MPj Astro 1.5.1 Instruction Manual

Introduction

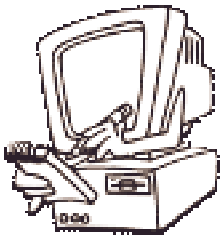
Welcome to Microprojects' MPj Astro, astronomy programme for the Apple Macintosh. This instruction manual is your guide to MPj Astro and all of its features. For the most part, the topics in this manual are organized by MPj Astro's main dialogues, menu titles and each item in those menus.

Read the section called "Setup Dialogue" first. This section will tell you what you need to do to have MPj Astro display the night sky as seen from your location and remember those settings.

From there, you are free to experiment and try out all the features, menu items and controls. You will probably want to read through this manual in its entirety at some point. That way you can get a better understanding of the variety of features available and learn what methods best suit you to use this application. Help balloons are available for all menu items, the main dialogues and display features.

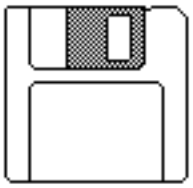
Microprojects hopes that you have many hours of enjoyment , discovery and learning about astronomy with MPj Astro.

PLEASE SUPPORT SHAREWARE



Go to Registration Page

Installation



Shareware Installer

To install MPj Astro on your hard disk simply double-click on the MPj Astro Installer icon. You will be asked where you want to install the programme and then several files will be uncompressed and placed in a folder named Microprojects. The installer remains unaltered after the installation. Once installed, the Microprojects folder should contain the MPj Astro application, a READ ME file, four data documents, a shortcuts file in the AstroText folder and this manual. The best version (68k, fpu, ppc) of MPj Astro for your computer will be automatically installed.

Registration Installer

This installer contains 35 high resolution astronomy photographs and the AstroStar document which contains data on all 7th and 8th magnitude stars (~65k stars).

If you have a registered version of MPj Astro 1.4, 1.4.1 or 1.5, you can upgrade to version 1.5.1 at no cost. See the MPj READ ME file for information.

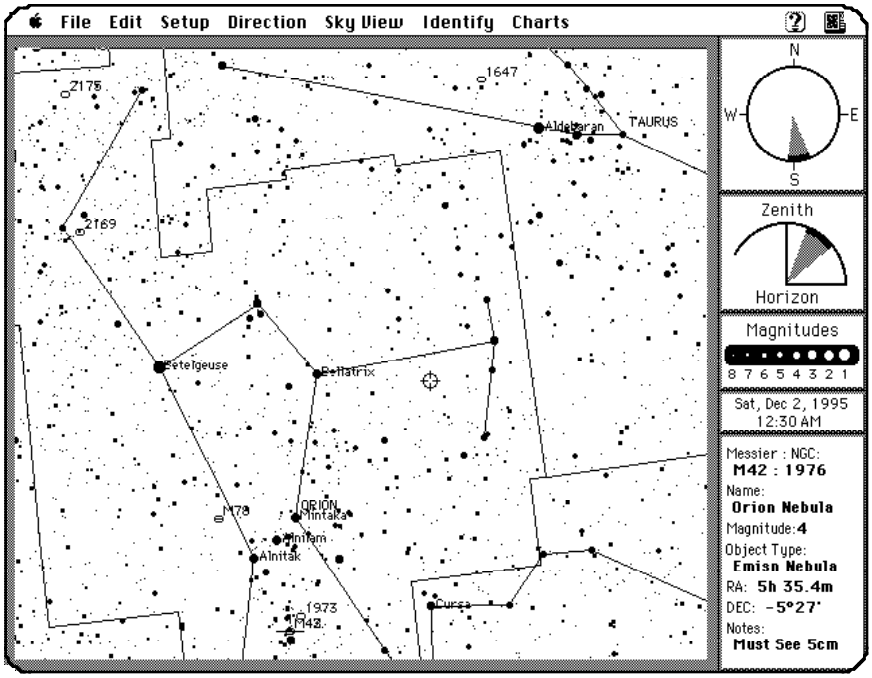
Launching MPj Astro

You launch MPj Astro like any other Macintosh application. You can select the MPj Astro icon and chose Open from the Finder menu or you can double click on the icon. You can also double click on any MPj Astro document although these documents are not available to you to be changed in any way. You can also create an alias of MPj Astro, place it anywhere you like, and launch from the alias.

A registration dialogue will appear the first time you launch MPj Astro after using the registration installer. Please enter your name where indicated. This will register you as the user of your copy of MPj Astro and your name will appear in the start-up display each time you launch MPj Astro.

If you ever have to change the registered name, hold down the option key as you launch MPj Astro and the registration dialogue will appear. You can then enter a new name.

MPj Astro Screen Display



Direction and Viewing Angle

Eye Elevation and Viewing Angle

Star Magnitude Chart

Current Date and Time

Data Panel

Sky Display Shown Reversed

The MPj Astro display will usually fill your entire screen. The dimensions of the different sections may vary from the picture shown here based on the overall size and resolution of your particular monitor. This picture can be used to identify the various sections of the display that are mentioned throughout this manual. If you would like to use a smaller window and you have a large enough monitor, hold down the shift key (very small window) or the command key (640X480 window) as you launch MPj Astro.

Direction Graphic

This graphic displays the current direction you are facing by compass direction. The width of the wedge indicates the current viewing angle as it relates to the left and right sides of the sky display. Click in this graphic and control buttons will appear in the data panel. Option + Click on the direction circle and the sky display will change to that direction.

Elevation Graphic

This graphic indicates how far up you are looking, based on degrees from horizon to zenith. The width of the wedge indicates the current viewing angle as it relates to the top and bottom sides of the sky display. Click in this graphic and control buttons will appear in the data panel. Option + Click on the elevation circle and the sky display will change to that elevation.

Magnitude Chart

This chart represents how stars of a particular magnitude will appear in the sky display. Click on a star and its exact magnitude, along with other information about the star, will appear in the data panel. This chart will change, as do the star sizes, when 7th or 8th magnitude stars are displayed.

Date and Time

This panel displays the current viewing date and time. Click in this panel and control buttons will

appear in the data panel.

Data Panel

This panel changes depending upon what portion of the display you click in. If you click in the Direction, Elevation or Time areas of the display, control buttons appear that allow changes to those aspects of the sky display. If you click on an object in the sky display, information about the object will be displayed in the data panel. Select Cursor Position from the Identify menu and the data panel will display the current position of the cursor in terms of Right Ascension, Declination, Altitude and Azimuth. Solar System charts and the calendar display have their own appropriate uses for the data panel. If you have a small monitor, shift + click on an object to see its transit, rise and set times.

Arrow Keys

Besides the data panel control buttons and menu items, the direction, eye elevation, time and viewing angle can be changed with the keyboard arrow keys. These keys can be hit once or held down for continuous action.

The right arrow key changes your direction clockwise by 5°. The right arrow + option keys advance the time by ten minutes.

The left arrow key changes your direction counter clockwise by 5°. The left arrow + option keys decrement the time by ten minutes.

The up arrow key raises the eye elevation by 5°. The up arrow + option keys decrease (zoom in) the viewing angle by 5°.

The down arrow key lowers the eye elevation by 5°. The down arrow + option keys increase (zoom out) the viewing angle by 5°.

Mouse Button

If you hold down the mouse button, the cursor will change to a hand symbol. You can then scroll the sky display to change the direction and eye elevation. When the mouse button is released, MPj Astro will re-orient the display to the correct angle and perspective.

HINT: drag the sky area of interest to the centre of the display - the reorientation is based on the display centre coordinates.

