

Using 2sky

For Palm OS®, Version 3.0.1

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Introducing 2sky

The first sky existed long before people invented a second sky – made of maps, myths and measurements – to understand it.

2sky draws and labels the best-known features of the second sky. In less time than it takes to read this sentence, 2sky opens with the view as you see it overhead right now. Unlike a paper chart, 2sky computes star and planet positions for your exact location. It zooms in for greater detail than a paper map, or out to see a "fisheye-lens" view of the entire sky down to and even below the horizon. With equal ease, 2sky can go forward or backward in time, and show you the skies over distant countries, serving also as a world clock.

If you're new to astronomy, it will take some time at first to get your bearings. Star-finding is a visual skill, but easy to learn if you start with the brighter objects such as the Moon, Jupiter, Saturn, Venus, and the more prominent constellations such as Orion (in January) and Scorpius (in July). 2sky's search engine makes everything easy to find, and its tap-ID feature quickly expands your knowledge.

Pages 7 - 11 walk you through 2sky's controls and indicators, which, due to the direct action of your stylus, are much simpler than those of a desktop astronomy application of comparable power.

Now you're ready to take your PDA outside and start exploring both skies with confidence. If you're an experienced observer, you'll want to use 2sky's more advanced features such as inverting telescope fields and graffiti shortcuts, which are explained in these instructions.

It took millennia for people to invent the second sky. Now you can navigate the best-known parts of it in seconds...

Installing 2sky

System Requirements

To run 2sky, you will need

- A handheld device running Palm OS 3.0 or higher. Color recommended.
- HotSync Manager 3.0+ (Windows) or 2.0+ (Macintosh). This comes with your Palm hardware.
- 565K to about 10,000K RAM, depending on how many stars you install.

2sky will not run on the Palm Pilot Personal®, last sold in 1996, nor on any Windows or Linux handheld computer.

Download

If you have the CD-ROM, you won't need to decompress anything and can skip this step. Otherwise, download 2sky from www.2sky.org (You can do this immediately after ordering). Your browser should decompress it into a folder called 2sky30 (you may have to search for it on your desktop or hard drive). These instructions are available in PDF format from the download page.

Install

Inside the **2sky30** folder (or **Basic** folder in the Total Download / CD-ROM) you will see a bunch of files with Palm icons or names ending in .prc or .pdb. You may also see a file called .DS Store, a Windows artifact that you can safely ignore.

To install the Palm files, try double-clicking one of them. If nothing happens, or you get a dialog asking you to choose an application, you'll need to open Hotsync Install from your OpenPalm™ Desktop application, then drag the files into it. Be sure to install to your handheld and *not* to expansion media such as an SD card or Memory Stick.

At minimum, 2sky requires these four files to run:

File	Size, KB	Description
2sky.prc	165	The 2sky application
2skyPlacesDB.pdb	10	World cities and observatories
2skyDB.pdb	351	Stars, galaxies, nebulae
MathLib.prc	50	A shared math library

Once you have installed these files and hotsynced, you can install optional extra databases such as:

Ngcl2DB.pdb (13,000 additional galaxies, clusters and nebulae),
2skyCometsDB
2skyAsteroidsDB
Items from the **Extras** directory, if present (see p. 19).

If you are installing to a Tungsten T5, be sure the install dialog is set to install to main memory, not extended memory. The T5 installer gives a fake alert that the larger files (mag9 and mag11, if available) didn't install. You can verify they did install by opening 2sky and zooming in to 2 degrees. If the smallest stars say "field star" when you tap them, your large database is installed.

If you are installing to a Tungsten T3, you must also install the two patch files (*AppSlipRotate* and *StatusBarLib*) in the **REQUIRED for T3** folder, which fix a bug in your hardware. Do not install them to any other device because they will definitely crash it!

For further tips on installing files, see your handheld's documentation and the Troubleshooting section near the end of these instructions.

Uninstall

To remove the files from your Palm handheld computer, tap the home button  that's built into your hardware, then tap the text at the top left of the display to bring down the menu. Select **delete...** and choose 2sky, then tap the Delete button at the bottom of the display. This will delete all 2sky files. If 2skyMag9DB is installed, you will need to delete it, too.

