4386 Abbreviated instruction
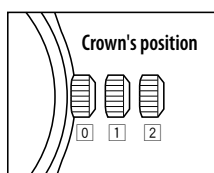
CAMPANOLA

- To see details of specifications and operations, refer to the instruction manual: 📕 4386 instruction manual
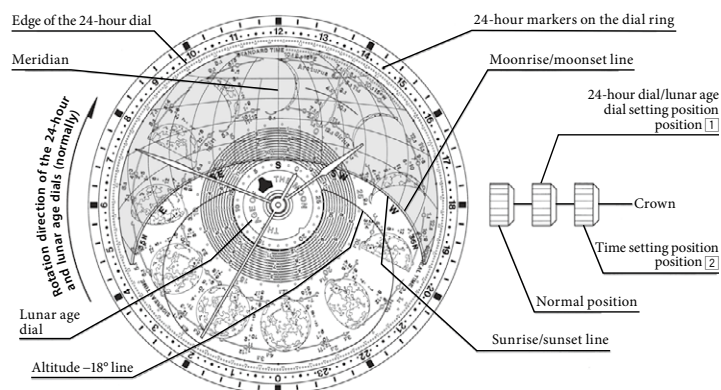
Component identification

24-hour dial
Hour hand
Minute hand
Crown
Second hand
Lunar age dial

Crown's position

| 0 | 1 | 2 |

- Actual appearance may differ from the illustration.

24-hour dial / lunar age dial (lunar age display at 35° N latitude)

Edge of the 24-hour dial
Meridian
Rotation direction of the 24-hour and lunar age dials (normally)
Lunar age dial
Altitude −18° line
24-hour markers on the dial ring
Moonrise/moonset line
24-hour dial/lunar age dial setting position position 1
Crown
Time setting position position 2
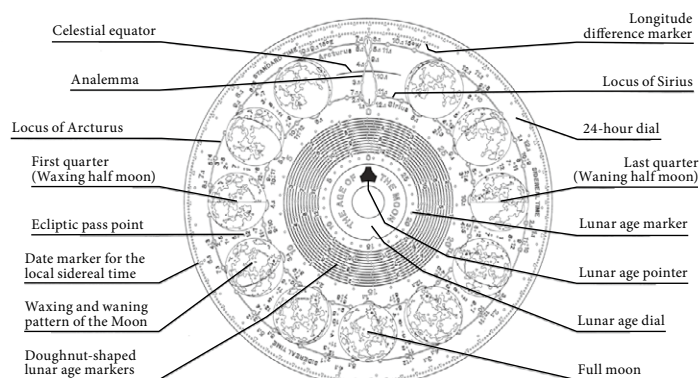Normal position
Sunrise/sunset line

- Distortion of the southern hemisphere is small and full range of celestial sphere where the Sun and Moon pass at 35° N is displayed. (Northern limit of the celestial sphere displaying part overlapping 24-hour dial: Declination +29.25°)

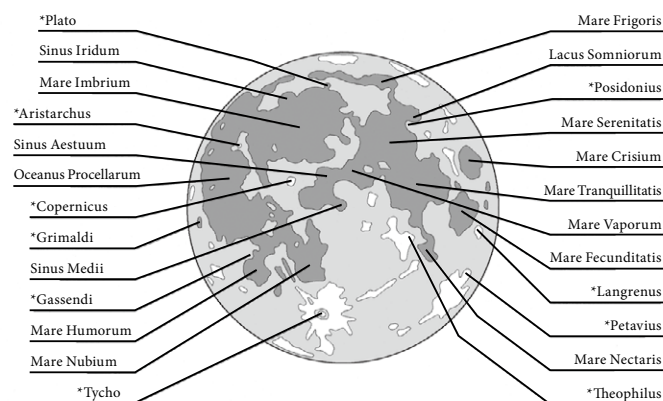## Celestial display range (lunar age display at 35° N latitude)

Declination +29.25°
(Northern limit of display range)
Rotation direction of the celestial sphere
Celestial north pole
Latitude (35°)
Zenith at 35° N
(Out of display range)
Meridian
Horizontal refraction
(Approx. 0.57°)
Altitude line
Celestial equator
Declination −55.57°
(Southern limit of visible range)
Azimuth line
Horizon
Earth

- Horizon is almost equal to the upper edge of the sunrise/sunset line on the dial of the watch.