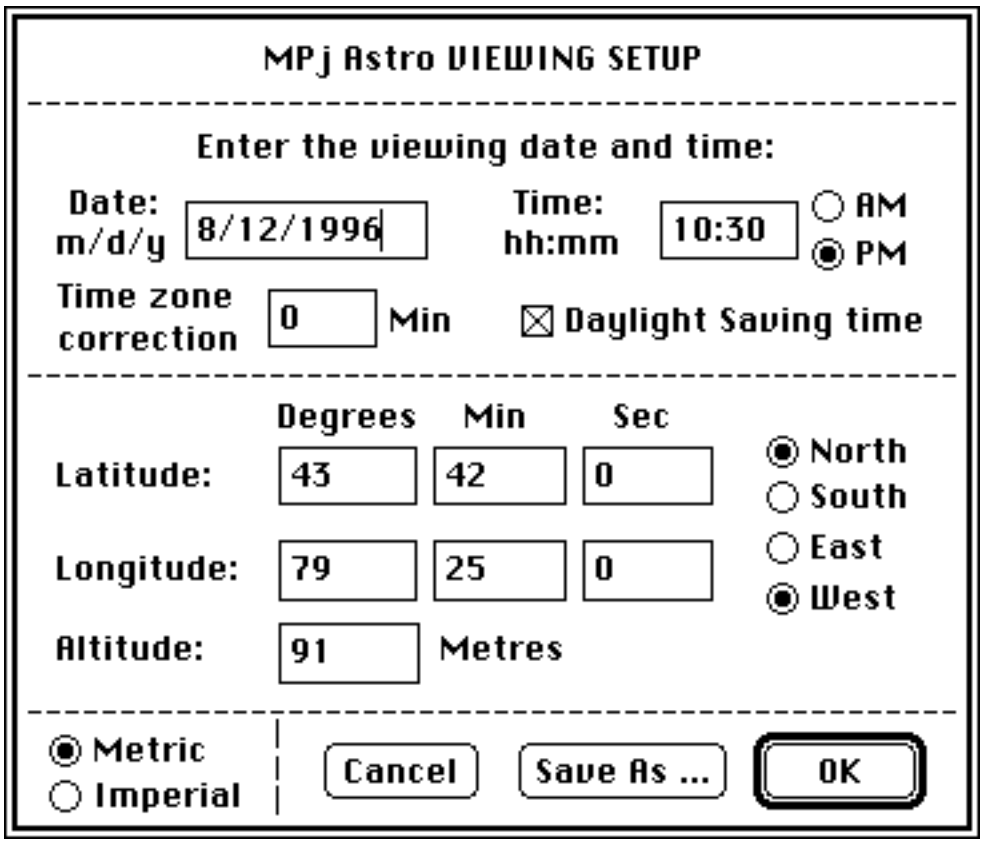
Angular Separation

It is often quite difficult to judge how far apart two objects are when viewing them in the sky display. Hold down the shift key and then click on the first object and drag across the sky display to the second object. A line is drawn between the objects and the angular separation in degrees is shown. Your closed fist held at arm's length is about 10°.

Object Tracking

You can track an object over time much like a telescope drive can stay pointed at an object by compensating for the earth's rotation. Hold down the command key and click on an object. The object will be identified in the top left of the sky display. Then click on the date and time display to bring up the time change buttons. Hold down the time change button you want and the sky display will change while the selected object will remain stationary. Note that for planets, the moon and comets, you can track how those objects change position from day to day by holding down the 'day' time change button. This feature works best on a PowerMac.

Setup Dialogue



The Setup Dialogue is selected from the Setup Menu, item Setup. From this dialogue your home location, time zone correction and other settings are established.

Date

The date defaults to the current date - the date as indicated by the Macintosh clock. You can change this date at any time. Just be sure to enter the date in month/day/year format, and enter the entire year. Year “96” will be just that, not 1996! You can enter any date from the year 2000 BC to the year 6000. If you enter 0, that is the year 1 BC. Enter -99 for 100 BC, etc. The date you enter can not be saved as MPj Astro always starts up with the current date.

Time hh:mm

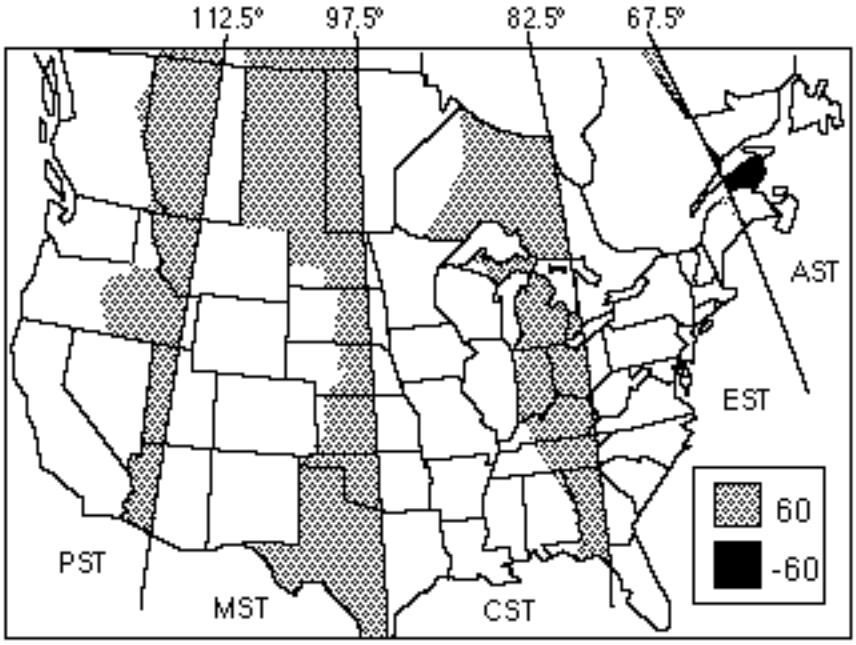
The time setting defaults to 10:00 PM. If you wish a different start up time, you can enter any time you like. The Save As... button will record your new time as the default.

Time Zone Correction

The time zone entry can be a bit tricky. Time zones are based on 15° bands of longitude around the earth. The middle of the first one is at longitude 0° and they go around the earth from there. Your local time is roughly based upon your longitude in relation to these 15° bands, but your actual time zone depends on local geography, provincial or state boundaries and other factors.

The point is that your actual time zone may be quite far from the 15° band that it is based on. MPj Astro can not know about your local time zone - it makes certain decisions based on your longitude only. So, the rule is that if you are west of your 15° band boundary you must enter 60 minutes for the time zone correction. If you are east of the boundary, enter -60 minutes. If you are located within the

normal 15° band, enter 0 minutes. The map should help. In some countries, they have fractional changes to their time, not just hour changes. If the World Cities list has a city close to your location, select that city and then go to the Setup item and see what is filled in for a time zone correction. You should probably use the same correction. The time zone correction is saved with the Save As... button.



Daylight Saving Time

Check the daylight saving time check box if you are currently on daylight saving time. This setting is saved with the Save As... button.

Location

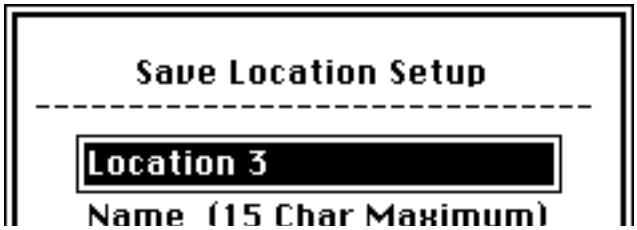
Your location should be entered in the Latitude and Longitude boxes, as well as your altitude above sea level. If you are close to a city in the World Cities list, that location is sufficient. However, your exact location can be found in a good atlas or from a local airport or weather station. Your altitude is used for lunar parallax calculations. The Save As... button saves your location and MPj Astro will always start up at that location. The “Home” (command+H) item at the start of the World Cities list will restore your home location, once it has been saved, if you have selected some other city or location. Four additional user locations can be identified and saved with the Save As... button.

Metric / Imperial

The Metric and Imperial buttons allow you to choose which form of distance units you want to see in the displays and printed reports (kilometres or miles). This setting is saved with the Save Setup button.

Cancel / OK

The Cancel and OK buttons will return you to the sky display. The Cancel button will not apply any changes and the OK button will apply the changes but will not save them.



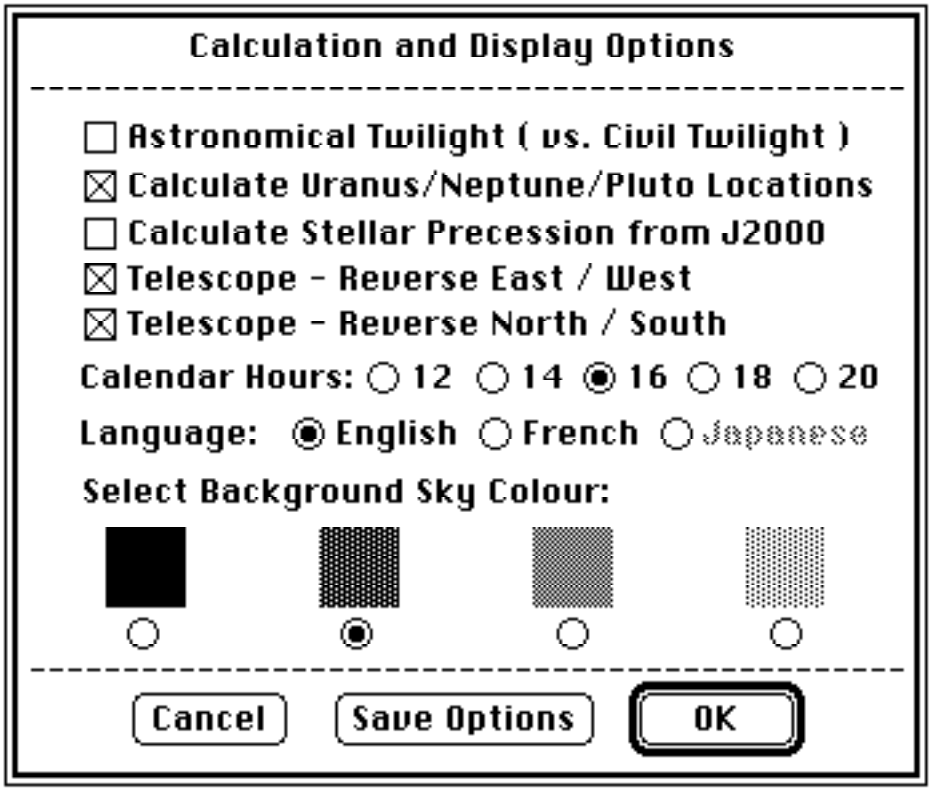
Save As...

