

Solaris Time

The hour of the sun: twelve hours of light and twelve of dark, measured from your own horizon

Version 1.0.2 · companion document to Full Specification v3.09.1

Trial period commences: Equinox 0°, 2026 · official epoch: Equinox 0°, Year 0, 2028

1. What Solaris Time is

A Solaris day has two halves. From sunrise to sunset there are twelve **day hours**, written **DT**, for *diurno tempore*. From sunset to the next sunrise there are twelve **night hours**, written **NT**, for *nocturno tempore*. That is where the two letters come from, and they are easy to hold on to in English as well: **DT** is day time, **NT** is night time. The minutes inside those hours are ordinary minutes. Only how many of them fit into an hour changes, with the season and with the latitude of the observer.

This is not a new form of the hour. It is usually called the *temporal* or *seasonal* hour, and it was the ordinary hour of daily life for most of recorded history. What is new is that a device can now compute it exactly, for a given position, without a sundial and without a table.

The three fixed points of the day

0:00 DT Sunrise. The first hour of light begins, so the clock begins at nought. The Solaris day turns over here.

6:00 DT The middle of the light. Solar noon at the observer's own horizon, not at the centre of a time zone.

0:00 NT Sunset. The twelve hours of dark begin, and they run on to the next sunrise.

The day boundary

A Solaris day begins at 0:00 DT, that is at sunrise, and it runs on through the night that follows until the sun comes up again. Just as a Gregorian day turns over at 0:00 on the clock of a time zone, this one turns over at 0:00 on the clock of the sun. Between midnight and sunrise it is therefore still the day before. Section 9 of the Full Specification sets this out as the rule of the calendar.

2. Notation

A moment is written as the hour, the minutes within that hour, and the mark of the half of the day. The minutes are ordinary minutes; only how many of them go into an hour differs. An hour of seventy-four minutes therefore counts on past sixty, and one of forty-six minutes stops short of it.

Written	Reads as
4:16 DT	Sixteen minutes into the fifth hour of light. The hours count from 0, so 0:00 DT is sunrise itself.
5:65 NT	Sixty-five minutes into the sixth hour of dark, which is possible because that night hour is longer than sixty minutes.
(14:32)	Ordinary clock time, small and in brackets. It stands beside the hour of the sun exactly as the Gregorian date stands beside the Solaris date, and for the same reason: to help the reader find their footing, not to be the answer.

No full stops are used in the mark: DT and NT, not D . T . For recording a moment in a machine-readable form, the Solaris Date Notation defines the minute of the day on a scale that rests on the epoch of the calendar and on nothing outside it; see SDN v2.0.2.

3. How the hours behave

Because the light and the dark are each cut into twelve, the two kinds of hour trade length through the year. A day hour and a night hour always add up to two hours of the clock. At the equinoxes both stand very close to sixty minutes; at the solstices they are as far apart as the latitude allows.

Where you stand	Equinox 0°	Solstice 90°	Equinox 180°	Solstice 270°
Porto, 41° N	61 min day / 59 night	76 / 44	61 / 59	46 / 74
The equator, 0°	61 / 59	61 / 59	61 / 59	61 / 59
Sydney, 34° S	61 / 59	49 / 71	61 / 59	72 / 48

Lengths rounded to the minute, computed for sunrise and sunset at the standard horizon of -0.833° , which is why the equinox hours are not exactly sixty. The two halves of the world read the table in opposite directions: at Solstice 90° the hours of light are at their longest in Porto and at their shortest in Sydney. On the equator they barely move at all.

Where the sun does not rise or set

Far to the north or south there are days on which the sun does not cross the horizon at all. There are no unequal hours on such a day, and none are invented: the clock says so and ordinary time keeps running. The day then follows standard time: it begins at 0:00 local standard time and has twenty-four hours of sixty minutes. The same holds when no location is known.

4. Where the hours came from

The division of the day into twenty-four parts is Egyptian in origin, and it was not built out of equal pieces. Night was tracked by *decans*, star groups that rose in succession, and twelve of them served to mark the hours of darkness; daylight was then divided into twelve to match.¹ Because the length of daylight changes through the year, so did the hour.

