BY THEODORE DIEHL-PESHKUR

Celestial Achievement

The Richard Mille Planetarium Tellurium is a unique device that links its creator to the long tradition of complex astronomic horology

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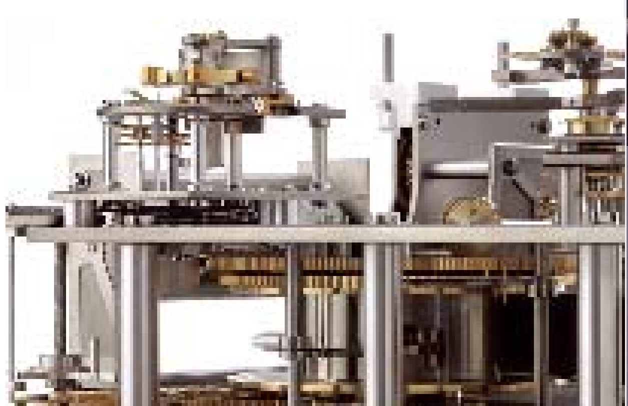

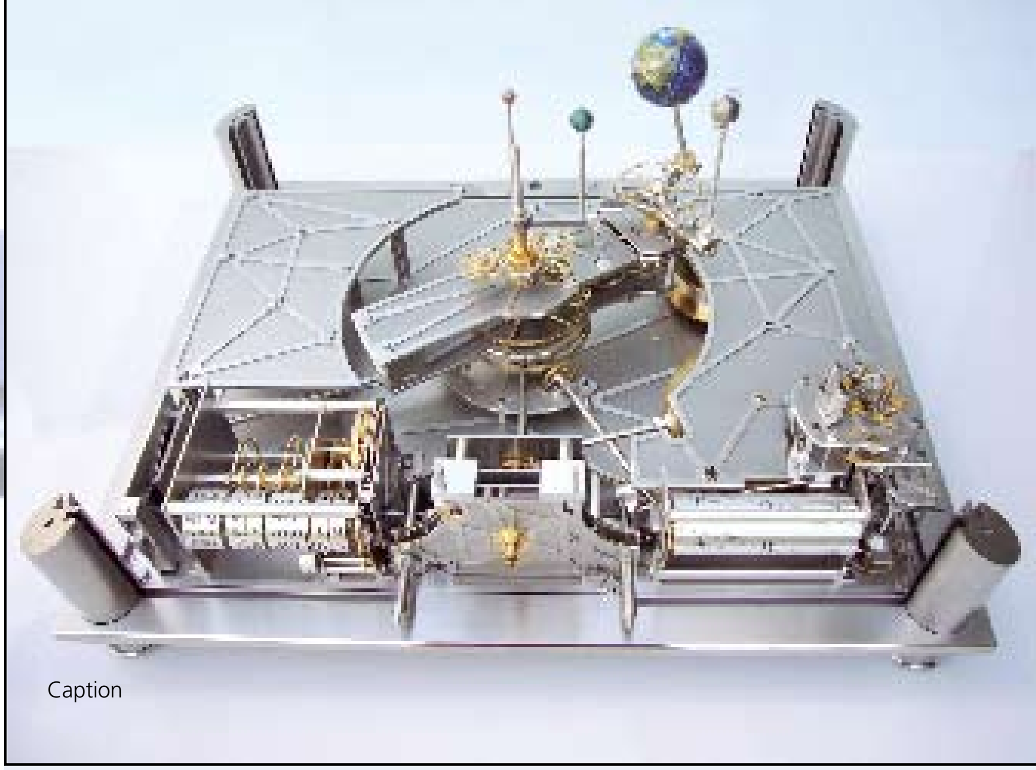

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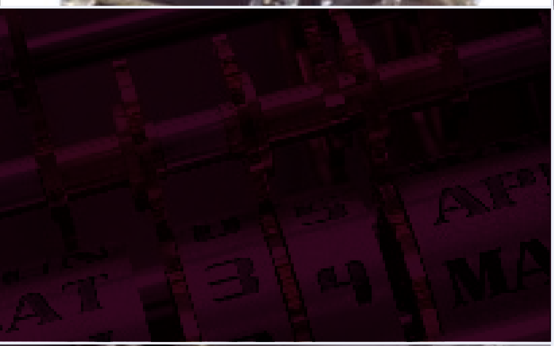

Disconnected as we are today from celestial experiences like lunar and solar cycles, which we now (if at all) only glean via digital media, we have forgotten the tremendous impact such information had on humanity and its development. It literally opened the way for the creation of civilization.