Illustration of the 24-hour and lunar age dials

Celestial equator
Analemma
Locus of Arcturus
First quarter (Waxing half moon)
Ecliptic pass point
Date marker for the local sidereal time
Waxing and waning pattern of the Moon
Doughnut-shaped lunar age markers
Longitude difference marker
Locus of Sirius
24-hour dial
Last quarter (Waning half moon)
Lunar age marker
Lunar age pointer
Lunar age dial
Full moon

Full moon pattern on the 24-hour dial and place names

*Plato
Sinus Iridum
Mare Imbrium
*Aristarchus
Sinus Aestuum
Oceanus Procellarum
*Copernicus
*Grimaldi
Sinus Medii
*Gassendi
Mare Humorum
Mare Nubium
*Tycho
Mare Frigoris
Lacus Somniorum
*Posidonius
Mare Serenitatis
Mare Crisium
Mare Tranquillitatis
Mare Vaporum
Mare Fecunditatis
*Langrenus
*Petavius
Mare Nectaris
*Theophilus

- *: crater

Setting the time

1. **Pull the crown out to position ☐2 when the second hand points 0 second.**
The second hand stops.

2. **Rotate the crown to set the time.**
- Move the hand 4 or 5 minutes forward and move them back to the right time to set the time more precisely.

3. **Push the crown in to position ☐0 in accordance with a reliable time source to finish the procedure.**
The second hand starts moving.

Setting 24-hour/lunar age dials

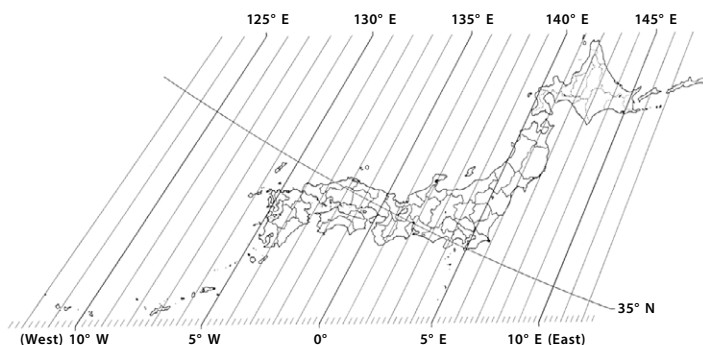**1.** **Find out the lunar age.**
- Look up the lunar age in a newspaper or on the Internet.
- As the lunar age advances by 1 every day, it advances approximately 0.042 every hour.
  For example, if the next day's lunar age is 5.8 (lunar age at noon) and it is 17:00 of the current day, convert 19 hours (from 17:00 to the next 12:00) into 0.8 days (19/24 = approx. 0.8) and subtract the value from 5.8, and you get 5 as the current lunar age.

2. **Check the difference between longitude of the observation point and that of standard time covering the point.**
- From the illustration below, you can find the difference from the longitude of Japan standard time.

3. **Pull the crown out to position ☐1 .**

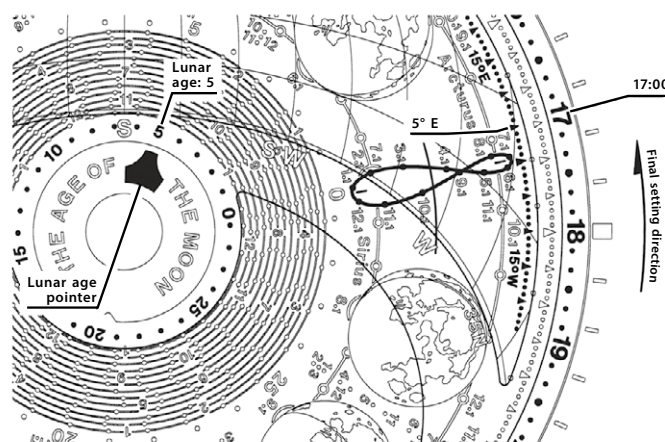**4.** **Rotate the crown to set the lunar age.**
- Rotate the crown to move the lunar age pointer on the lunar age dial to point the value got in step 1.
- Rotate the crown to the direction nearer to the lunar age to set.
  Rotate the crown to the left to increase the lunar age (the 24-hour and lunar age dials turn to the right). Rotate the crown to the right to decrease the lunar age (the 24-hour and lunar age dials turn to the left).

