

THE ASTRONOMER'S KNIFE

Offline HTML Astronomy Toolkit

User Manual & Onboarding Guide

Field: The Weird & Wonderful · Knife 30 of 50 · \ Offline.Ltd

10

TOOLS

100%

OFFLINE

∞

UPDATES

5 yr

EVENT ORACLE

This manual covers every tool, input field, output, keyboard shortcut, and file management feature of the Astronomer's Knife. It is designed for both first-time users and returning astronomers who want a quick reference. The companion Markdown edition can be uploaded to any AI assistant for natural-language Q&A about the knife.

Version 2.0 · For use with The_Astronomers_Knife.html

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1. Getting Started

The Astronomer's Knife is a single HTML file containing ten astronomical calculators, a live planetarium, an intelligent observing planner, and a five-year celestial events oracle. It runs entirely in your browser with no internet connection, no installation, and no server.

System Requirements

BROWSER	VERSION	NOTES
Chrome / Chromium	90+	Recommended — fastest canvas rendering
Firefox	88+	Full support
Safari	14+	macOS and iOS — full support
Edge	90+	Chromium-based — full support
Mobile browsers	Current	Responsive layout, touch-friendly

How to Open

Double-click `The_Astronomers_Knife.html` in any file manager. The knife opens in your default browser. No web server or installation is required. Works on Windows, macOS, Linux, Android, and iOS.



PRO TIP

E-mail this HTML file to your webmail. It will always be waiting on any computer, phone, or tablet — your personal cloud, without the cloud. Keep it on your phone for quick reference at the telescope. Works offline under the stars.

The Welcome Screen

On first launch, a welcome modal appears explaining that your work is saved automatically in this browser, and that you should use the **Files** tab to export a state file for backup. Click **Got it — open the knife** to dismiss. The modal will not appear again on that browser.

2. Interface Overview

The knife interface follows a consistent layout across all Offline.Ltd products: a branded header, a horizontal tab bar, a scrollable content area, and a footer disclaimer bar.

The Header

The red backslash (\) is the Offline.Ltd brand mark — it represents both a knife blade and a local filesystem path. To its right: the product name, the field category (*The Weird & Wonderful*), and the knife number (30 of 50). A purple left border on the header identifies the field colour for this knife.

The Tab Bar

Tool tabs are on the left; system tabs are on the right, separated by a vertical border. The ten tool tabs are:

TAB	TOOL NAME	SHORTCUT
■ Tonight	Tonight's Best — observing planner	—
■ Sky Map	Horizon Planetarium — interactive star chart	—
■ Events	Celestial Events Oracle — 5-year calendar	—
Moon Phase	Moon Phase Calculator	—
Solar Position	Solar Position calculator	—
Sunrise/Sunset	Sunrise & Sunset with twilight	—
Julian Day	Julian Day Number converter	—
Constellations	Constellation Reference (30 entries)	—
Magnitude	Magnitude & Distance Calculator	—
Planets	Planet Visibility estimator	—

System tabs: ■ **Files** (state management) and ? **Help** (documentation and search). An amber dot appears on the Files tab when unsaved changes exist.

Tooltips

Input fields with a circled ■ icon have hover/tap tooltips explaining the expected format or range.

The Disclaimer Bar

A fixed footer reminds users that calculations use simplified algorithms for observation planning — not for navigation. A link opens the full disclaimer in the Help tab.

3. Saving & File Management

The knife auto-saves your work to the browser's localStorage every 15 seconds and whenever you change tabs. This data persists between sessions on the same browser. To transfer your data to another device or create a backup, use the export/import workflow in the **Files** tab.

Exporting State

1. Open the **Files** tab.
2. Click **Export All** ↓.
3. A JSON file is downloaded with the naming pattern: `astronomer.knife.state_YYYY-MM-DD.json`.
4. Keep this file alongside the HTML knife file.

Importing State

1. Open the **Files** tab.
2. Click **Import All** ↑.
3. Select a previously exported JSON file.
4. All tool inputs are restored instantly.



CAUTION

Importing a state file overwrites all current data for every tool. Export your current state first if you want to keep it.

Per-Tool Export

Each tool has its own Export/Import buttons in the Files tab, allowing you to save and restore individual tools without affecting the others.

Clearing All Data

The **Clear All Data** button in the Files tab permanently deletes all saved data for this knife from localStorage. A confirmation dialog prevents accidental deletion.