The Save As... button displays another dialogue that allows the “Home” location and up to four more custom locations to be labelled and saved. First, set up your location information and then select the Save As... button. Enter a description of your location and select one of the five location buttons in the Save Location dialogue. Your locations will be shown at the top of the World Cities list under the Setup menu. Note: the “Home” location saves the current location plus the default time, time zone, daylight saving and metric selections. The other four user locations save location and altitude only.

Map Control Panel

MPj Astro reads the Macintosh Map control panel information the first time it is launched. If you have set up your Map and Date&Time control panels correctly you may not need to make any adjustments to the latitude, longitude, time zone and daylight savings time settings. The other settings still need to be established. Just be sure to save your “Home” setup once it is correct.

Options Dialogue



The Options Dialogue allows you to select several display and calculation options. The Save Options button saves all the options in this dialogue, the OK button applies any changes made but does not save them and the Cancel button does not save or apply any changes.

Twilight

Astronomical twilight extends much longer than civil twilight. If you are observing faint objects with a telescope or binoculars, you should wait until astronomical twilight ends. Otherwise most observations can begin at the end of civil twilight. Technically, civil twilight ends when the sun is six degrees below the horizon where astronomical twilight ends when the sun is 18° below the horizon. Several reports, the sky display (colour) and the calendar display all use twilight calculations. They will use the twilight option you select here.

Calculate Uranus/Neptune/Pluto

The next check box allows you to select whether or not the locations of Uranus, Neptune and Pluto are calculated. If you have no interest in these planets, do not select this option and the planetary calculations will run a little faster. NOTE: the Far Solar System Chart requires these calculations.

Precession

Precession is an effect that produces the “wobble” to the Earth’s axis over time. It is much like the gyration of a top, except that in the case of the Earth one circuit around takes about 25,800 years. Lunisolar precession is caused by the Sun and Moon acting on the Earth’s equatorial bulge and is a fairly lengthy calculation. Nutation is a smaller related perturbation of the Earth’s axis.

J2000 means the beginning of the year 2000. That is the “start point” for all of MPj Astro’s calculations. So without precession calculations the star positions displayed are actually the positions

they have in the year 2000. This does not mean that you should choose to calculate precession for all years except the year 2000. Precession does not make a noticeable shift in star positions unless you are viewing many years from 2000. And because the precession calculations are quite long, selecting this option will needlessly slow down most viewing changes. However, if you are viewing a time many years, or many hundreds of years, from the year 2000 you should select this option or the sky display will be quite inaccurate.

The PPC version of MPj Astro uses the precession setting to enable additional planet position equations and nutation calculations. If you want the best accuracy at all times, select the precession option. These additional equations are too extensive for 68k and fpu machines.

If you want to go back in time to see what the sky looked like during various historical events, be careful of the date. Most of the countries of the world use the Gregorian calendar, named after Pope Gregory. One of his astronomers, Aloysius Lilius, corrected the Julian calendar by changing the leap year rules and “eliminating” October 5-14, 1582. Any date prior to October 15, 1582 is therefore a Julian calendar date. The Macintosh clock is only aware of Gregorian leap year rules, so for Julian or BC dates MPj Astro uses its own clock routines. For this reason the displayed date might not use some of your date formatting selections for dates prior to October 15, 1582.

Telescope View

Telescope - Reverse East / West reverses the East-West orientation of Jupiter’s satellites and Saturn's rings displays. Telescope - Reverse North / South reverses the North-South orientation of these charts. Select the options that match your telescope if you wish the satellite positions and rings to be displayed as you would see them with your telescope. If you want to see these charts as the objects appear in binoculars, do not select these options.

If you are viewing the sky at 30° or less and have selected 7th or 8th magnitude stars, the Telescope View item in the Sky View menu will reverse the sky display according to these settings. This allows you to see the sky and produce star chart printouts that match your telescope.

Calendar Hours

The calendar hours buttons set the time range of the calendar display. All are valid choices, but some Macintosh screens may have more room than others to display time ranges other than the default time of 16 hours. Also, different times of the year provide varying lengths of observing time. This may also effect what choice you make. Try the different values and save the time you like the best.

Language

All MPj Astro displays, menus, dialogues and balloon help can viewed in English, French or Japanese (with the KanjiTalk OS). Most language changes are available once you select a language from this dialogue. However, a few changes require that you select a language, save the selection with the Save Options button and then quit MPj Astro. When you launch MPj Astro again, all the language changes will be in place.

Sky Background

The sky background colour option accommodates variations between different screens and personal choice. Try them out and see what you like best. On black and white screens this option has no effect as the sky background is always black.

Site Horizon

You can define your normal viewing horizon profile from the Site Horizon… item in the Setup menu. Once defined, the Site Horizon item in the Identify menu allows you to turn your horizon profile on and off.

The default horizon is essentially a sea level horizon, but unless you live in the middle of a small island your horizon profile is unlikely to be that flat or that low. This feature can give your sky view a horizon that matches what you actually see when you go out to observe the sky.

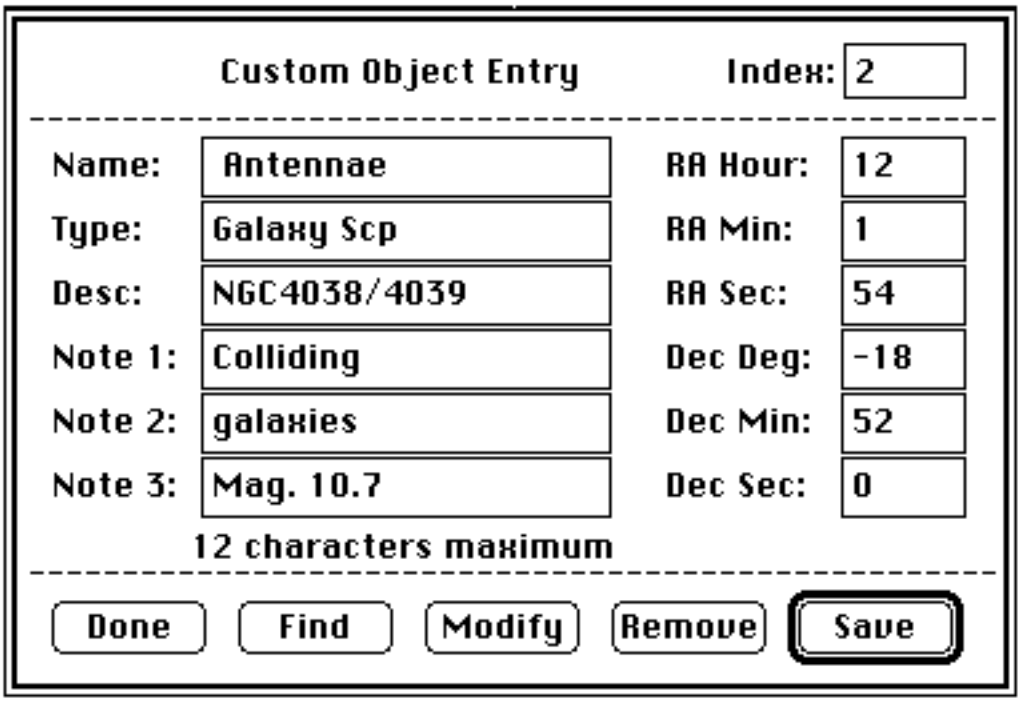
Some preparation is required before you actually draw your horizon. The drawing chart requires that you know your horizon profile in terms of how many degrees above level your horizon is, all 360° of it. A simple device can be made with a protractor, some string and a small weight to measure the height, in degrees, of the distant hills or objects that surround your viewing area.

Once you have mapped out your horizon in this way, the actual drawing of your horizon profile is quite easy. Move the cursor to the chart area and it should change to a pencil shape. Draw your horizon line from left to right by holding down the mouse button as you draw. The slower you draw the more accurate the line will be. If you make a mistake you can go back and make corrections to any portion of the horizon. Just always draw from left to right.

Once you have your horizon shape the way you want it, the Save button will save your horizon. Then any time you select Site Horizon from the Identify menu the sky display will use your horizon shape rather than the default sea level horizon.

If you want to modify your horizon at any time, go to the horizon building chart and click on the Restore button. That will load your saved horizon profile and you can then make any changes to it that are needed. The Save button will save your changes. The OK button will use your horizon shape for this session of MPj Astro but will not save it. The Cancel button will return you to the sky display without using or saving any changes you may have made. The Clear button clears the horizon chart back to sea level if you want to start over.

Edit Custom Dialogue



You can add up to 500 of your own objects to the MPj Astro data base. These custom objects can be anything you like but the intent is to allow you to add deep sky objects of interest to you that were not included in the general data base.

If you select the Custom Objects item in the Identify menu, the objects that you add will be shown in the sky display with a square symbol in the same colour as the NGC oval symbol. If you click on the square, your information will appear in the data panel. Custom objects are also supported by the print function and show up in the visible objects list of the Print Summary report.