Setup

In Launcher, look for 2sky's icon (you may have to choose the "All" category in the upper right corner of Launcher to see 2sky).



Tap the 2sky icon. If anything essential is missing, 2sky will let you know.

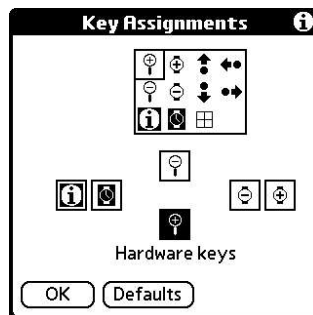
You will see three setup screens. The first screen is the License Agreement, which you can view again from the **Info/About 2sky** menu

The second screen presents a list of Observing Sites. Pick the closest one in your time zone, scrolling the list with hardware keys or **Graffiti** to indicate the first letter of each country. Tap the **i** button in the title bar for more tips.



If you're far (more than 300 miles or 500 kilometers) from the nearest listed site in your time zone, you should add a new location to the list (see *Observing Sites*, page 9).

The third screen shows 2sky's **Key Assignments**. 2sky reprograms your device's hardware keys for rapid navigation. See page 14 for details about hardware key assignments.



Tap OK to start 2sky.

Register

Earlier versions of 2sky used an Unlock Code. If 2sky asks you for an Unlock Code, please visit <http://2sky.org> to register and get the latest version.

2sky is no longer copy-protected. It doesn't nag you or suddenly stop working, and there are no codes you have to enter to get it to work better or longer. But it isn't freeware. We offer it for download only to paid customers, who also get free upgrades until the next whole-numbered version (such as 4.0) and prompt technical support.

Please share 2sky with friends and family – and encourage them to register!

Help

2sky's **Info/ Help** menu has a detailed description of the controls, as well as shortcuts and a glossary. To open the menu, use your hardware's menu key, or the menu icon in the **Sky Navigator** (next page).



Some dialog labels include a circled **i** icon. When you see it, tap it to get background information and helpful hints.



The troubleshooting guide at the end of these instructions includes answers to most technical support questions we've seen since we released 2sky. For the very latest tips, please visit 2sky.org/faq.html.

2sky Basics

Want to begin exploring immediately? This section will get you started, showing you step-by-step how 2sky's features work together. Be sure 2sky is installed in your device and that you have set up your location (page 5) before you begin this section.

Moving the View

2sky draws the view as you see it looking outward into the sky. Every view is like a camera that you can aim by dragging the stylus slowly around the display.

Dragging left pulls off-screen stars into view from the right, so it's just like looking right. To look higher in the sky, drag the display down. 2sky won't let you flip over backwards to get from North to South; use a side-side motion instead. This is natural: we rarely if ever lean over backwards to view the stars upside-down!

Don't use short, quick strokes to try to move the sky. If you tap it too quickly, 2sky will try to **identify** a star. If there's no star close to where you tapped, it displays the **Sky Navigator** instead. To move the display, you'll need to hold down and slightly move the stylus until the stars begin to move, then drag it around the screen. On very old hardware, this may take a second or two.

Sky Navigator

When you tap far from any stars in 2sky, it displays the **Sky Navigator**. This window shows you 2sky's settings (Location, Date, Time, Field of View) and all of its controls. If your handheld has Palm's 5-way keypad or Tapwave's Navigator, you can use it to pop up, dismiss, navigate, and select items in the Sky Navigator.



Direction Indicators

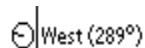
What if the Sun isn't actually in the sky right now? 2sky draws it anyway. But the **Alt** indicator on the left hand side of the screen will show that you're looking *below* the horizon. How? It inverts the text and draws a line pointing down.



Alt stands for altitude, the angle in degrees between the center of 2sky's display and the closest point on the horizon.

Looking below the horizon in 2sky lets you see what's about to rise (for example, the brighter stars and planets, or the Moon), what has just set, or any part of the sky that happens not to be visible now.

At the bottom of the display, you'll see the Azimuth indicator. Azimuth (**Az** for short), which shows the compass direction of the center of 2sky's display in degrees going Eastward from North. A tiny compass appears next to Azimuth. The "needle" shows the direction that 2sky is pointing.



If you don't see the alt and az indicators, open the **View** menu and tap **Reticle** to toggle them on.

