



TIDELock

# Why TideLock and What is it?

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## Introduction

In this article, I would like to give you an introduction as to why TideLock is a different kind of application from those, comparable ones, that you can find in the stores.

This is purely to distinguish the application in terms of features and usefulness, to users.

99.9% or 100%. So, if I say the Sun is coming up at x hours at your location, that should be a fact. This way you can build a reliance on TideLock's data. I have run simulations many times and compared them to NASA spacecraft data (I work especially with LRO) and I have met the goal.

I have a **long-term commitment on this app**. I want it to evolve and do more things. I have a roadmap and lots of ideas coming up. I update the app very frequently with many improvements.



I want the app to have a **long reach for users that normally are on different platforms**. For that reason, I have the app available for mobile platforms (including **Smartphones** and **Tablets**) but also for desktops (which includes **Windows** and **Linux**) and a few other in between (for instance, Xbox and UWP).

Before I do that though let me say a few things about why and how I wrote TideLock that you may find interesting:

First of all, **I love working on this kind of App**. Over the years I have written many apps but this is my favorite class as I have been an amateur astronomer for a really long time and I am heavily involved and interested in the field.

Second, with a few exceptions credited on my web page, **I wrote everything you see, manually and without calling any outside services** (unless it is obvious, such as the weather). Everything TideLock does it is doing as you click things and it is not going out to other sites for information or data. This was accomplished by using a variety of resources such as **Jean Meeus' Astronomical Algorithms** which is at the heart of TideLock. I also used models from NASA and other sites but they are all calculated by TideLock on the fly.

**Precision, precision, precision....** This is a major goal for me. I aim such that every calculation you see is accurate

The App is **free** and it contains **absolutely no advertisements**. It also requires very little permissions so your privacy is guaranteed.

**This is a scientific application**. It does not have anything to do with Astrology or Religion as many other apps do. It is simply aimed at scientific uses.

The app is becoming more and more **observer focused**. I would like someone observing the moon (for instance for

ALPO Astronomy and others) to find this app useful in finding moon and sun data, terminator coordinates, etc.

These and more are the reasons I wrote the app and intend to keep it going. Now let me describe to you selected concepts and how to get the most out of TideLock.

## What is TideLock?

Some people think the moon is just dead or that there is nothing to see when looking at it since spacecraft have landed or orbit so closely, everything is done. **They could not be more wrong...**

First of all, the moon is an incredible natural wonder and one you can see with your eyes. If you show the moon to a child just with basic binoculars, what you see first is an experience s/he will remember forever.



Secondly, **spacecraft can map the moon but they cannot “see it”**. When you look at the moon even thru the most basic and cheap equipment and you see the morning shadow advancing thru the craters – that is actually looking at the moon and the experience is amazing. Any camera can photograph this for your memories.

Finally, the moon **is being observed professionally. Associations such as the ALPO have entire Lunar Sections** that include topographical studies or observation of Lunar Transient Phenomena. The moon does have active phenomena occurring whether it is albedo changes, regolith changes, impacts, gas emissions, etc. You can contribute to this easily.

And in the end, the moon is a gateway to bigger things. It gets you used to handling coordinates or equipment and you can then more easily study other things like the planets.

This is why TideLock puts a lot of focus on orbital mechanics and elements of the moon – so that you can know all you need to know about where it is or what it is doing and then, it provides realistic (though not to scale)

simulations for Jupiter and Saturn – two jewels that should be your next targets.

## Overview of Main Functions

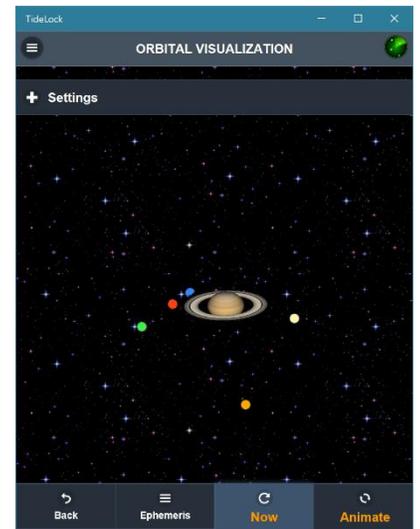
TideLock includes a set of main functions, which are very easy to use, and some additional tools to support what you are doing. These are the main and utility functions at a glance:

### Main Functionality

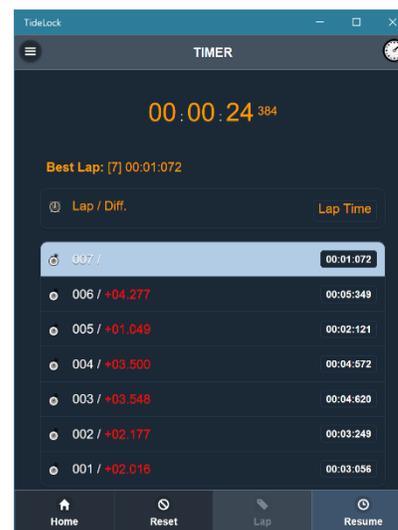
- Moon Functions
  - Current Phase
  - Current Details
  - Perpetual Calendar
  - Full Ephemeris
  - Visibility Details
  - Tabulated Almanac
  - Coordinate Display

- Jupiter Functions
  - Full Ephemeris
  - Event Predictor
  - Real-time animation.

- Saturn Functions
  - Full Ephemeris
  - Real-time animation
  - Real-time Rings



### Supporting Functions



- Solar System
  - Ephemeris of the Sun
  - Ephemeris of Planets
  - Lunar Eclipses
  - Detailed Moon
  - Surface Map

- Main Utilities
  - Full Lap Timer for Events
  - Calculator and Compass
  - Magnification Tool
  - Weather Predictor

Planet	Disk	Diameter	Magnitude	Elongation	Altitude	Azimuth	Longitude
Mercury	5.67"	77.6%	-1.06	16.1° West	-37.17°	---	162° 37' 33.34"
Venus	11.55"	86.4%	-3.71	27.3° West	-36.13°	---	150° 59' 53.68"
Mars	3.62"	89.1%	1.64	16.1° West	-37.38°	---	159° 10' 26.82"
Jupiter	31.25"	99.8%	-1.50	28.4° East	-28.24°	---	205° 03' 19.33"

## Supporting Functions

Supporting functions are very self-explanatory so they do not need much to cover here but here is a brief description of what they actually do... Please note that some of these tables are **too large for**

**smaller devices and so changing the device orientation will help** fit them in as the tables auto-grow and display more information in landscape mode.

## System Ephemeris and Eclipses

Displays exact ephemeris of the Sun or all planets for your exact time and location settings. This can enable you to determine where objects are and you may filter on any planet you wish to obtain its parameters and for easy location in the sky.

Lunar eclipses are also available in the same type of table and with filters. Lunar eclipse data is detailed and you can see all important parameters of the eclipse at a glance. The list includes one hundred years of eclipses.

## Detailed Moon Surface Map

This is a high-resolution map of the surface of the full moon. The full moon makes it harder to see features but it can consistently present the entire moon to you for easy location of features. It is quite easy to get lost looking at the moon in the telescope and not know what crater you are looking at unless it is a specific landmark. For that reason, I included a simple map with reference annotations so that you can identify a landmark and from there, find out what you are really looking at.



Please note that when you go to this page in the App, you see the map but **you have to double click it to enable zoom**, pan and pinch mode.

## Tools

Tools are also quite easy to understand just by using them but here is an overview of what they do...

### Lap Timer

A very useful tool to time events. It works in full real-time and it can take “laps” – e.g. measure multiple events, as many as you wish. These laps are displayed on the screen and **can be shared** with another app such as a messaging tool or a text memo for later review.

The timer can be paused or reset and best times are displayed in case you are measuring certain types of events.

### Calculators

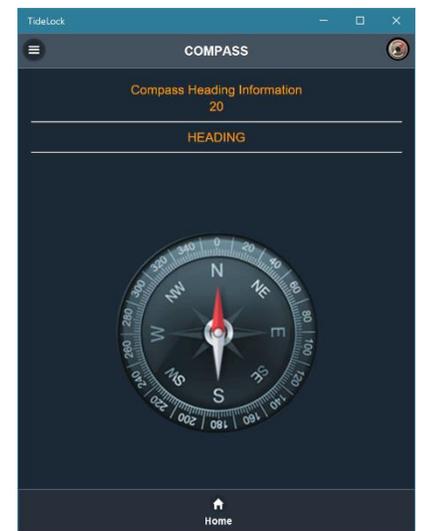
A small scientific calculator is included if you need to perform quick and basic operations such as calculating angles. This is quite useful.

Additionally, a magnification aid is also available if you need to know your effective observing magnification.

## Compass

The compass tracks every 0.0050 ms and can orient itself magnetically or to true north depending on your configuration options, under Settings.

