CAMPANOLA

# 取扱説明書

INSTRUCTION MANUAL

CAN18

Thank you for your purchase of this Campanola watch.
Before using the watch, read this instruction manual carefully to ensure correct use.
After reading the manual, store it in a safe place for future reference.

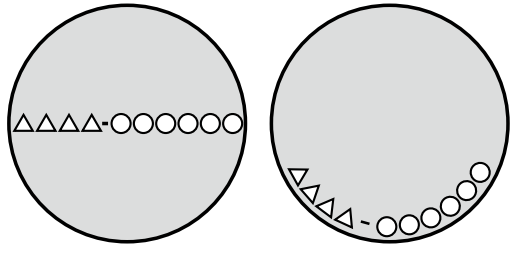
Visit the Citizen website (http://www.citizenwatch-global.com/) to view visual guides for operation of your watch. Some models may be equipped with external features (calculation scale, tachymeter, etc.). Visual guides for operation of such external features can also be found on the website.



**To check the movement number**

A case number–4 alphanumeric characters and 6 or more alphanumeric characters–is engraved on the case back. (Figure on the right)
The first 4 characters of the case number represent the movement number of the watch.
In the example on the right, " △△△△ " is the movement number.

**Engraving position example**




The engraving position may differ depending on watch model.

# Safety precautions (IMPORTANT)

This manual contains instructions that should be strictly followed at all times not only for optimal use, but to prevent any injuries to yourself, other persons or property.
We encourage you to read the entire booklet (especially, pages 48 to 55) and understand the meaning of the following symbols:

▪ Safety advisories are categorized and depicted in this manual as follows:

| | |
|---|---|
| ⚠ **DANGER** | Highly likely to cause death or serious injury. |
| ⚠ **WARNING** | Can cause serious injury or death. |
| ⚠ **CAUTION** | Can or will cause minor or moderate injury or damage. |

▪ Important instructions are categorized and depicted in this manual as follows:

| | |
|---|---|
|  | Warning (caution) symbol followed by instructions that should be followed or precautions that should be observed. |
|  | Warning (caution) symbol followed by prohibited matters. |

# Before using this watch

## ◆ Protective stickers

Be sure to remove any protective stickers that may be on your watch (case back, band, clasp, etc.). Otherwise, perspiration or moisture may enter the gaps between the protective stickers and the parts, which may result in a skin rash and/or corrosion of the metal parts.

## ◆ Band adjustment

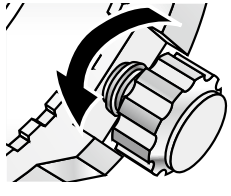
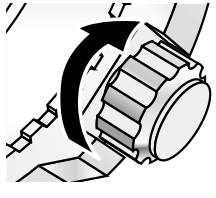
We recommend seeking the assistance of an experienced watch technician for sizing of your watch. If adjustment is not done correctly, the bracelet may unexpectedly become detached leading to loss of your watch or injury. Consult Citizen Owners' Help Desk.

## ◆ How to use a specially designed crown

Some models are equipped with a specially designed crown to prevent accidental operation.

### Screw down crown

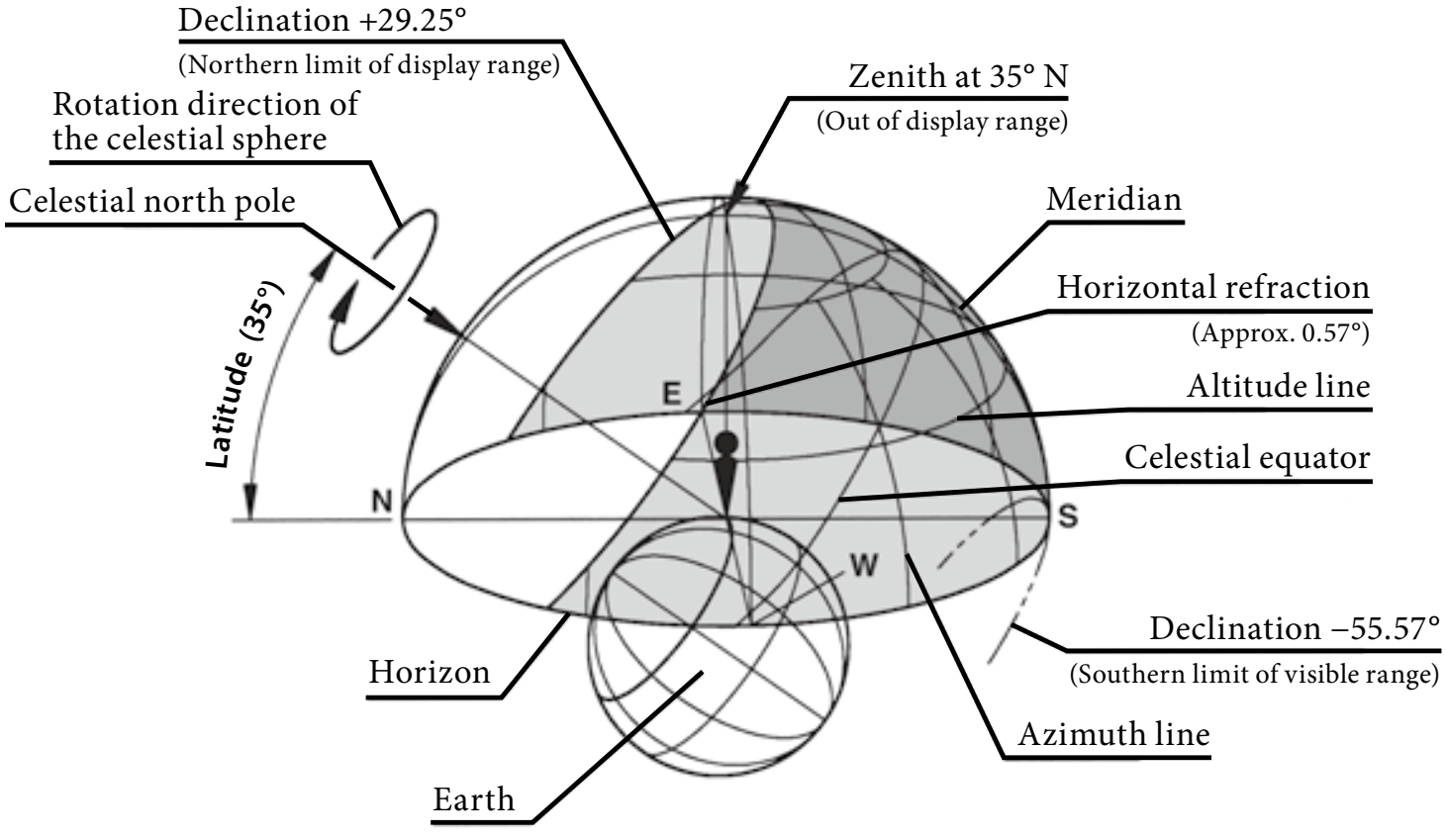
Unlock the crown prior to operate your watch.

| | Unlock | Lock |
|---|---|---|
| **Screw down crown** |  Rotate the crown counterclockwise until it releases from the case. |  Push the crown in to the case. With gentle pressure towards the case, rotate the crown clockwise to secure it to the case. Be sure to tighten firmly. |