Tap-ID

Tap any star. It tells you its name.

Every object that 2sky draws will tell you its name when you tap it. For more information, tap the name itself. This brings up the **Observing Notes** dialog, which contains several screens of information, depending on what you're looking at. These include common names, catalog designations, magnitude, angular diameter, distance, light-time, angular separation, Right Ascension, Declination, Azimuth, Altitude, rise, transit, set times, and lunar phases.

All terms and abbreviations are defined in the Glossary (page 19) and in 2sky: just scroll down in **Observing Notes**.

Tap the first letter of any constellation name to read its lore. If you don't see any constellation **Names**, toggle them back on from the **View** menu.

Clock On/Off Indicator

If things aren't appearing where you expect, there's a good chance the clock got turned off. The clock indicator appears in the **Sky Navigator** and has two states:

- ☑ Clock **on**. 2sky shows what's visible now at the selected site, using the clock that's built into your Palm and adding the time difference, if any, between your home site and current observing site.
- ⌚ Clock **off**. To help remind you that the clock is off, 2sky also displays this in the upper left corner of the screen.

In the **Sky Navigator**, tap the clock icon to toggle the clock **on**. When you animate the display or change the date, the clock automatically turns off again. When you turn it on, the view always updates to the current date and time.

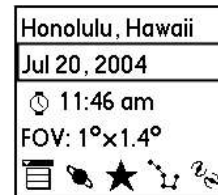


Changing Date and Time

To set 2sky to any date between 1904 and 2032 (the range available to Palm OS):

1. Tap empty space to bring up the **Sky Navigator**.
2. Tap the date text. The standard Palm OS calendar tool will appear.

To set 2sky to any time, tap the time text immediately below the date text.



The Asterisk (*) means Daylight Saving Time (Summer Time)

Sometimes you'll see an asterisk next to the time in 2sky, e.g. 12:23 am*. The asterisk means that 2sky thinks the time shown on your handheld is Daylight Saving Time, also known as Summer Time. 2sky automatically puts this adjustment in without you having to edit anything.

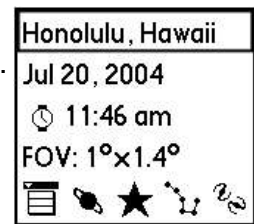
However, in the extremely unlikely event that your town should change its rules for observing Daylight Saving Time, you can always edit the rules. Just bring up the **Sky Navigator** and tap your location (top line) to bring up the **Locations** dialog, then tap the **Edit** button.

Observing Site Selector

What's visible in the sky depends on where you are on the globe, as well as the date and time. If your travels cross the equator, for example, you'll notice new stars you couldn't see before. Other, familiar ones won't rise.

In general, if you move or travel more than 300 miles (480 kilometers) in any direction, you should adjust the observing sites settings for your new location.

Tap empty space to bring up the **Sky Navigator**, then tap the location text at the top to bring up the **Choose Locations...** dialog.

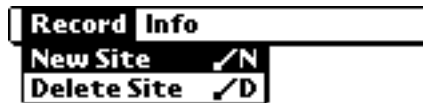


Notice there are two columns. Tap anywhere in the first column to pick **your** location, i.e. where you really are right now. Tap anywhere in the second column to select **2sky's** location. In most cases, you should make them the same. When the two are different and the clock is on, 2sky adds the time difference between the two locations (in the case pictured, that's 11 hours). In other words, 2sky is also a world clock, and will draw what they're seeing anywhere on Earth right now. When 2sky's current site isn't the same as your home site, you'll see an airplane icon (✈) in the sky map just next to the clock icon.

Tips: when you're searching the Observing Sites dialog, enter the first letter of any site to advance 2sky's list. Also, tap the word **Yours** to advance the list to your site, or **2sky's** to advance it to 2sky's.

To add a **new site**:

1. choose a site in the same time zone, if possible, then
2. bring up the menu in the **Choose an Observing Site...** dialog and tap **New Site** to edit your new site's coordinates.