PRO TIP

Name your state files by season and location: `astronomer.knife.state_highlands_summer.json`. This makes it easy to maintain multiple observing setups.

4. Tonight's Best

Tab: ■ Tonight

An intelligent observing planner that combines Moon phase, planet positions, twilight times, and deep-sky targets into one smart dashboard. Shows you exactly what to observe, when, and where to look.

Inputs

FIELD	DESCRIPTION
Latitude	Observer latitude in decimal degrees (−90 to +90)
Longitude	Observer longitude in decimal degrees (−180 to +180)
Date	Observing date (defaults to today)
UTC Offset	Hours offset from UTC (e.g. +1 for CET, −5 for EST)

Outputs

FIELD	DESCRIPTION
Moon Tonight	Phase name, illumination %, deep-sky quality rating
Darkness Window	Astronomical twilight end/begin times, total dark minutes
Planets at 22:00	All 7 planets with altitude, magnitude, elongation
Recommended Targets	Top 10 Messier objects above 15° sorted by altitude

Use Cases

Use this as your first stop before an observing session. Check if the Moon will interfere with faint targets, find which planets are up, and build a prioritised list of the best deep-sky objects for that night.

Common Difficulties

PROBLEM	CAUSE & SOLUTION
No targets shown	Check that latitude/longitude and UTC offset are correct for your location
Moon interference warning	Normal — indicates the Moon is more than 50% illuminated, reducing visibility of faint objects
All planets below horizon	Try a date when outer planets are near opposition, or adjust the time

**PRO TIP**

Export the observing list as JSON before heading out — you can print it or load it on another device.

5. Horizon Planetarium

Tab: ■ Sky Map

An interactive alt-azimuth canvas showing the actual sky from your location right now. Displays the 100 brightest stars, constellation lines for 30 major constellations, the Moon, and all 7 planets.

Inputs

FIELD	DESCRIPTION
Latitude	Observer latitude in decimal degrees
Longitude	Observer longitude in decimal degrees
Time offset	Slider: -12 to +12 hours from current time
Lines: ON/OFF	Toggle constellation lines
Labels: ON/OFF	Toggle star/planet name labels
Glow: ON/OFF	Toggle horizon atmospheric glow effect

Outputs

FIELD	DESCRIPTION
Sky canvas	Stereographic projection of the visible hemisphere
Object popup	Tap/click any object for: name, type, altitude, azimuth, magnitude, constellation

Use Cases

Hold your phone up to the real sky — the map matches what you see. Drag to rotate azimuth; use the time slider to see what the sky will look like later tonight or earlier this morning.

Common Difficulties

PROBLEM	CAUSE & SOLUTION
Canvas blank	Ensure latitude and longitude are valid numbers
Objects in wrong position	Check that your system clock is correct — the map uses UTC internally
No planets visible	All planets may be below the horizon at this time; use the time slider to search

**PRO TIP**

This is your personal Stellarium in airplane mode. The map uses stereographic projection with north at top.

6. Celestial Events Oracle

Tab: ■ Events

A five-year calendar of meteor showers, eclipses, planetary oppositions, and greatest elongations. Each event includes visibility details from your latitude.

Inputs

FIELD	DESCRIPTION
Latitude	Observer latitude (used for radiant visibility and eclipse relevance)
Filter buttons	All Events, ■ Meteors, ■ Eclipses, ■ Planets

Outputs

FIELD	DESCRIPTION
Timeline	Chronological event cards grouped by year, colour-coded by type
Meteor details	ZHR, parent body, Moon interference rating, radiant visibility
Eclipse details	Type, visibility regions
Planet details	Opposition distance or elongation angle and direction

Use Cases

Plan ahead for the next major meteor shower or eclipse. Check Moon interference before committing to a meteor shower trip.

Common Difficulties

PROBLEM	CAUSE & SOLUTION
Event not showing	Ensure the date filter is set to "All Events" and check the year range
Moon interference says Poor	Normal — the Moon illumination on that date will wash out faint meteors



PRO TIP

Check the Moon interference rating for meteor showers — it makes or breaks a display. Best showers: Perseids (Aug), Geminids (Dec), Quadrantids (Jan).

7. Moon Phase Calculator

Tab: Moon Phase

Calculates illumination fraction, phase name, and age for any date. Includes a visual moon rendering, an 8-phase strip, and upcoming lunar event predictions.