# Contents

English

# Lunar age display at 35° N latitude




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

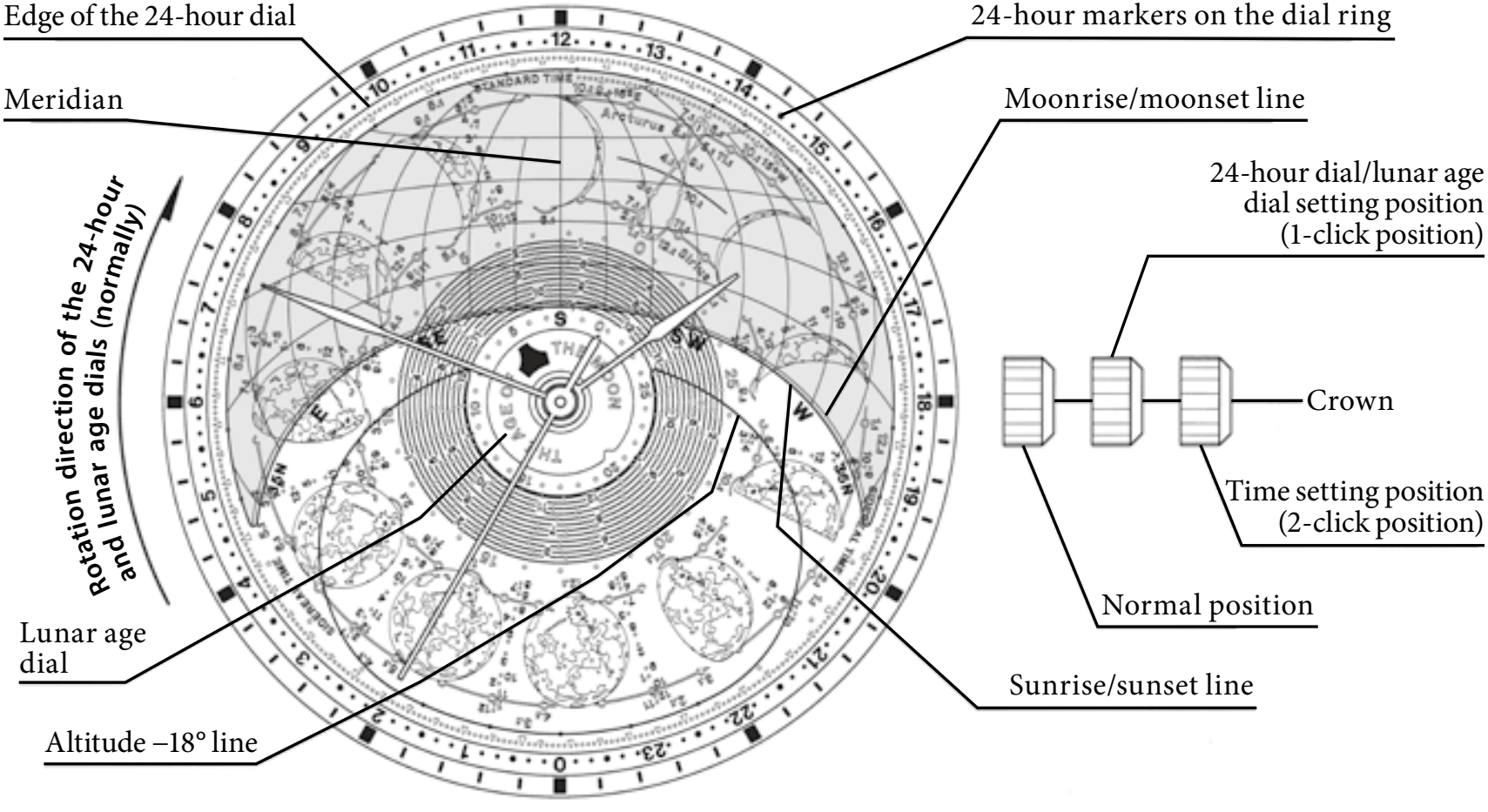
## Celestial display range of CAMPANOLA lunar age watch

* Actual appearance and/or functions may differ from the model illustrated above.

# CAMPANOLA lunar age watch

The CAMPANOLA lunar age is an analog quartz watch which displays positions of the Sun and Moon and lunar age changing gradually with time. The large 24-hour dial, which clearly shows time in a day, and the lunar age dial at the center of the watch show relationship between lunar age and wax and wane of the Moon. The watch is useful for star watching as it provides the following information: direction and altitude of the Sun; approximate direction and altitude of the Moon; local sidereal time; direction and altitude of Sirius and Arcturus; determination of astronomical twilight. In addition, the watch shows time of sunrise and sunset; it is useful also for everyday life.

# Lunar age display at 35° N latitude




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°)