Astronomic observation opened up our development of preparing for the changes of the seasons, the rhythms of planting and reaping, the birth of religion, and perhaps the most important of all: the concept that direct observation could lead to a deeper understanding of the universe and the ability to predict specific celestial events.

The jump from the creation of these ancient stone observatoria to the much smaller and portable clockwork-driven planetarium-tellurium of this article might at first seem a far-fetched leap, yet both share the identical creational source: the absolute human desire to comprehend and visualize the vast universe that exists around us. The only difference between the two is the method and means utilized to create them and the way in which they are utilized.

Richard Mille's Planetarium-Tellurium

In order to clarify what it is that makes the Richard Mille Planetarium Tellurium so unusual and unique, we must take a trip through the past in order to place it into context.

The exact definition of what comprises a planetarium is somewhat unclear; however, most horological historians will agree that a planetarium, as the name implies, will always show planetary information of one kind or another. Globally speaking we can separate these devices into two major groups. The most prolific, found today in musea across the globe, are the manually set versions in

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which the setting of a specific time by hand would show the consequent positions of celestial bodies at that particular moment.

One of the earliest surviving examples of such a planetarium harks from Greece. It is a portable, manually set device called the Antikythera, dating from circa 50 B.C. Originally discovered in 1901, it was only much later, in 1959, that the interior containing its highly complex gearing, hidden within its deep green bronze exterior, became visible under X-ray examination.

A reconstruction of the mechanical remains revealed that it was used to depict the movements of the moon, sun and four of the planets visible to the naked eye.

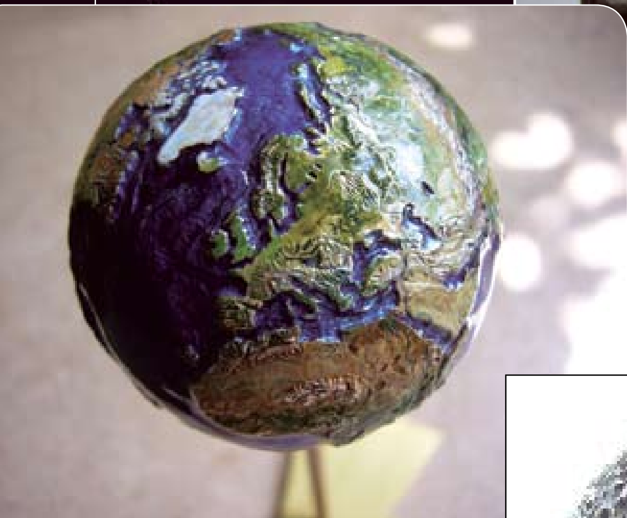
The second group consists of clockwork-driven devices that automatically keep track of celestial motions without manual intervention as long as they are continuously driven by water, springs or by other means. This autonomously driven group can then be further divided into two sections: non-portable such as clock towers or civic timekeepers with astronomic functions and portable/semi portable variants for personal use. This last group is the most rare and unusual type and forms the central subject of this article.