When	What happened
Antiquity	The temporal hour is the hour of daily life across the Greek and Roman world. In midsummer Alexandria a daylight hour ran roughly half as long again as a midwinter one. ¹ Water clocks and sundials were built to follow it, with scales that changed by season.
c. 150 BC	Hipparchus proposes dividing the day into twenty-four <i>equinoctial</i> hours, equal parts taken from the day on which light and dark are already equal. ^{1,2} Astronomy needed a constant unit. Ordinary life did not adopt it, and kept the seasonal hour for well over a thousand years.
14th century	The mechanical clock arrives in Europe. It can be built to keep temporal hours, but it is naturally suited to equal ones: a wheel driven by a falling weight has no way of knowing that the days are getting longer. Fixed hours become common only once these clocks spread. ¹ The equal hour won on mechanism, not on argument.
1873	Japan kept temporal hours throughout the Edo period, with clocks, the <i>wadokei</i> , engineered to run at two different rates for day and night and reset with the seasons. The system was abolished with the calendar reform of 1873. ³
1884	The International Meridian Conference in Washington fixes a prime meridian and a universal day, and standard time zones follow. ⁴ From then on the clock no longer told you where the sun was. It told you which administrative zone you were standing in.

That last step is worth being precise about. The equal hour is an excellent unit and there is nothing wrong with it. What was lost was not accuracy but reference: an hour used to be a fraction of the observer's own daylight, and it became a fraction of a day defined at a distant meridian. Within a single time zone, solar noon can fall well over an hour apart from one edge to the other, and the clock says nothing about it.

5. The clock and the calendar together

The Calendarium Solaris is anchored to the equinox, an observable astronomical moment rather than a historical convention. Solaris Time applies the same principle one level down: the calendar takes its structure from the Earth's orbit, the clock from the Earth's rotation, both read at the sun.

The two meet at the **Anchor Days**. On the equinoxes a day hour and a night hour are almost exactly equal, which is the astronomical fact the anchor day marks. On the solstices they stand at their yearly extreme. The calendar's four turning points are also the four turning points of the clock, and on those days the clock shows it without being told.

6. What is computed, and how

Sunrise, solar noon and sunset are computed with the standard solar position algorithm of the United States National Oceanic and Atmospheric Administration: the declination of the sun and the equation of time, from which the hour angle of the horizon follows. The horizon is taken at 90.833° from the zenith, which allows for half the solar disc and for the usual atmospheric refraction, and is the convention the published tables hold to.

The whole computation is carried out in Coordinated Universal Time and converted for display only at the end. A local clock jumps twice a year in many countries; a sunrise does not. Where the sun does not cross the horizon, the computation answers that no sunrise and no sunset exist, rather than a made-up time.

One engine, in the app and on the website

The same engine runs in Solaris Focus and on this website, carried over line for line, so an hour of the sun read in the app and an hour read in the browser land on the same second.

7. In practice

Part	What it does
Faces	One ring of twenty-four, day and night as two half rings, one ring of twelve, or digital.
Alarms	An alarm set on an hour of the sun is worked out again from sunrise every day, so it moves with the sun instead of standing still while the sun moves. An alarm that has to line up with the rest of the world is set to standard time, and then it does stand still.
Timers	Ask for an hour and you get the hour you are actually in, which is long while the light lasts and short while it does not.
Weather	Given per part of the Solaris day and per hour of the sun, rather than per clock hour.
Other locations	The clock shows the hour of the sun in locations you add, so you can see what part of their day somebody else is in.
Turned off	The whole system can be switched off in one place, and then an hour is simply sixty minutes and nothing is called a sun hour that is not one.
Without a location	No location means no sunrise, and no sun hour is invented. Ordinary hours are shown, and the reason is said.

8. What this document does not claim

No study has ever tested the Solaris clock. Nothing here should be read as a claim that counting in hours of the sun makes anyone healthier. That research does not exist, and it would be dishonest to imply otherwise.

What the published evidence does support is narrower and still worth saying. The intrinsic period of the human circadian pacemaker averages about 24.18 hours, so it has to be reset every day by an external cue.⁵ That cue is light: across tens of thousands of people, the timing of the human clock tracked local solar time rather than local clock time, shifting with longitude inside a single time zone.⁶ A week outdoors under sunlight alone advanced internal timing by about two hours relative to a week under ordinary electric lighting.⁷ The gap between biological and social timing is associated with a higher body mass index independently of sleep duration, and deliberate misalignment in the laboratory reduced leptin, raised glucose and insulin, reversed the daily cortisol rhythm and raised mean arterial pressure.^{8,9} Compared across United States time zone borders, where only the sun differs, a later sunset was associated with less sleep and worse health and earnings outcomes.¹⁰ Even the one-hour shove of daylight saving time is followed by a measurable rise in acute myocardial infarction.^{11,12}

Those are findings about light and timing, not about any particular notation for the hour. What a solar clock can honestly claim is this: it makes the cue visible. If you can see that you are in the ninth hour of light, sunset is not a surprise, and the shape of your own day at your own latitude is in front of you rather than hidden behind a number agreed at a distant meridian.

9. Sources

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