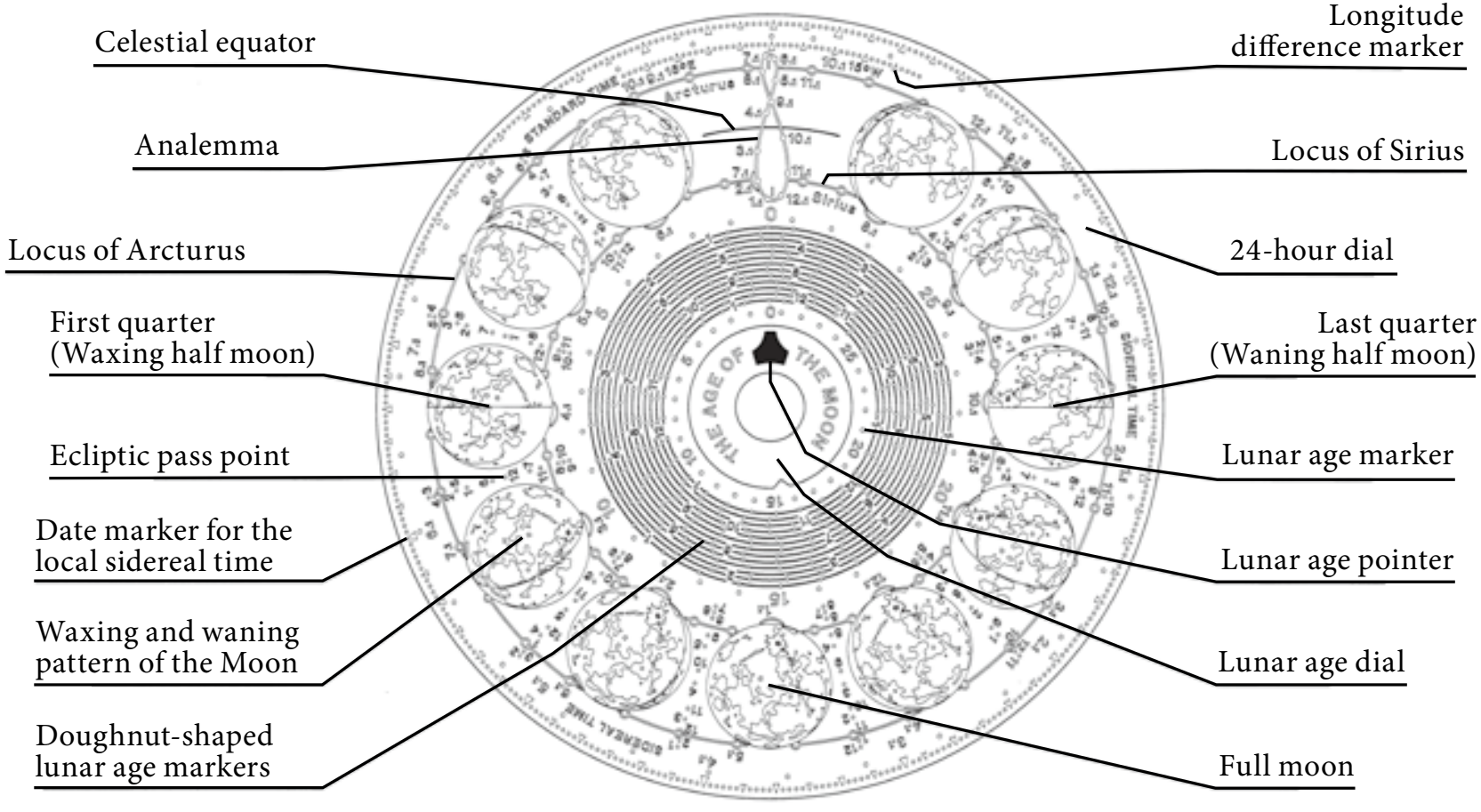
# Main features

- Lunar age display feature with smooth continuous movement and small accumulated error owing to the 24-hour dial, which indicates time in the one-day cycle rotation, and the lunar age dial, which has almost the same rotation cycle as the average cycle of movement of the Moon on the celestial sphere. The figure of eight showing the annual locus of the Sun on the 24-hour dial (analemma) and the direction of the lunar age marker on the lunar age dial show the lunar age and positional relationship of the Sun and Moon and you can see the moon shape easily by referring to the waxing and waning patterns on the former dial.
- Indication feature of direction and altitude of the Sun and sunrise/sunset determination feature, which are useful in everyday life. You can see the direction and altitude of the Sun all through the year and determine sunrise and sunset by using the position of the Sun on the analemma, the azimuth and altitude lines and the sunrise/sunset line on the transparent dial. You can also see sunrise/sunset time.

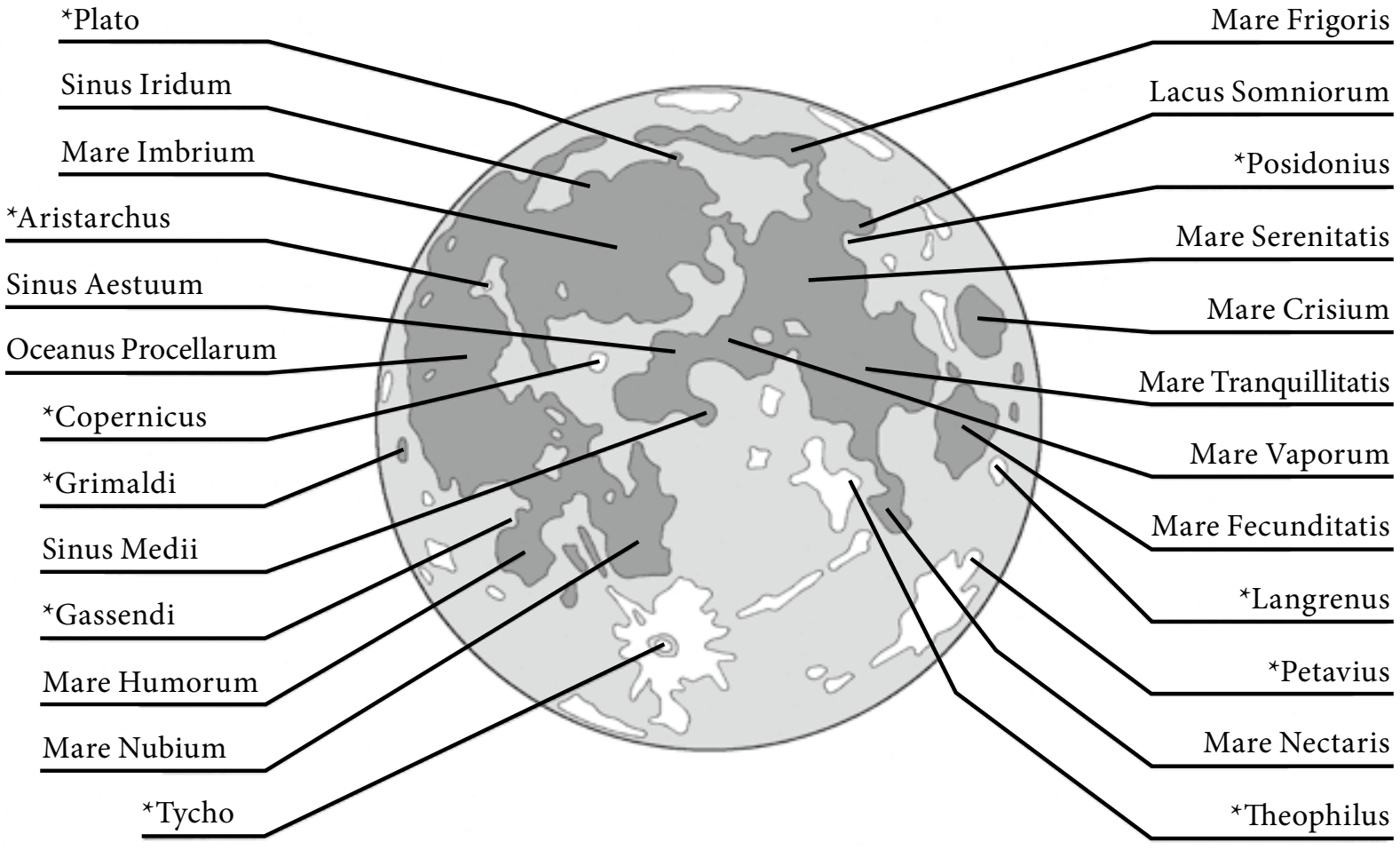
- Astronomical twilight determination feature, which can estimate darkness level of the sky and useful for sky watching. You can also find starting/ending time of astronomical twilight using the altitude –18° line on the transparent dial.
- Indication feature of direction and altitude of the Moon and moonrise/moonset determination feature, which are highly needed for sky watching and useful as a support of astronomical twilight determination. You can see the approximate position of the Moon on the celestial sphere as well as approximate determination of moonrise/moonset by reading the position of the Moon with the 24-hour dial and the moonrise/moonset line on the transparent dial. You can see influence of moonlight by referring to lunar age, in addition.

- Local sidereal time display feature, which is useful for finding constellation. You can find the local sidereal time by reading the 24-hour marker on the dial ring corresponding to the day marker of the current day on the rim of the 24-hour dial.
- Rise/set determination and direction/altitude indication features of Sirius and Arcturus, which are the brightest stars in the southern/northern hemisphere respectively. You can see their direction and altitude as well as rise/set determination by reading their positions in the first, eleventh and twenty-first days of each month on their loci on the 24-hour dial and the azimuth and altitude lines on the transparent dial.

# Illustration of the 24-hour and lunar age dials



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




*: crater

English

# Setting the time and 24-hour/lunar age dials

* Tip for pulling out the crown: If you find it difficult to pull out the crown, do not try to force it. Push the crown back in once and insert the nail of your right middle finger lightly at its neck from the rear cover side rotating it a little to set it to the 1-click position. In the 1-click position, you can perform fast correction of the 24-hour and lunar age dials. To pull out the crown to the 2-click position, hold it between the nails of your right thumb and middle finger and pull it out a little strongly while rotating it slightly. The crown moves to the 2-click position and the second hand stops. You can set the hour and minute hands in the 2-click position. The 24-hour and lunar age dials move in conjunction with the hands.

