
TELLURIUM
JOHANNES KEPLER



THE TRILOGY OF TIME

Tellurium Johannes Kepler





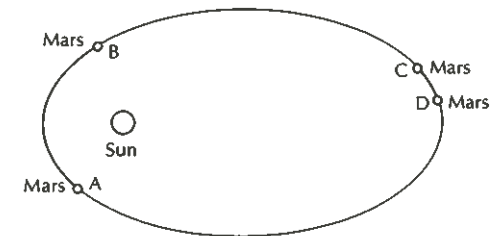
Johannes Kepler, 1571 - 1630

JOHANNES KEPLER

Mathematician and astronomer

Johannes Kepler developed a completely new model of the solar system, based on a relationship between the orbits of the planets and the five regular or platonic elements of geometry. He sent the Danish astronomer Tycho Brahe a copy of his work in the hope that the Dane's observation would confirm his hypothesis. At first, Brahe refused to let him look at his documents but he then invited Kepler to Prague to work as his assistant. Kepler took up the offer in the year 1600, but Brahe died the following year. In Brahe's records, which were concerned with the orbit of Mars, Kepler found a note to the effect that the planets moved along elliptical orbits.

On the basis of his observation, Johannes Kepler published two laws in his *Astronomia Nova*. The first stated that every planet orbits the Sun in an elliptical orbit. The second states that planets move fastest when they are nearest to the Sun and slowest when they are furthest from the Sun. The influence of the Sun on the orbital velocity of the planets explains why Mars covers the distance between A and B and in the same time as the shorter distance between C and D.



In his *Harmonies of the World*, Kepler later postulated a third law, according to which the squares of the orbital times of the planets are proportional to the cubes of the third powers of their mean distance from the Sun. With the aid of this equation, Kepler was able to calculate relative distances between the Sun and the planets although the actual distances were not yet known exactly.

These laws explained almost all irregularities in the planetary movements. They led to the idea that the movements of the celestial bodies might be influenced by forces other than the hand of God.

"It is my intention to show that celestial mechanics have nothing to do with the hand of God", wrote Kepler, "in that almost all of the various sequences of movements are due to a single, magnetic force." This was a bold statement. Kepler therefore not only squarely opposed the teaching of the church but also came very close to another universal law through his reference to magnetism – the law of gravitation later formulated by Isaac Newton.

Johannes Kepler was excommunicated for heresy and died in poverty in 1630.

TELLURIUM JOHANNES KEPLER

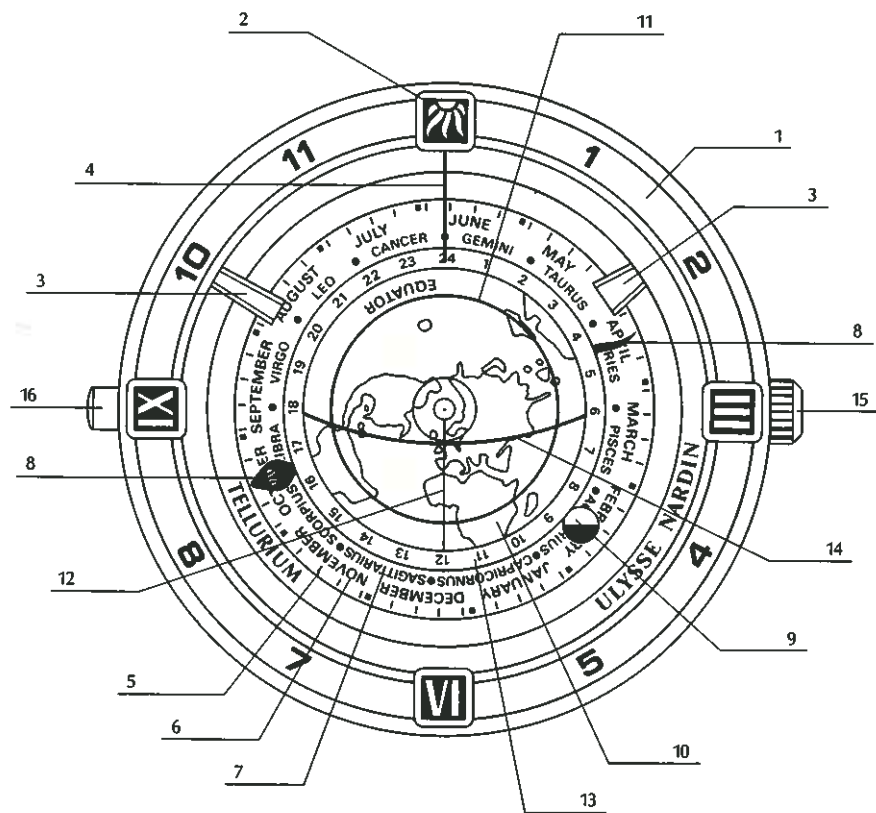
The TELLURIUM from ULYSSE NARDIN – Tellus is from classical Greek and means Earth – is showing the Sun, the Moon and the Earth against a background of stars called the ecliptic. In contrast to known telluria showing the Sun at the centre, the TELLURIUM JOHANNES KEPLER from ULYSSE NARDIN rotates the Earth at the centre so that its geographical shape can be fully displayed as observed from the North Pole. The Sun is fixed at 12 o'clock. The Moon circles the earth anticlockwise, the ecliptic clockwise.