**The compass needs calibration** prior to use. Use your device calibration instructions or a calibration app to do this before using the compass otherwise it may point wrong.



## Weather

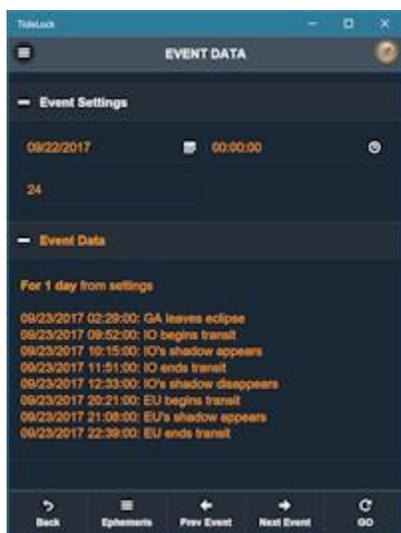
TideLock defaults to the NOAA reports, same as The Weather Channel and many other apps. This weather is for the United States only but you can select the WeatherAPI setting instead for worldwide reports.

## Primary TideLock Functions

Primary functions are centered mostly around the moon but also Jupiter and Saturn observation. Let's start with Jupiter and Saturn and then explain the moon which is the most extensive coverage TideLock does.

### Jupiter

Jupiter was included in TideLock to provide useful observational data to someone looking thru a telescope or looking for the current configuration of the Galilean satellite system. As was done with the moon, data for Jupiter is entirely accurate and provided in real time so you can adjust any simulation to the current time of observation.



Start with Jupiter Ephemeris. First, this page will tell you where the moon is and whether Jupiter is visible this evening or not. If it is visible, drop down the ephemeris tab on this very page and you will see where it is in the sky. The Jupiter Visibility tab also provides visibility information to aid you in locating the planet. You may scroll thru time here back and forth using the buttons at the bottom of the screen.

Once you have done this, you may go back and choose the Jupiter Events page. In this page, you can track any important events you may want to observe and you can do this at any time interval. For instance, if I enter now a 2-hour interval and press GO, I get a notification under the events drop down, predicting the following event “09/22/2017 00:59:00: EU disappears”. If I change the interval to 24 hours, TideLock predicts the following:

09/22/2017 00:59:00: EU disappears
09/22/2017 04:34:00: EU leaves eclipse
09/22/2017 12:36:00: IO disappears
09/22/2017 15:15:00: IO leaves eclipse

You can scroll thru this interval using the buttons at the bottom of the screen, for instance if I press again, I get:

09/23/2017 02:29:00: GA leaves eclipse
09/23/2017 09:52:00: IO begins transit
09/23/2017 10:15:00: IO's shadow appears
09/23/2017 11:51:00: IO ends transit

Predictions are accurate for transits, shadows, eclipses, occultations and even the Great Red Spot. Finally, if you wish to see this visually, go back and select the Orbital Simulation page...

### Jupiter Orbital Simulation

This simulation is to put a visual to the event predictor we discussed above. It is very simple but realistic. Set the time interval at which to advance the animation – any time you want will do – you may speed it up or slow it down. Then click **animate** and the system moves per the events above.

This is a realistic and real-time simulation of the system – if you look thru a telescope this is what you will see.

**Having said that, it is not drawn to scale** because screens on these devices are small and I thought it necessary to see shadows and moons rather than near invisible dots. So, take that into account. Let me explain a bit better – if you see an IO transit, there is an IO transit happening but my image for IO is quite large for Jupiter because it is now drawn to scale. Positionally, all is good and reliable though.



### Saturn

As is the case with Jupiter, I included Saturn in TideLock to aid you in locating the planet and observing it. TideLock provides a bit less information on Saturn but still it helps you visualize and locate the system.

Like with Jupiter, the ephemeris page is designed to provide localization data and visibility details. You get the moon information so you know about glare and whether Saturn itself can be seen tonight or not. And then you get the drop downs with the rest of the data. Press the scrolling buttons if you need to see data forward or backwards in time.



### Saturn Orbital Simulation

For Saturn, TideLock displays not only the configuration of its main moons, it also displays an accurate position for the planet rings. These change over a very long time of course but when they do, TideLock shows these changes. You can test this by entering dates into the future.

The first thing to do here is set your animation intervals to any period you want, then press **NOW** to effect the current date and time selected configuration. After that, press **animate** and watch the system go.