Each object that you add is referenced internally by an index number. One object is included in the custom data base at index one. You can start adding your own objects at index two through 500. The Print Custom command in the File menu will print out a listing of all the objects in the custom data base with the index number identified. This report can be used to locate any object and to get a listing of all the data that you have added.

To add an object to the custom data base, select the Edit Custom… item in the Edit menu. This brings up the Edit Custom Dialogue. Fill in the name, description and other information in the areas provided. Limit each entry to a maximum of 12 characters - that is the limit that the data panel can display. The Save button will save your entry at the next available index.

The control buttons at the bottom of the dialogue allow you to save your entry, find an entry by index number and to modify or remove an existing entry. Each time you save an entry the index number is automatically advanced to the next available index. The Done button returns you to the sky display - it does not save the current entry.

The entry fields are labelled Name, Type, Description and Notes. The Name entry is used to identify the object, the other entries are descriptive only and can be any text you like. The Name entry will be printed in the star chart print out and can be used to identify a photograph that you can add yourself.

See the section on photographs for a discussion of adding your own photographs to the data base. Any observation notes that you create about a custom object will also use the object's name entry as the name of the file.

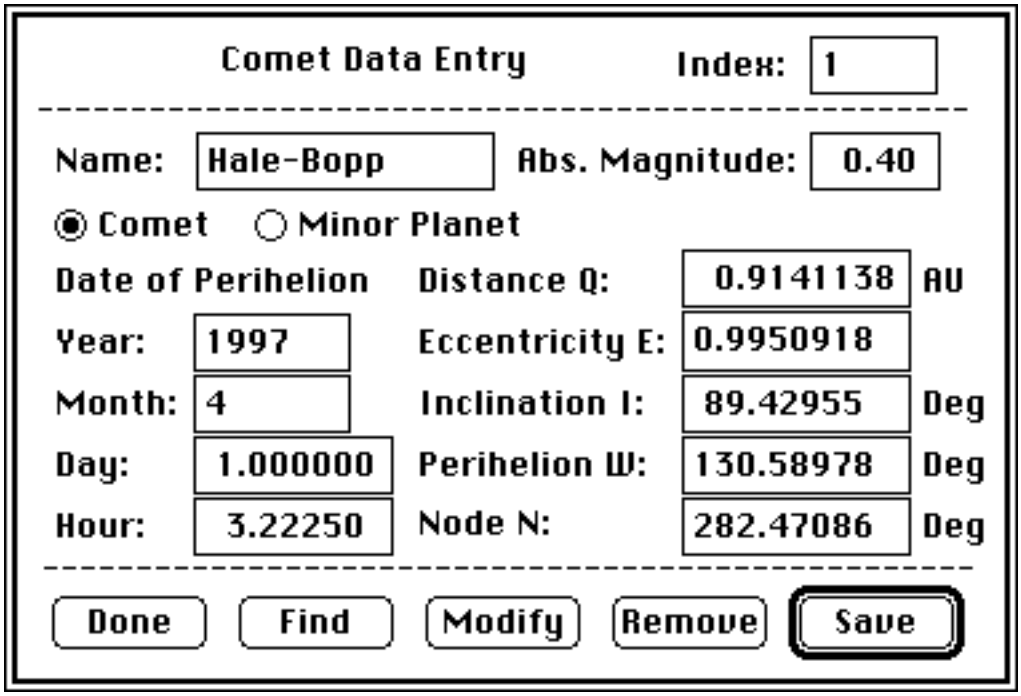
The location of your objects is entered in the Right Ascension and Declination area of the dialogue. If you do not know the astronomical coordinates of the object you wish to enter, you can get reasonably accurate coordinates by finding the area of the object in the sky display and selecting Cursor Position from the Identify menu. Move the cursor to the observed location and the coordinates will be displayed in the data panel.

If the Declination of your object is negative degrees, enter a minus sign for the degree entry only. If you have several objects to enter it is best to enter them all in one session with the dialogue. MPj Astro must be restarted in order for your objects to appear in the sky display. All the custom objects that are currently visible will appear in the Find Custom submenu located in the Edit menu. If your object is not in this list it simply means that it is not visible on this date or time or at this location.

If you wish to remove an object from the custom data base, enter the index number and then use the Find button to make sure you are removing the correct object. The same procedure should be used for modifying an existing entry. The Save button is the only control that automatically finds the next available index number. If you remove an object in the middle of the data base, the index numbers of the other entries are not changed. The next time you save a new entry, the empty index number will be used.

Although the custom data base was designed for adding additional deep sky objects, you can use this data base to identify any object or location you want. For example, if you want to print a star chart with the exact location of true north to help align your telescope, you can add a custom object located at RA 0h, 0m, 0s and Dec 90° 0' 0". Print your star chart at 5° viewing angle (after restarting MPj Astro of course) with the north displayed and you will get the exact spot where you should align your telescope's equatorial axis.

Edit Comet Dialogue



You can add up to 500 comets and minor planets to the MPj Astro data base. Their postion in the sky is calculated from orbital elements that are based on a particular date called the epoch. These orbital elements can be obtained from a variety of sources, including sites on the internet. The closer the epoch is to the current date the more accurate the calculations will be. Note that the orbital elements usually listed for comets are not the same as the orbital elements listed for minor planets.

If you select the Comets item in the Identify menu, the comets and minor planets that you add will be shown in the sky display with a triangle symbol in a light grey colour. If you click on the triangle, calculated information will appear in the data panel. Comets are also supported by the print function and show up in the visible objects list of the Print Summary report.

Each object that you add is referenced internally by an index number. The Print Comet command in the File menu will print out a listing of all the objects in the comet data base with the index number identified. This report can be used to locate any object and to get a listing of all the data that you have added.

To add an object to the comet data base, select the Edit Comet… item in the Edit menu. This brings up the Edit Comet Dialogue. Fill in the name and other information in the areas provided. Note that some entries change between comets and minor planets.

The control buttons at the bottom of the dialogue allow you to save your entry, find an entry by index number and to modify or remove an existing entry. Each time you save an entry the index number is automatically advanced to the next available index. The Done button returns you to the sky display - it does not save the current entry.

If you wish to remove an object from the comet data base, enter the index number and then use the Find button to make sure you are removing the correct object. The same procedure should be used for modifying an existing entry. The Save button is the only control that automatically finds the next

available index number. If you remove an object in the middle of the data base, the index numbers of the other entries are not changed. The next time you save a new entry, the empty index number will be used.

Name
This entry must be limited to 12 characters, so imaginative abbreviations may be needed.

Comet / Minor Planet Buttons
These buttons determine what orbital elements need to be entered and change the description of these elements. Make your selection before you enter any of the orbital data.

Date of Perihelion / Date of Epoch
This entry is either a comet's perihelion date or a minor planet's epoch in universal time (UT). The perihelion is the point at which the comet is closest to the sun. For a comet, the date can be entered as year/month/day and hour or as year/month and fractional day. If you enter a fractional day, enter zero for the hour. For minor planets the date of epoch is entered as year/month and day. The day is rarely fractional. **Enter the minor planet's mean anomoly (M) in degrees in the hour location.**

Distance Q / Motion n
The distance entry is the perihelion distance (q) in astronomical units (AU) for comets or the mean motion (n) in degrees per day for a minor planet.

Eccentricity (e)
The orbit's eccentricity is a value between 0 and 1.2. It is a measurement of the orbit shape: 0 represents a circle, values approaching 1 represent a highly elliptical orbit, exactly 1 represents a parabolic orbit and values greater than 1 represent a hyperbolic orbit.

Inclination (i)
This value indicates the angle in degrees of the orbit relative to the ecliptic. This value must be referred to the standard equinox of 2000.0 and can be greater than 90 degrees.

Perihelion (w)
Enter the argument of the perihelion in degrees. If the longitude of the perihelion is given, the argument of the perihelion is equal to the longitude of the perihelion minus the longitude of the ascending node ($w = \pi - n$). Some listings refer to the argument of the perihelion as SOMEGA. This value must be referred to the standard equinox of 2000.0.

Node (n)
The longitude of the ascending node is entered in degrees. It is sometimes listed as LOMEGA. This value must be referred to the standard equinox of 2000.0.

Absolute Magnitude (H)
Most listings do not give a comets absolute magnitude, and even if you can find it magnitude calculations are not very accurate. Use the calculated magnitude for these objects as a rough guide only.

You can use the supplied comet and minor planet data base as a guide for your own entries. The values listed may be very out of date by the time you use MPj Astro. Remember, these orbital elements are accurate only for a short time around the listed epoch, so if you have more recent data please modify the supplied values.

File Menu

Open / Close
Observation notes can be created for any named and selected object with the Open command. MPj Astro will also create a notes file when you option-click on any named object. These notes are placed in a folder named AstroText within the Microprojects folder. The Open command can access these text documents and Close will close any text window that is open in the sky display. MPj Astro will open and display a styled text document (SimpleText) but will not save or create styles.

Save
The Save command will save the current observation notes in a file with the same name as the object in the AstroText folder. Observation notes created with MPj Astro are unstyled TEXT documents.