The TELLURIUM from ULYSSE NARDIN also has certain features which are not evident in this clarity, if at all, in old Telluriums.

1. The Earth is at the centre of the display so that the Earth's disc, the Moon, the dragon hand and the ecliptic rotate relative to the Earth – Sun axis.
2. The Sun is fixed at 12 o'clock noon.
3. Solar and lunar eclipses are indicated by the dragon hand.
4. The illumination of the Earth by the Sun with its seasonal shifts between the Tropic of Cancer and the Tropic of Capricorn is indicated (day and night).
5. The illuminated half of the Moon always faces the Sun.

Some of the functions of the TELLURIUM from ULYSSE NARDIN are unique and protected by international patents.

Features of the TELLURIUM from ULYSSE NARDIN

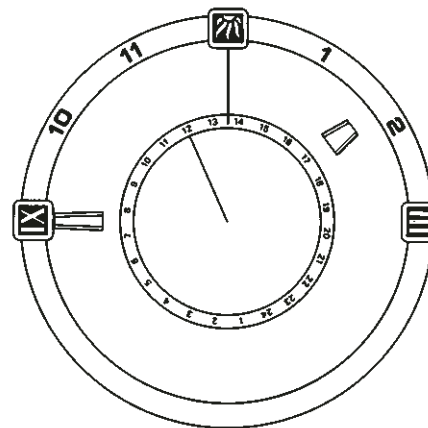


Upper part of the case:

- | | |
|--|--|
| 1. 12 hour indication (local or legal time) | 6. Months |
| 2. Fixed sun position at 12 o'clock noon | 7. Signs of the zodiac |
| 3. Hour and minute hands | 8. Dragon hand |
| 4. Reference line (inlaid in the sapphire crystal) | 9. Moon |
| | 10. Earth (center dial plate) |
| | 11. Equator |
| | 12. Greenwich Mean Time |
| | 13. 24 hour division |
| | 14. Gold-plated steel spring (day and night divider) |
| | 15. Crown |
| | 16. Pusher |

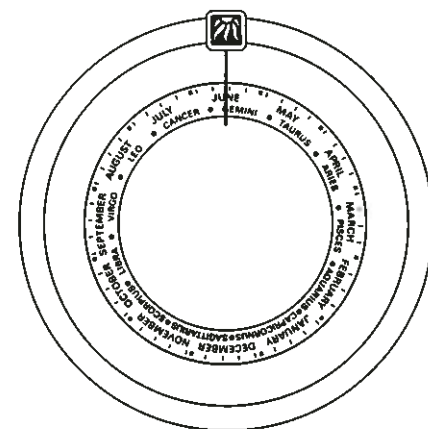
Ecliptic:

- | |
|-------------------------------------|
| 5. Date indicator (7-days division) |
|-------------------------------------|



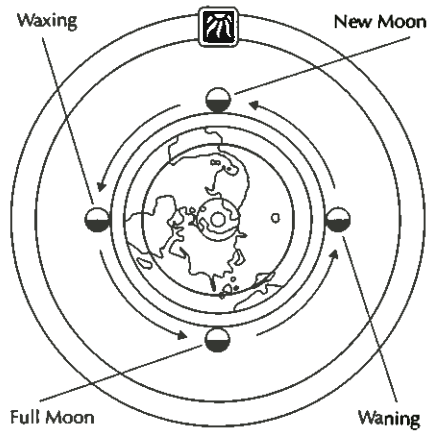
Hours and minutes

The legal (local) time is indicated by the hour and minute hands and the numbers engraved on the upper part of the case. Picture: 0145 or 1345.



