

Image credit: NASA/JPL

Mokusei Ver 1.04

This manual is provided in English language only. The author is not a native speaker of English. The author assumes and provides that the user is familiar with the use of desktop and Pocket PCs as well as with basic (solar system) astronomy.

1. Outline:

Mokusei (Japanese for Jupiter) is shareware for the purpose of simulating the motions of the Galilean Moons of Jupiter. The application also provides static and dynamic data about the Jupiter system which is of special interest to amateur astronomers because of its fast changes and suitability to both large and small telescopes. During summer 2007, Jupiter is favorably positioned in the evening and night sky for observation.

2. Important Notice:

Mokusei is not a precise scientific tool, merely a guide for amateur astronomers planning observations of Jupiter with a telescope. Best care has been taken during development, yet errors in precision, graphical representation or simply due to the human factor cannot be ruled out. The author disclaims any warranty or liability whatsoever in any respect for the fitness to any particular purpose and will not accept any claims except regarding error/bug fixes and scientific data updates.

The shareware **trial period** is **15 days** with unlimited functions. There is **no refund** policy. Please **evaluate** Mokusei **carefully** before you purchase. After expiration a shareware key must be registered. Support is limited to the program's functions and cannot be extended to assistance related to operating systems, individual hardware and astronomy.

3. Target Platforms

Two installers are provided, one for the desktop another for the Pocket PC. Since the user interface is designed in particular for the Pocket PC, the size of Mokusei's screen spans over 240(W) x 320(H) pixels on the desktop as well.

3.1. Operating Environments

Desktop: Windows XP/Vista, .NET Framework 1.x or 2.x

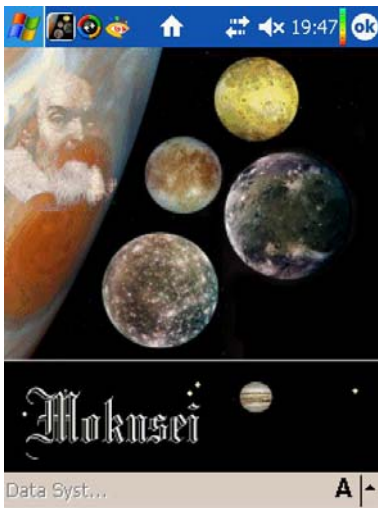
Pocket PC: Pocket PC 2003(SE)/WM5/WM6, .NET Compact Framework 1.x or 2.x

Installation on Pocket PCs in a storage card recommended (1MB of data).

3.2. Download Locations

http://www.alfcen.net/mokusei/mokusei_ppc_setup.exe

http://www.alfcen.net/mokusei/mokusei_desktop_setup.exe



4. Operation

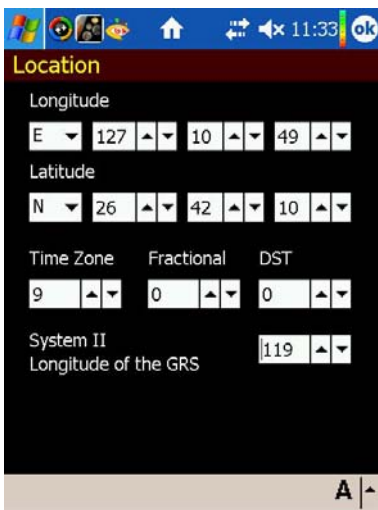
4.1. First Setup

At first start-up you will be presented a splash screen (tap/click to close) and next with screen which allows to enter your geographic location. Enter your longitude and latitude in ddmss (sexagesimal) notation. Next, please set your time zone with decimal fraction and daylight saving time (DST), if applicable. One of several sources available in the internet which help find your geographic coordinates is here:

<http://www.geonames.org/>

Since the Great Red Spot (GRS) of Jupiter shifts position over time, it's system II longitude is best adjusted by the user. As of July 2007, the longitude is assumed at 119 degrees. You may wish to confirm the latest value here:

http://www.skyandtelescope.com/observing/objects/javascript/Transit_Times_of_Jupiters_Red_Spot.html



Tap on the screen close gadget (ok).

Upon completion of this setup the main screen "The Galilean Moons" will be presented. Tap on the [Update] button to set current date and time.

4.2. Main Screen "The Galilean Moons"

4.2.1. Orbit Mode

Shows the Galilean satellites as viewed on top (north). Besides data and time the current central meridian in system II notation, CM-II is provided. The next line informs whether or not Jupiter's Great Red Spot, GRS, is positioned on the facing side of Jupiter (visible or hidden). Underneath the time to the next transit of the GRS is calculated. At the bottom right of the screen the current azimuth and altitude of Jupiter are displayed. Press [Update] to reset to current.