Inputs

FIELD	DESCRIPTION
Date	Any date (defaults to today)
Today button	Reset to current date
← Day / Day →	Step forward or backward by one day

Outputs

FIELD	DESCRIPTION
Moon visual	SVG rendering of the illuminated disc
Phase name	New Moon, Waxing Crescent, First Quarter, etc.
Illumination	Percentage of disc illuminated (0–100%)
Age	Days since last New Moon (0–29.5)
Phase angle	Degrees through the synodic cycle (0–360°)
Upcoming events	Next 6 New and Full Moon dates with days remaining

Use Cases

Check the Moon phase before planning a deep-sky session. Best conditions: ± 3 days around New Moon.

Common Difficulties

PROBLEM	CAUSE & SOLUTION
Phase looks wrong	Verify the date — the calculator uses synodic month arithmetic from a known New Moon epoch



PRO TIP

Best deep-sky observing is within three days of New Moon. Plan your sessions around the upcoming events list.

8. Solar Position

Tab: Solar Position

Calculates solar altitude, azimuth, declination, and equation of time for any location, date, and time. Includes a sun arc visualisation.

Inputs

FIELD	DESCRIPTION
Latitude	Observer latitude in decimal degrees
Longitude	Observer longitude in decimal degrees
Date	Any date
Time (UT)	Time in Universal Time, format HH:MM

Outputs

FIELD	DESCRIPTION
Altitude	Solar altitude above/below horizon in degrees
Azimuth	Compass bearing of the Sun in degrees
Declination	Angular distance of the Sun from the celestial equator
Eq. of Time	Difference between apparent and mean solar time (minutes)
Solar Noon	Time of solar culmination in UT
Horizon status	Above/Below badge
Sun arc diagram	Canvas plot of the solar path across the sky for the day

Use Cases

Determine exactly when and where the Sun will be for photography golden hour, solar observing, or planning when astronomical darkness begins.

Common Difficulties

PROBLEM	CAUSE & SOLUTION
Altitude negative at noon	Normal in polar regions during winter — the Sun does not rise above the horizon

9. Sunrise & Sunset

Tab: Sunrise/Sunset

Calculates sunrise, sunset, and all three twilight boundaries (civil, nautical, astronomical) for any location and date. Includes a 7-day forecast table.

Inputs

FIELD	DESCRIPTION
Latitude	Observer latitude in decimal degrees
Longitude	Observer longitude in decimal degrees
Date	Any date
UTC Offset	Hours offset from UTC — times shown in local time

Outputs

FIELD	DESCRIPTION
Sunrise / Sunset	Local times
Day Length	Hours and minutes of daylight
Solar Noon	Local time of culmination
Civil Dawn/Dusk	Sun at 0° to -6° — outdoor activities possible
Astro Dawn/Dusk	Sun at -12° to -18° — sky fully dark
7-day forecast	Table of rise/set/day length for the coming week

Use Cases

Plan your observing window: true darkness begins at astronomical dusk. At high latitudes in summer, astronomical twilight may not end at all.

Common Difficulties

PROBLEM	CAUSE & SOLUTION
Shows Polar day/night	At high latitudes around solstices, the Sun may not rise or set at all — this is correct behaviour
Times look wrong	Verify the UTC offset matches your timezone; also check longitude sign (west is negative)

10. Julian Day Number

Tab: Julian Day

Converts between calendar dates and Julian Day Numbers (the continuous day count used in astronomy since 4713 BC). Includes a reverse converter and a reference table of notable Julian dates.

Inputs

FIELD	DESCRIPTION
Calendar Date	Any date for forward conversion
Time (UT)	Time in Universal Time, format HH:MM
JDN (reverse)	A Julian Day number for reverse conversion

Outputs

FIELD	DESCRIPTION
Julian Day	JD to 5 decimal places
Modified JD	JD – 2400000.5
Julian Century (T)	Centuries since J2000.0
Unix Timestamp	Seconds since 1970-01-01
Reverse result	Calendar date and time from a JD input

Use Cases

Convert dates for astronomical computations. Compare observations across different calendar systems. Calculate time intervals between events.