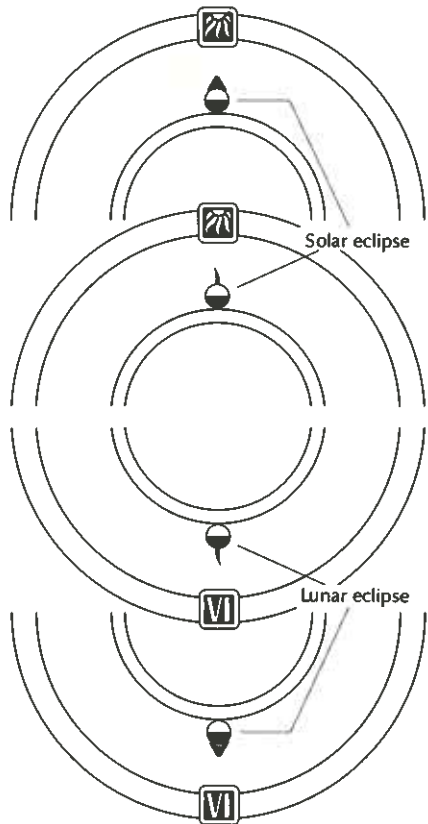
Date, month and signs of the zodiac

The date, month and signs of the zodiac on the ecliptic are read with the reference line below the Sun i. e. 15th June in the sign of Gemini.



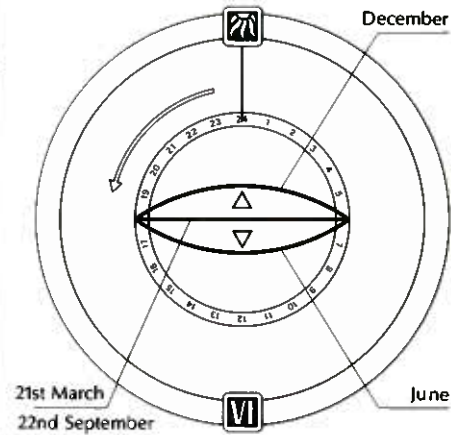
The Moon and the lunar phases

The Moon circles the Earth counterclockwise. The gold coloured half shows the illuminated side of the Moon and the dark side its shadow side. The illuminated half always faces the Sun. Viewed from the Earth (center dial), the lunar phases can thus be read at any time.



Eclipses

A solar eclipse is indicated when the Moon and the head or tail of the dragon hand are simultaneously under the Sun, at 12 o'clock. (The Moon blocks the Sun). A lunar eclipse is indicated when the Moon and the head or tail of the dragon hand are simultaneously at 6 o'clock. (The Earth blocks the Sun).

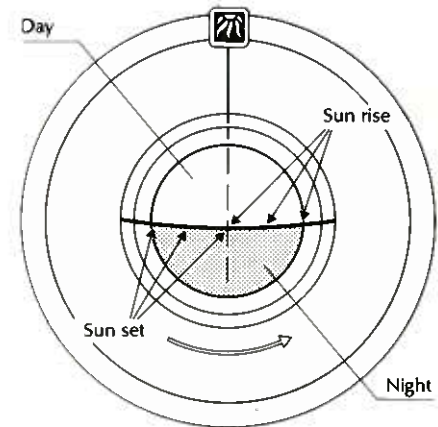


Illumination of the Earth by the Sun

The Earth with the 24 hour division completes one revolution counterclockwise in one day.

A spring is stretched across the Earth and bends in the course of a year from the Tropic of Capricorn to the Tropic of Cancer and vice versa.

During the equinox on 21st March and 22nd September, the spring is exactly on the axis 3-9 o'clock.



In the summer it bends, towards 6 o'clock (Tropic of Cancer) and in the winter towards 12 o'clock (Tropic of Capricorn).

The part of Earth above the spring is illuminated by the Sun (day) and the part below is turned away from the Sun (night).

Sunrise occurs along the spring, from its point of intersection with the Equator at 3 o'clock to its intersection with the Sun-Earth axis; sunset takes place on the opposite side of the spring, between its point of intersection with the Sun-Earth axis and its point of intersection with the Equator at 9 o'clock.