Tap/click on the XYZ icon to view the positions of the Galilean satellites in rectangular coordinates. This screen also displays the legend for the data.

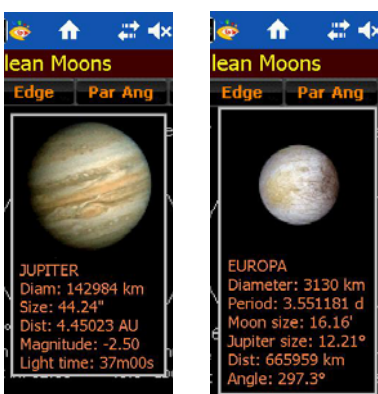
On the Pocket PC, the center position of Jupiter can be adjusted with the device's cursor keys. Press the center key to recenter Jupiter.

Tap/click on Jupiter to view some data, including

1. Equator diameter in kilometers
2. Angular size (diameter) in seconds of arc *
3. Phase of illumination in degrees *
4. Distance to Earth in astronomical units *
5. Visual magnitude *
6. Jupiter's light-time to Earth in mm:ss *

* at selected date and time

Tap/click on the data panel to close.



Likewise, tap/click on any of the moons to view the following data:

1. Equator diameter in kilometers
2. Orbital rotation period in days (equals axial rotation, as tidally locked to Jupiter)
3. The angular size of the moon as seen from Jupiter in minutes of arc *
4. The angular size of Jupiter as seen from the moon in degrees of arc *
5. The center distance between the moon and Jupiter in kilometers *
6. Angle from inferior conjunction in degrees *

* at selected date and time



For comparison, the angular size of the Earth Moon is 30 minutes of arc on average.
 1 degree of arc = 60 minutes of arc = 3600 seconds of arc.

Tap/click on the data panel to close.

Galilean satellite motions in past and future can be simulated with the animation bar at the bottom of the screen. From left to right: back, stop, pause, forward. To set timer interval and time increments, select Time Setting from the menu.

The Time Setting screen also allows to set date and time for investigation of past or future events.

If you check the "Confirm selection" check box the selected data will be shown before leaving the screen.



In Orbit mode, the button [Par Ang] and the instrument icons on the bottom are disabled.

4.2.2. Edge Mode

Changes the view to edge-on and enables the controls disabled in Orbit mode. This is the pattern as viewed from Earth taking the tilt of Jupiter's rotation axis into account. Tap/click on [Par Ang] to add the parallactic angle to set a view as really seen through binoculars or a telescope.

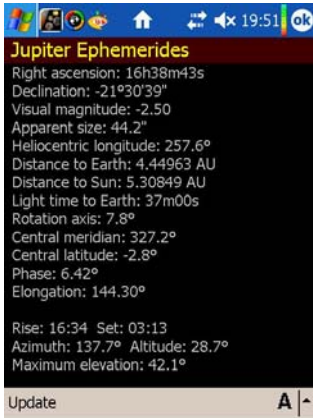
The parallactic angle is a phenomena of diurnal motion, negative before meridian transit and positive after. At meridian transit the angle is 0 while the Jupiter system is drawn tilted only by the amount of its rotation axis inclination.

In Egde Mode you can select four different optical instruments. While the view in binoculars is unchanged (east left, north up), telescopes mirror and/or rotate the image depending on construction and additional viewing accessories, such as diagonals. The buttons from left to right are:

- Binoculars: no change
- Refractor: 180 deg rotated
- Cassegrain: mirrored left-right (with 90 deg star diagonal)
- Newtonian: 180 deg rotated

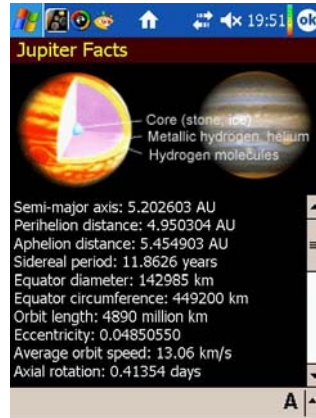
As in Orbit mode, the center position of Jupiter can be shifted, data is made available upon tap/click on an object, the rectangular coordinates are available, and animations be performed.

5. Data Menu



5.1. Jupiter Ephemerides

Calculates positional and physical ephemerides of Jupiter for a given date and time. Tap/click on Update to reset to current.