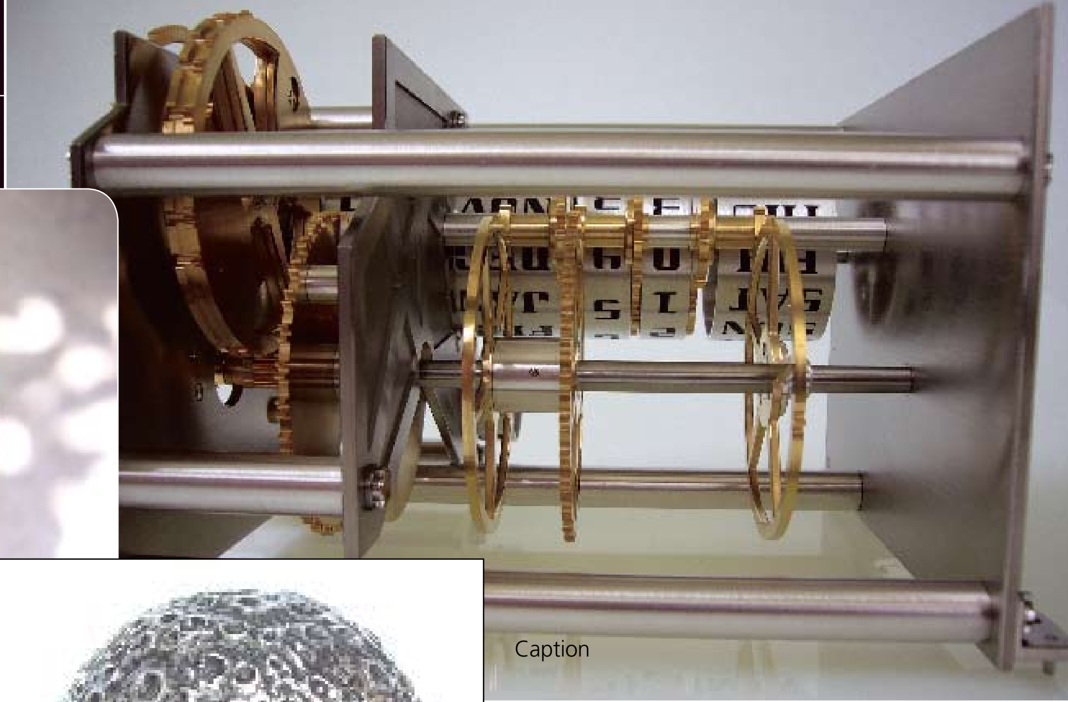
All of these devices have to cope with the problem of accuracy and the realistic representation of astronomic motion. Through the course of centuries, as the knowledge of our solar system's structure slowly evolved from the terracentric to the heliocentric concept, the exact motions of the planets became steadily more accurately defined. The resulting increased precision of these measurements set goals for the increased accuracy to be depicted within the planetarium model, creating ever greater demands on the precision of gearing systems, their teeth and the ratios needed to depict planetary motion.

For instance, a +1° error in eight hours in the rotation of the earth on its axis corresponds in fifteen days to a +45° discrepancy, making it necessary to re-synchronise a planetarium every fortnight.

The clockwork-driven type of planetarium had to cope with even more difficulties: the additional inaccuracies presented by the escapement supplemented the untrustworthiness of the astronomical gear work.

It was therefore only much later, after various discoveries and inventions led to the refinement of the escapement mechanism, that the portable variety of planetarium became truly serious devices for astronomical study. Nonetheless, the complexity and difficulty in the construction of the more portable





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planetarium for household or personal use means that this type is of the greatest rarity, with only a handful of high quality examples in existence today.

The number of planets depicted by planetaria are always connected to the every increasing knowledge of the solar system as such, with more planets being added as time passes and methods of discovery more advanced and precise. Indeed, astronomers using the most modern techniques available today would contest that there are indeed at least two or more additional planets, as well as pseudo planets, in orbit beyond Pluto, whose orbits no planetarium would be able to keep up with, let alone portray!

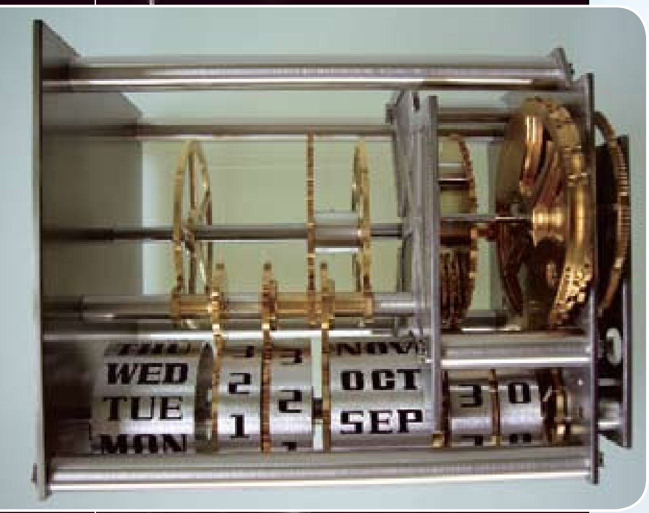
The tellurium on the other hand is a different case altogether as it is focused solely on the earth's movements; it depicts the earth's yearly cycle around the sun, its diurnal movements and its parallelism of axis in three-dimensional fashion. It seems to have developed first in The Netherlands with fine examples of telluriums created by the famous Amsterdam cartographer Wilhelm Janszoon Blaeu (1571-1638) and others dating from the first half of the 16th century.