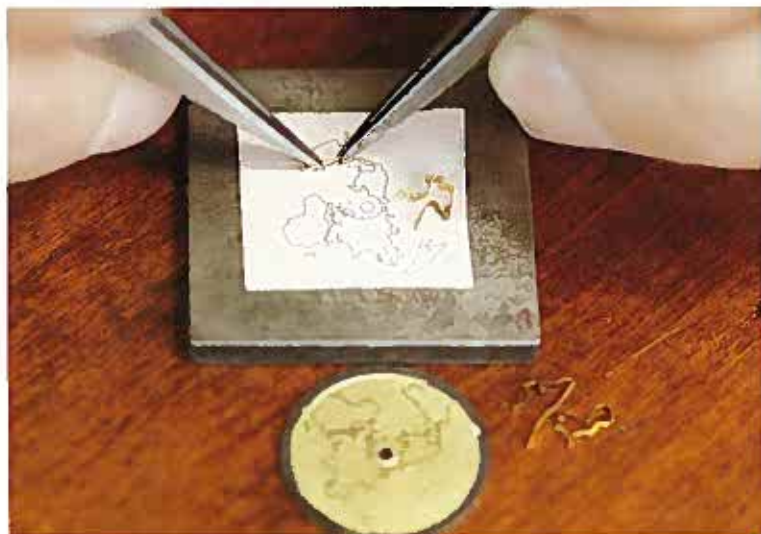
Enamel cloisonné – an old art rediscovered

Over 30 years have passed since this elaborate art form of enamelled cloisonné was last applied to decorate a small number of rare and exclusive watch faces. Even then, only a few artists had mastered the many intricate processes that were necessary to make cloisonné watch dials in genuine enamel.

Enamel is glass comprising silica, red lead and potash. Normally it is colourless, but when fused with metal oxides it takes on fantastic colours. It may be opaque, transparent or translucent.

With the TELLURIUM JOHANNES KEPLER, ULYSSE NARDIN is giving this lost art a new lease of life.

The cloisons are bent by hand with a pair of pincers



The most difficult and time consuming operation is the bending of the cloisons, the intricate design contours or gold frames which keep the various colours of liquid enamel from flowing into one another. A gold wire

with a width of 0.07 mm and a height of 1.0 mm is bent by hand with two pairs of pincers to follow the contours of each continent and the major islands. Modern tools such as jigs and moulds are of no help. The smaller the motif, the more difficult it is to make the cloisons.

Dial with cloisons before enamelling



A heat resistant vegetable glue is needed to attach the tiny cloisons to the dial plate. The dial is then baked in an oven to solidify the glue and make it possible to enamel the individual cells in different colours. The fine enamel grains are mixed with water and applied with a goose quill. They melt in the oven at 840° celcius and harden when taken out. 4-5 layers are needed to obtain the glossy deep colour of genuine enamel and to even out the thickness of the differently coloured continents and oceans.

To reduce the height of the cloisons to the thickness of the enamelled surface is an extremely delicate polishing process. Finally a soft mop is used to smoothen the surface thereby giving the enamel its particular deep shine and glow.

It takes 54 processes, 12 baking operations and over 100 working hours to complete each cloisonné enamel dial for the TELLURIUM JOHANNES KEPLER of ULYSSE NARDIN.

Not one is alike as the colours which melt into one another vary from one dial to another and make this extraordinary, handcrafted master timepiece a timeless object of art.

Goose quill and pincers are the artist's tool



Right: An enamelled dial before being polished

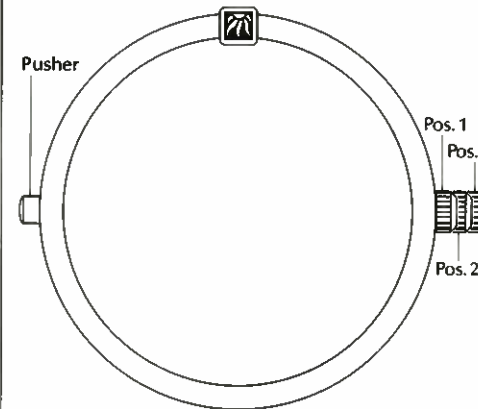
Left: final enamel cloisonné dial



How to set the TELLURIUM JOHANNES KEPLER

In the TELLURIUM from ULYSSE NARDIN, all indicators are synchronised and move in a determined relationship to one another. The gearing system, an exclusivity from ULYSSE NARDIN, is patented worldwide and can be adjusted forwards and backwards by means of a single crown.

Crown positions and pusher



Position 1. Manual winding of the automatic movement.

Position 2. Fast setting of the astronomical indication i.e Moon, dragon hand and ecliptic. The hour and minute hands and the Earth are not moving during this procedure.

Position 3. Setting the local time with hour and minute hands and the Earth dial with GMT time. The astronomical indications are automatically adjusted.

