

New Horizon Map (File Menu)

Create a new horizon map window, using the stored default settings. If the "auto redraw" option is turned on, the map will be computed and displayed automatically as soon as the window has been created.

New Area Map (File Menu)

Selecting this option displays the Area Map View dialog.

Press the **OK** button to create a new area map using the specified centre position and field of view.

Press the **Cancel** button to cancel the operation.

Open (File Menu)

Open a saved map file. When this option is selected a standard file selector will be displayed, allowing you to select the name of a map file to be opened.

Press **OK** to open the map file as a new map window.

Press **Cancel** to abort the operation.

Close (File Menu)

Close the current window.

Save (File Menu)

Save the current map using the existing file name.

Save Defaults (File Menu)

Save the current map settings as the default values to be used for creating a new map of this type. You will be asked to confirm that the settings should be saved.

Save As (File Menu)

Save the current map to a file, prompting for a file name. Selecting this option will display a standard file selector, allowing you to enter the name under which the map should be saved on disk.

Press **OK** to save the map file to disk.

Press **Cancel** to abort the operation.

Preferences (File Menu)

Display the Global Preferences Dialog, to set up global program options.

Write BMP File (File Menu)

Save the current map as a picture to a Windows bitmap (BMP) file, prompting for a file name. Selecting this option will display a standard file selector, allowing you to enter the name under which the map should be saved on disk.

Press **OK** to save the map file to disk.

Press **Cancel** to abort the operation.

Zoom In (View Menu)



Zoom in on the map. The map is zoomed around the centre of the image currently visible in the window.

Zoom Out (View Menu)



Zoom out on the map. The map is zoomed around the centre of the image currently visible in the window.

Zoom to 10° Field of View (View Menu)

Zoom to a 10° (vertical) field of view.

Zoom to 20° Field of View (View Menu)

Zoom to a 20° (vertical) field of view.

Zoom to 60° Field of View (View Menu)

Zoom to a 60° (vertical) field of view.

Zoom to 90° Field of View (View Menu)

Zoom to a 90° (vertical) field of view.

Zoom to 180° Field of View (View Menu)

Zoom to a 180° (vertical) field of view. This displays the whole of the visible sky on a circular map.

Show (View Menu)

Display the Visible Objects Dialog. This dialog provides a rapid means of controlling the visibility of the different types of object which can be displayed on the map.

Time Skip (View Menu)



Switch "time skip" mode on or off. When switched on, the map time will be updated automatically at the interval set by the [Automatic Map Update Dialog](#), which is accessed from the **Time Skip...** option of the **Options** menu.

Copy (View Menu)

Copy the current window as a bitmap image to the Windows clipboard. Once copied, it can be pasted into other applications, such as a word processor.

Notes:

This function copies the entire "client area" of the window, and will only work successfully if the window is wholly visible on the screen. Using this function when the window is partially off the edge of the screen will result in "garbage" being written to the portion of the bitmap corresponding to the non-visible portion of the window.

Select North View



Set the map view to North, preserving the current altitude and field of view.

Select East View



Set the map view to East, preserving the current altitude and field of view.

Select South View



Set the map view to South, preserving the current altitude and field of view.

Select West View



Set the map view to West, preserving the current altitude and field of view.

Increase Limiting Star Magnitude

Increase the limiting magnitude of the stars on the map by half a magnitude.

Decrease Limiting Star Magnitude

Decrease the limiting magnitude of the stars on the map by half a magnitude.

Toggle Star Label Display



Switch the display of star labels on or off. Star labels are displayed according to the settings in the Star Labelling Options dialog.

Toggle Constellation Figure Display



Switch the display of constellation figures on or off. Constellation figures are lines connecting the bright stars in a constellation, and can provide a useful way of memorising the constellations.

Toggle Constellation Name Display



Switch the display of constellation names on or off.

Toggle Constellation Boundary Display



Switch the display of official IAU constellation boundary lines on or off.

Toggle Comet Display



Switch the display of comets on or off. The comets to be displayed are selected using the **Comet...** item on the **Options** menu.

Toggle Asteroid Display



Switch the display of asteroids on or off. The asteroids to be displayed are selected using the **Asteroid...** item on the **Options** menu.

Toggle Deep-Sky Object Display



Switch the display of deep sky objects on or off. The type of deep sky objects to be displayed are selected using the **Deep Sky...** item on the **Options** menu.

Toggle Altitude/Azimuth Grid Display



Switch the altitude/azimuth grid on or off. The way the grid is displayed is controlled using the **Alt/Az Labels...** item on the **Options** menu.

Toggle Right Ascension/Declination Grid Display



Switch the RA/Dec grid on or off.

Draw Map (View Menu)



If automatic redraw mode is turned off, this option causes an invalid map to be recalculated using the current settings. The symbol "INV" (Invalid) will be displayed on the status bar when the map needs recalculating.

See also:

[Auto Redraw](#)

Flip Map Vertically (View Menu)



Invert the map top-to-bottom. This command can be used to correctly align the map display with the inversions and reflections of the image introduced by the optics of your telescope.

Flip Map Horizontally (View Menu)



Reflect the map left-to-right. This command can be used to correctly align the map display with the inversions and reflections of the image introduced by the optics of your telescope.

Clean Up Map (View Menu)

Remove any eyepiece circles, Telrad finder circles, and object tracks from the map.

Set Map Viewpoint (Options Menu)



Set up the viewpoint of the map. Selecting this option displays the Field of View dialog.

Stars (Options Menu)

Display the Stars Dialog. This determines the magnitude of the faintest star which will appear on the map, and also controls the size of the star images.

Star Labels (Options Menu)

Display the star labels dialog. This controls which stars on the map will be labelled (if star labels are turned on), and also what type of label (proper name, Bayer letter, or Flamsteed number) a star is labelled with.

Deep Sky Options (Options Menu)

Display the [Deep Sky Options Dialog](#). This controls what type of deep sky objects will be displayed on the map (if deep sky object display is turned on).

Comets (Options Menu)

Display the Comet Selection Dialog. This determines which comets in the comet catalogue are displayed on the map, and also provides maintenance facilities for the catalogue, allowing the user to add, remove and edit comet details.

Asteroids (Options Menu)

Display the [Asteroid Selection Dialog](#). This determines which asteroids in the asteroid catalogue are displayed on the map, and also provides maintenance facilities for the catalogue, allowing the user to add, remove and edit asteroid details.

Alt/Az Grid (Options Menu)

Display the [Altitude/Azimuth Label Options Dialog](#). This determines the way in which the altitude and azimuth scales of the Horizon map are labelled.

RA/Dec Grid (Options Menu)

Display the [RA/Dec Grid Options Dialog](#). This determines the way in which the right ascension/declination grid is drawn on the Horizon map..

Screen Colours (Options Menu)

Displays the screen colour editing dialog. This allows the user to edit the colour of the various objects appearing on the screen map display. These colour settings are automatically saved between runs of the program.

Printer Colours (Options Menu)

Displays the printer colour editing dialog. This allows the user to edit the colour of the various objects appearing on a colour printed map. These colour settings are automatically saved between runs of the program.

Screen Fonts (Options Menu)

Displays the screen font editing dialog. This allows the user to select the font used to draw the various items of text which appear on the screen map display. These font settings are automatically saved between runs of the program.

Printer Fonts (Options Menu)

Displays the printer font editing dialog. This allows the user to select the font used to draw the various items of text which appear on the printed map. These font settings are automatically saved between runs of the program.

High Precision (Options Menu)

Switches high precision calculation mode on or off. When high precision mode is switched on (ie, when a check mark appears alongside the menu), the positions of all objects displayed on the map are rigorously corrected for precession, proper motion (in the case of stars), aberration, nutation, and refraction. When high precision mode is switched off, positions are only corrected for refraction.

The only situation in which high precision mode becomes important is when displaying maps for the distant past or future, where precession has an important influence. As a rough guide, high precision mode should be switched on for any map drawn for a date more than 50 years either side of 2000AD.

Astrometric (Options Menu)

Toggles astrometric drawing mode on or off.

When astrometric drawing mode is switched off, the positions of all objects displayed on the map are rigorously calculated for the epoch of observation. Star positions are corrected for precession, proper motion, nutation and aberration. Switch off astrometric mode if you want to see the coordinates of objects as they actually are in the sky for the date and time at which you are observing.

When astrometric drawing mode is switched on, the stars are displayed on the map in their J2000.0 catalog positions, and all other objects are precessed to this standard epoch. The only position correction applied to the positions of stars is proper motion. On this type of map, all moving objects will be shown in the correct place relative to nearby stars, but their right ascension and declination will be for epoch J2000.0, rather than for the epoch of observation.

The program can calculate astrometric maps *much* more quickly than non-astrometric maps. This option is initially switched on as a default, and should probably be left switched on.

Auto Redraw (Options Menu)

Switches "auto redraw" mode on or off. When switched on (ie, when a check mark appears alongside the menu item), the map is automatically recalculated following any change which necessitates this. If you are running SkyMap on a slow computer - specifically, on a computer without a maths co-processor - you may wish to switch this option off to allow you to make changes to the map settings more rapidly.

If auto redraw mode is switched off and the map settings change in a way that necessitates a recalculation, the letters "INV" (short for "Invalid") will appear on the status bar to inform you of the situation. Once all required changes have been made, the map can then be recalculated using the **Draw** item on the **View** menu, or the equivalent tool bar button or keyboard shortcut.

Time Skip (Options Menu)

Displays the [Automatic Map Update Dialog](#), which controls the rate at which map time automatically advances when time skip mode is switched on.

Search for a Planet (Search Menu)

Search for a planet, or the Sun or Moon. A dialog box containing the names of the planets will be displayed. The action of this command varies slightly with the map type:

On an Area map, the map will be centred on the location of the planet.

On a Horizon map, the map will be centred on the location of the planet if it is currently above the horizon using the current location and time settings. If the planet is not currently visible, a message will be displayed and the current viewpoint left unchanged.

Search for a Constellation (Search Menu)

Search for a constellation. A dialog box containing the names of the constellations will be displayed. The action of this command varies slightly with the map type:

On an Area map, the map will be centred on the location of the constellation name.

On a Horizon map, the map will be centred on the location of the constellation name if it is currently above the horizon using the current location and time settings. If the constellation name is not currently visible, a message will be displayed and the current viewpoint left unchanged.

Search for a Star by Proper Name (Search Menu)

Search for a star by specifying its "proper name". A proper name is a name such as "Polaris", "Betelgeuse", "Aldebaran", etc. Only a few stars on the map will have a proper name; mainly the brighter stars.

On a Horizon map, this command will display a dialog box listing all the proper names of stars that are currently above the horizon. Selecting a name will centre the map on that star.

On an Area map, the command displays a dialog box listing all the proper names in the star database. Selecting a name will centre the map on that star.

Search for a Star by Bayer Letter (Search Menu)

Search for a star by specifying its Bayer letter. Bayer letters are Greek letters which label the brightest stars in a constellation. In the majority of cases, the stars are labelled roughly in decreasing order of brightness; the brightest star being " α ", the second brightest " β ", and so on, although there are exceptions to this. The stars of Ursa Major, for example, are labelled in sequence along the shape of the "Plough" or "Big Dipper". In some cases, a number is added to the letter. The stars forming Orion's "shield", for example, are labelled " $\pi 1$ ", " $\pi 2$ ", etc.

When this command is selected, a dialog box is displayed allowing the entry of a Greek letter, a qualifying number, and a constellation. The number zero should always be used where no number is required.

In the case of a Horizon map, the stars currently above the horizon are searched for a match with the specified star. In the case of an Area map, the entire star database is searched. If a match is found, the map is centred on the star; otherwise a message is displayed.

Search for a Star by Flamsteed Number (Search Menu)

Search for a star by specifying its Flamsteed number. Flamsteed numbers are numbers which label the brighter stars in each constellation. Today they are normally used in cases where a fairly star does not have a Bayer letter, since they normally extend to a fainter magnitude limit than that permitted by the 24 letters of the Greek alphabet used in the Bayer labelling scheme.

When this command is selected, a dialog box is displayed allowing the entry of a Flamsteed number and a constellation.

In the case of a Horizon map, the stars currently above the horizon are searched for a match with the specified star. In the case of an Area map, the entire star database is searched. If a match is found, the map is centred on the star; otherwise a message is displayed.

Search for a Star by SAO Catalogue Number (Search Menu)

Search for a star by specifying its SAO catalogue number. This is rarely useful, but is supplied for completeness. When this command is selected, a dialog appears allowing the entry of an SAO catalogue number.

In the case of a Horizon map, the stars currently above the horizon are searched for a match with the specified star. In the case of an Area map, the entire star database is searched. If a match is found, the map is centred on the star; otherwise a message is displayed.