Save As...
This command allows you to save the current observation notes in a file with a different name, or in a different location.

Page Setup...
Use this standard dialogue to tell MPj Astro what your printer page dimensions are.

Print
The Print command will print whatever you currently have displayed. This includes the sky display in star chart form, both solar system displays, eclipse graphs and the calendar display. The print function supports all of the items in the Identify menu, so if you want that item in your star chart just remember to select it first and then request the print.

Print Custom
This command will print a listing of all the custom objects you have added to the data base. See the section in this manual on editing custom objects for a complete description.

Print Comet
This command will print a listing of all the comets and minor planets that are in the data base. See the

section in this manual on editing comets for a complete description.

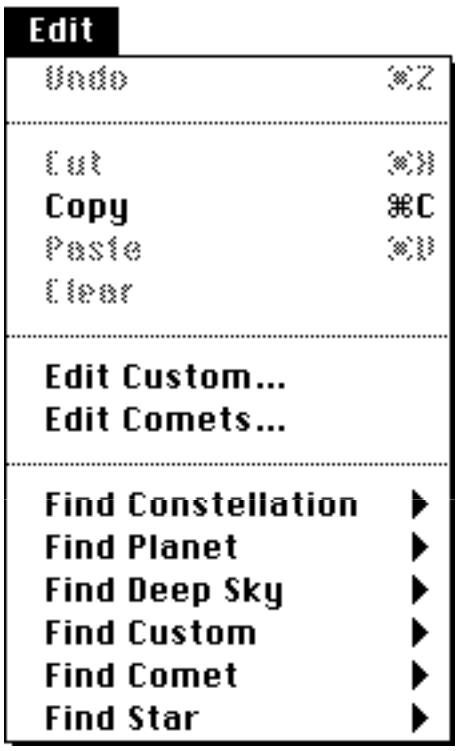
Print Summary

This command will print a summary listing of today's statistics and all of the objects that are visible at the current time. The visible objects list includes planets, constellations, deep sky objects, named stars, comets, minor planets and custom objects. If you want a print of just the day's statistics, hold down the option key before going to the File menu and selecting Print Summary.

Quit

The Quit command quits MPj Astro and returns you to the Finder.

Edit Menu



The Undo item is not used in MPj Astro.

Cut / Copy / Paste / Clear

The copy command creates a 'PICT' image of the current sky display and places it into the Clipboard. If you hold down the option key before selecting Copy from the menu, black and white images are reversed (black stars on a white background). The option key has no effect with colour screens. These Clipboard images can be used in any application accepting 'PICT' images.

If you are editing an observation notes file, these commands perform their respective functions for text editing.

Edit Custom...

See the Edit Custom Dialogue section of this manual for a complete description of how to add custom objects to the MPj Astro data base.

Edit Comets...

See the Edit Comet Dialogue section of this manual for a complete description of how to add comets and minor planets to the MPj Astro data base.

Find Items

Each Find item displays a submenu that lists all of the currently visible objects of the indicated type. Objects in the list that are connected to observation notes appear underlined. If a Find item is dimmed it is because that particular object type is not selected in the Identify menu. You can select any item listed in the submenu and the sky display will change to centre that item, outlining the name of the object in a green box. If the item is within the current sky display, the object's name is boxed without moving the sky display.

Setup Menu

Setup... / Options... / Site Horizon...

See the associated sections of this manual for information on these items.

World Cities

The World Cities submenu lists many cities throughout the world. You can see the sky from any of these locations by simply selecting the desired city. Special locations are also listed, such as the North and South Pole and the Moon. Select “Home” at the top of the list to return home. Four more user locations are listed under Home.

Special note should be made of the Moon item. The actual viewing location from the moon is Mount Piton, at selenographic coordinates 41° N, 1° W in Mare Imbrium. This places the earth nearly due south and about 50° above the lunar horizon.

Run Real Time

Check this item to automatically lock the sky display to the Macintosh clock. The sky display will update once every minute. This feature is intended for Power Book users who have their computer with them during observing sessions. The Jupiter’s Satellites chart, Twinkle Sky and Screen Saver displays also run in real time.

Moon Size 1.5°

Check this item to enlarge the Moon, Sun (and Earth) to approximately three times their actual size. This setting better represents the magnitude of the Moon and the way we perceive it. The Moon is actually only about 1/2 of a degree in size and this looks very small in the sky displays. But for an accurate view, do not select this item. Also, this item should not be selected if you are observing an eclipse and is automatically turned off if you select eclipse tracking.

Load OrbiTrack™

OrbiTrack is an application by BEK Developers that calculates the orbital positions of satellites. The satellite data can be written to files in "Voyager 1.2" format (this is an OrbiTrack configuration entry). The Load OrbiTrack™ ... command reads these files and then plots the satellite positions in the sky display.

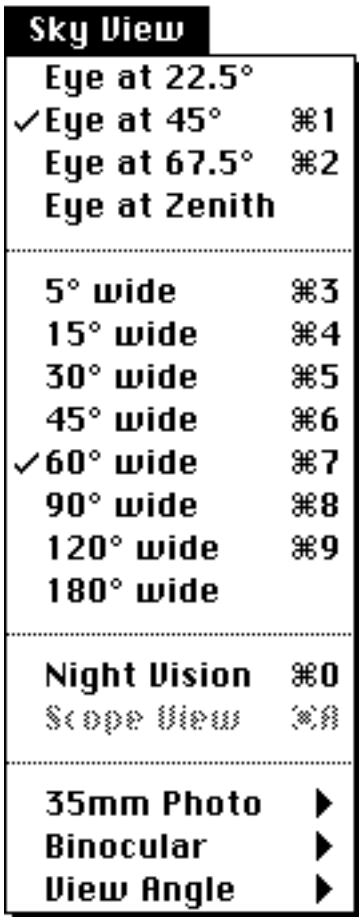
The satellite plot points are displayed as squares in the sky display and connected by a line. If the satellite is visible the square is filled in, otherwise the square is an outline. Each plot point is

identified by the time when the satellite will be at that position and one plot point identifies the satellite by name.

Clear OrbiTrack™

This command clears all the currently loaded satellite plots.

Sky View Menu



Eye Elevation

This menu gives you control over two aspects of your view of the sky. The first is your eye elevation, the angle up from the horizon that you are looking toward. The menu items of “Eye at” allow you to change that angle to specific degrees above the horizon. The maximum angle up is called Zenith, which is looking straight over head.

You can also change your eye elevation with the up arrow and down arrow keys, much like you change direction. The change is 5° either up or down. The eye elevation graphic always shows you how far up you are looking as well as how wide a view you have. If you click in the eye elevation graphic, control buttons appear in the data panel that allow you to change your eye elevation by either 10° or 1°. You can click in the button for a one time change or you can hold down the mouse button while the cursor is over one of the control buttons for a continuous action.

Viewing Angle

The other control change possible from the Sky View menu is your viewing angle. The choices range from 5° to 180° wide. The viewing angle is measured from corner to corner of the sky display and is approximate due to the variations in monitor sizes. One control button in the data panel allows you to change the viewing angle by 2°. If you hold down the option key while using either the up arrow or down arrow keys, the viewing angle will zoom in or out by 5°. The control buttons and arrow keys can change the viewing angle within a range of 5° to 120°. The 180° menu item is the only way to see the special 180° view of the sky.

Night Vision

This command alters the way MPj Astro displays just about everything. For colour monitors, the sky background goes to black and everything outside the sky display, including all menu items, go a deep red. The data panel items are displayed in outline and every attempt is made preserve your night vision. Jupiter's Satellites and Saturn's Rings have Night Vision versions. For B&W monitors, the panel items are drawn in outline on a black background and the menu bar disappears. One caution - the menu is still there and operational. If you select a menu it will appear in its normal blazing white. This command is intended for PowerBook owners who use MPj Astro outside at night during their viewing sessions.

Scope View

If you want to reverse the sky display and the sky chart printouts, select this command. It is enabled if you have selected a telescope orientation in the Options Dialogue and are viewing the sky at 30° or less with 7th or 8th magnitude stars selected. This may sound like a lot of qualifications to enable this function, but this is the only situation that viewing the sky upside down or backwards makes any sense.

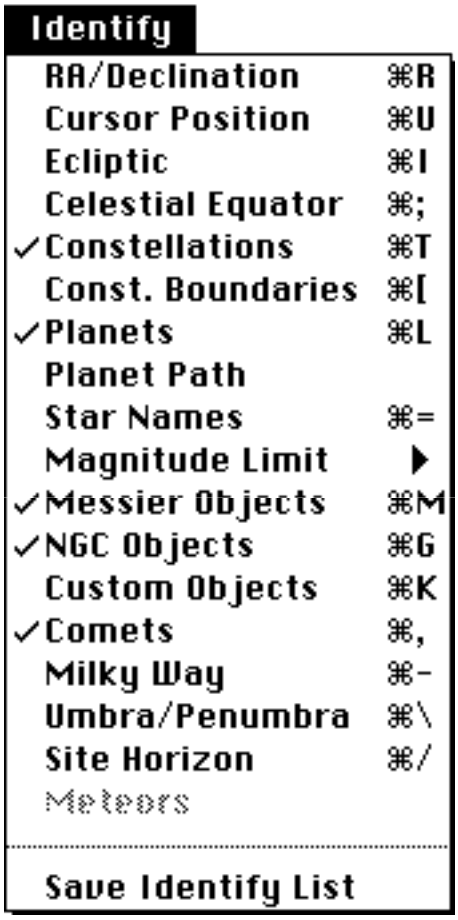
Angle Size

The last three items in this menu present submenu selections to mark the sky with an outline that shows what size a 35mm camera lens, different power binoculars or a specific angle covers. Binoculars do not have a standard viewing angle for a given power, so the binocular angles are approximate. If you place the cursor inside one of these outlines you can drag the outline around the sky display.