When pressing the pusher at 9 o'clock, the astronomical indications remain blocked if the time is being corrected in winding position 3 (see setting instructions).

How to reset the TELLURIUM JOHANNES KEPLER when it has not been worn:

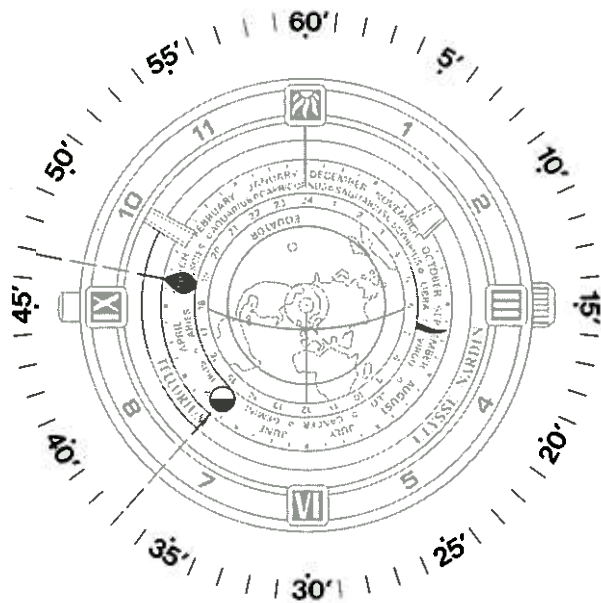
1. CHECK AND SETTING

Determine which year the TELLURIUM JOHANNES KEPLER is showing.

2. Pull crown to position 2 and set 1st January with the reference line under the Sun.

Determine the position of the Moon and the dragon head with the help of the hours displayed on the case bezel (12 hours = 60 minutes). In the example below, the Moon is at 37 minutes (between 7-8 o'clock) and the dragon head at 47 minutes (between 9 and 10 o'clock).

The table on page 17 indicates that this position is only applicable for January 1st 1988.



Example: The TELLURIUM JOHANNES KEPLER is to be set to 28th October 1992, to 17:00 Central European Time – GMT + 1 hour (Paris, Berlin, Milan, Zurich).

1. In crown position 2, make 4 complete revolutions with the ecliptic, to advance by 4 years to January 1st 1992. Use the reference line below the Sun. The correct position of the Moon and the dragon head can be checked from the table "Positions of Moon and dragon" on page 17. On 1st January 1992, the Moon is at 9 minutes (between 1 and 2 o'clock) and the dragon head at zero (0) below 12 o'clock.

2. SETTING THE MONTH AND DATE

In crown position 2, turn the calendar/ecliptic clockwise until 1st October is under the reference line. (Note that the Moon rotates counterclockwise). Use a calendar to define the date of the New or Full Moon of October 1992. For October 1992, the New Moon occurs on 25th October.

Continue turning the crown in position 2 in the same direction until the Moon is under the reference line below the Sun, i. e. October 25th. Then move in crown position 3 the hour and minute hands forward 6 x 12 hours or 3 x 24 hours (3 days) to reach October 28th.

3. SETTING THE TIME

In crown position 3 turn the hour and minute hands clockwise till the reference line is at 16 hours GMT. Now depress the pusher at 9 o'clock to block the astronomical indications from moving and set the hour and minute hands for 5:00 pm Central European Time (GMT + 1 hour).

4. TAKING INTO ACCOUNT THE TIME ZONES

For time settings other than GMT (Greenwich Mean Time), the time differences are read from the time table on page 18.

In the above example, it is plus 1 hour for Central European Time. For the astronomical indications to be in the correct positions set the GMT first with the 24 hour indicator and the reference line. Afterwards the correct local time is set with the hour and minute hands in crown position 3 and simultaneously holding the pusher in a depressed position.

For Hong Kong, advance the hands by 8 hours, for New York, set them back 5 hours, by simultaneously holding the pusher in the depressed position. The hour and minute hands show now local time and the 24 hour indicator continues showing GMT under the reference line.

5. SUMMER AND WINTER TIME – LIGHT SAVING TIME

To change to summer time, the hour and minute hands must be turned forward 1 hour in **crown position 3** by simultaneously pressing and holding the pusher. The astronomical indications do not change.

To reverse to winter time the same procedure is used, but the hour and minute hands must be set back 1 hour.