## ◆ Setting the time

1. **Pull the crown out to the 2-click position as the second hand points 0 second.**
2. **Rotate the crown to set hour and minute hands to the current time.**
   Move the minute hand 4 or 5 minutes forward and return to the correct time when setting it.
3. **Push the crown in to the normal position in accordance with a reliable time source.**

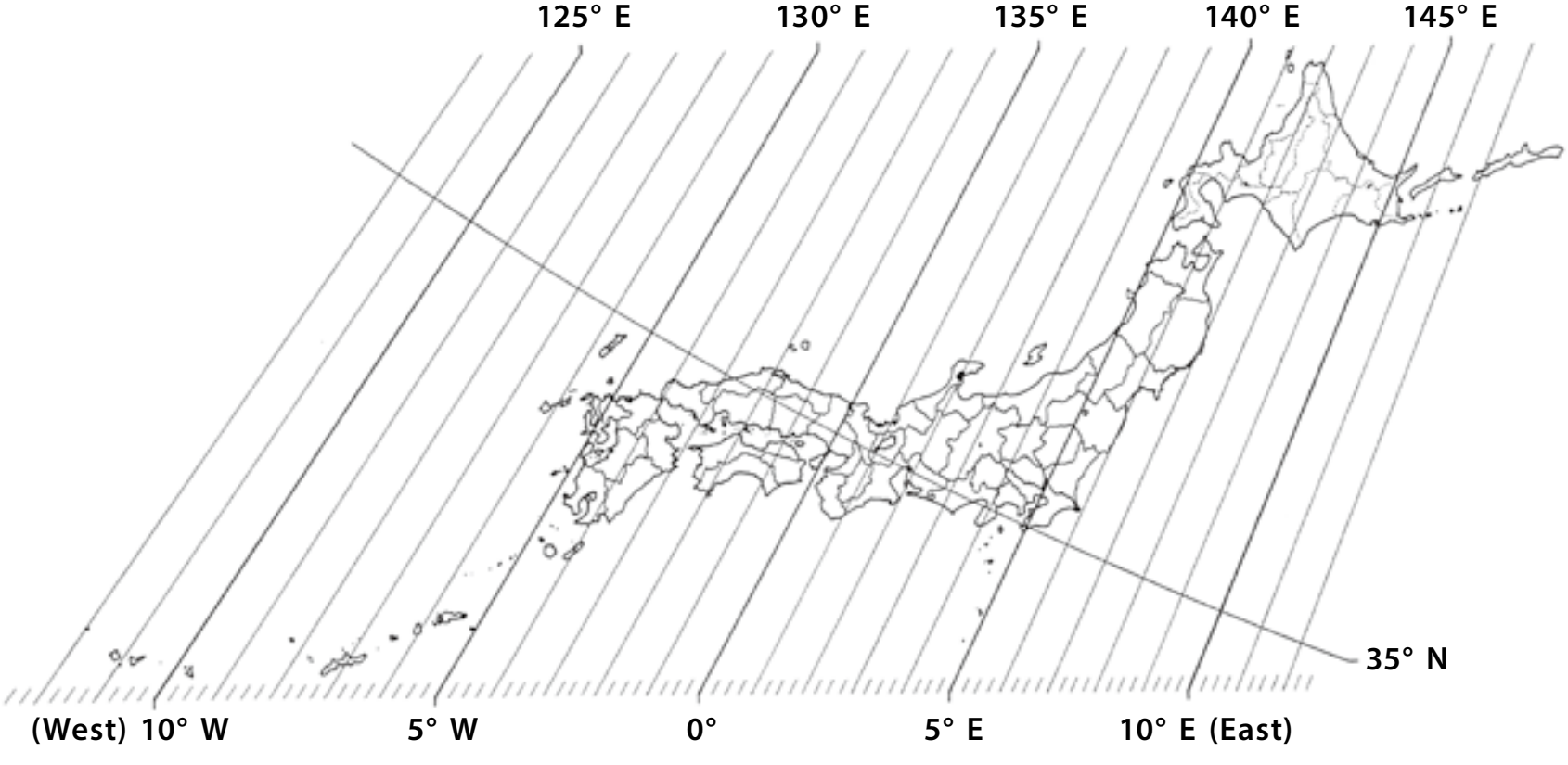
## ◆ Setting the 24-hour/lunar age dials

### 4. Find out the lunar age.

* Look up the next day's lunar age (lunar age at noon) in a newspaper or on the Internet. As the lunar age advances by 1 every day, you can find out the current lunar age by converting hours from current time to the next day's noon into day and subtract the value from the next day's lunar age. 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.

### 5. Check the difference between longitude of the observation point and that of standard time covering the point.

Longitude and difference from the longitude of Japan standard time (135° E)



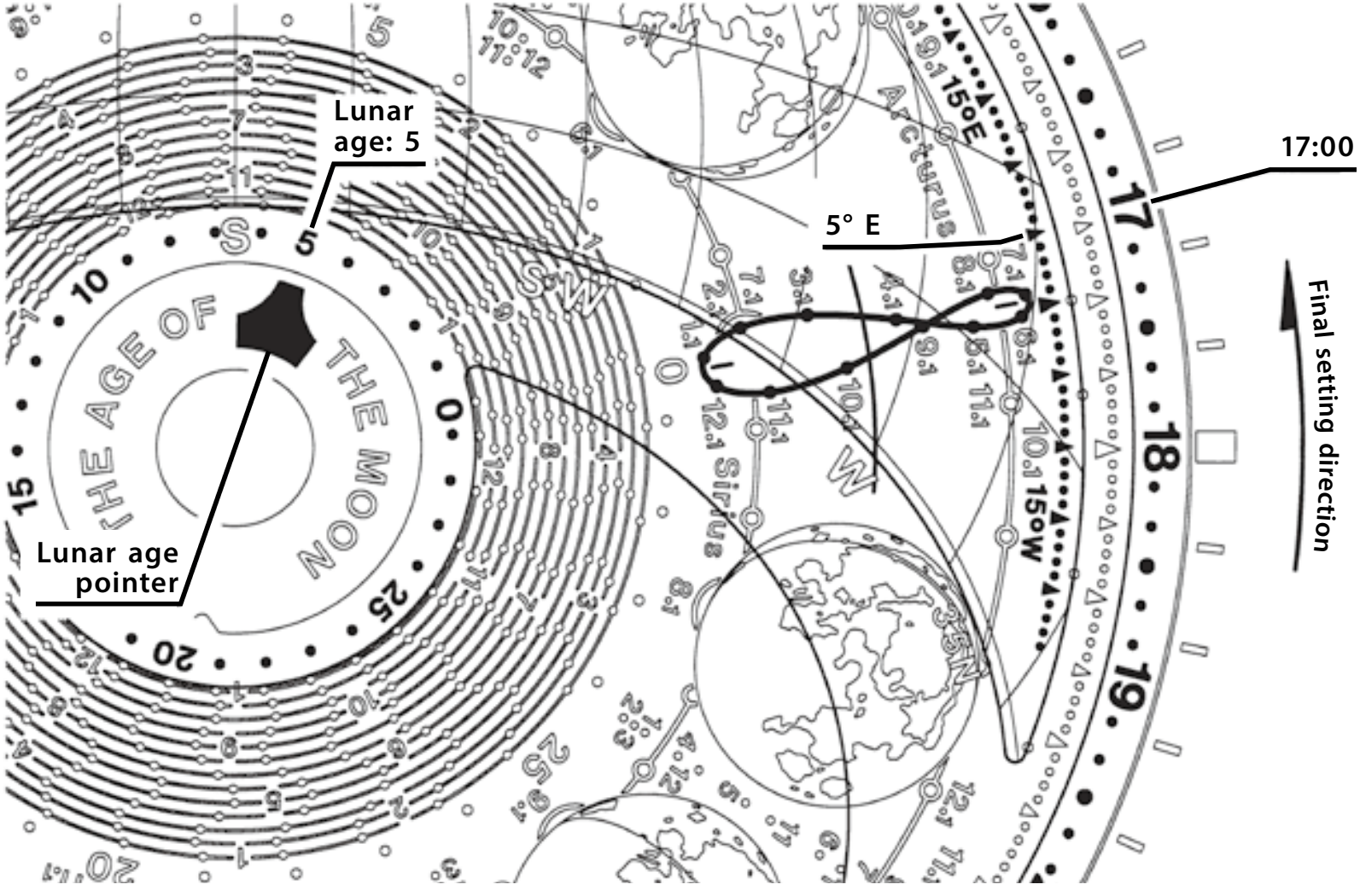
**6. Pull the crown out to the 1-click position and rotate it to move the lunar age pointer on the lunar age dial to point the value got in step 4 on the lunar age makers on the 24-hour dial through the shorter course.**

* Rotate the crown to the left to increase the lunar age (the 24-hour and lunar age dials turn to the right). Rotate it to the right to decrease the age (the dials turn to the left).