Search for a Deep Sky Object by Popular Name (Search Menu)

Search for a deep sky object by its "popular name". Such names include "Orion Nebula", "Whirlpool Galaxy", "Ring Nebula", etc.

Selecting this option displays a dialog box of names. In the case of a Horizon map, the list contains the names of all objects currently above the horizon; in the case of an Area map, it contains all the names in the database. Selecting a name centres the map on the location of the object.

Note that the object will not necessarily be visible on the map after this command is used. The command simply centres the map on the *location* of the object - it does not automatically display it. You may have to use the **Deep Sky...** item on the **Options** menu, and possibly the **Deep Sky** tool bar button to actually see the object!

Search for a Deep Sky Object by Catalog Number (Search Menu)

Search for an object in the deep sky database by catalog number. When selected, a dialog will appear in which a catalogue number (such as "M 31" or "NGC 7088") can be entered. In the case of a Horizon map, the list of objects currently above the horizon will be searched for the object; in the case of an Area map, the entire database will be searched. If located, the map will be centred on the location of the object.

Notes:

1. The object will not necessarily be visible on the map after this command is used. The command simply centres the map on the *location* of the object - it does not automatically display it. You may have to use the **Deep Sky...** item on the **Options** menu, and possibly the **Deep Sky** tool bar button to actually see the object!
2. The catalog number entered is not case sensitive, and spaces are not significant (although all other characters, such as "-", are significant). Thus, if you wish to search for "NGC 4565", you may enter any of the following:
NGC 4565
nGC4565
ngc4 5 65
and the object will still be located.
3. You may search for either the "main" or the "alternative" name of an object. For example, entering either "M 42" or "NGC 1976" will successfully locate the Orion Nebula.

Search for a Comet (Search Menu)

Search for a comet on the map. When this command is selected, a dialog box with a list of comets will be displayed. In the case of an Area map, the list will contain the names of all the currently active comets; for a Horizon map it will contain those active comets which are currently above the horizon.

Selecting a name from the list will centre the map on the comet's location.

Search for an Asteroid (Search Menu)

Search for an asteroid on the map. When this command is selected, a dialog box with a list of asteroids will be displayed. In the case of an Area map, the list will contain the names of all the currently active asteroids; for a Horizon map it will contain those active asteroids which are currently above the horizon.

Selecting a name from the list will centre the map on the asteroid's location.

Setting the Date and Time of Observation (Options Menu)

To set the time and date for which the map is drawn, select the **Time...** item from the **Options** menu. The Observation Time Dialog will be displayed.

For the horizon map, changing the time of observation obviously alters the map view completely. For the area map, the main effect is to alter the positions of objects in the solar system.

Shortcut: 

Notes:

1. The observation time is taken to be in the observer's local time zone. SkyMap converts the entered time to UTC by applying the corrections for the observer's time zone and (if applicable) for daylight saving time.
2. If the date is on or after 0h on October 15th, 1582, it is assumed to be in the Gregorian calendar. If before this, the Julian calendar is used.

Setting the Location of the Observer (Options Menu)

To set up the position of the observer, together with associated information such as time zone information, weather conditions, etc, select the **Observer...** item from the **Options** menu. The Observation Location Dialog will be displayed.

For the horizon map, changing the observer's location obviously alters the map view completely. For the area map, the only effect is to slightly alter the apparent positions of objects in the solar system, most notably the Moon, due to the effects of parallax.

Shortcut: 

Image Viewer (Tools Menu)

Run the Image Viewer application. By default this is the SkyImage program supplied with SkyMap, but can be customised to run any program by changing the "Viewer" entry in the Global Preferences Dialog.

Planet Visibility (Tools Menu)

Displays the Planet Visibility Dialog, which provides a quick way of seeing which solar system objects are currently above the horizon.

Daily Phenomena (Tools Menu)

Displays the Daily Phenomena Dialog, showing the rise, set and transit times of the Sun, Moon and planets. Note that this can take a short time to calculate, especially on a slow computer.

Eyepiece Database (Tools Menu)

Displays the Eyepieces Dialog, which displays the eyepiece and telescope databases, allowing the magnification and field of view of any combination of eyepiece and telescope to be determined.

1, 2, 3, 4 command (File menu)

Use the numbers and filenames listed at the bottom of the File menu to open the last four maps that you viewed.

Exit (File Menu)

Use this command to end your SkyMap session. You can also use the Close command on the application Control menu.

Shortcuts

Mouse: Double-click the application's Control menu button.



Keys: ALT+F4

Toolbar (View menu)

Use this command to display and hide the Toolbar, which includes buttons for some of the most common commands in SkyMap. A check mark appears next to the menu item when the Toolbar is displayed.

See [Toolbar](#) for help on using the toolbar.

Toolbar



The toolbar is displayed across the top of the application window, below the menu bar. The toolbar provides quick mouse access to many tools used in SkyMap,

To hide or display the Toolbar, choose Toolbar from the View menu (ALT, V, T).

To obtain information about any button on the Toolbar, select context sensitive help mode by either clicking the help button:



or pressing **SHIFT+F1**, then click the button you require help on.

Status Bar (View Menu)

Use this command to display and hide the Status Bar, which describes the action to be executed by the selected menu item or depressed toolbar button, and keyboard latch state. A check mark appears next to the menu item when the Status Bar is displayed.

See [Status Bar](#) for help on using the status bar.

Status Bar



The status bar is displayed at the bottom of the SkyMap window. To display or hide the status bar, use the Status Bar command in the View menu.

The left area of the status bar describes actions of menu items as you use the arrow keys to navigate through menus. This area similarly shows messages that describe the actions of toolbar buttons as you depress them, before releasing them. If after viewing the description of the toolbar button command you wish not to execute the command, then release the mouse button while the pointer is off the toolbar button.

The right areas of the status bar indicate which of the following keys are latched down:

Indicator	Description
CAP	The Caps Lock key is latched down.
NUM	The Num Lock key is latched down.
SCRL	The Scroll Lock key is latched down.

Cascade (Window Menu)

Use this command to arrange multiple opened windows in an overlapped fashion.

Tile (Window Menu)

Use this command to arrange multiple opened windows in a non-overlapped fashion.

Tile Horizontal (Window Menu)

Use this command to vertically arrange multiple opened windows in a non-overlapped fashion.

Tile Vertical (Window Menu)

Use this command to arrange multiple opened windows side by side.

Window Arrange Icons

Use this command to arrange the icons for minimized windows at the bottom of the main window. If there is an open document window at the bottom of the main window, then some or all of the icons may not be visible because they will be underneath this document window.

1, 2, ... command (Window Menu)

SkyMap displays a list of currently open document windows at the bottom of the Window menu. A check mark appears in front of the document name of the active window. Choose a document from this list to make its window active.

Help Index (Help Menu)

Use this command to display the opening screen of Help. From the opening screen, you can jump to step-by-step instructions for using SkyMap and various types of reference information.

Once you open Help, you can click the Contents button whenever you want to return to the opening screen.

Using Help (Help Menu)

Use this command for instructions about using Help.

About SkyMap (Help Menu)

Use this command to display the copyright notice and version number of your copy of SkyMap.

Map Status (Help Menu)

Display the Map Information Dialog, showing information about the current map.

Registration Benefits (Help Menu)

Selecting this option displays the Registration Benefits Dialog, explaining the benefits of registering the unregistered version of SkyMap. It also displays the length of time that the program has been in use for.

Context Help



Use the Context Help command to obtain help on some portion of SkyMap. When you choose the Toolbar's Context Help button, the mouse pointer will change to an arrow and question mark. Then click somewhere in the SkyMap window, such as another Toolbar button. The Help topic will be shown for the item you clicked.

Shortcut

Keys: SHIFT+F1

Scroll Bars

Displayed at the right and bottom edges of the document window. The scroll boxes inside the scroll bars indicate your vertical and horizontal location in the document. You can use the mouse to scroll to other parts of the document.

Size (System Menu)

Use this command to display a four-headed arrow so you can size the active window with the arrow keys.



After the pointer changes to the four-headed arrow:

1. Press one of the DIRECTION keys (left, right, up, or down arrow key) to move the pointer to the border you want to move.
2. Press a DIRECTION key to move the border.
3. Press ENTER when the window is the size you want.

Note: This command is unavailable if you maximize the window.

Shortcut

Mouse: Drag the size bars at the corners or edges of the window.

Move (Control Menu)

Use this command to display a four-headed arrow so you can move the active window or dialog box with the arrow keys.



Note: This command is unavailable if you maximize the window.


Shortcut

Keys: CTRL+F7

Minimize (Application Control Menu)

Use this command to reduce the SkyMap window to an icon.

Shortcut

Mouse: Click the minimize icon  on the title bar.
Keys: ALT+F9

Maximize (System Menu)

Use this command to enlarge the active window to fill the available space.

Shortcut

Mouse: Click the maximize icon  on the title bar; or double-click the title bar.
Keys: CTRL+F10 enlarges a document window.

Next Window (Document Control Menu)

Use this command to switch to the next open document window. SkyMap determines which window is next according to the order in which you opened the windows.

Shortcut

Keys: CTRL+F6

Previous Window (Document Control Menu)

Use this command to switch to the previous open document window. SkyMap determines which window is previous according to the order in which you opened the windows.

Shortcut

Keys: SHIFT+CTRL+F6

Close (Control Menus)

Use this command to close the active window or dialog box.

Double-clicking a Control-menu box is the same as choosing the Close command.



Note: If you have multiple windows open for a single document, the Close command on the document Control menu closes only one window at a time. You can close all windows at once with the Close command on the File menu.

Shortcuts

Keys: CTRL+F4 closes a document window
 ALT+F4 closes the SkyMap window

Restore (Control Menu)

Use this command to return the active window to its size and position before you chose the Maximize or Minimize command.

Switch to (Application Control Menu)

Use this command to display a list of all open applications. Use this "Task List" to switch to or close an application on the list.

Shortcut

Keys: CTRL+ESC

Dialog Box Options

When you choose the Switch To command, you will be presented with a dialog box with the following options:

Task List

Select the application you want to switch to or close.

Switch To

Makes the selected application active.

End Task

Closes the selected application.

Cancel

Closes the Task List box.

Cascade

Arranges open applications so they overlap and you can see each title bar. This option does not affect applications reduced to icons.

Tile

Arranges open applications into windows that do not overlap. This option does not affect applications reduced to icons.

Arrange Icons

Arranges the icons of all minimized applications across the bottom of the screen.

No Help Available

No help is available for this area of the window.


No Help Available

No help is available for this message box.

Print (File Menu)

Print the current map to the default printer. Selecting the option displays the Print Options Dialog, allowing the print options to be selected.

Shortcuts

Toolbar: 
Keys: CTRL+P

Print Dialog

The following options allow you to specify how the document should be printed:

Printer

This is the active printer and printer connection. Choose the Setup option to change the printer and printer connection.

Setup

Displays a Print Setup dialog box, so you can select a printer and printer connection.

Print Range

Specify the pages you want to print:

All Prints the entire document.

Selection Prints the currently selected text.

n

Pages Prints the range of pages you specify in the From and To boxes.

Copies

Specify the number of copies you want to print for the above page range.

Collate Copies

Prints copies in page number order, instead of separated multiple copies of each page.

Print Quality

Select the quality of the printing. Generally, lower quality printing takes less time to produce.

Print Progress Dialog

The Printing dialog box is shown during the time that SkyMap is sending output to the printer. The page number indicates the progress of the printing.

To abort printing, choose Cancel.

Print Setup (File Menu)

Use this command to select a printer and a printer connection. This command presents a Print Setup dialog box, where you specify the printer and its connection.

Print Setup Dialog

The following options allow you to select the destination printer and its connection.

Printer

Select the printer you want to use. Choose the Default Printer; or choose the Specific Printer option and select one of the current installed printers shown in the box. You install printers and configure ports using the Windows Control Panel.

Orientation

Choose Portrait or Landscape.

Paper Size

Select the size of paper that the document is to be printed on.

Paper Source

Some printers offer multiple trays for different paper sources. Specify the tray here.

Options

Displays a dialog box where you can make additional choices about printing, specific to the type of printer you have selected.

Network...

Choose this button to connect to a network location, assigning it a new drive letter.

The Horizon Map

A horizon map shows a view of the sky as seen by an observer for a selected place and time. Its main use is simply to see "what's up" at any desired time. Once the map has been calculated, the viewpoint can quickly be moved to display a view of any part of the visible sky.

Although all the information in SkyMap's databases *can* be displayed on a horizon map, it isn't a good idea to display faint stars, deep-sky objects, etc - the map just gets too crowded and takes too long to draw! The recommended way of working is to use the horizon map to get a general picture of what's visible, then to draw a detailed Area map for a specific part of the sky that you wish to observe.