Technical details of the TELLURIUM JOHANNES KEPLER

Water resistant to 30 meters (3 atm)

Diameter of the watch case 43.00 mm

Diameter of the movement 36.00 mm

Height of the movement 10.10 mm

The Tellurium consists of 275 individual parts.

To guarantee shock protection, the plates and wheels are made of a very light metal alloy which is three times lighter than the brass normally used. The wheels have also been skeletted to reduce the weight by another 30%. A novel friction clutch system prevents damage to the gearing system when the quick corrector is activated or when the TELLURIUM is exposed to excessive shocks. The friction clutch may shift the ecliptic slightly forwards or backwards, though it is barely noticeable. If this should be the case simply correct the month with the crown in pos. 2.

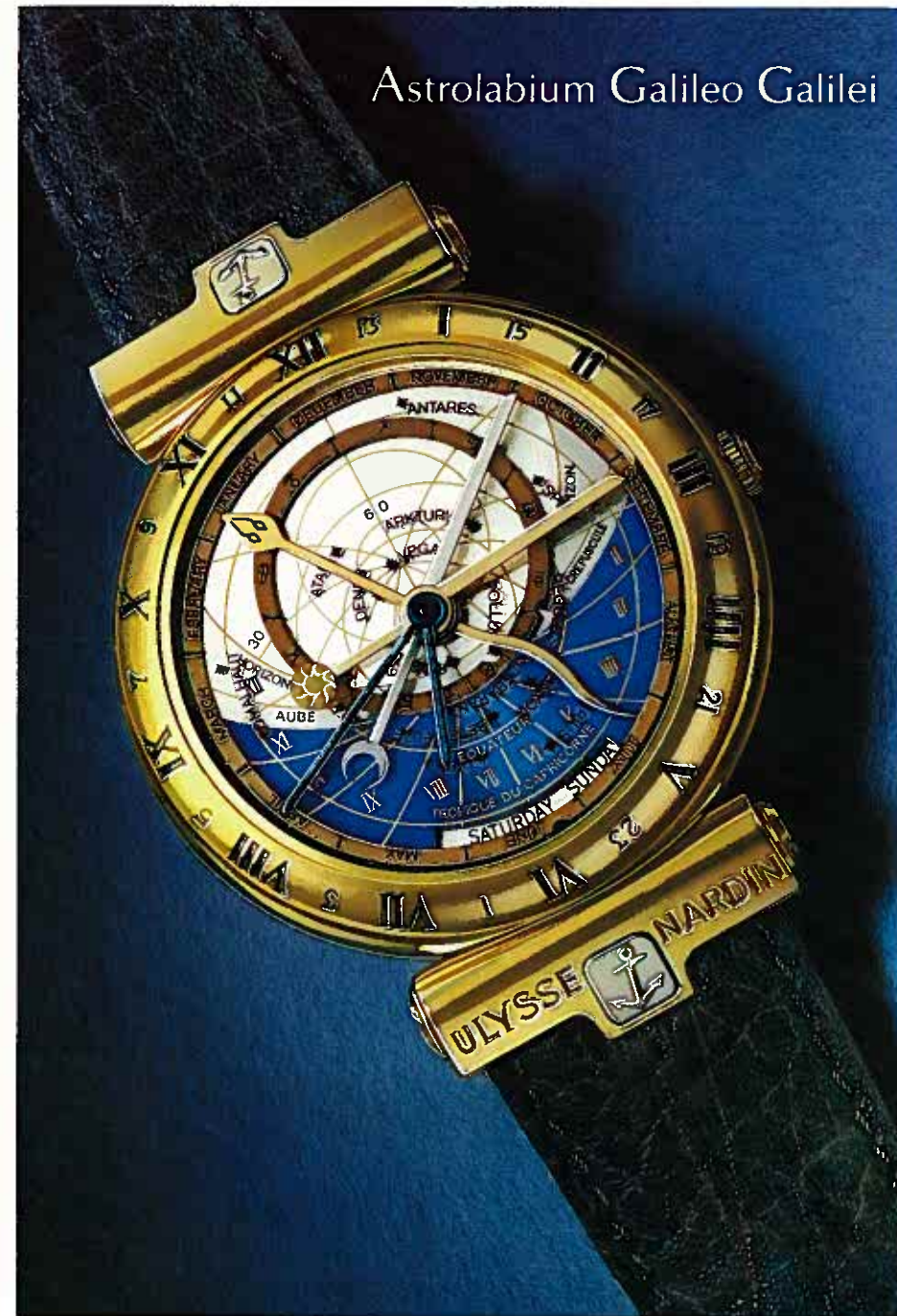
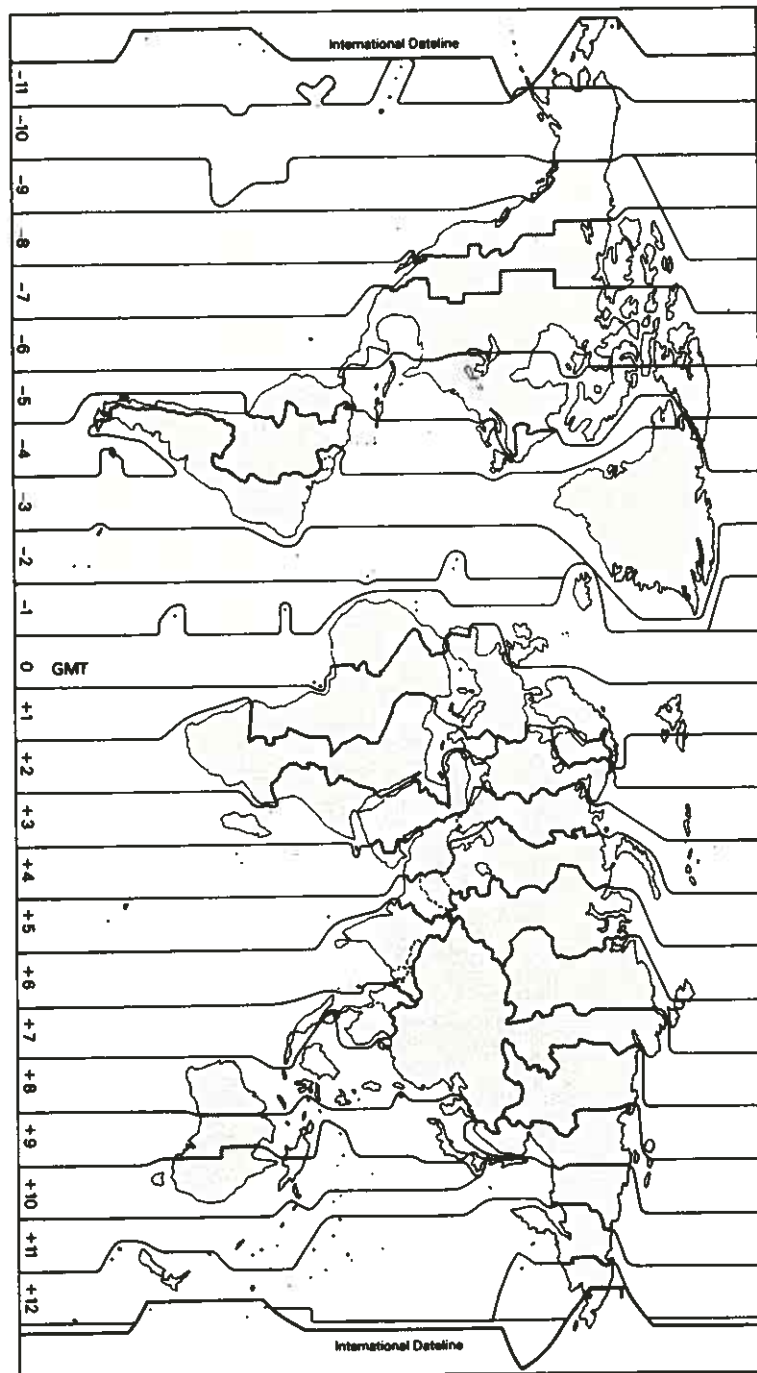
The quick corrector of the astronomical gearing system permits adjustments without moving the hour and minute hands. The quick corrector (pos. 2) advances the TELLURIUM 80 times faster than time settings (pos. 3) with the hour and minute hands. It is, therefore, possible to reset the watch correctly within minutes even if it has not been worn for several years.