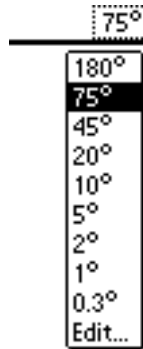
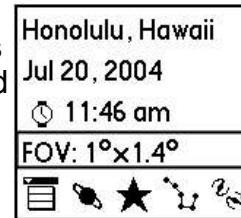


To look up any location's latitude and longitude online, visit <http://www.getty.edu/research/tools/vocabulary/tgn/index.html>

To look up any location's time zone information, visit <http://timeanddate.com/>

Zoom Controls

In the **Sky Navigator**, the text below the time show's 2sky's current Field of View (FOV) in degrees across the width and height of the display. Tap it to get a menu of 9 zoom levels. Select any level to zoom out or pull back.



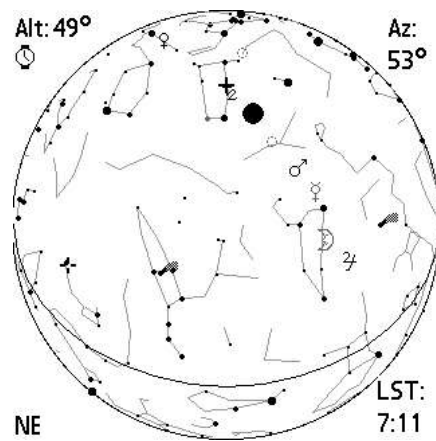
If you prefer different fields of view (e.g. 180°, 90°, 45°, 22.5°...), just tap **Edit...** at the bottom of the menu. See the *Advanced Features* section on Page 15 for details on editing the FOV dialog.

To zoom in and out more easily, it's convenient to use hardware keys, described on page 14.

The 180° View

The 180° view works like a camera just like the rest of 2sky. In this view it's really easy to see the round shape of the *celestial sphere*. Though we're looking at it from the *inside*, our eyes percieve it as looking from the outside. This is the same optical illusion you see in any very wide-angle photo.

Like the rest of 2sky, the 180° view can show objects below the horizon, which appears as a curved line across the celestial sphere. To get a view of the entire visible sky, enter **z** (for zenith) and verify that the Alt indicator reads 90°. Because this view is extremely wide-angle, it flattens and shrinks the constellations near the edges of the view. Objects near the center of the view are undistorted. You can drag the sky around in this view to place any constellation in the center.



The Alt and Az indicators (near the top) are textual in this display. The Alt text inverts when you're looking below the horizon. LST (lower right corner) stands for the Local Sidereal Time. LST is the Right Ascension (RA), in hours, of your local meridian (the line from north to south crossing the zenith in the sky). This meridian line rotates, like a clock, 360° every sidereal day. It's a useful measure. For example, Libra is at 15 hours RA, so it's always highest in the sky at an LST of 15 hours.

Searches

The icons in the bottom rows of the **Sky Navigator** bring up various dialogs:

-  Menu (see next section).
-  Find Planets.
-  Find Stars.
-  Find Constellations.
-  Find Deep-Sky Objects such as galaxies, nebulae, etc.
-  Find Meteor Showers (requires 2skyMeteorDB)
-  Find Comets (requires 2skyCometDB)
-  Find Asteroids (requires 2skyAsteroidDB)

In some search dialogs, you can enter text to jump forward in a catalog. For numeric catalogs such as Messier or NGC, just enter the number, for example, 31, not *M31*. Tap on any item to go there.

If your handheld has a 5-way keypad, you can highlight objects using the select button (tap it a second time to go there). Unhighlight using the left button (tap it a second time to exit the dialog), or advance/back up using the up/down buttons.

Approximate rise times appear to the right. Tap the selector label at the top to choose whether to display rise, set or transit times.

View Menu

2sky's menus are intentionally brief to reduce the clutter. Most of the functions that would occupy a desktop menu have been moved into the flow of the program for faster use in the field. Each of the view menu choices is described below.

Saved Views

2sky always launches just the way you left it last – although if you left the clock on, it will update the screen. To save multiple views for later reference, go to the **View** menu and tap **Save...** Be sure to name your view something unique.

To return to your view later, tap **Go To Saved...** and select it from the list.

This feature saves everything, including the look direction, whether the clock is on or off, custom zoom settings, and key assignments. You can use this feature to save:

- a view locked on the Moon, perhaps from a distant friend's city.
- views from your eclipse safari
- your favorite eyepiece settings (see page 17)
- the view out bedroom window
- custom key assignments

Return Home

This shortcut makes the current site the same as the home site, saving several taps.