For more information about drawing and using a horizon map, select one of the topics below:

[Creating and Setting up a Horizon Map](#)

[Changing the Viewpoint](#)

[Displaying Objects on a Map](#)

[Identifying Objects on a Map](#)

[Measuring Angular Separation](#)

[Searching for Objects on a Map](#)

[Drawing an Area Map](#)

[Saving the Map Settings](#)

See also:

[Using the Help System](#)

Identifying Objects on a Map

To identify any object on a map:

1. Position the tip of the mouse pointer over the object, then press the *right* mouse button. A "pop-up" menu will appear underneath the mouse pointer. The exact number and wording of the items on the menu will depend on the situation, but there should be a menu item referring to the object you clicked on.
2. Select the item with the *left* mouse button, and a dialog box containing information about the object will be displayed.

For further help on the information displayed in the object description dialog box, press **F1** while the dialog is visible.

Drawing an Area Map from a Horizon Map

There are three different methods of drawing an Area Map from a Horizon Map display:

1. Select the **File/New Area Map...** menu item.
2. Position the mouse pointer over the point on a Horizon Map that you want to appear in the centre of the area map. Press the *right* mouse button to display the pop-up menu of local options. Select the **Area Map...** item from this menu.
3. Hold down the left mouse button and "drag" a selection rectangle around the portion of the Horizon Map for which you want to draw an Area Map. Release the left mouse button when the selection rectangle is the correct size. This method is better in most cases than method (2) since it allows the size, as well as the centre, of the map to be selected graphically.

Whichever of these methods is used, the Area Map View Dialog will be displayed. Conform that all the information displayed, then press **OK** to display the new map, or **Cancel** to cancel the operation.

Changing the Horizon Map Viewpoint

Once the horizon map has been displayed for the first time, the viewpoint can easily be changed to view any part of the visible sky. There are several ways to do this:

1. Use the buttons on the tool bar to change the view to North, East, South, or West. This leaves the central altitude and field of view unchanged.



2. Position the mouse pointer over the location you wish to be the centre of the new map. Press the *right* mouse button. Select **Centre** from the pop-up menu which appears.
3. From the **Options** menu select **Field of View**. Enter the central altitude and azimuth and the required field of view into the dialog box which appears.

Shortcut:



Creating and Setting Up a Horizon Map

To create a new horizon map, select **New Horizon Map** from the **File** menu. A new map window will appear, and the default map settings will be loaded. The time and date will be read from the computer's clock. Once the map has been created, you will probably wish to configure it. This involves several steps:

[Setting the Date and Time of Observation](#)

[Setting the Location of the Observer](#)

See also:

[Saving the Map Settings](#)

Displaying Objects on the Horizon Map

A wide variety of objects can be displayed on a horizon map. These include:

- Stars
- Planets
- Comets
- Asteroids
- Deep sky objects (galaxies, star clusters, and nebulae)
- Constellation boundaries, figures, and names
- A grid of altitude and azimuth lines

The objects which appear on the map are controlled in two ways:

1. The items on the **Options** menu set the display options for each type of object. For example, the **Star Labels...** item controls the way in which stars are labelled; the **Comets...** item allows the user to select which comets will be displayed. To get specific help on these options, select the item and then press **F1**.
2. The **Show...** item on the **View** menu (and the equivalent buttons on the tool bar) allows the user to select *which* items are shown on the map. A huge quantity of information is available, and having it all displayed at once would be very confusing. This menu item provides a rapid way to select exactly the desired items.

Shortcut:



Saving the Horizon Map Settings

When all the horizon map options have been set up to your satisfaction they can be saved for use as the default settings for all subsequent horizon maps. To do this:

1. From the **File** menu select **Save Defaults...**. A dialog box will appear asking for confirmation of the operation.
2. Click on the **Yes** button, or just press **Enter**. The current map settings will then be saved.

Searching for Objects on a Horizon Map

To search for specific objects on a horizon map use the items on the **Search** menu. Note that you can only search for objects which are currently above the horizon.

See also:

[Searching for a Planet](#)

[Searching for a Constellation](#)

[Searching for a Star by Proper Name](#)

[Searching for a Star by Bayer Letter](#)

[Searching for a Star by Flamsteed Number](#)

[Searching for a Star by SAO Number](#)

[Searching for a Deep Sky Object by Popular Name](#)

[Searching for a Deep Sky Object by Catalog Number](#)

[Searching for a Comet](#)

[Searching for an Asteroid](#)

Observation Location Dialog

This dialog contains information about the observer. The information can be divided into several categories:

Position Information

The latitude and longitude of the observer, in degrees, minutes and seconds. This information can be obtained from a local map.

Time Zone Information

The observer's time zone, and whether or not daylight saving time is currently in effect. Note that the time information is entered in **minutes** (not hours) ahead of or behind UT (Greenwich Mean Time).

Weather Information

The observer's local weather conditions. This information is used to calculate the effects of refraction. Unless you live in a very extreme climate, or desire the ultimate in accuracy when calculating the apparent altitude of an object, it is quite acceptable to leave these values at their default settings.

Location List

The listbox at the bottom of the dialog can be used to select a location. If a name is selected from a list, the appropriate latitude, longitude and time zone information are automatically filled in.

You can add your own entries to the location list by editing the ASCII file `LOCATION.SKY` with any convenient editor - the DOS "edit" editor is fine for this purpose. Each line in the file consists of four items, separated with a space. These items are, in order:

Latitude in degrees, + if North, - if South.

Longitude in degrees, + if West, - if East.

Time difference from GMT in hours. + if behind GMT, - if ahead of GMT

Name to appear in the list.

An example line from the file is:

```
47.60 122.33 8 USA: Seattle WA
```

If you add the names of any large towns or cities to the list, please send me the information and I'll incorporate it into the next release of SkyMap.

Observation Time Dialog

This dialog specifies the date and time of observation. Note that the time is taken to be in the observer's local time zone, possibly corrected for the effect of daylight saving time, as specified in the [Observation Location Dialog](#).

The **Now** button sets the date and time from the computer's clock.

The **Midnight** button leaves the date unchanged, but sets the time to 00:00:00.

Note that any date on or after October 15th, 1582, is assumed to be in the Gregorian calendar. Any date before this uses the Julian calendar.

Horizon Map View Dialog

This dialog defines the centre and field of view of the horizon map.

Map Centre

The altitude and azimuth of the centre of the map.

Field of View

The vertical field of view of the map. in degrees.

About SkyMap Dialog

This dialog displays copyright and version information about SkyMap. When requesting help, please always quote the version number shown. The picture is the spiral galaxy M74 in Pisces.

Star Dialog

This dialog controls both the "limiting magnitude" of stars on the map (ie, the faintest star which is drawn), and also the way in which the stars are drawn.

Limiting Magnitude

The magnitude of the faintest star to be drawn on the map.

Image Display

This section of the dialog allows you to control the sizes of the "dots" used to represent the stars on the map.

The first line shows the size of the *largest* star image which will be drawn, and the magnitude it corresponds to. Any star brighter than the magnitude shown will be displayed using this dot size.

The second line shows the size of the *smallest* star image which will be drawn, and the magnitude it corresponds to. Any star fainter than the magnitude shown will be displayed using this dot size. Note that if automatic magnitude scaling is switched on (see below), the number entered on this line is ignored.

A star whose magnitude falls between these two limits (as the majority should do) will be drawn with a dot whose diameter is inversely proportional to the magnitude.

Automatic Magnitude Scale

This checkbox switches between "manual" and "automatic" magnitude scaling.

If "manual scaling" is in operation (the only option available in previous versions of the program), the "faintest star" symbol is used for any star fainter than the magnitude entered in the second line of the "Image Display" section of the dialog.

If "automatic scaling" is in operation, only the *size* of the faintest star image is taken from the "Image Display" section; the faintest star magnitude is taken to be the limiting magnitude of the map. Under most circumstances the option should be switched on.

Star Label Options Dialog

This dialog allows you to specify which labels are used when star labelling is switched on.

Label Options

This group of check boxes specifies which label will be drawn for a star. The options are:

Proper Names, eg "Rigel".

Bayer Letters, eg " α ".

Flamsteed Numbers, eg "31".

When labelling a star, this list is scanned from top to bottom. The star is labelled using the first existing label which corresponds to a checked option. Eg, if both the "Proper Names" and the "Bayer Letters" options are checked, a star which has both a proper name and a Bayer letter will be labelled with its proper name; a star with only a Bayer letter will be labelled with the letter.

Magnitude Filter

These radio buttons allow you to select whether all stars on the map are labelled, or only those stars brighter than the indicated magnitude.

Altitude/Azimuth Grid Options Dialog

This dialog controls the way the altitude/azimuth grid is drawn, if it is switched on.

Azimuth Label Options:

Label with:

These radio buttons determine whether azimuth is labelled using compass points (eg, "N", "NE"), or azimuth (true compass bearing) numbers (eg 180°).

Azimuth Interval:

If the azimuth axis of the map is being labelled with azimuth numbers, these radio buttons allow you to either specify how far apart the lines are drawn, or to allow SkyMap to determine the interval automatically.

Compass Interval:

If the azimuth axis of the map is being labelled with compass points, these radio buttons allow you to either specify how far apart the lines are drawn, or to allow SkyMap to determine the interval automatically.

Draw Azimuth Lines:

If this box is checked, an azimuth grid will be drawn on the map. If the box is left blank, just points along the horizon line will be labelled.

Altitude Label Options

Label with:

These radio buttons determine whether lines of altitude are drawn across the map, or simply "tick marks" down the centre of the map.

Altitude Interval:

These radio buttons allow you to either enter an altitude labelling interval manually, or allow SkyMap to decide the interval automatically.

Notes:

In the majority of situations, leaving all labelling options set to "automatic" will produce a satisfactory result.

Colour Settings Dialog

This dialog allows the colour of each component of the map to be set. There are two ways to edit an item:

1. Double click the mouse on the name of the item.
2. Click on the name of the item to select it, then press the **Edit...** button.

In either case, a colour selector dialog will be displayed, allowing the colour of the item to be set. When all colours are set to your satisfaction, press the **OK** button, and all maps will be redrawn with the new colour scheme.

Notes:

1. Colour settings are *global* and apply to *all* maps. Changing the colour settings from any map alters them for all maps.
2. Colour settings are automatically saved between runs of the program - there is no need to use the **File/Save Defaults...** menu item to save a new colour selection.
3. There are two types of item - ones which just have a colour (such as the map background colour), and ones which have both a colour and a line style (such as constellation boundary lines). A slightly different dialog is displayed for the two cases.

Global Preferences Dialog (File/Preferences...)

This dialog sets global application options. The set options are automatically stored when the dialog is exited.

Maximize application window:

If this option is checked, SkyMap will maximize itself - ie use the whole screen - when run on subsequent occasions. If the option is not checked, the program will run as a normal sized window.

Maximize new map window:

If this option is checked, a new map window will be created in a maximized state - ie, using the whole of SkyMap's "workspace".

File Locations:

This section of the dialog allows you to specify the search paths that SkyMap will use when looking for various files. Options are:

Images: The directory in which SkyMap will look for image files when deciding whether a picture of an object is available for display. For more information, see [Displaying Pictures Automatically](#).

Viewer: The complete path name of the program that SkyMap will run to display a picture. By default this will be `SKYIMAGE.EXE`, in the same directory as the SkyMap program. You may use any image viewer you wish - the only requirement is that it should be able to display the picture whose name is passed on the command line.

Startup Map Options:

Specifies what type of map, if any, is created automatically when the program is run.

Tool Tips

These items configure the "pop up help" messages which appear as the mouse moves over the buttons on the toolbar.

Display Help: Check this box to switch on the pop-up help messages; leave it blank to disable this feature.

Delay: The time in milliseconds that the mouse must be over a button before the help message appears. The default is 500 milliseconds - half a second.

Print Options Dialog

This dialog sets the options used when printing a map.

Colour

These radio buttons select whether a colour or black and white map is printed. If the colour option is selected, the printer colour options are used when printing the map; if the black and white option is selected, all objects are printed in black.

Note that the colour option can successfully be used to print a "grey scale" map on a black and white printer. The way that colours are translated to shades of grey will vary with the printer, and some experimentation will be required to produce a good result. This can produce excellent results on a PostScript laser printer; the results on a 9-pin dot matrix printer are not quite so good!

Show Map Key

This check box controls whether or not a key (legend) is displayed at the bottom of a printed map.

Find Planet Dialog

This dialog allows you to search for a planet, or the Sun or Moon. Select from the list the name of the object you wish to find, and press **OK**.

Notes:

On a Horizon Map only those planets currently above the horizon can be located. Attempting to search for a planet not currently visible will product the message "<object name> is not currently above the horizon". A search on an Area Map will always be successful.

Find Constellation Dialog

This dialog allows you to search for a constellation. Select from the list the name of the constellation you wish to find, and press **OK**.