As with Jupiter, this is an accurate animation and depiction of reality. However, it is not to scale so that you can better see the objects (they are larger than in reality – much larger).

### TideLock Moon Functions

This is the core of what TideLock does and where it provides the most information. In fact, TideLock provides so much information about the moon it is split across multiple screens. Some users have told me this is not needed and it would be best to use one screen but, frankly, that is just impossible on a small device. On the desktop, you could fit it better but TideLock is used primarily on Smartphones and Tablets so one has to accommodate this.

Therefore, in my description below I will refer to the flow among said screens in what I think is the best way for you to follow but do feel free to float to whatever page you want.

### Current Phase and Details

Two important screens... The current phase shows you the moon right now (or for whatever date you select but it defaults to this very instant). The information provided here is simply so you know what the phase is, when the main phases will happen and really quickly, where the moon is at the moment (zodiacal position). Because there is a drop down open with these details, the image of the moon maybe half shown so simply scroll down to see it all.



The second important function here is called Summary, also from the Moon Menu. This summary is more detailed than the phase and it extracts only the most important parameters from other screens so that you can set a plan to observe the moon. This is because it shows the same information as in the phase screen but also important visual information such as rise and setting times of the moon and Sun as well as dawn times and the position of the rising and setting terminators. With this information, you can set an observation session quite easily.



### Perpetual Monthly Calendar

Having said all this, if you prefer to look at the moon a different day (for advanced planning reasons) you may use the Month Calendar function which displays a full month and can scroll back and forth in perpetuity. From this calendar, you can click any image of the moon and this has two effects: first, it goes to the phase page for that date and second, it sets the date so other pages

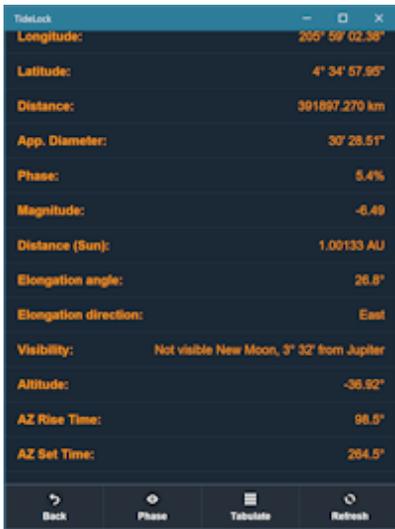
can be updated accordingly.

also display data for said date so, this is an easy and convenient way to force a date in the system.

If you prefer to see more detail for the calendar day you have selected, this can be tabulated (bottom row of buttons) to display richer information on the image you clicked.

### Detailed Ephemeris

Well, now that you have seen the summarization data you can delve into a lot of detail. If you start with the ephemeris page note that this page by default resets the date to today. You would need to come to this page from another page (not from the menu) to keep the date set. So, if you come in by clicking on the calendar the date will be whatever you clicked on the calendar. If you exit to the main menu and return here, the date is reset to right now!



In any case, the ephemeris page is your landing page for initial reference. In here, you can see anything and everything you need about where the moon is. In the end, this is just an expanded version of the phase and summarization page. To see more details, use the bottom navigation... click details for instance, and you will see things like this:

### Moon crescent (broad) evening, 8° 2' from Saturn

Which is important visual information that also includes important additional details, in this case the fact that Saturn is nearby. If you go back to Phase (bottom navigation), from Phase you can then press **cards** and see the final set of data used for actual instrument observation.

That completes the whole round of how to put together moon data from all these screens. There are many ways to navigate so this is just a proposed best way from me. You may navigate any other way you wish to.

### Surface Texture Map

This is important so let's cover it again... Sometimes I have looked at the moon in its "full moon" strength and frankly, you don't know where anything is as the intense light makes it hard to recognize familiar features. To aid with this, TideLock includes a very simple but annotated surface map that quickly identifies features all over so that you can recognize those



There are a couple of quirks you do need to be familiar with. Here they are:

- **When you first come to this screen, double click the image of the moon** (double tap with your finger) to start interactions, otherwise the image stays there statically.
- Once tapped, you can now pan, pinch, scroll, zoom or whatever you need to do. You can do this with your fingers of course or, with the mouse if on a desktop.
- **The image of the moon is large and may not fit entirely in portrait mode.** If you zoom but cannot see side features, just turn your device landscape and they will appear.



This concludes our tour thru TideLock concepts. I hope this was valuable and thank you for using this app. More information and videos here:



[www.madvoc.com/tidelock.html](http://www.madvoc.com/tidelock.html)