Go To RA/Dec and Go To Az/Alt

When you select these menu items, a dialog displays the coordinates of the center of the screen where you were just looking. After you edit it and tap **OK**, 2sky will go to the new location you specified.

If you return to this screen several times in a row, you'll notice that the numbers change slightly because of round-off error in drawing the display. To minimize this error, zoom in.

Toggles: Lines, Names, Reticle

The next two items in the View menu switch the constellation **Lines** and **Names** on and off. Note: Constellation names don't appear in fields of view bigger than 89° because they would all run into each other.

The **Reticle** toggles the Alt & Az indicators on and off, except in the 180° view.

Do you use a **TelRad** reflex finder to locate objects in the sky? Now 2sky draws it to scale in all views when you select this toggle. The circles are 4°, 2° and ½°.

Options Menu

This menu may grow slightly in future releases. For now, it contains just two items, described below.

Preferences...

Use this dialog to customize the way that 2sky draws the sky.

The **Palette** preference sets the colors that 2sky uses. On a color device, the palette includes black on white for better viewing in broad daylight, and red on black to preserve night vision. On a monochrome device, the palette lets you invert the display.

Draw Planets as: is set to show planets as symbols by default. If you prefer to see them as they actually appear in the sky, change this setting to draw them as dots.

Star ID optionally draws star names, Bayer's alphabetical catalog designations or Flamsteed's numerical designations. Because star identifiers would run into each other in wider-angle views, they only become visible when the FOV is 15° or less.

Draw lines while moving is turned off by default because drawing lines during a pen draw slows the display.

Horizon when set draws the horizon. Stars and other objects appearing below the horizon aren't visible to the observer, but 2sky draws them anyway so you can see what's below the horizon. When 2sky is zoomed in, the horizon line may be either above or below the display and therefore not be visible.

Ecliptic when set draws the line that the planets appear to follow in the sky.

Celestial Equator when set draws the line of zero declination in the sky.

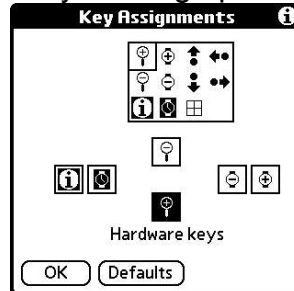
Galactic Equator when set draws the plane of the galaxy in the sky. This loosely coincides with the "Milky Way."

Earth Shadow draws the Umbra and Penumbra of the Earth, for observing Lunar Eclipses.

If you're using a color device with 2red installed, there's also a check box called **2red sets 2sky's colors**. 2red makes the Palm OS default colors black and red to preserve night vision. When you select this mode, 2sky checks 2red's settings at launch and matches them. This is especially convenient when you launch 2sky directly from 2red.

Keys...

Use this dialog to customize the functions that 2sky assigns to your device's hardware keys. 2sky will auto-detect the keys such as thumb wheels and 5-way controllers if they are available and draw a picture of them near the bottom of this dialog. Just tap the picture of a key to bring up a menu of options.



The available options are:

-   Zoom and Unzoom
-   Step Forward and Backward in time (animate)
-   Sky Up and Down
-   Sky Left and Right
-  Same as tapping in the center of the display
-  Clock On
-  Show Sky Navigator.
- (Blank) does nothing; i.e. the key does what Palm OS originally meant it to do

If you use the ID key , the Telrad toggle in the **View** menu will help identify what's in the center of the display. Repeated taps identify the object, lock it, and bring up Observing Notes about it.

Import Comets / Asteroids

Imports comets or asteroids from your handheld's built-in Memo app, overwriting either 2skyCometDB or 2skyAsteroidDB (if installed). This is an advanced feature for experts and serious tinkerers only. Visit <http://2sky.org/ac.html> for detailed formats and links to data sources.

Advanced Features

2sky does a lot more than just show you the stars over any location. It can lock objects in the display, animate eclipses and planetary conjunctions, and simulate the view through your telescope. Graffiti shortcuts abound, and you can customize the view to show more or fewer deep-sky objects and stars. This section describes how to use all of these advanced features.