Notes:

1. The point in the constellation that the search will display in the centre of the map is the point at which the constellation name is displayed. This is not always in the physical centre of the constellation!
2. On a Horizon Map only those constellations currently above the horizon can be located. Attempting to search for a constellation not currently visible will product the message "<constellation name> is not currently above the horizon". Please note also the point made above - you may be unable to successfully search for a constellation even though some part of it is actually visible. ". A search on an Area Map will always be successful.

Find Star by SAO Number Dialog

This dialog allows you to search for a star by its number in the SAO Star Catalog. Enter the catalog number in the dialog, and press **OK**.

Notes:

On a Horizon Map only those stars currently above the horizon can be located. Attempting to search for a star not currently visible will produce the message "The object is not currently above the horizon". A search on an Area Map will always be successful.

Find Star by Proper Name Dialog

This dialog allows you to search for a star by its "proper name". Select from the list the name of the star you wish to search for, and press **OK**.

Notes:

For a Horizon map, the list of names will only contain the names of stars currently above the horizon. For an Area Map, the list will contain all the names in the star database.

Find Star by Bayer Letter Dialog

This dialog allows you to search for a star by its Bayer letter. Enter the letter, optionally a qualifying number, and a constellation, then press **OK**.

Notes:

1. On a Horizon Map only those stars currently above the horizon can be located. Attempting to search for a star not currently visible will produce the message "The object is not currently above the horizon". A search on an Area Map will always be successful (assuming that the star is in the star database, that is).
2. You must always select a Greek letter and a constellation from the appropriate boxes on the dialog. A few stars have a number "qualifying" the letter (eg 2 Orionis), but for the majority of stars which have no such number, enter zero into the number field.

Find Star by Flamsteed Number Dialog

This dialog allows you to search for a star by its Flamsteed number. Enter a number and a constellation, then press **OK**.

Notes:

1. On a Horizon Map only those stars currently above the horizon can be located. Attempting to search for a star not currently visible will produce the message "The object is not currently above the horizon". A search on an Area Map will always be successful (assuming that the star is in the star database, that is).

Find Object by Popular Name Dialog

This dialog allows you to locate a deep sky object by its "popular name" (such as "Whirlpool Galaxy", for example). Select from the list the name of the object you wish to find, and press **OK**.

Notes:

1. On a Horizon Map, only those objects currently above the horizon can be located. Attempting to search for an object not currently visible will produce the message "The object is not currently above the horizon". A search on an Area Map will always be successful (assuming that the object is in the database, that is).
2. This dialog displays the contents of the ASCII text file `SACPOP.SKY`. You can add your own entries to this file, or edit existing ones, using any convenient text editor (such as "NotePad", for example). Each line of the file has the format:

```
Popular Name|Catalog Number
```

where "Popular Name" is the descriptive name which appears in the dialog box, and "Catalog Number" is the corresponding catalog number which is searched for when that entry is selected. The two are separated by the vertical bar character "|". For example, one line of the file says:

```
Dumbbell Nebula|M 27
```

This means that if "Dumbbell Nebula" is selected from the listbox, the deep sky database will be searched for the object "M 27".

Find Object by Catalog Number Dialog

This dialog allows you to locate a deep sky object by its catalog number (eg "M31", "NGC 4565", "3C 273"). Enter the name of the object you wish to locate and press **OK**.

Notes:

1. The search string entered is not case sensitive, and all spaces are ignored. Note, however, that all other characters (such as "-") *are* significant. For example, if you want to locate the object "NGC 7088" you could enter any of the following:
ngc7088
Ngc 7088
NGC 7 0 88
2. You can search for an object by entering either its "main" or "alternative" name. For example, searching for either "M42" or "NGC 1976" will locate the Orion Nebula.

See also:

[Deep Sky Object Catalogs.](#)

[Dreyer Object Descriptions](#)

Find Comet Dialog

This dialog allows you to search for a comet. Select from the list the name of the comet you wish to locate, and press **OK**.

Note that, for a horizon map, only the names of those comets currently above the horizon will be displayed.

Find Asteroid Dialog

This dialog allows you to search for an asteroid. Select from the list the name of the asteroid you wish to locate, and press **OK**.

Note that, for a horizon map, only the names of those asteroids currently above the horizon will be displayed.

Find Messier Object Dialog

This dialog allows you to search for a Messier object. Enter the number of the Messier object you wish to locate and press **OK**.

Comet Selection Options Dialog

SkyMap maintains a catalogue of comets in the data file `COMET.SKY`. Since comets are typically only visible for a few months either side of their perihelion passage (the point at which they are closest to the Sun), you will normally only want to display the positions of a few comets at any one time. This dialog allows you to select which comets from the catalogue are "active" - ie, will have their position calculated - and also provides facilities for maintaining the comet catalogue.

Most of the dialog is occupied by two listboxes:

Known Comets

This is the list of all the comets in the catalogue.

Active Comets

This is the list of comets whose positions will be calculated by SkyMap for the current map.

Selecting Comets for Display

To add a comet to the **Active** list, highlight its name in the **Known** list, and click the **Add>>** button. The name of the comet will appear in the **Active** list. As a shortcut, simply double click the name of the comet in the **Known** list.

To remove a comet from the **Active** list, highlight its name in the list, and click the **<<Remove** button. The name of the comet will disappear from the **Active** list. As a shortcut, simply double click the name of the comet in the **Active** list.

Note that although the name of any comet in the catalogue can be added to the **Active** list, only those comets less than a year either side of perihelion passage will actually be displayed on the map. This is due to problems in computing the position of a comet in a near-parabolic orbit a long way from perihelion.

Maintaining the Comet Catalogue

The buttons in the **Catalogue** section of the dialog allow the user to maintain the catalogue. The available options are:

Add...

Add a new comet to the catalogue. When this button is pressed, the Comet Orbit Dialog is displayed, allowing the user to enter information about the orbit of the new comet.

Edit...

Edit the orbit of the comet whose name is currently highlighted in the **Known** comets list. When this button is pressed, the Comet Orbit Dialog dialog is displayed.

Delete

Delete from the catalogue the comet whose name is currently highlighted in the **Known** comets list. You will be asked for confirmation before the comet is deleted.

Setting a Magnitude Limit

The radio buttons in the **Magnitude selection** group allow comets to be selected by magnitude. This can be very useful, to prevent a fruitless search for a 17th magnitude comet with a pair of 10x50 binoculars, for example! The options available are:

All objects

Display on the map the positions of all the comets on the **Active** list.

Brighter than mag <n>

Only display on the map the positions of those comets from the **Active** list brighter than the indicated magnitude.

Comet Orbit Dialog

This dialog allows information about a comet to be entered or edited. Information contained in the dialog is described below. The orbital elements should all be referred to epoch J2000.0.

Name:

The name of the comet. Up to 31 characters can be entered. A short period comet (one with an orbital period less than 200 years) has a name beginning with "P/".

Image:

The name of a file containing a picture of the comet. Only a file name should be entered here - the file is assumed to be located in the image file directory specified in the Global Preferences Dialog.

T:

The date of perihelion passage of the comet. The time scale used for this is Terrestrial Dynamical Time (TDT).

q:

The distance of the comet from the Sun at the time of perihelion passage, in astronomical units (AU).

e:

The eccentricity of the comet's orbit. An eccentricity of 0.0 means that the orbit is circular, whilst a value of 1.0 indicates a parabola. The majority of comets have an eccentricity between 0 and 1.

ω :

The argument of perihelion, in degrees.

Ω :

The longitude of the ascending node of the orbit, in degrees.

i:

The inclination of the orbit, in degrees.

Magnitude Parameters:

These numbers (H and G) are used to calculate the magnitude of the comet given its distance from the Earth and Sun.

Star Information Dialog

This dialog displays information about a star. The information displayed will differ from star to star, but could include the following:

Catalog Number

The identity of the star in the SAO or GSC catalog is displayed in the dialog's title bar.

Constellation

The name of the constellation containing the star.

Proper Name

A name, such as "Rigel", by which the star is commonly known.

Bayer Letter

The Bayer identification of the star in the constellation, such as " β Orionis".

Flamsteed Number

The Flamsteed identification of the star in the constellation, such as "19 Orionis".

Magnitude

The visual magnitude of the star.

RA, Dec

The star's right ascension and declination.

Alt, Az

The star's apparent altitude and azimuth.

Rise, Set, Transit

The local time that the star rises, transits the observer's meridian, and sets. A "-" displayed before a rise time indicates that the event occurred the previous day; a "+" displayed after a set time indicates that the event occurs the next day. In the case of a circumpolar star (or, for an Area Map, a star which never rises from the observer's location), only a transit time will be displayed.

Notes:

1. For a Horizon Map, if the position is labelled "epoch J2000", the position shown is the uncorrected catalog position of the star for epoch J2000.0. If the position is labelled "epoch of date", the position is the apparent position at the epoch of observation, fully corrected for proper motion, precession, nutation, and aberration.
2. For an Area Map, if the position is labelled "epoch J2000", the position shown is the astrometric position of the star for J2000.0, corrected only for proper motion. If the position is labelled "epoch of date", the position is the apparent position at the epoch of observation, fully corrected for proper motion, precession, nutation, and aberration.
3. In both the above cases, the displayed right ascension and declination does *not* include a correction for refraction; the altitude and azimuth, however, does take refraction into account.

4. The altitude and azimuth, and the times of rise, set and transit, are computed from the displayed right ascension and declination. They will only be rigorously correct, therefore, if the star's position is displayed for the epoch of observation. In modern times, however, the difference between the position computed from the J2000 catalog position, and the apparent position will be very small, and only important if the utmost rigour is required.

Planet Information Dialog

This dialog displays information about a planet. Several "pages" of information are available, and are selected using the group of radio buttons on the right side of the dialog. The information available is described below:

Local Information

This page displays information about the planet which varies according to the observer's location. The information available is:

Right Ascension, Declination

The apparent topocentric coordinates of the planet, corrected for the effects of diurnal parallax. This will normally differ from the geocentric position by a small amount, but the effect is negligible except in the case of the Moon.

Altitude

The apparent altitude of the planet, including the effects of refraction.

Azimuth

The apparent azimuth of the planet.

Rise

The local time at which the planet rises. A "-" after the time indicates that the event occurred the previous day.

Transit

The local time at which the planet transits the meridian - ie is due south in the northern hemisphere, or due north in the southern hemisphere.

Set

The local time at which the planet sets. A "+" after the time indicates that the event occurs the following day.

Geocentric Information

This page displays information about the planet as it would hypothetically be seen from the centre of the Earth - ie independent of the position of the observer. The items displayed are:

Right Ascension, Declination

The apparent geocentric right ascension and declination of the planet. This is rigorously reduced from mean to apparent place.

Constellation

The name of the constellation the planet is currently in.

True Distance

The geometric distance between the planet and the Earth. For all objects except the Moon the figure is expressed to high accuracy in AU, and a rounded figure in Km is also given. For the Moon, the accurate distance in Km is given.

Heliocentric Information

This page displays information about the planet relative to the Sun. The items displayed are:

Ecliptic Longitude

The ecliptic longitude of the planet, for the mean equinox and ecliptic of date.

Ecliptic Latitude

The ecliptic latitude of the planet, for the mean equinox and ecliptic of date.

Radius Vector

The distance of the planet from the Sun. The distance is given to high accuracy in AU, and a rounded figure in Km is also given.

Physical Information

This page displays physical information about the planet. The items available are:

Magnitude

The apparent magnitude of the planet. Note that, in the case of Saturn, this figure does not take any account of the illumination of the ring system, so the planet will be brighter than the displayed figure.

Phase

The phase of the planet. This corresponds to the fraction of the planet's disk which is illuminated by the Sun.

Equatorial Diameter

The equatorial diameter of the planet's apparent disk, in seconds of arc.

Polar Diameter

The polar diameter of the planet's apparent disk, in seconds of arc. If this is not given, the planet's disk is assumed to be circular.

Phase Angle

The angular separation between the Sun and the Earth, as seen from the planet. This is simply an alternative method of expressing the phase of the planet - the smaller the phase angle, the closer the phase is to "full", as seen from the Earth.

Elongation

The angular separation between the planet and the Sun. A small elongation indicates that the planet can only be observed shortly before sunrise or after sunset.

Light Time

The length of time it takes for light to travel from the planet to the Earth at the time of observation. This is a measure of how "old" the image of the planet we see actually is. Eg, if the light time of Saturn is 1h 25m, we are actually seeing Saturn as it was 1h 25m ago (and, of course, in the location it occupied at that time).

Notes:

1. For a Horizon Map, the right ascension and declination of the planet is always referred to the mean equinox and ecliptic of date.
2. For an Area Map, the right ascension and declination are astrometric positions for epoch J2000.0 if the "astrometric" option is enabled, and are apparent positions

referred to the mean equinox and ecliptic of date otherwise.

3. In both the above cases, the displayed right ascension and declination does *not* include a correction for refraction; the altitude and azimuth, however, does take refraction into account.