**7. Rotate the crown to align the longitude difference marker corresponding to the difference got in the step 5 with the current time (in 24-hour system) on the 24-hour markers on the dial ring.**
**The longitude difference markers exist just above the analemma on the 24-hour dial. The makers 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 with rotating the crown to the right (the 24-hour and lunar age dials turn to the left).**

For example, if 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, with rotating the crown to the right (the 24-hour and lunar age dials turn to the left) at last.

**8. Push the crown in to the normal position.**


Lunar age: 5
Lunar age pointer
5° E
17:00
Final setting direction
THE AGE OF THE MOON
Arcturus
Sirius

* Follow the procedure below to make lunar-age indication more accurate corresponding to the range of error if lunar-age indication error becomes larger after setting lunar age in step 6 since the turning degree of the 24-hour dial in step 7 is very large.

**Extra note: procedure to make lunar-age indication more accurate**

- Confirm that the 24-hour dial is at the position to set and the value of the lunar age pointed by the lunar age pointer on the lunar age dial is ±0.5 to the value to set and read the first indication error. “+” means the lunar age goes forward of the correct value; “-” means it goes behind of that.
- Pull the crown out to the 1-click position.
- Adjust the 24-hour and lunar age dials at the same time by applying the rotation number and direction corresponding to the first indication error read above which can be chosen from the list ① or ② on page 24 (methods in ① is recommended as they put less stress to the watch adjustment mechanism).

- Rotate the crown to the right finally (the 24-hour and lunar age dials turn to the left) to adjust the 24-hour dial exactly.
- Push the crown in to the normal position.

* The lunar age indication error may become larger after passing new moon as the motion of the Moon is not in constant speed and its waxing and waning cycle may be longer or shorter. Though you can adjust lunar age indication after every new moon applying operation on the list ① or ②, avoid every-new-moon adjustment as far as possible. Lunar age is not more than auxiliary element to know status of the Moon and its finer value is not so significant and the adjustment put extra stress to watch adjustment mechanism.
* This watch displays the lunar age based on continuous moving indication method in 29.52-day cycle, which is near the synodic month, average cycle of wax and wane (see page 47). The method causes smaller accumulated error than intermittent moving indication method in 29.5-day cycle, which is used for ordinary lunar-age indication, and the lunar age indication error rarely exceeds 1 until the next battery replacement if the lunar age is almost exactly set at the first setting.

## ① Method to adjust the lunar age indication error within ±0.24 (recommended)

| First indication error | Movement of the 24-hour dial | Adjustment degree | Indication error after adjustment |
|---|---|---|---|
| −0.5 to −0.24 | Rotate 30 times to the right | +0.48 | −0.02 to +0.24 |
| −0.24 to +0.24 | None | | |
| +0.24 to +0.5 | Rotate 30 times to the left | −0.48 | −0.24 to +0.02 |

## ② Method to adjust the lunar age indication error within ±0.18

| First indication error | Movement of the 24-hour dial | Adjustment degree | Indication error after adjustment |
|---|---|---|---|
| −0.5 to −0.3 | Rotate 30 times to the right | +0.48 | −0.02 to +0.18 |
| −0.3 to −0.26 | Rotate 89 times to the right | +0.44 | +0.14 to +0.18 |
| −0.26 to −0.22 | Rotate 118 times to the left | +0.08 | −0.18 to −0.14 |
| −0.22 to −0.18 | Rotate 59 times to the left | +0.04 | −0.18 to −0.14 |
| −0.18 to +0.18 | None | | |
| +0.18 to +0.22 | Rotate 59 times to the right | −0.04 | +0.14 to +0.18 |
| +0.22 to +0.26 | Rotate 118 times to the right | −0.08 | +0.14 to +0.18 |
| +0.26 to +0.3 | Rotate 89 times to the left | −0.44 | −0.18 to −0.14 |
| +0.3 to +0.5 | Rotate 30 times to the left | −0.48 | −0.18 to +0.02 |

# 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 (see page 47) 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 (page 25) and the indication feature of direction and altitude of the Moon (pages 30 - 34).