Lock

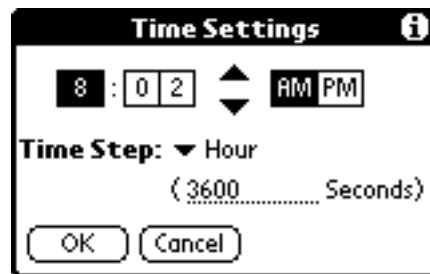
Whenever you search for and select an object, 2sky centers it in the display and draws a lock icon () in the upper left side of the display. You can also lock objects by double-tapping them. (A third tap on the now-centered object will bring up the **Observing Notes** dialog.)

Lock keeps an object from drifting off-screen during animations, or while being observed with the clock turned on. To unlock an object, just tap any part of the display where the stars are drawn (i.e. anywhere below the top line).

When an object is locked, the sky will usually rotate to some extent during the animation. This happens because the object may be changing its position in the sky, and 2sky must rotate the display to keep the object centered.

Animation

Tap the time text in the **Sky Navigator** to bring up the **time settings** dialog.



Set the **time step** to read “Hour” and tap OK. Now, when you tap the hardware keys that you assigned to forward or backward time steps (previous page), you’ll see the time move forward or backward by one hour. Notice that the sky appears to rotate.

Many different time steps are available, and you can further edit them down to the exact number of seconds. By experimenting to find the correct time step, you can come up with some interesting ways to animate astronomical events. For example, if you search for the Sun and then use time steps of Solar Days, you’ll see the stars moving past the Sun, and eventually the Moon and some planets, too (this is easiest to see in the 75° FOV). Then, if you tap the screen to unlock

the Sun, return to **Time Settings** and change the time step to sidereal day, you'll notice that the stars stay put while the Sun moves. If the progress is too slow, you can always return to **Time Settings** and append a zero to the number of seconds!

Tip: for faster animations, toggle **Lines off** in the **View** menu.

Here are some animations to get you started:

Site	FOV	Date	Time	Time Step	View	Lock?	Description
Any	45°	Any	Any	Sidereal Day	Mars	no	Sidereal Time
Any	1°	Any	Any	Solar Day	Moon	yes	Lunar Phases
Paris	1°	June 8, 2004	11:00 am	15 minutes	Sun	yes	Venus transit

If an object (such as the Sun) vanishes during an animation, find it again using the search feature, or do this:

1. reverse the animation
2. zoom out to make the object small
3. tap the object
4. tap its name
5. select the locked check box to lock it again.

Planet Max Zoom

When the display is locked on the Moon or a planet, you can zoom all the way in to see its shape and illumination. In the case of Jupiter, you'll see its moons, and for Saturn, you'll see its rings. It can be fun to animate Jupiter's moons in 1-hour increments: most people have no idea how fast they move! If you animate in increments of 7 days or more, the inner planets (Mercury, Venus, Mars) will change a lot in size and phase.

Saturn's rings and Jupiter's moons will appear to “wobble” as you animate them. This exactly duplicates how they will appear through binoculars or telescopes throughout the night or from night to night.

Sometimes Saturn's rings or the crescent phase of a planet will appear to “jump” from one side to the other. If you zoom out and repeat the animation forward and backward, you'll see what's going on: 2sky sometimes has to rotate the sky 180° to keep the zenith above the center of the screen.

The planets are not drawn to the same scale, as you can verify by checking the FOV in the **Sky Navigator**. Because the Moon is so much nearer and therefore larger in the sky than the planets, it appears as a disk in several different zoom views.

Custom FOV (Field Settings)

In the FOV menu (page 10), tap the **edit** item to bring up the **Field Settings** dialog to edit any of 2sky's nine fields of view. The first column is the field of view itself. Tap any number in that column to edit it (for example to make a 90° field of view).

Magnitude Cut-off

The next two columns in **Field Settings** show the magnitude cutoffs for stars (*) and extended objects such as galaxies (~). Tap any number to edit. 2sky will only display stars or objects as bright as the cutoff listed for each FOV. This is handy if you sometimes observe from light-polluted skies. 2sky won't let you set the magnitude in each view beyond an upper cutoff that's set by the hardware's draw speed.

Telescope Field

The **Circle** column in **Field Settings** (above) lets you add circles to simulate the view through your telescope or binocular eyepiece. Just tap the double-dashes to edit.