Deep Sky Information Dialog

This dialog displays information about a deep sky object. The exact information displayed will vary from object to object, but could include the following:

Name

The main name of the object will appear on the title bar of the dialog.

Type of object

A description of the basic classification of the object - eg "open cluster", "galaxy", etc.

Catalog

The name of the catalog from which the main name of the object is taken.

Other Names

One or more alternative names for the object. Most objects in the Messier catalog, for example, will also have an NGC number. For example, M42 (the Orion nebula) is also known as NGC1976.

Magnitude

The magnitude of the object. For extended objects, this is normally the *integrated* magnitude - ie the total light emitted from the object.

Size

The approximate size of the object, in either minutes or seconds of arc. For galaxies, the size of both the major and minor axes is normally given, together with a position angle. The position angle is the angle between the major axis and north, measured anticlockwise from north.

Number of Stars

For clusters, this gives an indication of the number of visible stars in the cluster.

Magnitude of Brightest Star

For star clusters, the magnitude of the brightest star. For planetary nebulae, the magnitude of the central star.

Classification

The classification of the object. This information is only present in the registered version of the program.

Description

The Dreyer description of the object. This information is only present in the registered version of the program.

Notes

Brief notes about the visual appearance of the object. This information is only present in the registered version of the program.

RA, Dec

The apparent right ascension and declination of the object.

Alt, Az

The apparent altitude and azimuth of the object.

Rise, Set, Transit

The local time that the object rises, transits the observer's meridian, and sets. A "-" displayed before a rise time indicates that the event occurred the previous day; a "+" displayed after a set time indicates that the event occurs the next day. In the case of a circumpolar object (or, for an Area Map, an object which never rises from the observer's location), only a transit time will be displayed.

Comet Information Dialog

This dialog displays information about a comet. The items displayed are as follows:

Name

The name of the comet.

Magnitude

The visual magnitude of the comet. Note that this is only a very approximate figure - the magnitude of a comet is notoriously difficult to predict! Note also that comets are normally diffuse objects, and the magnitude refers to the *total* brightness of the comet - in order to see a 10th magnitude comet it will probably be necessary to be able to see 13th magnitude stars in the same field!

Elongation

The angular separation between the comet and the Sun, in degrees.

Distance

The distance of the comet from the Earth, in both AU and Km.

Radius Vector

The distance of the comet from the Sun, in both AU and Km.

Constellation

The constellation the comet is in.

RA, Dec

The apparent right ascension and declination of the comet for the mean equinox and ecliptic of date.

Alt, Az

The apparent altitude and azimuth of the comet.

Rise, Set, Transit

The local time that the comet rises, transits the observer's meridian, and sets. A "-" displayed before a rise time indicates that the event occurred the previous day; a "+" displayed after a set time indicates that the event occurs the next day. In the case of a circumpolar comet (or, for an Area Map, a comet which never rises from the observer's location), only a transit time will be displayed.

Asteroid Information Dialog

This dialog displays information about an asteroid. The items displayed are as follows:

Name

The name of the asteroid.

Magnitude

The visual magnitude of the asteroid.

Elongation

The angular separation between the asteroid and the Sun, in degrees.

Distance

The distance of the asteroid from the Earth, in both AU and Km.

Radius Vector

The distance of the asteroid from the Sun, in both AU and Km.

Constellation

The constellation the asteroid is in.

RA, Dec

The apparent right ascension and declination of the asteroid for the mean equinox and ecliptic of date.

Alt, Az

The apparent altitude and azimuth of the asteroid.

Rise, Set, Transit

The local time that the asteroid rises, transits the observer's meridian, and sets. A "-" displayed before a rise time indicates that the event occurred the previous day; a "+" displayed after a set time indicates that the event occurs the next day. In the case of a circumpolar asteroid (or, for an Area Map, an asteroid which never rises from the observer's location), only a transit time will be displayed.

Area Map View Dialog

This dialog sets the centre and the field of view of the area map.

Map Centre

The right ascension and declination of the centre of the map.

Field of View

The top-to-bottom field of view of the map, in degrees. This must be between 0.1° and 180° .

Visible Objects Dialog

This dialog provides a rapid way of selecting the type of objects to be displayed on the map. Each type of object has a check box on the dialog. Check the boxes corresponding to those objects you wish to display; leave blank the boxes corresponding to the items you do not wish to see. Note that certain items on the map, such as the Ecliptic line, can *only* be switched on and off using this dialog.

Deep Sky Options Dialog

This dialog allows you to select which deep sky objects will be displayed on the map. The items displayed are as follows:

Object Selection

This listbox allows selection of the types of object to be displayed. An object type will be displayed if the corresponding line in the listbox is currently highlighted.

If the "All Objects" line at the top of the list is highlighted, all objects in the deep sky database will be displayed. If this line is not highlighted, only those objects whose specific type is highlighted in the rest of the list will be displayed.

Catalog Selection

Selects which catalog objects will be displayed from. The options are:

All Catalogs: Display objects from all catalogs in the database.

Messier Catalog: Display only objects from the Messier catalog.

Magnitude Selection

This option allows a magnitude filter to be applied to the objects displayed. You may request that either all (otherwise eligible) objects are displayed, or that only objects brighter than a specified magnitude should be displayed.

Display Labels

Specifies whether or not deep sky objects will be labelled.

Show Object Sizes

This option (only available on the Area Map) allows you to specify whether deep sky objects will be displayed using a symbol of a standard size, or with their actual size and (in the case of galaxies) orientation.

Notes:

1. Not all deep sky objects in the database have size information available. Those which do not will be displayed with a standard symbol regardless of the setting of the "Show object sizes" option. Those objects which do have size information will only be displayed with the correct size if that size is *larger* than the standard size symbol. What this means in reality is that when you first draw a map you will probably see "large scale" structures such as bright and dark nebulae, open clusters, etc, displayed with circles of varying sizes, and standard symbols used for small objects such as galaxies, globular clusters, etc. As you zoom in on a galaxy cluster, for example, you should see more and more of the galaxies drawn with their correct size and orientation.
2. Not all objects in the database have magnitude information available. Dark nebulae have no associated magnitude by definition - they are "black" objects only seen in "silhouette" against a brighter object such as an emission nebula or the Milky Way

background stars. Dark nebulae will always therefore be displayed (if selected), regardless of the current setting of the "magnitude filter". Other objects such as faint galaxies simply have no magnitude information stored in the database; these objects will be filtered out by *any* setting of the magnitude filter, ie they will only be displayed if the magnitude selection option is set to "All objects".

3. This dialog allows the selection of deep sky objects. In order to actually display the selected objects on the map, they must be made visible using either the "Deep Sky Objects" toolbar button, or by selecting the appropriate option in the object visibility dialog on the **View** menu.

Track Object Dialog

This dialog specifies the way in which an object track will be calculated and displayed.

The top portion of the dialog determines the frequency and number of position calculations, and the interval at which positions should be labelled. The "labelled" positions will be marked with a cross, and may optionally also display the date and (except in the case of planets) magnitude of the object.

The other portions of the dialog determine what information will be displayed at each labelled point, and also whether the labels will be drawn horizontally (for objects moving N-S) or vertically (for objects moving E-W).

Notes:

1. Object tracks are drawn as a sequence of line segments joining up the calculated positions. Reducing the interval at which positions are calculated will result in a smoother track, obviously at the expense of increased calculation time. For example, specifying:
Calculate position every 5 days
Calculate 20 positions
Labelling interval: 2 positions
and:
Calculate position every 1 days
Calculate 100 positions
Labelling interval: 10 positions
will both produce the same track showing the object's motion for 100 days, with labels every 10 days, but the second of these tracks will contain 5 times as many points, and will take 5 times longer to calculate. Increasing the number of positions calculated to obtain a smoother track can be useful, especially in the case of objects near the stationary points of retrograde loops.
2. If you simply want a line drawn with *no* labelled points, enter a labelling interval of 0 (zero).
3. The first position on the track will be calculated for the date and time currently selected for the map. Each subsequent position will add to this date and time the appropriate calculation interval. If, as is normally the case, the calculation interval is a whole number of days, you may wish to set the map time to midnight (0h) before calculating the track.

Planet Options Dialog

This dialog sets the options for display of planets. The items available are:

Label with

Selects whether planets are labelled with names, or astronomical symbols.

Draw dark limb of Moon

If this option is switched off, the Moon is drawn as it appears in the sky. If the option is switched on, the dark (unilluminated) limb of the Moon is drawn with a dotted line. This can be useful for viewing eclipses and lunar occultations.

Map Information Dialog

This dialog displays information about the current map. The information displayed is as follows:

Local Time

The local time and date.

UTC

The UTC (Greenwich mean time) corresponding to the local time.

TDT-UT

The current value of "delta T" - the difference between terrestrial dynamical time and UT (GMT), in seconds.

Julian Day

The Julian day number corresponding to the UTC.

Sidereal Time

The local apparent sidereal time.

Latitude and Longitude

The location of the observer.

Registration Benefits Dialog

This dialog displays the length of time that the unregistered version of the program has been in use for, and explains the benefits of registering the program.

Automatic Map Update Dialog

This dialog allows the user to control the rate at which map time automatically advances when time skip mode is switched on. The items available on the dialog are:

Every

The interval of "real time" after which the map is updated.

Advance map time by

The amount by which the map time is changed at every update.

Direction

Allows you to specify whether the map time is moved forwards or backwards at every update.

Asteroid Selection Options Dialog

SkyMap maintains a catalogue of asteroids in the data file `ASTEROID.SKY`. The catalog can contain a large number of asteroids, but you will normally only want to display a small number of these at any one time. This dialog allows you to select which asteroids from the catalogue are "active" - ie, will have their position calculated - and also provides facilities for maintaining the asteroid catalogue.

Most of the dialog is occupied by two listboxes:

Known Asteroids

This is the list of all the asteroids in the catalogue.

Active Asteroids

This is the list of asteroids whose positions will be calculated by SkyMap for the current map.

Selecting Asteroids for Display

To add an asteroid to the **Active** list, highlight its name in the **Known** list, and click the **Add>>** button. The name of the asteroid will appear in the **Active** list. As a shortcut, simply double click the name of the asteroid in the **Known** list.

To remove an asteroid from the **Active** list, highlight its name in the list, and click the **<<Remove** button. The name of the asteroid will disappear from the **Active** list. As a shortcut, simply double click the name of the asteroid in the **Active** list.

Maintaining the Asteroid Catalogue

The buttons in the **Catalogue** section of the dialog allow the user to maintain the catalogue. The available options are:

Add...

Add a new asteroid to the catalogue. When this button is pressed, the [Asteroid Orbit Dialog](#) is displayed, allowing the user to enter information about the orbit of the new asteroid.

Edit...

Edit the orbit of the asteroid whose name is currently highlighted in the **Known** asteroids list. When this button is pressed, the [Asteroid Orbit Dialog](#) dialog is displayed.

Delete

Delete from the catalogue the asteroid whose name is currently highlighted in the **Known** asteroids list. You will be asked for confirmation before the asteroid is deleted.

Setting a Magnitude Limit

The radio buttons in the **Magnitude selection** group allow asteroids to be selected by magnitude. This can be very useful, to prevent a fruitless search for a 17th magnitude asteroid with a pair of 10x50 binoculars, for example! The options available are:

All objects

Display on the map the positions of all the asteroids on the **Active** list.

Brighter than mag <n>

Only display on the map the positions of those asteroids from the **Active** list brighter than

the indicated magnitude.

Asteroid Orbit Dialog

This dialog allows information about an asteroid to be entered or edited. Information contained in the dialog is described below. The orbital elements should all be referred to epoch J2000.0.

Name:

The name of the asteroid. Up to 31 characters can be entered.

Image:

The name of a file containing a picture of the asteroid. Only a file name should be entered here - the file is assumed to be located in the image file directory specified in the Global Preferences Dialog.

T:

The reference date of the mean anomaly - ie the date at which the asteroid has the mean anomaly specified by **M**.. The time scale used for this is Terrestrial Dynamical Time (TDT).

M:

The mean anomaly of the asteroid at the reference date **T**, in degrees.

a:

The semi-major axis of the orbit, in astronomical units (AU).

e:

The eccentricity of the orbit. An eccentricity of 0.0 means that the orbit is circular, whilst a value of 1.0 indicates a parabola. All asteroids have an orbital eccentricity less than 1.

ω :

The argument of perihelion, in degrees.

Ω :

The longitude of the ascending node of the orbit, in degrees.

i:

The inclination of the orbit, in degrees.

Magnitude Parameters:

These numbers (H and G) are used to calculate the magnitude of the asteroid given its distance from the Earth and Sun.

Daily Phenomena (Tools Menu)

Displays the local times at which the Sun, Moon and planets rise, transit the local meridian and set for the current observation date.