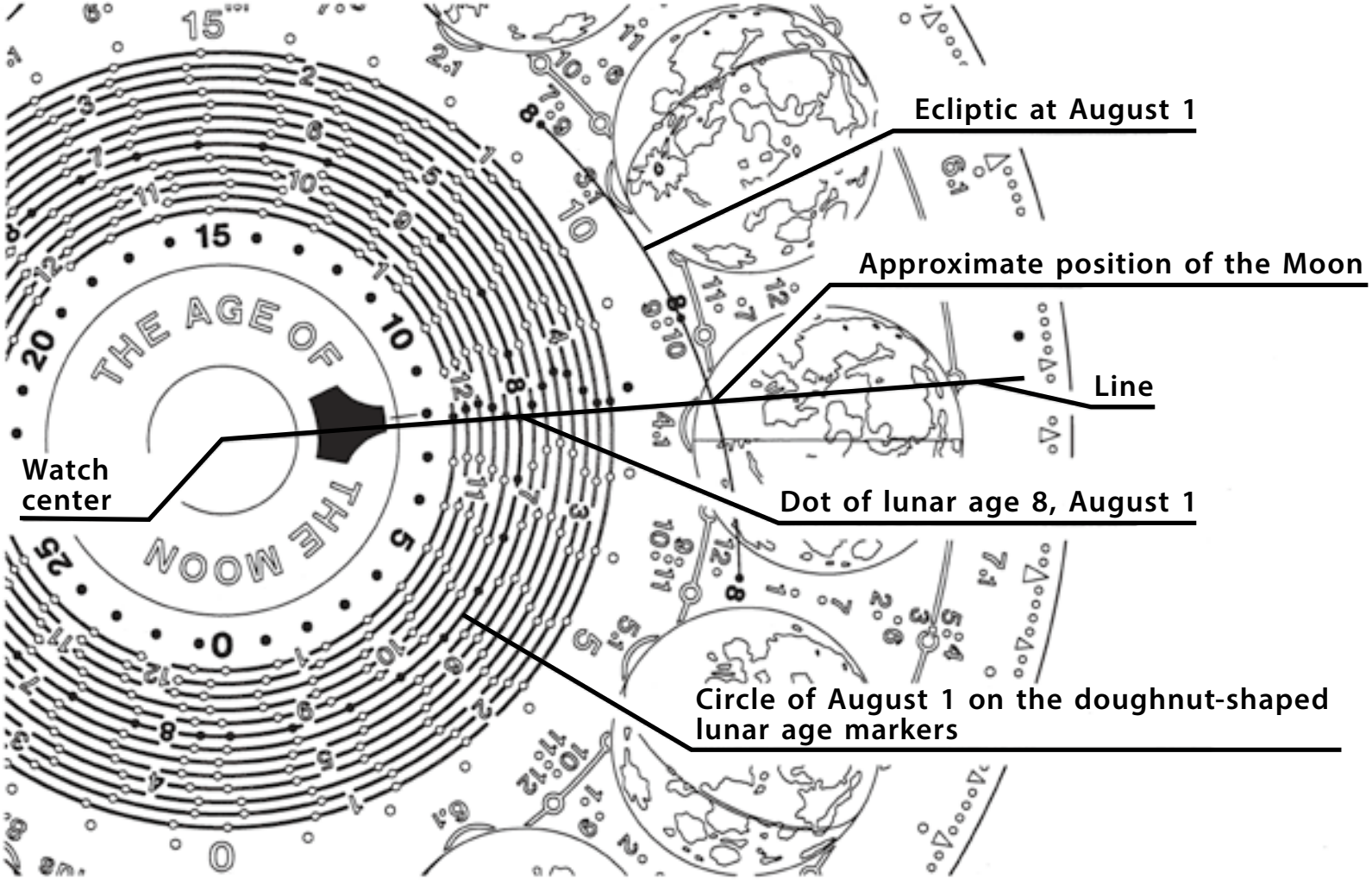
## Ex.: sunrise time of January 1

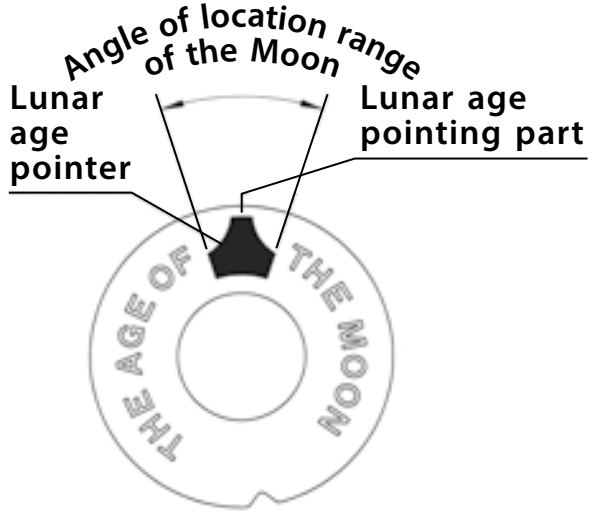
# Features using the positional indication of the Moon

* 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
THE AGE OF THE MOON




* 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.

English

- 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, 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 maker 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

(Makers 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. |

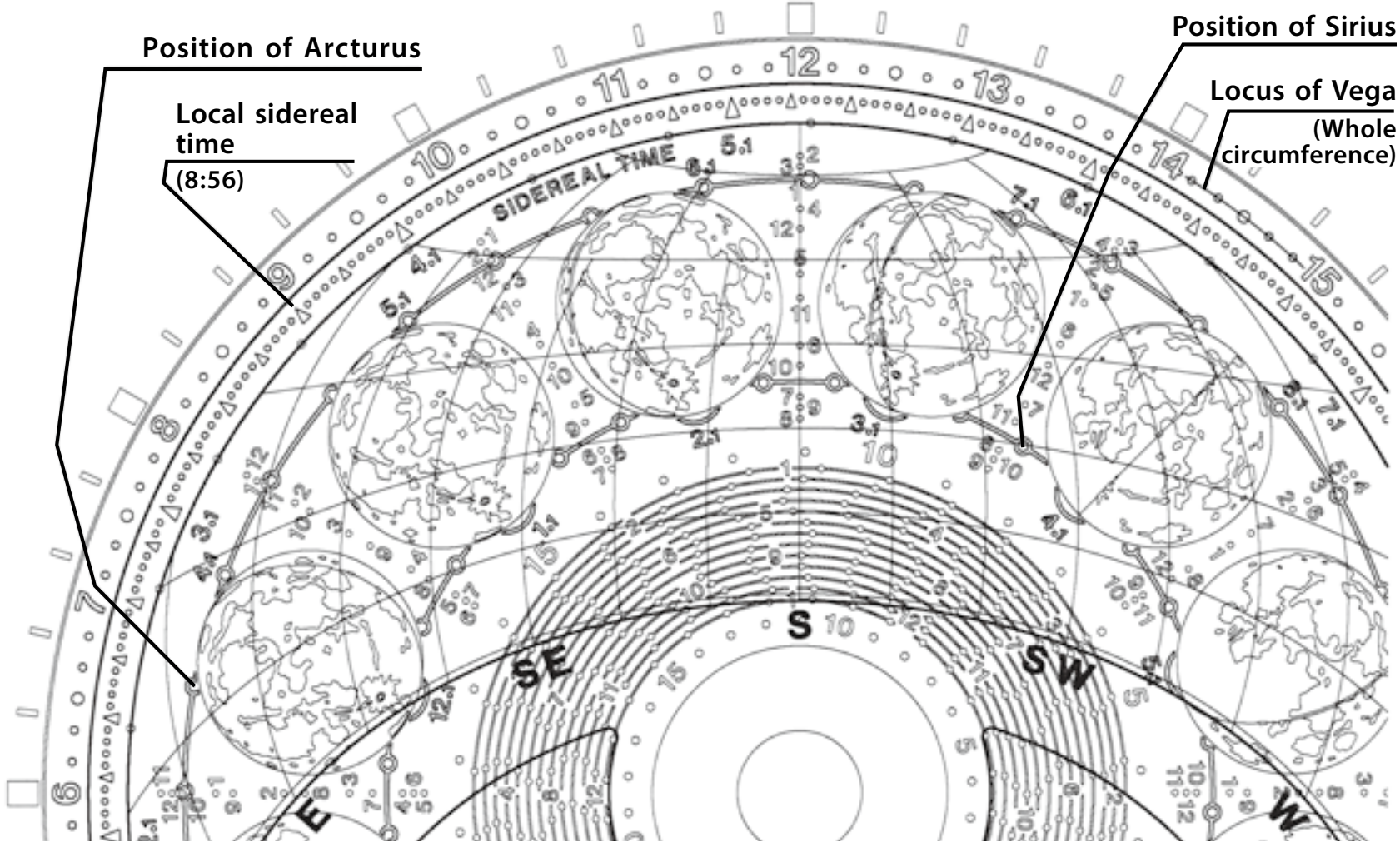
# Indication feature of the locations of Sirius and Arcturus

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



# Brief explanation of astronomical terms

**Celestial sphere**

This is an imaginary sphere used for displaying the visible positions of celestial objects. The center is the observation point and the radius is infinite. However, when as a figure, it is drawn as a finite one seen from the outside.

**Zenith**

This is the point where a line drawn vertically above (direction of gravity) the point of observation intersects the celestial sphere. It is the point on the celestial sphere that is directly above the point of observation. This lunar age watch does not have the zenith (based on 35° N) as the display range of the celestial sphere (display range of the azimuth/altitude lines).

**Horizon**

This is the intersecting line between the celestial sphere and the plane that is perpendicular to the vertical line (direction of gravity) that includes the point of observation. The horizon (apparent altitude 0°, true altitude approx. −0.57°) is not displayed on the transparent dial of this lunar age watch. Instead, two lines are drawn: the thick one is the sunrise/sunset line (true altitude approx. −0.84°) and the thin one near above that is the moonrise/moonset line (true altitude approx. +0.38°).

**Celestial north pole**

When an imaginary line through the earth's axis is extended, it intersects the celestial sphere at two points. Celestial north pole is one of the points that can be observed from the northern hemisphere. The other point that can be observed from the southern hemisphere is called the celestial south pole.