Inverting Optics

The **Optics** column in **Field Settings** (above) simulates the way that various telescopes can flip the view upside-down, sideways, or both. Because you can set it separately for each view, you can set 2sky to run rapidly through a progression of instruments including reflex finders, binoculars, finder scopes, diagonals, etc. Just be sure to save these settings from the **View** menu.

When a view is flipped, you'll see a backward or upside-down "L" on the screen just below the FOV indicator.

Short Cuts

Use Graffiti or thumb-board characters **n**, **e**, **s**, **w** to jump to views facing North, East, South or West. Use **z**, **h**, **a** to point to the Zenith, Horizon, or Anti-zenith. Enter numbers **0-9** to view altitudes from 0° through 90°. Use **b** to put the horizon at the bottom of the screen. Use **t** to toggle a set of TelRad® setting circles.

Spectral Types

On color devices, 2sky plots stars in exaggerated color that approximates their spectral type (see Glossary, Page 19).

Object Outlines

On color and selected grayscale devices, 2sky draws ellipses that approximate the shape and orientation of galaxies, star clusters, and nebulae.

Expanding 2sky

2sky has plug-in databases and a separate app (2red) that are included in various combinations in the 2sky downloads (they're *all* on the CD-ROM).

Plug-in Databases

Name	Description	Requires	
Mag8DB	32,389 stars from magnitude 7 to 8	2skyDB	535K RAM
Ngclc2DB	Catalog of 13,123 deep-sky objects	2skyDB	290K RAM
Mag9DB	165,506 stars from magnitude 8 to 9.5	Mag8DB	1,406K RAM
Mag11DB	1,034,049 stars from mag 8 to 11.2	Mag8DB	8,191K RAM

Together, these plug-ins bring the total number of stars up to 1,081,998, and the total number of deep-sky objects up to 13,623. To save memory, neither Mag9DB nor Mag11DB include distance data. Note that Mag11DB does *not* stack on top of Mag9DB. So when both Mag11DB and Mag9DB are installed, 2sky simply ignores Mag9DB.

To avoid timeouts during hotsync, install the files from the *Basic* folder and hotsync before you install the larger files from *Extras*, which are large and take a long time (up to 30 minutes) to transfer from your computer to your Palm handheld.

Important note: you will *not* see more stars in the 180° view when you install these plug-ins. Instead, you'll notice more stars as you zoom in. This duplicates the experience of looking through progressively more powerful optics.

2red

2sky has a red on black mode to preserve your night vision. Wouldn't it be nice if your other Palm Apps had a red mode, too? With 2red, now they will (most of them, anyway). 2red also includes a menu option to restore the original system colors should they be overwritten by accident by another application. 2red can also launch 2sky and turn on its red palette in a single tap. *2red doesn't work with Sony Clie devices running Palm OS 5.*

Glossary

Alt (altitude): the angle between where you're looking and the closest point on the horizon. 90° is straight up, -90° is straight down.

Az (azimuth): the angle from north sweeping east along the horizon toward where you're looking. North is 0° , East is 90° , and West is 270° .

Dec (declination): latitude on the celestial sphere. 0° is over the equator, 90° is over the North Pole, and -90° is over the South Pole.

Deep-Sky Object: Anything visible beyond the solar system that isn't a star: galaxies, nebulae, and star clusters.

Galaxy: 1,000,000,000+ stars bound together by mutual gravitation. Its shape may range from loose to tight Spiral, prolate Elliptical, oblate Lenticular, to amorphous Irregular.

Globular Cluster: a tight spherical swarm of 100,000 to 1,000,000 very old stars.

LST (local sidereal time): the right ascension of the meridian (below). Every star transits (i.e. crosses) the meridian 4 minutes earlier each day.

Mag (magnitude): the star's brightness to the eye. A 2nd magnitude star is 2.512 times fainter than a 1st magnitude star.

Meridian: an imaginary line passing through the zenith and the points directly above the north and south pole.

Messier Object: One of 110 deep-sky objects noted by famed comet hunter Charles Messier.

Nebula: A cloud of gas and dust; often a place where stars are born.

Occultation: When one object covers up another in the sky. For example, the moon often occults bright stars and planets.