Viewing Perspective

Something should be said about viewing perspective. The sky can be thought of as the inside of a big sphere, while your monitor is flat. The same can be said of star maps. How do you squash a three-dimensional thing down to two dimensions? The fact is that it can not be done without some distortion - on a computer screen or a star map. And the wider the view, the more the distortion. MPj Astro uses a mathematical "projection" scheme to make the sky display as distortion free as possible, but some distortion is unavoidable, especially at very wide viewing angles. If you want the most accurate perspective in the sky display, view the sky at 60° width or less. And for those who are interested, a more detailed discussion of the mathematical projection scheme used by MPj Astro is included in the programmer's comments at the end of this manual.

Identify Menu



The Identify menu gives you control over what items appear in the sky display. All, some or none of these items can be selected together.

RA / Declination

This item places right ascension and declination lines on the sky display. Astronomers use this coordinate system to mark positions in the sky and it is similar to the longitude and latitude coordinate system used to mark positions on the Earth. These lines can be helpful in a variety of ways. For example, most star maps and astronomical tables will list the position of objects in terms of these coordinates. The lines on the sky display will allow you to quickly locate the area of the sky where the objects can be seen.

Cursor Position

This is the only item in the Identify menu that does not alter the sky display in some way. When selected, this item activates a coordinate display in the data panel. As you move the cursor within the sky display, the position of the cursor is updated in the data panel. Right ascension, declination, altitude and azimuth are listed. Altitude is the number of degrees above your horizon while azimuth is the number of degrees from due North measured clockwise.

Ecliptic

This is the name given to the imaginary line that the sun follows around the sky in a year's time. All the planets and the Moon never stray far from this line and all the constellations of the Zodiac are also

located near this line. The ecliptic can be useful in the sky display to help locate and track the positions of the planets. It is also a reference point for eclipses because the Sun, by definition, is always on this line.

Celestial Equator

This is the name given to the imaginary line that the Earth's equator projects onto the celestial sphere. It is, by definition, the circle formed at declination zero.

Constellations

Constellations help organize the sky and identify the stars and objects that are visible on a given evening. One of the first tasks a beginning astronomer should undertake is to learn how to identify the major constellations. Once learned, finding your way around the night sky is much easier and more enjoyable.

MPj Astro has a special facility to help you learn the constellations. Hold down the option key while you select constellations from the Identify menu. The constellation lines will appear without their names. This is a good way to learn the constellations - it means you can really identify them if you recognize the shape without the name.

Constellation Boundaries

Each constellation has a boundary that defines what stars belong to that constellation. The first published boundary coordinates (by Delporte) were for the year 1874. At that time most of the boundary lines fell on even right ascension and declination lines. Due to precession that is no longer true. In any case, this menu item will draw the boundary lines in the sky display and a printout will include them.

Planets

Planets are always shown with MPj Astro. This menu item changes the appearance of the planets so they are easily distinguishable from the stars and places the planet's name next to the planet symbol. If you click on a planet extra information about that planet will appear in the data panel. The planets Uranus, Neptune and Pluto are not shown unless they are selected in the Options Dialogue.

You can use the Solar System charts to see the respective positions of the planets in their orbits around the Sun and then go back to the sky display to see how they appear from Earth. This is an especially useful exercise when observing a planetary conjunction - when the planets "line up" as seen from the Earth.

Planet Path

Planet Path will plot the path of all visible planets from their current position forward in time. A total of 40 new positions are calculated for each planet. How far into the future the plot extends depends on the planet. With Planet Path selected, click on the planet and the data panel will indicate how many days ahead each path position represents.

Planet Path can show "retrograde loops" in a planet's path as well as maximum elongations and other events in a planet's path across the sky. Planet Path is supported by the print function.

Star Names

Most stars are designated by a Greek letter and the constellation that they are in or by other numbering schemes. However, some stars have been given names and it is those stars that this menu item identifies. Some well known examples are Polaris and Betelgeuse. Click on a star and the data panel will display the star's name if it has one, magnitude, spectral type, a note describing any special

information such as variable or double, the star's Bayer/Flamsteed name if it has one, Henry Draper Catalog (HD) number, Smithsonian Astrophysical Observatory (SAO) number, right ascension and declination.

Magnitude Limit

This item brings up a submenu that allows you to select any star magnitude from 1st to 8th. The sky display and any star chart printouts will show all stars from the selected magnitude and brighter. Stars that are brighter than 6th magnitude number about 3000, there are over 5,600 6th magnitude stars and there are over 65,000 stars in the 7th and 8th magnitude range included in the AstroStar document.

Stars in the 7th and 8th magnitude range are displayed for viewing angles of 30° or less to limit calculation times. In MPj Astro, each star is treated individually from a mathematical point of view, so it takes just as long to plot the position of a 8th magnitude star as it does to plot a brighter one. At wider viewing angles the sky display would almost turns solid with stars anyway so this is a realistic limitation. Note that the star sizes for each magnitude are larger when 7th or 8th magnitude stars are displayed.

Messier Objects

Deep sky objects are identified by a variety of schemes but objects in the Messier Catalogue are of special significance. The catalogue was compiled in the 18th century by Charles Messier and is a standard list of objects to be observed. Many astronomy clubs have Messier observing events and it is customary to keep a personal record of how many of these objects you have seen. That is why MPj Astro displays Messier objects with their own symbol and can be displayed separately from other deep sky objects. There are a total of 110 objects in the list (technically 109) although M102 is really M101 and M40 is a double star, not really a deep sky object.

NGC Objects

NGC stands for New General Catalogue and is the primary catalogue of galaxies, nebulae and star clusters. Messier objects also have an NGC number, but this menu item shows a selection of deep sky objects in addition to the Messier objects. An attempt was made to display only those objects that are observable in smaller telescopes or are objects that are very well known and spectacular. If you have other objects that are of interest to you and wish to add them to the MPj Astro data base, see the section in this manual called Edit Custom Dialogue. When you click on most deep sky objects, the minimum telescope size required to adequately see the object (e.g. 10cm) is shown along with other information.

Custom Objects

In addition to the Messier and NGC objects, you can add your own custom objects to the MPj Astro data base. From this menu item you decide whether to display your custom objects in the sky display or not. See the section in this manual called Edit Custom Dialogue for a complete description about adding your own custom objects to the data base.

Comets

Both comets and minor planets are shown in the sky display with this command. See the section in this manual called Edit Comet Dialogue for a complete description about adding your own comets and minor planets to the data base.

Milky Way

The Milky Way is our own galaxy, seen edge on from inside one of the outer spiral arms. It appears as a diffuse glow in a dark sky. Most of the stars in the Milky Way are hidden because of all the dust that lies in the plain of the galaxy. This gives our view of the Milky Way an irregular outline and shape. Select

this menu item to see the Milky Way in the sky display.

Umbra / Penumbra

The shadow of the Earth caused by the Sun is called the umbra and penumbra. MPj Astro displays this shadow as two concentric circles at the Moon's distance from the Earth. These outlines can be used to monitor the Moon's progress through the Earth's shadow during a lunar eclipse. The umbra is the dark inner portion of the shadow, where the penumbra is the light outer portion. These terms can also apply to the Moon's shadow on the Earth during a solar eclipse and to the structure of a sun spot, but it is only the Earth's shadow that is identified with this menu item.

Site Horizon

This menu item is used to display your custom horizon or use the default sea level horizon. See the section in this manual called Site Horizon for a full description of how to define your own horizon profile. If you have a permanent observing site it is worth the time to map out the profile of that location's horizon and build it into MPj Astro's data base. With your own horizon displayed in the sky display you can get a much better idea of what the sky at your observing site will look like. And for objects low in the sky you can tell if, when and where they will rise or set.

Meteors

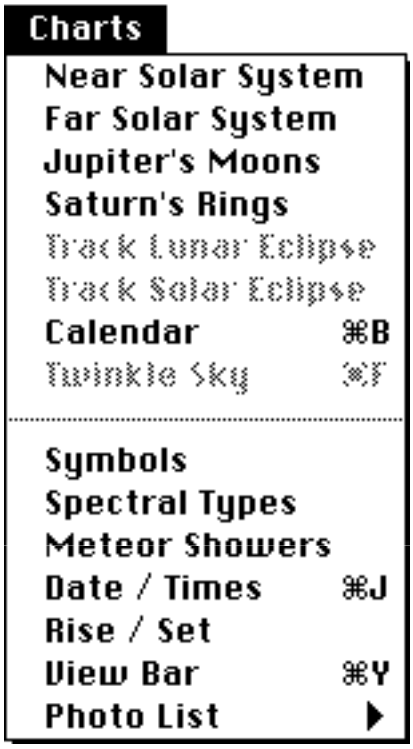
The meteor item is available only during the time of a meteor shower. This item is dimmed on all other dates. You can look at the Meteor Shower chart to get a list of the meteor showers that MPj Astro supports.