5. **Rotate the crown to align the longitude difference.**
- Align the longitude difference marker corresponding to the difference got in the step 2 with the current time (in 24-hour system) on the 24-hour markers on the dial ring.
- The markers indicate every 5° with ▲ and 1° with ● .
- Align the marker with the current time through the shorter course once, then move it slightly with rotating the crown to the left, and finally adjust its position exactly.
  Rotate the crown to the left to turn the 24-hour and lunar age dials to the right.
  Rotate the crown to the right to turn the 24-hour and lunar age dials to the left.

- Example: When the observation point is 5° east (140°E) from the longitude of Japan Standard Time (135°E), the lunar age is 5 and the current time is 17:00.

Align the first left ▲ (5° to the 15°E direction) from the center ▲ (marker nearest of the analemma) with 17:00 of the 24-hour markers on the dial ring.

When lunar-age indication error becomes larger after setting lunar age, refer to the instruction manual for how to correct it.

6. **Push the crown in to position ☐0 .**

Lunar age display feature

The current lunar age is automatically displayed. The lunar age marker on the 24-hour dial pointed with the lunar age pointer on the lunar age dial indicates the lunar age.
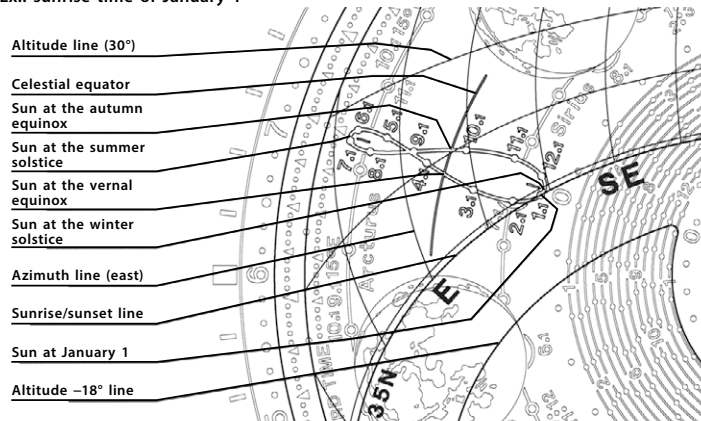
- Eleven average wax/wane patterns of the Moon corresponding to lunar age are displayed on the 24-hour dial.
- You can find a rough shape of the Moon of the day by referring to the wax/wane pattern of the Moon pointed by the lunar age pointer on the lunar age dial. The actual shape of the Moon may be different from the pattern on the 24-hour dial due to inconstancy of motion speed of the Moon or other reasons even if the lunar age is the same.
- The pattern on the Moon is drawn based on the view which takes the origin of the latitude and longitude of the Moon as the center and represents brightness distribution at full moon. It may be different from the actual one in shape or position owing to lunar age, libration of the Moon or other reasons.
- You can find amplitude of tide from the lunar age. Generally, it is a spring tide and tidal range is large around new moon (lunar age: 0) or full moon (lunar age: approx. 15); around half moon (lunar age: approx. 7 or 22) it is a neap tide and tidal range is small.
- You can guess rough ebb and flow from the lunar age dial. The rotation cycle of the lunar age dial is approximately twice of the average cycle of spring and neap tide. It is almost fixed that the direction which the lunar age pointer on the lunar age dial points to at a certain place at low tide in the day of new moon or full moon. It is useful for guessing ebb and flow to remember the direction and its opposite that the lunar age pointer on the lunar age dial points to at low tide in the day of new moon or full moon in a place at which you want to know ebb and flow. However, guessing based on that may rather be different from actual time of low and high tide in the period around neap tide.

Features using the positional indication of the Sun

The dots on the analemma on the 24-hour dial which are numbered from 1.1 to 12.1 show the positions of the Sun at the first day of each month (based on noon of the universal time in an average year). The nearest point to the watch center on the analemma represents the position of the Sun at the winter solstice and the farthest point shows that at the summer solstice. The two nodes of the analemma and the celestial equator (an arc crossing the middle of the analemma) show the positions of the Sun at the vernal and autumnal equinoxes.

- Indication feature of direction and altitude of the Sun
  Azimuth and altitude lines at latitude 35° N (at every 15°) and direction signs are drawn on the transparent dial and you can find the direction and altitude of the Sun all through the year by using them and the analemma on the 24-hour dial.
- Sunrise/sunset determination feature
  The sunrise/sunset line on the transparent dial shows the true altitude of the Sun (approx. −0.84°) when light from upper edge of the Sun (at the average distance in 35° N) reaches the horizon through the atmosphere. The position of the Sun of the day on the analemma is overlapped by the sunrise/sunset line at the time of sunrise/sunset. It is the day while the position of the Sun is above the sunrise/sunset line; It is the night while it is below the line.
- Astronomical twilight determination feature
  Twilight is not good for watching darker celestial bodies. It is better for watching them when the position of the Sun is in the range of the celestial sphere below the line of altitude −18° on the transparent dial. However, a brighter moon is not also good for watching them. Check influence of moonlight also by using the lunar age display feature and the indication feature of direction and altitude of the Moon.