Open Cluster: a loose grouping of up to several dozen young stars.

RA: Right Ascension, or longitude on the celestial sphere, measured in hours rather than degrees. The RA of the meridian is the same as the LST.

Planetary Nebula: the abandoned outer layers ejected by a Sun-like star when it dies.

Spectral Type: Stars were originally assigned arbitrary types A, B, C... according to their spectral lines, but the sequence has since been rearranged in terms of color and temperature. It runs:

O, W - Hot. Blue (drawn Violet). Short-lived.
B, A - Blue.
F - Yellow (drawn Green).
G - Yellow like the Sun.
K, R - Orange.
M, C, N and S - Cool. Red.

Zenith: the point directly overhead (90° altitude). 2sky marks it with a "+".

2sky Specifications

Accuracy (2 sigma):

- Stellar positions: 3 arcsec
- Saturn, Jupiter, Uranus: 9 arcmin
- Other planets: 1 arcmin
- Sun: 30 arcsec
- Moon: 4 arcmin

Available dates: January 1, 1904 to December 31, 2031

Items with names and lore:

- 760 stars
- 500 deep-sky objects
- All 88 constellations (89 entries)

Observing Sites: 167 (expandable and editable)

Troubleshooting

If your question isn't answered here, please visit 2sky.org/faq.html for the latest information.

Q: How do I get 2sky to run from a memory card?

A: It's not a good idea to run 2sky from a memory card. 2sky uses very large random-access databases that are fast for the same reason Palm OS itself is fast: data gets accessed in place, rather than copied around in memory. Unfortunately, card data doesn't work like this: it must be copied to the device whenever it gets used, and setting up to transfer data from the card takes Palm OS a lot of time.

If you feel like experimenting with a card despite these warnings, make sure that PlacesDB and MathLib remain on your device. When you launch 2sky, there will be a short delay as your device copies 2sky and all its data to the card. When you switch to another app, your device automatically deletes the copy of 2sky and all its databases that reside on your device.

Q: What if I get an "Unknown File Type" message when I try to download 2sky?

A: This could happen for two reasons:

1. Your Windows browser stripped the filename extension (.zip). Search for the file, then edit its name, adding .zip to the end of it.
2. Your browser doesn't have a MIME type for the file compression utility. Just click "Save" and search your hard disk for a folder called 2sky27.

Q: I tried to install 2sky on my device, but it's not there! Why?

A: First verify your settings:

1. Tap the button or silkscreen area of your palm that is labeled with a little house. This brings up Launcher.
2. Tap the text in the upper right of the screen. This brings up your category list.
3. Set your Launcher's category to "All".

If 2sky still doesn't show up:

1. Install it again, but don't push the hotsync button yet.
2. Check the install dialog on your PC's Palm Desktop to be sure that the user name matches the user name of your device. To find your device's User Name, open the HotSync app from Launcher.
3. Make sure 2sky appears in the install dialog.

4. Close the install dialog.
5. Hotsync your handheld device.

Q: I can still see the Sun in 2sky even though it's night. Why?

A: 2sky lets you look below the horizon. The **Alt** indicators (page 7) will be negative. If they're not, then the checklist in the next question will solve the problem.

Q: The stars don't match what I actually see in the sky. How do I get them to match?

A: Make sure that:

1. the clock is on (page 8)
2. your current site is the same as your home site (page 9)
3. your current site is close to where you are now.
4. the Altitude indicator is positive (page 7)
5. you are looking in the correct direction in Azimuth (page 7)
6. the FOV is 45° or greater (page 16)
7. the clock is set correctly in your handheld's Prefs application (see your handheld's documentation for details).

Q: When I search for an NGC object or star, I don't see it no matter how much I zoom in. Why?

A: 2sky's databases stack. If the Mag7 database is installed, but not Mag6, you won't see any Mag7 stars. The NGCIC database requires Mag7; if Mag7 isn't installed, but NGCIC is, searches will list the objects, but they won't appear when you choose them. Solve this by installing the intermediate database.

Q: What's the asterisk next to the time? E.g. 11:47 am*

A: 2sky displays the asterisk when it's correcting the star positions for Daylight Saving Time (also called Summer Time). See Page 9 for more detail.

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