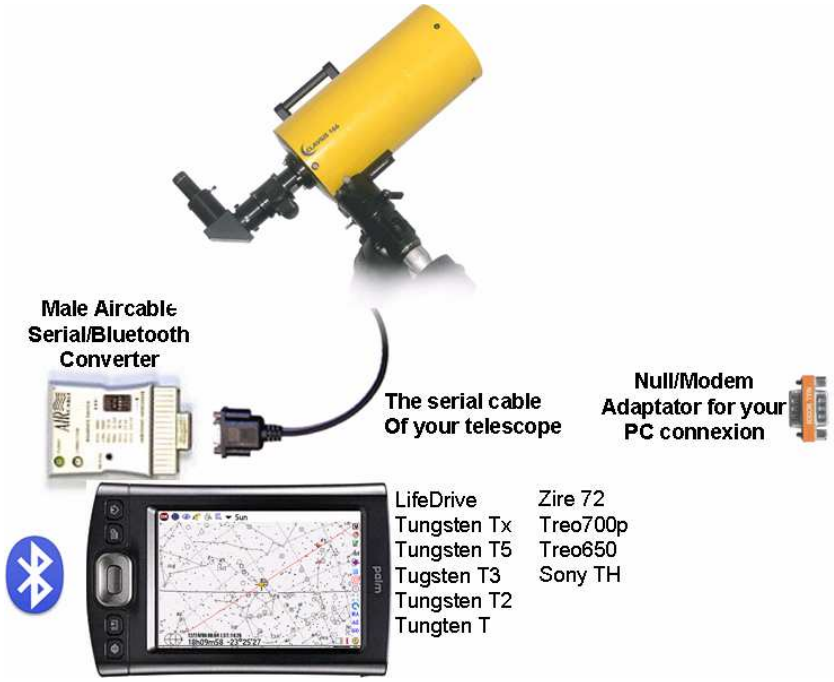
http://www.cablewholesale.com/cgi-bin/search.cgi?body=Search&text=mini+null+modem

- A serial cable compatible with your telescope mount. Ask your usual reseller. Many sites are available through the internet to obtain this hardware. Some of them are:
  - 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 be $85 (60+5+20).

5.1.2. Bluetooth



About the hardware:

- 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. Check with your usual reseller. Many sites are available through the internet to obtain this hardware. Some of them are:
  - 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 be $85 (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 support is still experimental. It has been tested using an Actisys 100M serial-to-infrared converter. The main disadvantage of this link is that you are obliged to be positioned in front of the IR sensor to communicate, which is not always convenient.

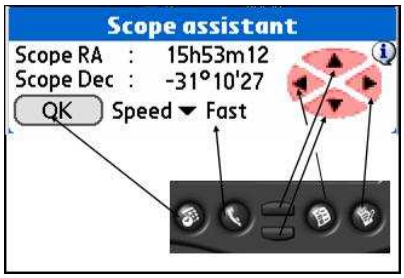
5.1.4. Manual mode

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 the 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 the LX200 protocol, so use the LX200 command set.

5.3.4. Astrophysics

Astrophysics mounts support LX200 protocol, so use the LX200 command set.

5.3.5. Takahashi

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

5.3.6. ServoCat

The 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

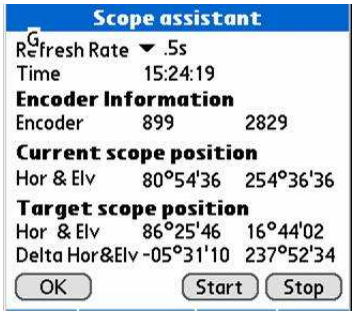
Dave Ek

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 using the NMEA protocol. It has been tested with 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 (Palm IQ3600).

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