Notes:

1. For each object, the dialog displays the time, on the date of observation, at which the object is on the local meridian, ie is due south (in the northern hemisphere) or due north (in the southern hemisphere). The time of rising is always before this, and the time of setting is always after it. A "-" following a rise time indicates that the time is actually in the previous day, whilst a "+" following a set time indicates that the time is in the next day.
2. If the object is either circumpolar (never sets), or never rises as seen from the observer's position, only a transit time is shown.

Planet Visibility (Tools Menu)

Displays a diagram showing the approximate altitude and azimuth of all visible planets, together with the Sun and Moon. This is just a quick way of seeing what is currently visible.

Window Title (Options/Setup/Window Title)

This dialog allows the title of the map window to be set or edited. This can be especially useful when saving a map to a file, as a means of giving the map a descriptive name.

Eyepieces Dialog

Displays a list of eyepieces and telescopes, showing the magnification and field of view resulting from using any eyepiece with any telescope.

This dialog can be invoked in two ways:

1. Using the **Tools/Eyepiece Database** menu item from either the Horizon Map or the Area Map. This method of invoking the dialog just allows the data to be viewed and edited.
2. By pressing the right mouse button on an Area Map and selecting **Eyepiece...** from the pop-up menu. As well as allowing the data to be viewed and modified, this method of invoking the dialog allows a "field of view" circle for the current telescope/eyepiece combination to be displayed on the map, centred on the point at which the mouse button was clicked.

Modifying the Data

Most of the space in the dialog is occupied by a list of eyepieces on the left, and a list of telescopes on the right. Each list has three buttons below it:

Add

Add a new entry to the list. Pressing this button displays a dialog allowing details of the new eyepiece or new telescope to be added to the list.

Edit

Edits the currently selected item in the list. Pressing this button displays a dialog displaying the data for the currently selected eyepiece or telescope, and allowing the information to be edited.

Delete

Deletes the currently selected item from the list. Confirmation will be requested before the item is selected.

Current Selection

This section of the dialog displays the magnification and true field of view that would result from the combination of the selected eyepiece and the selected telescope.

Draw on Map

Pressing this button dismisses the dialog, displaying a circle representing the field of view of the current telescope/eyepiece combination on the map. To dismiss the dialog without drawing a field of view circle, press the **Cancel** button.

Notes:

To remove the field of view circles and object tracks from the map, select the **View/Clean Up Map** menu item.

Eyepiece Details Dialog

Displays the data for an eyepiece, allowing information to be entered and edited.

Description

The name of the eyepiece, up to a maximum of 31 characters.

Focal Length

The focal length of the eyepiece, in mm.

Apparent Field

The apparent field of view of eyepiece, in degrees. The true field visible through the eyepiece will be this apparent field, divided by the magnification.

Telescope Details Dialog

Displays the data for a telescope, allowing information to be entered and edited.

Description

The name of the telescope, up to a maximum of 31 characters.

Diameter

The diameter of the primary mirror or objective lens of the telescope, in mm. If the mirror/lens size is quoted in inches, multiply by 25.4 to convert to mm.

Focal Ratio

The focal ratio of the telescope. This will normally be quoted as, for example, "f/10" or "f/6.3".

RA/Dec Grid Options

This dialog controls the way in which the grid of right ascension and declination is drawn on the map.

Grid Drawing

Automatic

The spacing of the grid lines is determined automatically. This will be satisfactory for most maps.

Manual

The spacing of the grid lines is specified manually by the settings elsewhere in this dialog.

Draw Labels

If this box is checked, the grid will be labelled at each intersection of right ascension and declination lines. If the box is left blank, no labels will be drawn.

Manual Grid Parameters

These settings are used if the "manual" setting is selected in the top portion of the dialog.

RA Line Spacing/draw every

The separation of lines of right ascension, in minutes of time, and the frequency at which points on the line are calculated, in degrees of declination.

Dec Line Spacing/draw every

The separation of lines of declination, in degrees, and the frequency at which points on the line are calculated, in minutes of right ascension.

Notes:

Each grid line consists of a series of points connected by straight lines. The point frequency (ie the "draw every <x> degrees/minutes" number) controls the "smoothness" of each grid line. Reducing this number will make the curve of a grid line "smoother", but obviously at the expense of increased calculation time, especially on a slow computer.

Bitmap Dimensions Dialog

This dialog specifies the size of the bitmap to be created, in pixels.

SkyMap v2.2 Help Index

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Using the Help System Effectively

This help system contains the complete documentation for SkyMap. The contents page contains items of general interest, which can be reached from any point in the system by pressing the **Contents** button.

Unlike a printed manual, this help system is *not* designed to be read in isolation. It is very much an *interactive* system, and is intended to be used in conjunction with the SkyMap program itself. Several ways of accessing help information are described below:

Help on using a map

To display help information about using a particular type of map, press the **F1** key whilst the map is displayed. A page of general information will be displayed, together with a list of related topics which may be of interest.

Help for a menu item or tool bar button

As you move the mouse pointer over a menu item or tool bar button, a brief description of the item will appear on the status bar at the bottom of the screen. To obtain a more extensive description of the item, press the context sensitive help button (or the keyboard equivalent, which is `SHIFT+F1`):



The mouse pointer will change to an arrow and question mark. Now, simply click the mouse over any menu item or button and a help screen will be displayed describing the use of that command or button.

Help for a dialog box

To display a help screen for a dialog box, press the **F1** key whilst the dialog box is on the screen.

ASP Ombudsman Statement

This program is produced by a member of the Association of Shareware Professionals (ASP). ASP wants to make sure that the shareware principle works for you. If you are unable to resolve a shareware-related problem with an ASP member by contacting the member directly, ASP may be able to help. The ASP Ombudsman can help you resolve a dispute or problem with an ASP member, but does not provide technical support for members' products. Please write to the ASP Ombudsman at 545 Grover Road, Muskegon, MI 49442 or send a CompuServe message via CompuServe Mail to ASP Ombudsman 70007,3536.

What is Shareware?

Shareware distribution gives users a chance to try software before buying it. If you try a shareware program and continue using it, you are expected to register. Individual programs differ on details -- some request registration while others require it, some specify a maximum trial period. With registration, you get anything from the simple right to continue using the software to an updated program with printed manual.

Copyright laws apply to both Shareware and commercial software, and the copyright holder retains all rights, with a few specific exceptions as stated below. Shareware authors are accomplished programmers, just like commercial authors, and the programs are of comparable quality. (In both cases, there are good programs and bad ones!) The main difference is in the method of distribution. The author specifically grants the right to copy and distribute the software, either to all and sundry or to a specific group. For example, some authors require written permission before a commercial disk vendor may copy their Shareware.

Shareware is a distribution method, not a type of software. You should find software that suits your needs and wallet, whether it's commercial or Shareware. The Shareware system makes fitting your needs easier, because you can try before you buy. And because the overhead is low, prices are low also. Shareware has the ultimate money-back guarantee -- if you don't use the product, you don't pay for it!

Contacting the Author

If you have any suggestions about ways in which SkyMap could be improved (and I'm sure there are many!), or you have any questions you'd like answered, feel free to contact the author by any of the following methods:

Electronic mail

I can be contacted at either of the following addresses:

CompuServe: 100113,1140
Internet: chris@chrism.demon.co.uk

Post

You can send me a letter at the following address:

Chris Marriott
9, Severn Road
Culcheth
Cheshire WA3 5ED
UK

Support in the USA and Canada

SkyMap is exclusively distributed in the United States and Canada by:

JASC, Inc.
10901 Red Circle Drive, Suite 340
Minnetonka, MN 55343
USA

If you have any questions about the software, you may contact JASC at this address or by phone, fax or e-mail at:

Phone: 612-930-9171
FAX: 612-930-9172
Orderline 800-622 2793
CompuServe: 76226,2652
Internet: 76226.2652@compuserve.com
JASC BBS: 612-930-3516

What's New in SkyMap v2.2?

This list provides a quick summary of the new features in SkyMap v2.2, for those people familiar with the previous version of the program:

- SkyMap can now draw maps using the 19 million object Hubble Guide Star Catalog, version 1.1, published as a set of two CD-ROMs by the Space Telescope Science Institute. This database covers the whole sky to below magnitude 14, so displays all stars visible in typical amateur telescopes. This facility is not available in the evaluation version of the program, but only in the SkyMap/GSC version, available as a registration option. Please refer to the registration forms for more details.
- A grid of right ascension and declination lines can now be displayed on a Horizon Map.
- The N,E,S,W buttons on the Horizon Map toolbar now remain "pressed in" when the map is drawn for those directions. This makes it easy to see at a glance which (if any) cardinal direction the map is facing.
- Two new buttons on the toolbar (and equivalent keyboard shortcuts) provide an easy way of increasing and decreasing the limiting magnitude of the stars visible on the map.
- A new auto magnitude scale option allows the program to automatically assign sizes to star image circles, rather than having to set them up manually.
- A new status bar panel displays the current limiting magnitude of the stars visible on the map.
- Clicking the left mouse button over two points on a map displays their angular separation in a new panel on the status bar.
- New user-editable data files of telescope and eyepiece data have been added. These allow you to quickly see the magnification and field of view resulting from any combination of eyepiece and telescope. On an Area Map the resulting field of view can be displayed as a circle on the map.
- A new option on the Area Map popup menu allows Telrad® finder circles to be displayed. The Telrad finder is a very popular device, and this is a much requested feature.
- Added "Tool Tips" to the toolbar. These are short help messages which pop up after the mouse has been over a button for a brief period, describing the function of that button. This feature can be disabled using a new option on the global preferences dialog.
- An Area Map can now be drawn from a Horizon Map by dragging a selection rectangle with the left mouse button. This is a much more convenient method than the previous one of pressing the right button over a point on the map because it allows the map size, as well as the centre, to be selected visually.
- A new Area Map can now be drawn from an existing one by dragging a selection rectangle with the left mouse button. It was not previously possible to draw a new Area Map from an existing one.
- On the Area Map, the tracks of an arbitrary number of moving objects can now be displayed simultaneously. Previously, only a single object track could be displayed.
- Maps can now be saved as a Windows bitmap image file (.BMP). This is a much-requested feature for saving a permanent record of a map. It's also a great way of creating Desktop "Wallpaper" files!

- A new View/Copy menu item copies the map to the Windows clipboard, for pasting into other applications.
- The line of the ecliptic can be displayed on both Horizon and Area maps.
- A limiting magnitude can now be specified for the display of comets and asteroids. This is useful to prevent, for example, the display of 17th magnitude comets if you only have a pair of 10x50 binoculars!
- If a date more than 50 years from the 2000AD "epoch" is selected, the program will automatically switch to high-precision calculation mode, to prevent the display of incorrect maps which don't take account of precession.
- Times of rise, set and transit can now be displayed for all objects.

Introduction

SkyMap is a "Planetarium" program for Microsoft Windows version 3.1 or later. It will display a map of the sky as seen from any point on Earth for any date between 4000BC and 8000AD. Two different types of map can be drawn - a "Horizon" map showing the observer's local horizon, and a "Sky Area" map showing a detailed view of a small area of the sky. You can get information about any object displayed on the map by simply pointing at the object with the mouse and clicking the button. The display of additional information, such as constellation figures or star labels can be switched on and off with a click of the mouse button, making it easy to see exactly what you want without being overwhelmed by unwanted information. When you have the map just as you want it, you can print it on any printer supported by Windows, in either black and white or colour.

SkyMap can also display photographic images, supplied in the form of GIF or Windows bitmap files. Thousands of such images are freely available on bulletin boards and commercial information systems such as CompuServe. This allows you to build up your own personal library of astronomical photographs which, coupled with the map displays, really helps to bring the sky to life!

There are a number of planetarium programs available today. Unlike some of these, SkyMap makes no claims of blinding calculation speeds. Instead, what SkyMap concentrates on is *accuracy*. When writing SkyMap I've used the most accurate methods available to me for all the calculations. This accuracy makes SkyMap equally suited for both the novice astronomer who just wants to know "what's that bright object up there?" and the serious amateur or professional astronomer who wants a detailed "finder chart" for a faint galaxy.

SkyMap carries out its calculations in as efficient a manner as possible, but it *never* compromises accuracy for the sake of speed. An increase in speed can always be achieved by using a faster computer! Having said all that, the speed is still reasonable; on the author's 33MHz 486-based PC for example, the horizon map, with default settings, is computed and drawn in about 5 seconds.

Whilst developing SkyMap I've received the help and encouragement of a number of people. I'd especially like to thank David Webber for many useful suggestions and help with the mathematical problems I encountered, and Steve Moshier for generously consenting to allow me to use many of his coding ideas for various astronomical calculations. I'd also like to thank the Saguaro Astronomy Club for giving me permission to use their excellent deep sky object database in this program. Finally, I'd like to thank Jean Meeus for writing the book "Astronomical Algorithms" (Willman-Bell, 1991), without which this program could never have existed.