Common Difficulties

PROBLEM	CAUSE & SOLUTION
Large Julian Day	Normal — the epoch is 4713 BC, so modern dates are in the millions
Reverse date off by one	Check whether you are counting from noon or midnight — JD starts at noon UT

11. Constellation Reference

Tab: Constellations

Quick reference for 30 prominent constellations, filterable by season (winter, spring, summer, autumn, or all). Each entry includes coordinates, area, notable stars, deep-sky objects, and mythological origin.

Inputs

FIELD	DESCRIPTION
Season filter	Buttons: All, Winter, Spring, Summer, Autumn
Constellation card	Click any card to expand detail panel

Outputs

FIELD	DESCRIPTION
Grid of cards	Name, Latin name, RA, Dec, area, season
Detail panel	Full description, notable stars, deep-sky objects

Use Cases

Quickly look up which constellations are visible this season, find the best deep-sky objects in a given constellation, or learn the mythology.

Common Difficulties

PROBLEM	CAUSE & SOLUTION
Constellation not listed	The reference covers 30 of the 88 IAU constellations — the most prominent ones for amateur observers

12. Magnitude & Distance Calculator

Tab: Magnitude

Four-mode calculator for astronomical magnitudes and distances. Includes a reference table of apparent magnitudes from the Sun (-26.7) to the Hubble limit ($+31.5$).

Inputs

FIELD	DESCRIPTION
Mode: Distance Modulus	Apparent magnitude (m) and distance (parsec)
Mode: Flux Ratio	Two magnitudes to compare brightness
Mode: Absolute Mag	Apparent magnitude (m) and parallax (arcsec)
Mode: Parsec \leftrightarrow Ly	Parsec or light-year value for conversion

Outputs

FIELD	DESCRIPTION
Distance Modulus	Absolute magnitude (M), distance modulus (μ), light-years
Flux Ratio	Brightness ratio (\times), magnitude difference
Absolute Mag	Absolute magnitude, distance in pc and ly
Parsec \leftrightarrow Ly	Converted value (1 pc = 3.26156 ly)

Use Cases

Calculate how far away a star is from its apparent and absolute magnitudes. Compare the brightness of two objects. Convert between parsecs and light-years.

Common Difficulties

PROBLEM	CAUSE & SOLUTION
Negative absolute magnitude	Normal — very luminous objects (supergiants, galaxies) have negative absolute magnitudes
Parsec conversion imprecise	The tool uses 3.26156 ly/pc — the IAU 2015 standard value

13. Planet Visibility

Tab: Planets

Estimates planet visibility from your location at a given date and time. Shows all 7 classical planets with altitude, azimuth, magnitude, and elongation. Includes a planet data reference table.

Inputs

FIELD	DESCRIPTION
Latitude	Observer latitude in decimal degrees
Longitude	Observer longitude in decimal degrees
Date	Any date
Time (local)	Observing time in local time, HH:MM
UTC Offset	Hours offset from UTC

Outputs

FIELD	DESCRIPTION
Planet cards	One card per planet showing: altitude, azimuth, magnitude, elongation, visibility badge
Visible badge	Green = above horizon; Red = below horizon
Reference table	Orbital period, distance (AU), diameter, type for all 7 planets

Use Cases

Check which planets are visible tonight, what their current brightness is, and how far from the Sun they appear (elongation).

Common Difficulties

PROBLEM	CAUSE & SOLUTION
Mercury always below horizon	Normal — Mercury is close to the Sun and only visible near greatest elongation, briefly after sunset or before sunrise
Magnitude looks wrong	Phase angle corrections are applied for inner planets; values are estimates, not ephemeris-grade

14. Keyboard Shortcuts

These shortcuts work from any tab.

Ctrl + S	Export full knife state (same as Files → Export All)
Ctrl + H	Open Help tab
Esc	Close any open modal (welcome, confirm dialogs)



PRO TIP

On macOS, use **Cmd** instead of Ctrl for all shortcuts.

15. Troubleshooting

JavaScript disabled

The knife is a JavaScript application. If scripts are blocked, you will see a blank page. Enable JavaScript in your browser settings or try a different browser.

localStorage cleared or unavailable

Some privacy modes (Incognito, Private Browsing) do not persist localStorage. Your data will be lost when you close the tab. Use Export All before closing to save your work.

Geolocation failure

If My Location does not work, your browser may be blocking location access. Grant permission in the browser address bar, or enter coordinates manually. The knife works without geolocation.