**Meridian**

On the line where the celestial sphere meets the plane that includes the celestial north pole, the zenith and the celestial south pole, this is the area that is higher than the horizon. Within this, the area that can be used to read the hour angle starting point or local sidereal time is the range from the celestial pole that is visible (celestial north pole in the case of the northern hemisphere), through the zenith and toward the opposite celestial pole (celestial south pole in the case of the northern hemisphere) until it reaches the horizon. When it needs to be specifically distinguished from the north-south azimuth line on the earth's surface it is called the “celestial meridian”, but “meridian” alone when used in astronomical observation is usually understood to mean the meridian on the celestial sphere.

**Celestial equator**

This is the intersecting line between the celestial sphere and the plane that includes the point of observation, perpendicular to the earth's axis.

## Ecliptic

The sun's mean path on the celestial sphere. It is inclined by approximately 23.4° relative to the celestial equator. The ecliptic pass points in the first days of the months are displayed on the 24-hour dial.

## Vernal equinoctial point

Of the two intersections between the ecliptic and the celestial equator, this is the point that the sun passes through as it moves from the south side of the celestial equator to the north side. The other intersection is the autumnal equinoctial point. The vernal equinox and the autumnal equinox occur when the center of the sun passes through these points.

## Declination and right ascension

Declination and right ascension determined by using the celestial equator and the vernal equinoctial point as a standard in order to describe positions on the celestial sphere. The declination is 0° on the celestial equator, and it is measured as far as +90° north of the celestial equator (celestial north pole) and -90° south (celestial south pole). The right ascension is 0° above the vernal equinoctial point, and it is measured as it turns to the east as far as 359° 59' 59".9… Usually, instead of degrees, minutes and seconds, the value for right ascension is converted to 0h - 23h 59m 59.9…s with 15° = 1 hour.

## Celestial latitude and celestial longitude

The latitude and longitude that are determined by using the ecliptic and vernal equinoctial point as the standard, in order to describe positions on the celestial sphere. The celestial latitude is 0° on the ecliptic, and it is measured as far as +90° north of the celestial equator (ecliptic north pole) and -90° south (ecliptic south pole). The celestial longitude is 0° above the vernal equinoctial point, and it is measured as it turns to the east as far as 359° 59' 59".9…

## The moon's path

The moon's transit as seen from the center of the earth on the celestial sphere. It is inclined by approximately 5.1° relative to the ecliptic. The intersection between the moon's path and the ecliptic moves on the ecliptic relative to the vernal equinoctial point in a cycle of approximately 18.6 years. However, when considering that the inclination angle between the moon's path and the ecliptic is relatively small, the moon's path can be seen as being approximately on the ecliptic.

## Local sidereal time

This is the angle (vernal equinoctial point hour angle) measured while turning to the west, from the starting point of the meridian of the observation point to the vernal equinoctial point. Instead of degrees, minutes and seconds, it is converted into hours, minutes and seconds (0h - 23h 59m 59.9…s) with 15° = 1 hour. You can get the local sidereal time by finding the one corresponding to the current day from the date markers for the local sidereal time (based on the noon of the universal time in the average year) on the rim of the 24-hour dial and reading the 24-hour marker on the dial ring pointed by the date marker of the current day.

## Hour angle

With the meridian as the starting point, this is the angle measured while turning to the west as far as the target celestial object (or point). Usually, the hour angle is also expressed in hours, minutes and seconds instead of degrees, minutes and seconds, converted with 15° = 1 hour. Also, celestial objects on the east side may be measured by turning east from the meridian and expressed with a negative value (–).

## Atmospheric refraction

This is the phenomenon and the value where the refraction caused by the atmosphere of the earth causes the apparent position of the celestial body to appear higher than its actual position. The refraction has been corrected for the altitude lines, including the sunrise/sunset line and moonrise/moonset line, which are displayed on the transparent dial. The refraction amount of celestial objects (approx. 0.57°) that appear to be on the horizon is called the horizontal refraction.

## Astronomical twilight

Twilight is the period after sunset or before sunrise when the sun's afterglow or pre-glow is in the sky and appears as a half-light. In particular, the period when the sun's altitude is -12° to -18° (18° under the horizon) is called the astronomical twilight. If the sky is clear, when the astronomical twilight finishes (or before it starts), stars of magnitude 6 can be seen near the zenith. On this watch, the –18° altitude line is displayed on the transparent dial with 35°N latitude as the standard, to determine the astronomical twilight.

| | |
|---|---|
| **New moon** | This is the phenomenon and the time when the celestial longitude of the moon is equal to the celestial longitude of the sun. |
| **First quarter** | This is the phenomenon and the time when the celestial longitude of the moon is 90° greater (or 270° smaller) than the celestial longitude of the sun. |
| **Full moon** | This is the phenomenon and the time when the celestial longitude of the moon is 180° greater (or 180° smaller) than the celestial longitude of the sun. |
| **Last quarter** | This is the phenomenon and the time when the celestial longitude of the moon is 270° greater (or 90° smaller) than the celestial longitude of the sun. |

**Lunar age**

This is the time expressed in days that have passed since the new moon. For example, “lunar age 5” means that 5 days have passed since the moment of the previous new moon. The lunar age marker on the 24-hour dial pointed with the lunar age pointer on the lunar age dial indicates the lunar age.

**Synodic month**

This is the average phase cycle of the moon, which is approximately 29.530589 days.

**Libration of the Moon**

The phenomenon that the center of the moon surface facing the observer librates periodically around the average position. Consequently, about 59 % of the whole moon surface may be observed from the Earth.

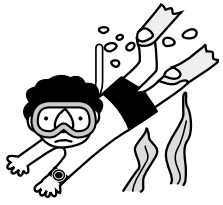
# Precautions

## ⚠ WARNING Water Resistance

- Refer to the watch dial and the case back for the indication of the water resistance of your watch. The following chart provides examples of use for reference to ensure that your watch is used properly. (The unit "1bar" is roughly equal to 1 atmosphere.)
- WATER RESIST(ANT) ××bar may also be indicated as W.R.××bar.
- Non-water resistant models are not designed to come into contact with any moisture. Take care not to expose a watch with this rating to any type of moisture.
- Water resistance for daily use (to 3 atmospheres) means the watch is water resistant for occasional accidental splashing.

| Name | Indication<br>Dial or Case back | Specification |
|---|---|---|
| Non-water resistant watch | — | Non-water resistant |
| Everyday-use water resistant watch | WATER RESIST(ANT) | Water resistant to 3 atmospheres |
| Upgraded everyday-use water resistant watch | WATER RESIST(ANT) 5 bar | Water resistant to 5 atmospheres |
| | WATER RESIST(ANT) 10/20 bar | Water resistant to 10 or 20 atmospheres |

- Upgraded water resistance for daily use (to 5 atmospheres) means that the watch may be worn while swimming, but is not to worn while skin diving.
- Upgraded water resistance for daily use (to 10/20 atmospheres) means that the watch may be worn while skin diving, but not while scuba or saturated diving using helium gas.

| | Water-related use | | | | |
|---|---|---|---|---|---|
| |  Minor exposure to water (washing face, rain, etc.) |  Swimming and general washing work |  Skin diving, marine sports |  Scuba diving using an air tank |  Operate the crown or button when the watch is wet |
| | **NO** | **NO** | **NO** | **NO** | **NO** |
| | **OK** | **NO** | **NO** | **NO** | **NO** |
| | **OK** | **OK** | **NO** | **NO** | **NO** |
| | **OK** | **OK** | **OK** | **NO** | **NO** |

English

## ⚠ CAUTION To Avoid Injury

- Be particularly careful when wearing your watch while holding a small child, to avoid injury.
- Be particularly careful when engaged in strenuous exercise or work, to avoid injury to yourself and others.
- Do NOT wear your watch while in a sauna or other location where your watch may become excessively hot, since there is the risk of burns.
- Be careful when putting on and taking off your watch, since there is a risk of damaging your fingernails, depending on the manner in which the band is fastened.
- Take off your watch before going to bed.