Chris Marriott
January 1995

Data Sources and Precision

The sources of the data used by SkyMap are as follows:

[Stars](#)

[Planets and Sun](#)

[Moon](#)

[Deep Sky Objects](#)

[Time Corrections](#)

Stars

Smithsonian Astrophysical Observatory (SAO) star catalog, (SAO Staff, 1966), 1990 machine readable version, as supplied on NASA's National Space Science Data Center's "Selected Astronomical Catalogs, Volume 1" CD-ROM.

The SAO star catalog is a catalog of 258,997 stars to epoch J2000.0, and is reasonably complete down to magnitude 9.5 or so. The star database supplied with the shareware version of SkyMap contains all the stars from the SAO catalog down to magnitude 7 - a total of 15,925 stars. Larger databases, up to and including the full SAO catalog, are supplied to registered users of SkyMap - refer to the separate registration form for details.

SkyMap rigorously reduces star positions from mean to apparent place. The following corrections are applied:

- Precession
- Proper Motion
- Nutation
- Aberration

In the case of the Horizon Map, the apparent place is used to compute the local altitude and azimuth of the star, and the altitude is then corrected for the effects of refraction.

Planets and Sun

The positions of the Sun, and the planets Mercury to Neptune are computed using a subset of Bretagnon and Francou's VSOP87 planetary theory, as described in the book "Astronomical Algorithms", by Jean Meeus (Willman-Bell, 1991).

Spot checks against recent editions of the "Astronomical Almanac" indicate that the mean error in the computed positions of the planets is under half a second of arc, with peak errors of about one arc second. For comparison, the apparent diameter of the planet Neptune is about 2", whilst that of Jupiter is typically 35".

Positions of Pluto are calculated using an accurate expression for the planet's motion valid for the years 1885 - 2099 (E.Goffin, J.Meeus, and C.Steyaert, "An Accurate Representation of the Motion of Pluto", *Astronomy and Astrophysics*, Vol 155, pages 323-325 (1986)). This should result in errors of less than 1" for the indicated period.

Moon

The position of the moon is computed from the ELP 2000-85 lunar theory (Chapront-Touzé and Chapront, 1988), which in turn is fitted to the DE200/LE200 numerical integration of the Jet Propulsion Laboratory (Standish, 1981).

Spot checks against the "Astronomical Almanac" again indicate that the mean error in the computed position of the Moon is about half an arc second, with peak errors around one arc second.

Deep Sky Objects

The deep sky object database used by SkyMap is based on version 6 of the Saguaro Astronomy Club's deep sky database, and is used with their generous permission. The database contains approximately 10,600 objects of all types.

See also:

[Deep Sky Object Catalogs](#)

[Dreyer Object Descriptions](#)

Time Corrections

Because of the irregularities in the Earth's rotation, the theories of motion of astronomical bodies do not use Universal Time (GMT), but a uniform timescale called Terrestrial Dynamical Time (TDT). SkyMap uses TDT internally for all its calculation of planetary positions, etc, but obviously the user specifies the time for which a map is required in UTC (or rather, in local time, which is converted to UTC).

The difference between TDT and UT is called "delta T", and currently has a value of approximately 1 minute. It is currently increasing at a rate of somewhat less than 1 second per year. The problem is that the value of delta T can only be determined historically (typically by analyzing the motion of the Moon), and current and future values can only be estimated, whilst values for the distant past (before the advent of modern astronomy) are uncertain to the order of many minutes.

What this means in practice is that although the time of a total solar eclipse in the year 1500BC could be computed to a precision of a fraction of a second in TDT, the actual time in UT that the eclipse occurs (hence the places on Earth from which it is visible) will be uncertain to within several minutes.

The "Astronomical Almanac" lists the values of delta T for every year from 1620 onwards (currently up to 1993), and provides estimates of its value for the current time. SkyMap has all this data stored, and interpolates or extrapolates in this table to find values of delta T for dates between 1620 and 2000.

For dates beyond the year 2000, an estimate of delta T is made using the method of L V Morrison and F R Stephenson, "Sun and Planetary System" vol 96,73 eds. W Fricke, G Teleki, Reidel, Dordrecht (1982).

For dates prior to 1620, an estimate is made using the method of F R Stephenson and M A Houlden, "Atlas of Historical Eclipse Maps", Cambridge University Press (1986). They estimate the uncertainty to be 15 minutes at 1500BC.

Dedication

Respectfully dedicated to the memory of:

*Francis R Scobee
Michael J Smith
Ellison S Onizuka
Judith A Resnick
Ronald E McNair
Gregory Jarvis
S Christa McAuliffe*

*the crew of Challenger flight STS 51-L, 28th January 1986
and to all who have lived - and died - for The Dream.*

*"Oh, I have slipped the surly bonds of earth,
And danced the skies on laughter-silvered wings;
Sunward I've climbed and joined the tumbling mirth
Of sun-split clouds -- and done a hundred things
You have not dreamed of -- wheeled and soared and swung
High in the sunlit silence. Hov'ring there,
I've chased the shouting wind along and flung
My eager craft through footless halls of air.
Up, up the long, delirious, burning blue
I've topped the wind-swept heights with easy grace,
Where never lark, or even eagle, flew;
And, while with silent, lifting mind I've trod
The high, untrampled sanctity of space,
Put out my hand, and touched the face of God."*

"High Flight" John G Magee Jr

Deep Sky Object Catalogs

The deep sky object database contains objects from more than 80 different catalogs. Some of these are general catalogs, such as the Messier catalog, whilst others are specific to objects of a particular type, such as the Barnard catalog of dark nebulae.

Each catalog used in the database has a unique prefix, which must be entered accurately in order to search for objects. These are as follows:

ADS Aitken Double Star catalog
AM Arp-Madore (globular clusters)
Antalova Antlova (open clusters)
Ap Apriamasvili (planetary nebulae)
Arp Halton Arp (interacting galaxies)
Bark Barkhatova (open clusters)
B Barnard (dark nebulae)
Basel Basel (open clusters)
BD Bonner Durchmusterung (stars)
Berk Berkeley (open clusters)
Be Bernes (dark nebulae)
Biur Biurakan (open clusters)
Blanco Blanco (open clusters)
Bochum Bochum (open clusters)
Ced Cederblad (bright nebulae)
Cr Collinder (open clusters)
Czernik Czernik (open clusters)
DDO David Dunlap Observatory (dwarf galaxies)
Do Dolidze (open clusters)
DoDz Dolidze-Dzimselejsvili (open clusters)
Dun Dunlop (globular clusters)
Fein Feinstein (open clusters)
Frolov Frolov (open clusters)
Gum Gum (bright nebulae)
H William Herschel
Haffner Haffner (open clusters)
Harvard Harvard (open clusters)
He Henize (planetary nebulae)
Hogg Hogg (open clusters)
HP Haute Provence (globular clusters)
Hu Humason (planetary nebulae)
IC 1st and 2nd Index Catalogs to the NGC
Isk Iskudarian (open clusters)
J Jonckheere (planetary nebulae)
K Kohoutek (planetary nebulae)
King King (open clusters)
Kr Krasnogorskaja (planetary nebulae)
Lac Lacaille (globular clusters)
Loden Loden (open clusters)
LDN Lynds (dark nebulae)
LyngaLynga (open clusters)
M Messier
MCG Morphological Catalog of Galaxies
Me Merrill (planetary nebulae)

Mrk Markarian (open clusters and galaxies)
Mel Melotte (open clusters)
M1 Minkowski (planetary nebulae)
M2 Minkowski (planetary nebulae)
M3 Minkowski (planetary nebulae)
M4 Minkowski (planetary nebulae)
NGC New General Catalog of Nebulae & Clusters.
Pal Palomar (globular clusters)
PC Peimbert and Costero (planetary nebulae)
Pismis Pismis (open clusters)
PK Perek & Kohoutek (planetary nebulae)
RCW Rodgers, Campbell, & Whiteoak (bright nebulae)
Roslund Roslund (open clusters)
Ru Ruprecht (open clusters)
Sa Sandqvist (dark nebulae)
Sher Sher (open clusters)
Sh Sharpless (bright nebulae)
SL Sandqvist & Lindroos (dark nebulae),
Shapley & Lindsay (clusters in LMC)
Steph Stephenson (open clusters)
Stock Stock (open clusters)
Ter Terzan (globular clusters)
Tombaugh Tombaugh (open clusters)
Ton Tonantzintla (globular clusters)
Tr Trumpler (open clusters)
UA Catalog of selected Non-UGC galaxies
UGC Uppsala General Catalog (galaxies)
UKS United Kingdom Schmidt (globular clusters)
Upgren Upgren (open clusters)
VV Vorontsov-Velyaminov (interacting galaxies)
vdB van den Bergh (open clusters, bright nebulae)
vdBH van den Bergh & Herbst (bright nebulae)
vdB-Ha van den Bergh-Hagen (open clusters)
Vy Vyssotsky (planetary nebulae)
Waterloo Waterloo (open clusters)
Westr Westerlund (open clusters)
Zw Zwicky (galaxies)

Dreyer Object Descriptions

The majority of objects in the deep sky database include the visual descriptions used by Johann Dreyer in his "New General Catalogue", published in 1888. These descriptions are remarkable for their information content, but can be somewhat daunting at first. For example, the Dreyer description of the globular cluster M3 in Canes Venatici is as follows:

GCL,EB,VL,VSMBM,*11

This can be translated as "Globular cluster, extremely bright, very large, very suddenly much brighter towards the middle, composed of 11th magnitude stars" - a pretty good description in only 19 characters!

Similarly the galaxy NGC 2863 in Hydra is described as:

CF,S,E,BET2*12,16

which means "considerably faint, small, elongated, between two stars of magnitude 12 and 16".

The description normally starts with a description of the object's brightness and size. Dreyer adopted the scale used for this from Sir John Herschel, and the order used may be confusing to modern observers; for example, is "considerably faint" brighter or fainter than merely "faint"? The other possible source of confusion is that 19th century astronomers often called a faint star "small" and a bright star "large", so one always has to be careful to judge whether a description such as "pretty small" refers to size or brightness!

The scale used is as follows:

Brightness		Size	
EF	Excessively faint	ES	Excessively small
VF	Very faint	VS	Very small
F	Faint	S	Small
CF	Considerably faint	CS	Considerably small
PF	Pretty faint	PS	Pretty small
PB	Pretty bright	PL	Pretty large
CB	Considerably bright	CL	Considerably large
B	Bright	L	Large
VB	Very bright	VL	Very large
EB	Extremely bright	EL	Excessively large

Next normally comes a description of object's general shape. This lies on a scale ranging from "round" to "extremely extended", as follows:

Code Shape

R	Round
VLE	Very little extended
E	Elliptic or oval
CE	Considerably extended
PME	Pretty much extended
ME	Much extended
VME	Very much extended
EE	Extremely extended

By far the most cryptic part of the description, at first glance, is the group of letters giving what Sir John Herschel described as "the degree and rate of condensation". A simple example is "GBM", meaning "gradually brighter towards the middle". Looking, though, at NGC 4725, a galaxy in Coma Berenices, we find the dreadful looking "VSVMBMEBN"! Even this mouthful, though, is fairly easily translated as "very suddenly very much brighter in the middle, with an extremely bright nucleus".

When the descriptions give directions on the sky, the terms "preceding" and "following" are used for west and east respectively. To see what is meant by this, picture the way an object drifts across the field of view of a telescope if the drive is switched off. Use of these terms is much more natural at the telescope eyepiece than the very confusing west and east, given the way that optical systems invert and/or reflect the field of view.

Quite often the notes speak of groups. The "1st of 4" is the first member of a group of four nebulae to drift across the field of view ie, the most western one, preceding all the others. All members of a group will have very nearly the same declination.