Ex.: sunrise time of January 1

Altitude line (30°)
Celestial equator
Sun at the autumn equinox
Sun at the summer solstice
Sun at the vernal equinox
Sun at the winter solstice
Azimuth line (east)
Sunrise/sunset line
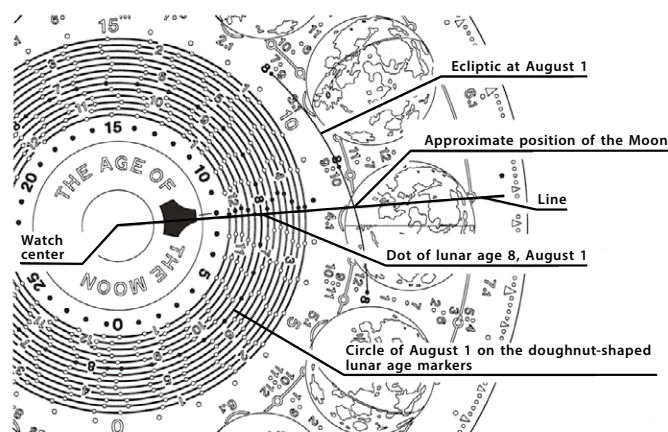Sun at January 1
Altitude −18° line

Features using the positional indication of the Moon

The ecliptic pass points of the first days of each month are indicated with the dots with month numbers 1 - 12 between the patterns of the Moon on the 24-hour dial. The imaginary ellipsoidal figures (not actually drawn) which connect dots of a month and the dot on the analemma of the month represent the ecliptics in the first days of months.
Dots on the doughnut-shaped lunar age markers on the 24-hour dial indicate the day of the month (when supposing the Moon moves on the ecliptic in its average speed) and the direction of the moon from the watch center corresponding to the lunar age.

- Indication feature of direction and altitude of the Moon
  You can find an approximate position of the Moon by using the doughnut-shaped lunar age markers and the position of the ecliptic of the day obtained on the 24-hour dial. Suppose a line from the watch center to the edge through the dot corresponding to the lunar age of the current day on the circle of current month of the day of doughnut-shaped lunar age markers. Next, suppose the ecliptic of the day (ellipsoidal figure) referring to the ecliptic pass points of the first day of the month. The node of the line supposed above and the supposed ecliptic of the day shows the approximate position of the Moon. Read the node through the azimuth/altitude lines on the transparent dial to find the approximate position of the Moon in the celestial sphere.
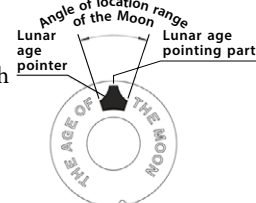
For example, when it is August 1 and the lunar age is 8, suppose a line from the watch center to the edge through the dot of the lunar age 8 on the August 1 circle on the 24-hour dial and the ecliptic of the day obtained from the ecliptic pass points of August 1. The node of the line and the ecliptic is the approximate position of the Moon.

Ecliptic at August 1
Approximate position of the Moon
Line
Watch center
Dot of lunar age 8, August 1
Circle of August 1 on the doughnut-shaped lunar age markers

Read the node through the azimuth/altitude lines on the transparent dial (based on those at 35° N) to find the approximate position of the Moon in the celestial sphere at 35° N.

The actual Moon moves on the moon's path, which has about 5.1° inclination from the ecliptic, in inconstant speed. In addition, considering the distance to the Moon, the size of the Earth affects the apparent location of the Moon: the altitude of the Moon from an actual watching point looks lower than that from the center of the Earth. Use the position of the Moon found only as a rough guide.

The angle of location range of the Moon are displayed by the maximum degree from the watch center, which covers the lunar age pointer on the lunar age dial, including variation range caused with inconstant movement of the Moon or other reasons.