Positions of Moon and dragon hand 1st January 1980 - 2049

Indications in minutes

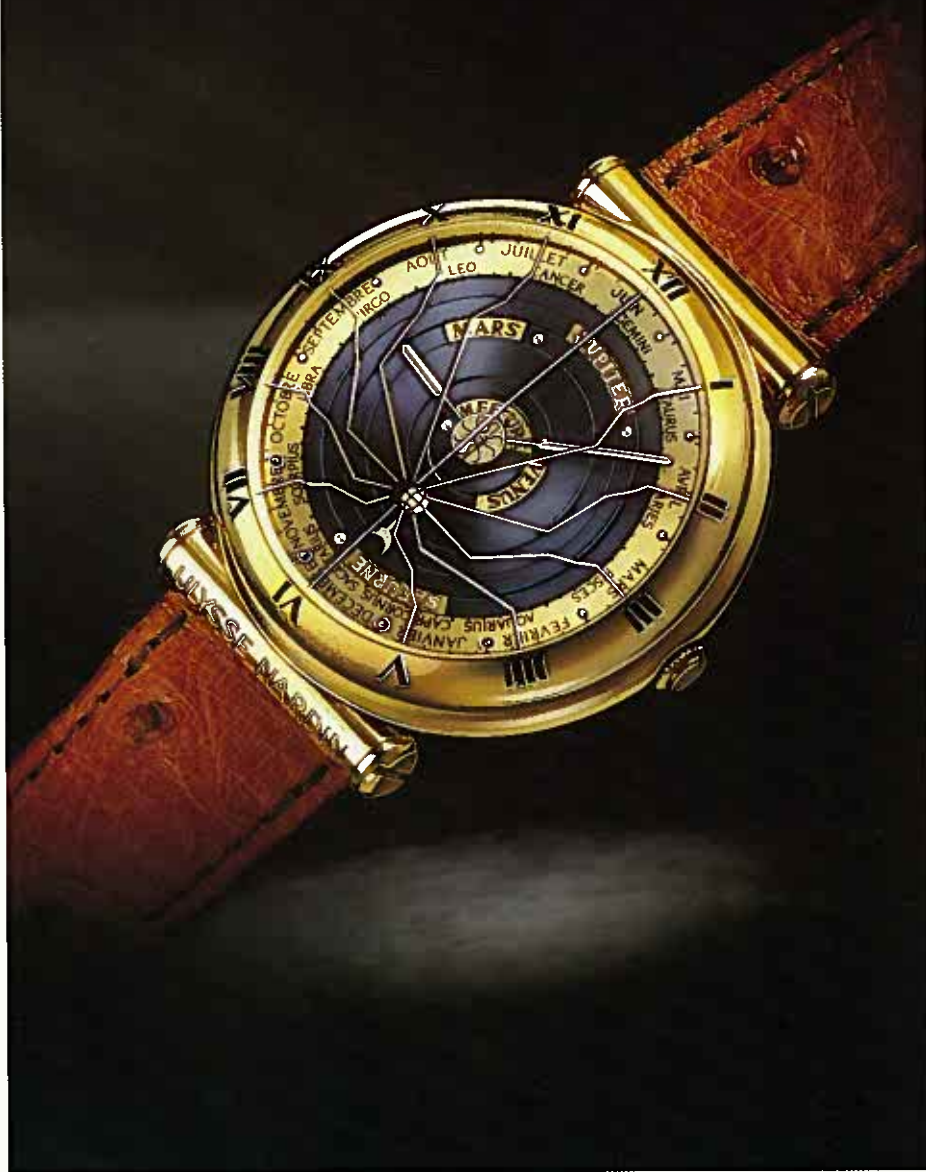
Year	Moon	Dragon	Year	Moon	Dragon
1980	34	21	2020	50	30
1981	12	25	2021	28	34
1982	50	28	2022	6	37
1983	28	31	2023	44	40
1984	6	34	2024	22	43
1985	43	37	2025	60	47
1986	21	41	2026	38	50
1987	59	44	2027	16	53
1988	37	47	2028	53	56
1989	15	50	2029	31	59
1990	53	54	2030	9	3
1991	31	57	2031	47	6
1992	9	0	2032	25	9
1993	47	3	2033	3	12
1994	25	7	2034	41	16
1995	3	10	2035	19	19
1996	40	13	2036	57	22
1997	18	16	2037	35	25
1998	56	19	2038	13	28
1999	34	23	2039	50	32
2000	12	26	2040	28	35
2001	50	29	2041	6	38
2002	28	32	2042	44	41
2003	6	36	2043	22	45
2004	44	39	2044	60	48
2005	22	42	2045	38	51
2006	60	45	2046	16	54
2007	37	48	2047	54	57
2008	15	52	2048	32	1
2009	53	55	2049	10	4
2010	31	58	2050	47	7
2011	9	1			
2012	47	5			
2013	25	8			
2014	3	11			
2015	41	14			
2016	19	17			
2017	56	21			
2018	34	24			
2019	12	27			

International time zones



Astrolabium Galileo Galilei

Planetarium Copernicus



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