Calculations seem wrong

All algorithms use simplified formulas from Jean Meeus' *Astronomical Algorithms*. Accuracy is typically within a few arcminutes. For sub-arcsecond precision, use a dedicated ephemeris (e.g. JPL Horizons).

Tab bar scrolls on mobile

On small screens, the tab bar becomes horizontally scrollable. Swipe left/right to access all tabs.

Import file rejected

The knife validates the 'knife' field in the JSON file. It must be 'astronomer'. Files from other Offline.Ltd knives are rejected to prevent data corruption.

16. Accuracy & Limitations

The Astronomer's Knife uses simplified algorithms suitable for amateur observation planning. The primary reference is Jean Meeus' *Astronomical Algorithms* (2nd edition).

TOOL	TYPICAL ACCURACY	NOTES
Solar Position	± 1 arcminute	Meeus low-precision formula
Sunrise/Sunset	$\pm 1-2$ minutes	Atmospheric refraction assumed 34 arcmin
Moon Phase	± 0.5 day	Synodic month arithmetic from known epoch
Planet Positions	$\pm 1-2^\circ$	Low-precision Keplerian elements, no perturbations
Julian Day	Exact	Integer arithmetic; proleptic Gregorian before 1582
Magnitude	Exact formula	Pogson scale; phase corrections for inner planets
Sky Map	$\pm 1-2^\circ$	Same as planet positions; star positions from J2000.0 catalogue
Events Oracle	± 1 month (planets)	Meteor/eclipse dates are fixed; planet events are interpolated monthly



CAUTION

This tool is offered "as is" for amateur observation planning. Do **not** use it for aviation navigation, maritime navigation, scientific publication, or any safety-critical purpose. For professional-grade ephemerides, consult JPL Horizons or the *Astronomical Almanac*.

17. Glossary

Astronomical terms used across the tools in this knife.

Altitude (alt)	Angular height of an object above the horizon, in degrees (0° = horizon, 90° = zenith).
Apparent magnitude	Brightness of an object as seen from Earth. Lower numbers are brighter; negative values are very bright.
Absolute magnitude	Brightness of an object if placed at a standard distance of 10 parsecs.
Azimuth (az)	Compass bearing measured clockwise from north (0° = N, 90° = E, 180° = S, 270° = W).
Celestial equator	Projection of Earth's equator onto the sky. Objects on it have declination 0° .
Civil twilight	Sun between 0° and -6° below the horizon. Enough light for outdoor activities.
Conjunction	Two objects at the same right ascension or ecliptic longitude as seen from Earth.
Declination (Dec)	Angular distance of an object north (+) or south (−) of the celestial equator.
Distance modulus	The difference $m - M = 5 \log_{10}(d) - 5$, relating apparent magnitude, absolute magnitude, and distance.
Ecliptic	The plane of Earth's orbit; the apparent annual path of the Sun across the sky.
Elongation	Angular separation of a planet from the Sun as seen from Earth.
Equation of time	Difference between apparent solar time and mean solar time, caused by Earth's orbital eccentricity and axial tilt.
Greatest elongation	Maximum angular separation of Mercury or Venus from the Sun — best time to observe inner planets.
Julian Day (JD)	Continuous day count since 4713 BC, used to simplify time intervals between astronomical events.
Light-year (ly)	Distance light travels in one year: 9.461×10^{12} km \approx 0.3066 parsecs.
Magnitude	A logarithmic scale of brightness. Each step of 1 magnitude = 2.512× change in brightness.
Nautical twilight	Sun between -6° and -12° . Horizon faint, bright stars visible.
Opposition	An outer planet directly opposite the Sun from Earth — closest approach and peak brightness.

Parallax	Apparent shift of a nearby star against distant background stars, measured in arcseconds.
Parsec (pc)	Distance at which 1 AU subtends 1 arcsecond of parallax. 1 pc = 3.26156 light-years.
Phase angle	Angle between the Sun and Earth as seen from a planet (or the Moon).
Right Ascension (RA)	Angular distance measured eastward along the celestial equator, in hours (0–24h).
Sidereal time	Time based on Earth's rotation relative to distant stars rather than the Sun.
Synodic month	Time between successive New Moons: approximately 29.53 days.
Zenith	The point directly overhead (altitude 90°).
ZHR	Zenithal Hourly Rate — the number of meteors a single observer would see per hour under ideal conditions.

THE ASTRONOMER'S KNIFE

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Clear skies.

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