The complete list of abbreviations used in the Dreyer description of an object appears below:

Code	Meaning
AB	about
ALM	almost
AM	among
APP	appended
ATT	attached
B	bright
B	brighter (always coupled with another letter)
BET	between
BF	brighter toward following side
BIN	binuclear
BN	bright toward north side
BP	brighter toward preceding side
BS	brighter toward south side
C	compressed
C	considerably
CH	chevelure
CL	cluster
CO	coarse, coarsely

COM	cometic
CONT	in contact
D	double
D	diameter
DEF	defined
DIF	diffused
DIFFIC	difficult
DIST	distance
E	extended
E	extremely, excessively
EE	most extremely
ER	easily resolvable
EXC	excentric
F	faint
F	following
G	gradually
GCL	globular cluster of stars
GR	group
I	irregular
IF	irregular figure
INV	involved, involving
L	large
L	little (adv.), long (adj.)
M	middle or in the middle
M	much
MM	mixed magnitudes
MN	milky nebulosity
N	nucleus or to a nucleus
N	north
NEB	nebula
NF	north following
NP	north preceding
NR	near
P	poor
P	preceding
P	pretty (before F, B, L, S) (size and brightness blocks)
PG	pretty gradually
PLN	planetary nebula
PM	pretty much
PS	pretty suddenly
QUAD	quadrilateral
QUAR	quartile
R	round
R	resolvable
RI	rich

RR	exactly round
RR	partially resolved, some stars seen
RRR	well, resolved, clearly consisting of stars
S	small
S	suddenly
S	south
SC	scattered
SEV	several
SF	south following
SH	shaped
SM	smaller
SP	south preceding
ST	stars
ST9	stars from the 9th magnitude downward
ST9...13	stars from 9th to 13th magnitude
STELL	stellar
SUSP	suspected
TRAP	trapezium
TRI	triangle, forms a triangle with
TRIN	trinuclear
V	very
VAR	variable
VV	very very, an intensive of V
*	a star (or stars)
*10	a star of 10th magnitude
**	double star
***	triple star
()	items questioned by Dreyer enclosed in parentheses
"	arc seconds (two "not-equals" in published catalog)
'	arc minutes (one "not-equals" in published catalog)

Measuring Angular Separation

It can be difficult to relate the distance between two objects shown on a map with their actual separation in the sky. To help with this, SkyMap provides an easy method of quickly finding the angular separation between any two objects. Just click the left mouse button over the two points, and a panel on the Status Bar displays their separation in degrees and minutes of arc.

Notes:

1. Make sure that you don't move the mouse between pressing the button and releasing it, or SkyMap will think you are dragging a selection rectangle for a new map!
2. This method can be extended to measure the distances between a whole set of points; simply click on each point in turn, and the Status Bar panel will display the separation of the last two points clicked on.

Registered Versions of SkyMap

You may purchase two different versions of SkyMap:

Registered Version

The registered version of SkyMap provides the following enhancements over the shareware version:

- A much larger database of 88,000 stars to magnitude 8.5, compared with the 15,000 stars supplied with the shareware version.
- A new deep sky object description database containing classification information, Dreyer object descriptions, and observing notes for all the deep sky objects.
- No "nag screens" when the program starts.
- Removal of the "unregistered version" message on printed output.

SkyMap/GSC

SkyMap/GSC provides all the facilities of the registered version *and* the following extras:

- The complete SAO catalog of 259,000 stars to magnitude 9.5.
- The ability to use the "Hubble Guide Star Catalog, version 1.1" (GSC) CD-ROM database of 19 million stars to below magnitude 14 for the whole sky. Note that the GSC database is *not* supplied with SkyMap/GSC, it is published by the Space Telescope Science Institute and must be purchased separately. SkyMap/GSC contains details of how to purchase it.

For details of the cost of the different versions of SkyMap, and information about how to order, please refer to the separate registration forms contained in the package.

The Area Map

The area map displays a detailed view of a small area of the sky on a grid of right ascension and declination. Its main use is as a "finder chart" for observing a specific part of the sky.

For more information about drawing and using an area map, select one of the topics below:

[Creating and Setting up a Area Map](#)

[Displaying Objects on a Map](#)

[Identifying Objects on a Map](#)

[Measuring Angular Separation](#)

[Displaying the Track of a Moving Object](#)

[Searching for Objects on a Map](#)

[Saving the Map Settings](#)

See also:

[Using the Help System](#)

Creating and Setting Up an Area Map

An area map can be created in one of two ways:

1. Select **New Area Map** from the **File** menu. A dialog will appear allowing you to set the position of the map centre and the field of view. Press **OK** to create the map - a new window will appear and the default map settings will be loaded. The time and date will be read from the computer's clock.
2. Click the *right* mouse button over the point on a horizon map that you wish to appear at the centre of the area map, and select **Area Map...** from the menu which appears. A dialog will appear allowing you to alter the position of the map centre and to set the desired field of view. Press **OK** to create the map. A new area map window will appear and the default map settings will be loaded. The time, date, and observation location details will be copied from the horizon map.

Once the map has been created you may wish to alter the location of the observer, or the date and time for which the map is drawn:

[Setting the Date and Time of Observation](#)

[Setting the Location of the Observer](#)

See also:

[Saving the Map Settings](#)

Displaying Objects on the Area Map

A wide variety of objects can be displayed on an area map. These include:

- Stars
- Planets
- Comets
- Asteroids
- Deep sky objects (galaxies, star clusters, and nebulae)
- Constellation boundaries, figures, and names
- A grid of right ascension and declination lines

The objects which appear on the map are controlled in two ways:

1. The items on the **Options** menu set the display options for each type of object. For example, the **Star Labels...** item controls the way in which stars are labelled; the **Comets...** item allows the user to select which comets will be displayed. To get specific help on these options, select the item and then press **F1**.
2. The **Show...** item on the **View** menu (and the equivalent buttons on the tool bar) allows the user to select *which* items are shown on the map. A huge quantity of information is available, and having it all displayed at once would be very confusing. This menu item provides a rapid way to select exactly the desired items.

Shortcut:



Saving the Area Map Settings

When all the area map options have been set up to your satisfaction they can be saved for use as the default settings for all subsequent area maps. To do this:

1. From the **File** menu select **Save Defaults...**. A dialog box will appear asking for confirmation of the operation.
2. Click on the **Yes** button, or just press **Enter**. The current map settings will then be saved.

Searching for Objects on an Area Map

To search for specific objects on an area map use the items on the **Search** menu.

See also:

[Searching for a Planet](#)

[Searching for a Constellation](#)

[Searching for a Star by Proper Name](#)

[Searching for a Star by Bayer Letter](#)

[Searching for a Star by Flamsteed Number](#)

[Searching for a Star by SAO Number](#)

[Searching for a Deep Sky Object by Popular Name](#)

[Searching for a Deep Sky Object by Catalog Number](#)

[Searching for a Comet](#)

[Searching for an Asteroid](#)

Displaying the Track of a Moving Object

One very useful feature of the Area Map is the ability to display the track of a moving object - ie a planet, comet, or asteroid. A "track" is simply a line showing the path taken by the object over a period of time. Points along the track, equally spaced in time, can be labelled with the date and/or the magnitude of the object. This is a very useful facility for printing a finder chart showing the position of a comet (or other object) over a long period of time.

To display the track of an object, carry out the following steps:

1. Set the time and date to that required for the first position on the track.
2. Draw a map showing the object, if necessary using the items on the **Search** menu to bring it into view.
3. Move the mouse pointer over the object, and click the *right* mouse button. A pop-up menu will be displayed.
4. Select the "Track of <object>..." item from the menu. The Track Object Dialog will be displayed.
5. Click **OK** to calculate and display the object track, or **Cancel** to abort the operation.

Notes:

1. The first position on the track will be calculated for the date and time currently selected for the map. Each subsequent position will add to this date and time the appropriate calculation interval. If, as is normally the case, the calculation interval is a whole number of days, you may wish to set the map time to midnight (0h) before calculating the track.
2. If the map shows moving objects other than the one for which a track is displayed, the positions of these other objects will obviously only be correct for the start of the track.
3. You can zoom in and out and scroll around a map while a track is displayed. The track will be erased if anything is done which causes the map to be recalculated, such as changing the date, the observation location, or the field of view.

Displaying Pictures

One of the most exciting features of SkyMap is its ability to display photographic images. You can build up your own collection of pictures which, together with the maps, can really bring the sky to "life". A picture collection is also a good way to spend a cloudy night - here in England there are a *lot* of cloudy nights...

In order to display pictures, you really need a "SuperVGA" display capable of displaying 256 or more colours at once. You *can* display pictures on a standard 16-colour VGA display, but the results will probably be pretty horrible!

Pictures are displayed using the "SkyImage" application which accompanies SkyMap. For more information, refer to the following topics:

[Picture Formats](#)

[Displaying Pictures Manually](#)

[Displaying Pictures Automatically](#)

[Obtaining Picture Files](#)

Picture Formats

SkyMap can currently display picture files in the following formats:

1. GIF files. GIF is probably the most popular of all image formats currently in use. The format was specifically devised to enable pictures to be easily transferred between different types of computer, and there are literally tens of thousands on pictures in GIF format available. SkyMap will display files in either GIF87a or GIF89a format, and can handle both interlaced and non-interlaced images. GIF files often contain a "comment extension block" - a text description of the picture; SkyImage allows this to be displayed, and copied to the clipboard, so it can be pasted into other programs. The only restriction when using GIF files is that only the first image in a file can currently be displayed. GIF files for the PC normally have an extension of ".GIF".
2. Windows "Bitmap" files. These are "device independent bitmap" files created for use with Microsoft Windows. They normally have an extension of ".BMP" (for uncompressed images) or ".RLE" (for compressed images). Bitmap files are typically much larger than the equivalent GIF file, and are often found on BBSs for use as Windows "wallpaper" files.
3. NASA Planetary Data Systems (PDS) format. This is the file format used by NASA for pictures from spacecraft such as Voyager and Viking. The images normally have a resolution of 800x800 pixels, in 256 grey scales. Due to the large size of the files, CD-ROM is the primary distribution medium for these images. There are three variants of the image format in common use:
 - Uncompressed full-resolution images, which normally have an extension of ".IMG".
 - Compressed full-resolution images, with an extension of ".IMQ".
 - Uncompressed "browse" images. These are uncompressed images containing only 1/16th of the pixels of the full images, and are intended for rapid viewing. They normally have an extension of ".IBG".

Displaying Pictures Manually

Pictures are displayed using the separate "SkyImage" program supplied with the SkyMap package. This can be run in two different ways:

1. From the **Tools** menu, choose the **Image Viewer...** item. This will run the image viewer program, which by default is SkyImage. If you have your own image viewing program you would rather use, enter its name in the Global Preferences Dialog.
2. From the Windows Program Manager, double click on the SkyImage icon (a picture of a camera).

Once SkyImage is running, choose the **Open...** item from the **File** menu. A standard file selector will be displayed, allowing you to select a file from any available drive or directory. Press the **OK** button to display the image.

Displaying Pictures Automatically

SkyMap has the ability to load and display pictures of many types of object automatically. This can be done for all deep sky objects, comets and asteroids, as well as the planets, Moon, and Sun. In order to use this feature of the program, carry out the following steps:

1. Find a nice picture of the required object in any supported image format. You can use the "manual" method described above to look through pictures until you find one you would like to have as a "standard" picture for that particular object.
2. Copy the picture to the image directory specified in the [Global Preferences Dialog](#) , and rename the file to "OBJECT.EXT", where "OBJECT" is the name of the object, and ".EXT" is the "standard" extension for the image format - ".GIF" for GIF files and ".BMP" for bitmap files.

For planets, the name used should be one of the following:

SUN
MOON
MERCURY
VENUS
MARS
JUPITER
SATURN
URANUS
NEPTUNE
PLUTO

For deep sky objects, the name should be formed in the following way: take the primary catalog name of the object and remove all spaces. Next, replace any character which is not a letter or number by an underscore "_" character. If the resulting name is more than 8 characters long, take the *last* 8 characters of it. Finally, add the extension for the type of file.

Eg: "NGC 5664" becomes "NGC5664"; "Sh2-1" becomes "SH2_1"; "PK 342+27.1" becomes "PK342_27_1", which is shortened to its last 8 characters to give "342_27_1".

For a comet, or an asteroid, the file can be called anything you wish, but it must still be in the image file directory. Edit the details of the comet using the [Comet Selection Dialog](#) and enter the file name in the [Comet Orbit Dialog](#). Enter the filename of an asteroid image in the same way, using the [Asteroid Selection Dialog](#).

3. Now, if you draw a map and click the right mouse button over an object for which a picture has been stored, you should find that a **Picture of <object>...** item appears on the resulting pop-up menu. Selecting this item will run the image viewer and display the picture.

Notes:

When you click on a object, SkyMap will first of all look for a file with a ".GIF" extension, and then for a file with a ".BMP" extension. If files with both extensions are present, the GIF file will be displayed.

Obtaining Picture Files

There are many sources from which picture files (particularly GIF images) suitable for use with SkyMap can be obtained. Some of these are:

1. Commercial information services such as CompuServe. An especially good source are the CompuServe "Astronomy" and "Space" forums (type "GO ASTROFORUM" or "GO SPACE" from any prompt), which currently has more than 1000 astronomy and space-related GIF files available.
2. Bulletin board systems, of which there are a vast and ever-changing number. Some of these specialise in astronomy and carry a large number of GIF images.
3. Public domain and shareware software libraries.
4. If you have access to it, perhaps the best source of all are the vast resources of the Internet - a world-wide computer network. Take a look, for example at the machine "explorer.arc.nasa.gov" via anonymous FTP.
5. Finally, if you get really stuck, a collection of GIF images is available as an option for registered users of SkyMap. Refer to the registration form for details.