Selecting this item will identify the radiant point of the shower - where in the sky the meteors appear to be coming from - and meteors will streak across the sky display (do meteors make a sound?). For the best display of meteors, look to the radiant point with a wide view angle and then select Twinkle Sky. You may want to turn down the room lights for the best effect. Meteors are also shown in the Screen Saver display - without the sound.

Save Identify List

This item will save the checked items in the list (in the AstroPref file) so that MPj Astro will start up with those items selected. For example: if you normally check planets, 6th magnitude stars and constellations whenever you launch MPj Astro, select those items and then select Save Identify List. Those items will be automatically selected the next time you launch MPj Astro. This function will work for everything in the list except Planet Paths and Meteors.

Charts Menu



Near Solar System

The Solar System charts show the planets in their orbits from a position north of the Earth from out in space, centred over the Sun. The orientation is such that the Vernal Equinox is located in the upper left hand corner of the chart.

The Vernal Equinox, also called the first point of Aries, is the location where the ecliptic crosses the celestial equator. The Sun crosses the celestial equator from south to north at this location. Right ascension coordinates start at this location and increase in hours, minutes and seconds moving eastward.

The Near Solar System includes the planets Mercury, Venus, Earth, Mars, Jupiter and Saturn with all orbits to scale. You can observe the orientation of the planets from this chart and then see what they look like from Earth in the sky display. The control buttons in the data panel allow you to change the time forward or backward to animate the planets' movement in their orbits. If you click in the chart, a line is drawn from the Earth to the cursor position. This can be useful for checking planet conjunctions and general position reckoning.

Far Solar System

This chart operates just like the Near Solar System chart except that the Earth's orbit is not to scale. The planets in this chart are the Earth, Uranus, Neptune and Pluto. This chart is not available unless the "Calculate Uranus/Neptune/Pluto" check box is selected in the Options Dialogue. Both charts are supported by the print function.

Jupiter's Moons

Jupiter's four brightest satellites are visible even in low power binoculars. The problem is not seeing these satellites but identifying which one is which. This chart plots the position of these satellites to scale relative to Jupiter and identifies each one. The control buttons in the data panel allow you to

change the time forward or backward and watch how the satellites change their position. The satellites' orbits are in line with the Earth so they appear to move back and forth rather than around Jupiter. There is no specific print function for Jupiter's satellites because they are automatically plotted in every sky display print that includes Jupiter. This chart will update once per minute to the Macintosh clock if the Run Real Time menu item is selected.

Saturn's Rings

This chart displays the orientation of Saturn's ring system as seen from the Earth. The control buttons in the data panel allow you to change the time forward or backward and watch how the rings change their orientation over time. The data panel also displays the latitude of the Earth relative to the plane of the rings and the angle of Saturn's northern axis. There is no specific print function for Saturn's rings because they are plotted in every sky display print that includes Saturn.

Track Lunar Eclipse

There is a recommended technique to using this item. First of all, if this item is not dimmed it does not mean that there will be an eclipse. It simply means that there may be an eclipse. On the evening of a lunar eclipse, find the Moon and the umbra/penumbra in the sky display. Set the time to when the eclipse is about to begin. Then select Track Lunar Eclipse. The display will change to a 5° view angle centred on the umbra. The control buttons allow you to start and stop the eclipse tracking, change the update interval and to graph the eclipse.

Let the eclipse run its course from beginning to end, then select the eclipse graph. The graph data is collected as the eclipse progresses. Without enough data the graph either can not be produced or will have to interpolate the times of the eclipse events. When you have the eclipse graph displayed you can request a print and the eclipse graph will be printed.

The eclipse graph is reasonably accurate, but the event times may be in error by several minutes or so. MPj Astro does not store specific eclipse data. Eclipse tracking uses the same mathematics that MPj Astro uses all the time to plot the position of the Moon, Sun and other planets. The times of an eclipse listed in your news paper will give you the exact times. See the programmer's comments at the end of this manual for a discussion about the accuracy of calculations with MPj Astro.

Track Solar Eclipse

Solar eclipses are tracked in much the same manner as lunar eclipses, except that the display is centred on the Sun rather than the Earth's shadow. Follow the guidelines given under Track Lunar Eclipse for graphing a solar eclipse. The accuracy is about the same, although with a solar eclipse you may have to adjust your location on the Earth slightly to match the path of the Moon across the Sun exactly.

Calendar

This display shows a summary of the current day's objects and constellations in a "flat projection" chart. The time range of the calendar can be adjusted in the Options Dialogue. With this chart and the various control buttons in the data panel you can find out the coordinates of any objects shown, find their transit times (when they pass due south) and, with the horizon control, find out when they will rise or set at your location.

The chart is arranged with the celestial equator centred in the chart and right ascension on the top, local transit time on the bottom and declination on both sides. The graph bar at the bottom of the chart displays the extent of morning and evening twilight. The twilight times will be either civil or astronomical twilight, whichever you have selected in the Options Dialogue.

The transit control button displays a transit line that can be moved east or west with control buttons or by clicking in the chart area. The read out at the bottom of the display will identify the transit line's right ascension and local time. This is the time and coordinates when the position shown will pass due south at your location (transits).

The horizon control button displays a horizon profile that can be moved with the east / west buttons or by clicking in the chart area. This horizon profile can identify the local time that any object in the chart rises or sets. Move the horizon profile so that the object is just within the line and the read out at the bottom of the chart will show you the local time. This horizon is the default 0° altitude horizon, not your custom horizon.

If neither the transit line nor the horizon profile is displayed you can click in the chart area and get a right ascension and declination read out. The two intersecting lines can be moved with the east / west and up / down buttons or by clicking in the chart area.

If you use the calendar chart from different locations on the Earth, you will notice that the horizon profile changes shape. Give this some thought and you will see that the profile is correct for the location you have chosen. What about locations south of the equator?

Twinkle Sky

The normal sky display uses a colour scheme that is designed to clearly identify stars and other objects while allowing for labels and coordinate lines. Twinkle Sky is designed to display the sky more as it really appears - including atmospheric twinkling. This display is very useful if you are trying to learn to identify stars and constellations. For the best effect you may want to lower the room lights or even turn them all off. Twinkle Sky only "twinkles" on monitors set at 256 colours.

Screen Saver

If you hold down the option key as you select Twinkle Sky (command+option+F), the twinkling sky expands to fill the entire screen area. Touch any key or click the mouse to return.

Symbols

This chart describes the various symbols used in MPj Astro to represent Messier and NGC deep sky objects, planets, comets, minor planets and custom objects and how these symbols change if the object has a photograph associated with it in the AstroPhoto folder.

Spectral Types

When you click on a star its spectral type is given. This chart lists the various spectral classifications of stars and gives colour and temperature information about each class. Each class is also subdivided in steps from 0 to 9 as well as other designations.

Meteor Showers

This chart lists the meteor showers that are supported by MPj Astro. Included in the chart is the peak date, radiant location and average number of meteors per hour.

Date / Time

This table lists the current date and time in terms of several astronomical methods. The Julian date is often given in astronomy almanacs to identify the time of an event or when a planet will be at a specific location. The number given is the number of days since noon at Greenwich, England (0° Longitude) on January 1, 4713 B.C. This method of recording a date and time is independent of calendars and local time customs and is therefore used extensively in astronomy.

Universal Time is essentially solar time measured at Greenwich. It is really a mathematical way of measuring time and can be used reliably to record the time of some event. Again, it is independent of any local time keeping methods or customs.

Sidereal Time is time measured with respect to the apparent motion of the stars and indicates the time that has passed since the Vernal Equinox has passed due south. GST (Greenwich Siderial Time) is a standard reference (0° Longitude) where LST is your location's 'Local Sidereal Time'.

Rise / Set

This chart calculates your local time when the Sun and Moon rise and set.

View Bar

Select this item to show a data panel bar at the bottom of the sky display. This data panel identifies the current direction, eye elevation and angle of view. A cross hair symbol marks the exact location that is referenced.

Photo List

This submenu lists all the photographs in the AstroPhoto folder. Normally you double click on an object to see its photograph, but this list can be used to see any photograph in the folder. The File item at the top of the list will call up a standard file dialogue that will allow you to see any photograph on your hard disk, on a floppy or in a CD ROM drive if you have one. See the section about photographs in this manual for a discussion on MPj Astro's use of photographs and how you can add your own.

Photographs

Displaying Photographs

The photographs in the AstroPhoto folder are normally displayed by double clicking on an object in the sky display. If a photograph for that object exists, it will be displayed. Most planets, the Sun, Earth and Moon are included along with a selection of deep sky objects.