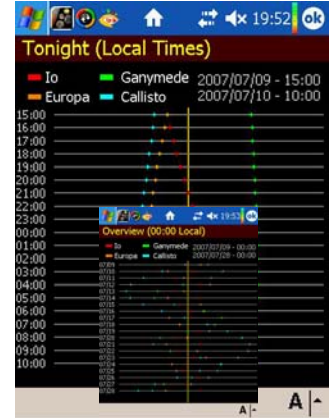
5.2. Jupiter Facts

A list of essential data about Jupiter.



5.3. Moon Facts

A list of essential data about the Galilean Moons. To select tap/click on a moon at the top of the screen.



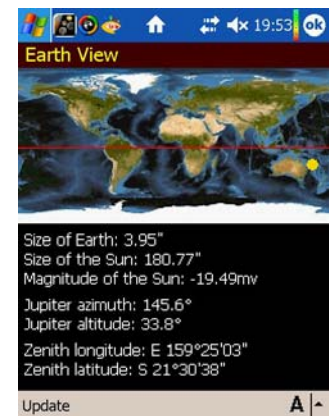
5.4. Tonight

Computes the east-west positions of the Galilean moons for today 15:00 to tomorrow 10:00 local time. Overview spans over 21 days in daily intervals.

5.6. Earth View

Plots the position on Earth where Jupiter is in the zenith at a given date and time and provides some data for a given date and time:

1. The angular size (diameter) of Earth as seen from Jupiter in seconds of arc.
2. The angular size (diameter) of the Sun as seen from Jupiter in seconds of arc.
3. The visual magnitude of the Sun as seen from Jupiter
4. Azimuth and altitude of Jupiter for the set location in degrees.
5. Longitude and latitude on Earth where Jupiter is in the zenith in ddmms.



5.7. Charts

5.7.1. Jupiter Central Meridian

Shows an image of Jupiter rounded to the central meridian in intervals of 10 degrees longitude. For example, if the central meridian is 218.6 degrees, then the image of Jupiter is centered on 220 degrees. Vice-versa, the central meridian is 212.9 then the image is centered on 210 degrees. Moon transits are plotted over Jupiter's cloud surface (without shadow). Tap/click on Update to reset to current.

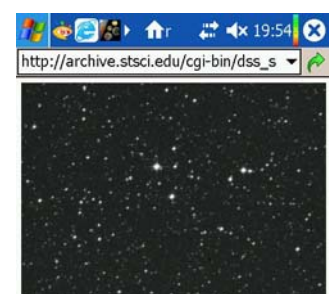
5.7.2. Star Chart

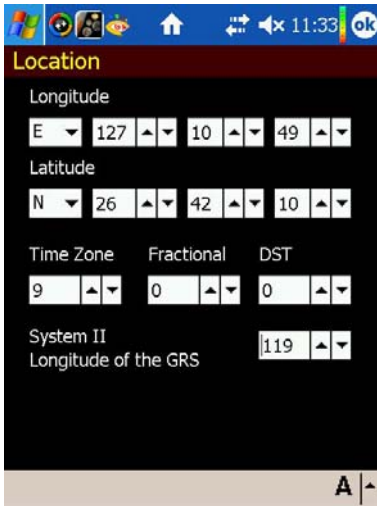
A small ecliptic star chart for rough orientation showing Jupiter's position among the constellations. The gray dotted line represents the local horizon, the green solid line the local meridian. Tap/click on Update to reset to current.



5.8. DSS

Launches the Internet Explorer and downloads an image of the excerpt of the sky where Jupiter is currently in the center. The image data is courtesy The STScI Digitized Sky Survey (c)1994 Association of Universities for Research in Astronomy Inc.





6. System Menu

6.1. About

The conventional About information.

6.2. Register

Opens a screen for entering a shareware key upon purchase.

6.3. Location

Allows setting of geographical coordinates, time zone and daylight saving time wherever applicable. Coordinates and time are required for calculation of local azimuth and altitude of Jupiter.

6.4. Time Setting

A calendar control and time selection with numerical up-down controls. This is used for selection of date and time of events you may wish to have Mokusei plot for you.

The animation section is provided for selection of

1. Time increment in hours.
2. Timer interval, the interval by which new computations are performed in time steps as selected in Increments.

If you check the "Confirm selection" check box the selected data will be shown before leaving the screen.



7. Contact for Support

Robert Brenner
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 Okinawa, Japan

Support excludes issues related to operating systems, hardware and astronomy. To learn more about Jupiter and the Galilean moons, please visit <http://galileo.jpl.nasa.gov/index.cfm>



Image credit: NASA/JPL

8. Acknowledgements

Mokusei is written in Basic4PPC (www.basic4ppc.com), highly recommended. All images used for Mokusei are courtesy NASA/JPL (www.nasa.gov). Windows XP, Windows Vista and .NET are registered trademarks of Microsoft Corporation.