## ⚠ CAUTION Precautions

- Always use the watch with the crown pushed in (normal position). If the crown is of the screw lock-type, make sure it is securely locked.
- Do NOT operate the crown or any push buttons when the watch is wet. Water may enter the watch causing damage to vital components.
- If water enters the watch or the watch fogs up and does not clear up even after a long time, consult your dealer or Authorized Service Center for inspection and/or repair.

- Even if your watch has a high level of water resistance, please be careful of the following.
  - If your watch is immersed in sea water, rinse thoroughly with fresh water and wipe with a dry cloth.
  - Do not pour water from a tap directly onto your watch.
  - Take off your watch before taking a bath.
- If seawater enters the watch, place the watch in a box or plastic bag and immediately take it in for repair. Otherwise, pressure inside the watch will increase, and parts (crystal, crown, push button, etc.) may come off.

## ⚠ CAUTION When Wearing Your Watch

### <Band>

- Leather, genuine skin and rubber (urethane) bands will deteriorate over time due to perspiration, body oils and dirt. Be sure to replace the band periodically.
- The durability of a leather band may be affected when wet (fading, peeling of adhesive), owing to the properties of the material. Moreover, wet leather may cause a rash.
- It is recommended to take off the watch if it gets wet, even if the watch itself is water resistant.
- Do not wear the band too tightly. Try to leave enough space between the band and your skin to allow adequate ventilation.
- The rubber (urethane) band may be stained by dyes or soil present in or on clothing or other accessories. Since these stains may not be removable, caution is required when wearing your watch with items that tend to easily transfer color (articles of clothing, purses, etc.). In addition, the band may be deteriorated by solvents or moisture in the air. Replace with a new one when it has lost elasticity or become cracked.

- Please request adjustment or repair of the band in the following cases:
  - You notice an abnormality with the band due to corrosion.
  - The pin of the band is protruding.
- We recommend seeking the assistance of an experienced watch technician for sizing of your watch. If adjustment is not done correctly, the bracelet may unexpectedly become detached leading to loss of your watch or injury.
  Consult Citizen Owners' Help Desk.

## <Temperature>

- The watch may stop or the function of the watch may be impaired in extremely high or low temperature. Do not use the watch in places where the temperature is outside the operating temperature range as stated in the specifications.

## <Magnetism>

- Analog quartz watches are powered by a step motor that uses a magnet. Subjecting the watch to strong magnetism from the outside can cause the motor to operate improperly and prevent the watch from keeping time accurately.
  Do not allow the watch to come into close proximity to magnetic health devices (magnetic necklaces, magnetic elastic bands, etc.) or the magnets used in the latches of refrigerator doors, clasps used in handbags, the speaker of a cell phone, electromagnetic cooking devices and so on.

## <Strong Shock>

- Avoid dropping the watch or subjecting it to other strong impact. It may cause malfunctions and/or performance deterioration as well as damage to the case and bracelet.

## <Static Electricity>

- The integrated circuits (IC) used in quartz watches are sensitive to static electricity. Please note that the watch may operate erratically or not at all if exposed to intense static electricity.

## <Chemicals, Corrosive Gasses and Mercury>

- If paint thinner, benzene or other solvents or products containing these solvents (including gasoline, nail-polish remover, cresol, bathroom cleaners and adhesives, water repellent, etc.) are allowed to come into contact with the watch, they may discolor, dissolve or crack the materials. Be careful when handling these chemicals. Contact with mercury such as that used in thermometers may also cause discoloration of the band and case.

## <Protective Stickers>

- Be sure to remove any protective stickers that may be on your watch (case back, band, clasp, etc.). Otherwise, perspiration or moisture may enter the gaps between the protective stickers and the parts, which may result in a skin rash and/or corrosion of the metal parts.

## ⚠ WARNING Handling of the Battery

- If the battery should happen to be removed from the watch, keep it out of the reach of small children.
- In the event a battery is swallowed, immediately consult a physician.

## ⚠ CAUTION Battery Replacement

- Always be sure to select a battery of the correct specifications when replacing the battery.

## ⚠ CAUTION Always Keep Your Watch Clean

- Rotate the crown while it is pressed in fully and press the buttons periodically so they do not become stuck due to accumulations of foreign matter.
- The case and band of the watch come into direct contact with the skin in the same manner as undergarments. Corrosion of the metal or unnoticed soiling such as that caused by perspiration and dirt can soil sleeves and other portions of clothing. Keep your watch clean at all times.
- The case and band of the watch come into direct contact with the skin. If you think there is something wrong, discontinue wearing the watch immediately and consult your physician. In the case of accumulation of sweat or dirt on a metal band or case, clean thoroughly using a brush and neutral detergent. In the case of a leather band, wipe clean using a dry cloth.
- Leather bands may become discolored by perspiration or dirt. Always keep your leather band clean by wiping with a dry cloth.

## Caring for Your Watch

- Wipe any dirt or moisture such as perspiration from the case and crystal with a soft cloth.
- For a metallic, plastic or rubber (urethane) watchband, wash any dirt off with water. Remove the small amounts of dirt trapped between the crevices of the metallic band with a soft brush.
- For a leather band, wipe off dirt using a dry cloth.
- If you will not be using your watch for an extended period of time, carefully wipe off any perspiration, dirt or moisture and store in a proper location, avoiding locations subject to excessively high or low temperatures and high humidity.



### <When Luminous Paint is used for your watch>

The paint on the dial and hands helps you with reading the time in a dark place. The luminous paint stores light (daylight or artificial light) and glows in a dark place. It is free from any radioactive substance or any other material harmful to a human body or environment.

- The light emission gradually becomes weaker as time passes.
- The duration of the light ("glow") will vary depending on the brightness, types of and distance from a light source, exposure time, and the amount of the paint.
- The paint may not glow and/or may dissipate quickly if exposure to light was not sufficient.

# Specifications

| | |
|---|---|
| **Model** | 4386 |
| **Crystal frequency** | 32,768 Hz (Hz: vibrations per second) |
| **Timekeeping accuracy** | Average monthly accuracy: ±20 seconds when worn at normal operating temperatures between +5°C (41°F) and +35°C (95°F) |
| **Operating temperature range** | –10°C (14°F) to +60°C (140°F) |
| **Additional functions** | • Lunar age display feature<br>Rotation cycle of the 24-hour dial: 24 hours<br>Lunar age dial rotary tooth ratio: 713/738 rotations per day<br>Lunar age dial rotation cycle: Approx. 24 hours, 50 minutes, 29 seconds<br>Rotation direction of the 24-hour and lunar age dials: both right (under normal circumstances)<br>Lunar age display cycle: 29.52 days |

| | |
|---|---|
| **Additional functions** | • Indication feature of direction and altitude of the Sun; Sunrise/sunset determination feature<br>• Indication feature of direction and altitude of the Moon; moonrise/moonset determination feature<br>• Indication feature of direction and altitude of Sirius and Arcturus<br>• Local sidereal time display feature<br>• Astronomical twilight determination feature |
| **Battery** | 1 small silver-oxide battery 280-39 (SR626SW) |
| **Battery lifetime** | Approx. 3 years |

* Specifications and contents of this booklet are subject to change without prior notice.