Angle of location range of the Moon
Lunar age pointer
Lunar age pointing part

- Moonrise/moonset determination feature
  The moonrise/moonset line on the transparent dial shows the true altitude of the Moon (approx. +0.38°) when light from the center of the Moon (at the average distance in 35° N) reaches the horizon through the atmosphere. You can execute rough determination of moonrise/moonset by referring to the positions of the moonrise/moonset line and the Moon on the 24-hour dial (obtained with the ecliptic and the doughnut-shaped lunar age markers). The area above the moonrise/moonset line is the moonrise area; the area below the line is the moonset area.

Local sidereal time display feature

The 365 markers on the outmost rim of the 24-hour dial is the day markers for reading the local sidereal time (based on the noon of the universal time in the average year). The ▲ markers represent the 1st, 6th, 11th, 16th, 21st and 26th day of each month and the small ● markers the other days. Convert the day of the month and the time into the universal time and find a marker corresponding to the converted day (based on the noon of the universal time/21:00 of Japan Standard Time), and read the value of the 24-hour markers on the dial ring which the marker points to. The value is the local sidereal time of the average year.

• Add a correction value on the list below to obtain more accurate local sidereal time.

List of correction values of local sidereal time
(Markers on the watch shows the average of years 1950.0 - 2050.0)

Year and month	Correction value	Year and month	Correction value	Year and month	Correction value
Mar. 2016 - Feb. 2017	+2 min.	Mar. 2026 - Feb. 2027	0 min.	Mar. 2036 - Feb. 2037	+3 min.
Mar. 2017 - Feb. 2018	+1 min.	Mar. 2027 - Feb. 2028	−1 min.	Mar. 2037 - Feb. 2038	+2 min.
Mar. 2018 - Feb. 2019	0 min.	Mar. 2028 - Feb. 2029	+2 min.	Mar. 2038 - Feb. 2039	+1 min.
Mar. 2019 - Feb. 2020	−1 min.	Mar. 2029 - Feb. 2030	+1 min.	Mar. 2039 - Feb. 2040	0 min.
Mar. 2020 - Feb. 2021	+2 min.	Mar. 2030 - Feb. 2031	0 min.	Mar. 2040 - Feb. 2041	+3 min.
Mar. 2021 - Feb. 2022	+1 min.	Mar. 2031 - Feb. 2032	−1 min.	Mar. 2041 - Feb. 2042	+2 min.
Mar. 2022 - Feb. 2023	0 min.	Mar. 2032 - Feb. 2033	+2 min.	Mar. 2042 - Feb. 2043	+1 min.
Mar. 2023 - Feb. 2024	−1 min.	Mar. 2033 - Feb. 2034	+2 min.	Mar. 2043 - Feb. 2044	0 min.
Mar. 2024 - Feb. 2025	+2 min.	Mar. 2034 - Feb. 2035	+1 min.	Mar. 2044 - Feb. 2045	+3 min.
Mar. 2025 - Feb. 2026	+1 min.	Mar. 2035 - Feb. 2036	0 min.	Mar. 2045 - Feb. 2046	+2 min.

Indication feature of the locations of Sirius and Arcturus

The two powder blue circles overlapping the waxing and waning moon patterns display the loci of Sirius and Arcturus. Sirius, with an apparent magnitude of −1.5, is the brightest in the stars in the whole celestial sphere excluding the Sun (Bayer designation: α CMa, declination −16° 42′ 58″ and right ascension 6h 45m 09s at the equinox J2000.0). Arcturus, with an apparent magnitude of −0.0, the fourth brightest stars there (Bayer designation: α Boo, declination +19° 10′ 57″ and right ascension 14h 15m 40s at the equinox J2000.0).

Each locus has 72 dots with dates whose center indicates the first, eleventh and twenty-first days of each month (based on the noon of the universal time in the average year). Using the loci and the azimuth/altitude lines on the transparent dial, you can determine rise and set of Sirius and Arcturus at the current time including the current day (using the upper edge of the sunrise/sunset line for determination) and can obtain their direction and altitude in their appearance.

For reference, Vega (apparent magnitude: 0.0, Bayer designation: α Lyr, declination +38° 47′ 01″ and right ascension 18h 36m 56s at the equinox J2000.0), the second brightest star in the northern celestial hemisphere (the fifth in the whole celestial sphere), has a location nearly opposite to Sirius across the watch center, as you can see from its right ascension, and its locus is nearly equivalent to the 24-hour markers on the dial ring. Though out of the range of the azimuth/altitude lines, you can guess the position of Vega through that of Sirius if you know the facts above: positional relationship of the two stars and the locus of Vega.

Ex.: 21:00, March 21 at the standard time longitude