The deep sky objects that have photographs have a unique symbol. A small line is drawn on either side of the normal symbol to indicate that this object, whether it is Messier, NGC or custom, has a photograph.

You can also use the Photo List item in the Charts menu. This submenu lists all the photographs in the AstroPhoto folder. Deep sky objects are identified by their NGC numbers, planets, comets and custom objects by their name. The AstroPhoto folder also contains some additional photographs that do not connect to objects in the sky display. Photograph “Saturn2” is an example. Use the Photo List item to access these photographs.

The File item at the top of the Photo List submenu calls up a standard file dialogue so that you can access any photograph currently on your system, in any floppy drive or in a CD ROM drive. The photograph must be a ‘PICT’ type file. MPj Astro will also play QuickTime movies and QuickTime VR images, so you can access those from the File item as well.

Technical Issues

The photographs in the AstroPhoto folder are JPEG compressed PICT type images. The QuickTime extension decompresses and displays them. Uncompressed photographs are generally very large files, so compression was required in order to offer a reasonable selection on one disk.

The images support up to 640X480 high resolution 24 bit colour monitors. On larger monitors the images will not fill the entire sky display. If your monitor displays only 8 bit colour some loss of image quality will occur.

Adding Your Own

MPj Astro not only allows you to add your own custom objects to the data base, but you can add your own photographs as well. They must be ‘PICT’ type photographs and can come from any source. If you have a scanner you can even scan photographs from books and magazines and add them to the MPj Astro data base. If you are connected to the Internet, NASA, JPL and many other sources carry hundreds of astronomy photographs. Most are in GIF or JPG format, but these photos can be easily converted to PICT images with available shareware converters and viewers.

When MPj Astro is launched, an attempt is made to match all the photographs in the AstroPhoto folder to NGC and custom objects in the data base. NGC and Messier objects are matched by their NGC numbers and custom objects by their names. Adding a photograph to the data base is simply a matter of placing the photograph in the AstroPhoto folder and naming it exactly the same as the object’s NGC number or the custom object’s name.

As an example, say you have a PICT type photograph of M4, a globular cluster near Antares in Scorpius. Put the photograph in the AstroPhoto folder and name the file ‘6121’ (M4’s NGC number). The next time you launch MPj Astro, M4 will show the Messier object symbol with small lines added to each side of the symbol. Double click on the symbol and your photograph will be displayed in the sky display.

QuickTime Movies

You can access QuickTime movies and VR images from the File item in the Photo List submenu located under the Charts menu. However, if you want to connect a movie to a planet, deep sky object or custom object, place the movie in the AstroPhoto folder and rename the movie to the same name as the object - just like you would for a photograph. Double click on the object and the movie will appear, allowing you to play the movie, change the volume if it has sound, and control other aspects of the movie. The movie will also show up in the Photo List submenu along with all the photographs in the AstroPhoto folder. Movie names will appear in italic.

Observation Notes

Observation notes can be connected to deep sky objects, comets, custom objects, planets and named stars. Type your notes with SimpleText or some other text editor application and save the file as a 'TEXT' type document. Name the file the exact same name as the object you want to connect with just like you would for a photograph. Place the document in a folder named AstroText inside the Microprojects folder. In MPj Astro, click on the object while holding down the option key and your notes will appear.

If you option+click on a named object that does not have any observation notes or select that object and then choose the Open command, a file will be created for you with the same name as the object and placed in the AstroText folder. If you do not have an AstroText folder, one will be created for you. You can edit your notes directly in the text window. If you have created styled text (SimpleText) MPj Astro will display the styles. The editor function in MPj Astro will not create or save styles, however.

If you are using MPj Astro in a classroom environment you can use the observation notes feature to include supplementary information about any object you wish. If you create the notes with SimpleText you can style the notes as well. Just be sure to lock the file so that your notes are not edited by the students.

Memory

When MPj Astro is launched it requests 2.0 megabytes of computer memory. If you have this much free memory available and are using a standard monitor MPj Astro should operate correctly. However, several things can effect how much memory is actually needed.

If you have a very high resolution monitor or display 24 bit colour MPj Astro may need a meg or more of additional memory. That is because the sky display, graphic displays and data panels are actually built in a memory based secondary screen buffer and then the displays are transferred to your screen. This provides a smooth transition between one sky display and the next. Also, animated displays like the solar system charts operate without flickering.

If you add many custom objects or comets to the data base, that will need more memory. If you add more photographs or observation notes, those objects do not require more memory.

During start up MPj Astro keeps track of how much memory it thinks it will need. If there is not enough memory allocated, MPj Astro will not build a secondary screen buffer - and will tell you that more memory is needed. If there still is not enough memory MPj Astro will not launch.

As a guideline, MPj Astro will need 2M of memory to operate with a colour monitor and a secondary screen buffer. If you are close to the memory limit MPj Astro needs, you may not be able to call up the calendar chart. If you get a message saying that there is not enough memory for the calendar, it is time to give MPj Astro a bit more memory.

If you have the memory, add an additional 2.3M to MPj Astro. With this much memory, MPj Astro will load the AstroStar data directly into RAM and 30° or less views with 7th and 8th magnitude stars will build much faster.

The memory that is allocated to MPj Astro can be changed by selecting the MPj Astro icon and then selecting the Get Info dialogue (command + I). Enter the amount of memory you want to allocate in the “Preferred size” box, changing the amount in 100K steps.

COPYRIGHT

TRADEMARKS

Apple, the Apple logo and Macintosh are registered trademarks of Apple Computer, Inc. Finder, QuickTime and System 7 are trademarks of Apple Computer, Inc. OrbiTrack is a trademark of BEK Developers.

LEGAL STUFF

Upon payment of the shareware fee, Microprojects grants you, the purchaser, license to operate this software on one computer at a time. However, if you have two or more computers for home use at one location you may install MPj Astro on all your machines.

SHAREWARE DISTRIBUTION

The MPj Astro Shareware Installer may be distributed on disk or electronically via information services, networks, bulletin boards, modems and user groups. If this application is to be included with any shareware collection sold for profit, prior approval in writing from Microprojects is required. In all cases the 'MPj READ ME' file must accompany any distributed copy of the MPj Astro software. The registration installer, photographs and the AstroStar document are NOT part of the shareware package and CAN NOT be freely distributed.

LIMITATION OF LIABILITY

Microprojects makes no warranties, either express or implied, regarding the fitness of this software programme for any particular purpose. Microprojects claims no liability for data loss or other problems caused directly or indirectly by this software programme. If your legal jurisdiction does not allow the exclusion of implied warranties, the above limitation does not apply to you. In no case shall Microprojects' liability exceed the license fee paid for this software programme.

MPj Astro 1.5.1 Registration

MPj Astro is distributed as SHAREWARE. You may evaluate the application for 10 days. If you wish to keep it, please support shareware and register your copy. The cost is US$25.

You can purchase and immediately receive the MPj Astro Registration Installer on the internet from Albert's Ambry. Transactions are via Credit Card with the option of making the purchase over a secure server. Please go to:

http://www.alberts.com

Search on: MPjAstro15.hqx

Click on the "Buy It" Hotlink to register.

You will download an installer that contains 35 high resolution astronomy photographs and the AstroStar document containing data on all 7th and 8th magnitude stars. A registration dialogue will appear the first time you launch MPj Astro with these files in your Microprojects folder.

Thank you for registering and supporting shareware.

If you prefer, you can register by cheque by mailing the registration form on the next page.

MPj Astro 1.5.1 Registration Form

MPj Astro is distributed as SHAREWARE. You may evaluate the application for 10 days. If you wish to keep it, please support shareware and register your copy. Register by mailing this form and US$25 or CD$33 to:

Microprojects
296 Spring Garden Ave.
North York, Ontario
Canada, M2N 3H3

Payment can be made by cheque (US or Canadian bank only please), postal money order or cash. Canadian residents please add GST (or HST) and Ontario residents please add PST.

A three-disk installer containing both the shareware and registration files is supplied on registration.

PLEASE SUPPORT SHAREWARE

Mail To:

NAME: _____

ADDRESS: _____

_____

_____

_____

eMail : _____

Educational Licenses

Network License

The educational price for MPj Astro is US$20.00 for the first Macintosh computer, and then US$5.00 for each additional Macintosh computer in the same lab or on the same network. This allows you to copy and load MPj Astro on all the computers or to use MPj Astro from a network server. A site license is issued for the appropriate number of computers along with the three-disk registration installer.

School License

A site license for an entire school costs US$50.00. This licence allows you to copy, load and use MPj Astro on every Macintosh computer in the named school regardless of the number of computers, labs or networks. A site license is issued for the school along with the three-disk registration installer.

Terms

Please indicate on the purchase order the requesting school and its shipping address. The disks and license are mailed to the school and the invoice is sent to the purchasing department. Other shipping requirements can be arranged. The item purchased is 'MPj Astro 1.5.1'. The item description is 'Astronomy Programme for the Apple Macintosh'. Payment terms is NET 30 Days.

Please send the purchase order to:

Microprojects
296 Spring Garden Ave.
North York, Ontario
Canada M2N 3H3