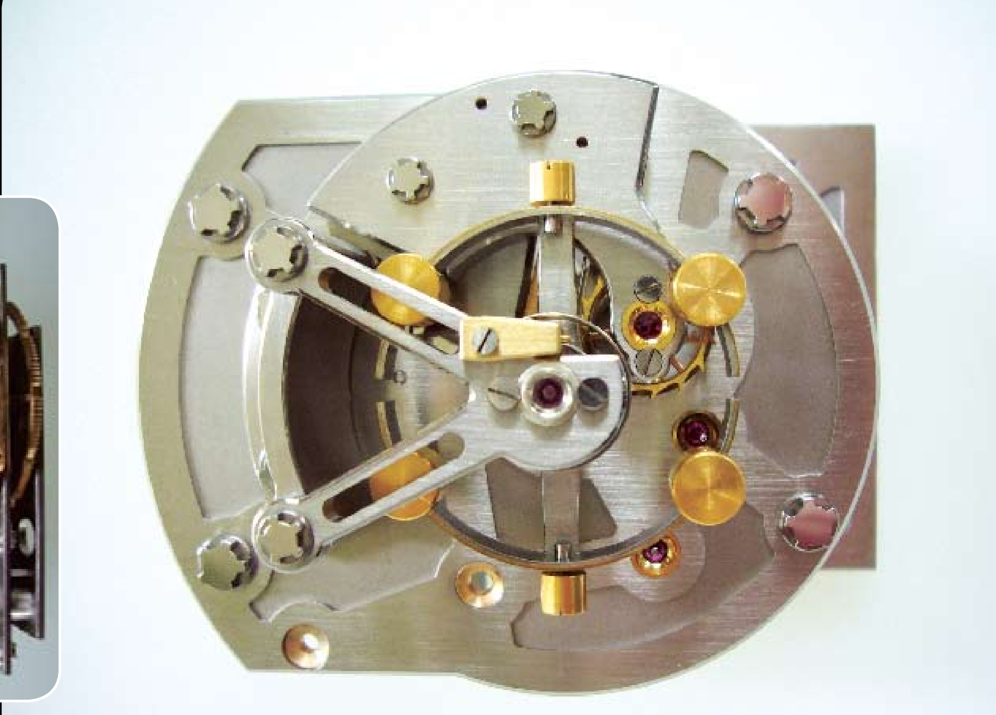
Richard Mille's contribution to the development of the Planetarium-Tellurium

Richard Mille's unique Planetarium-Tellurium easily counts as an exceptional creation, even within the context of the abovementioned centuries old history, since it addresses many of the problematic issues associated with planetarium construction. It includes the application of entirely new calculations, gearing and accuracy never before achieved in a planetarium-tellurium of this type. No wonder then that it took more than ten years of development before its completion and presentation at the Temple of Time Event in Singapore, September 2007.

"These kinds of astronomical devices were always totally fascinating for me in the way history, watchmaking and the cosmos all come together in one device," Mille explains. "Even though we have been to the moon and lost part of our fascination with space and the solar system, devices such as this have a tradition, just like our watches, yet they can be totally re-interpreted for our modern times and expectations.

"I wanted no compromises to be made, and to start from just a blank paper. So this meant really going back to scratch and making brand-new calculations for the moon and planets. We actually hired an astrophysicist to make these new and very accurate calcu-





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lations for the Planetarium-Tellurium. That was just the beginning."

This means that the main consistent error occurs only regarding the earth on its axis, with +1° in about 7.7 years. The other figures are as follows: +1° in about 168 years for the rotation of the moon around the earth, and -1° in about 2 million years for the rotation of the earth around the sun.

Given that the value of 1° is below the timing tolerances (+/-2°) adopted for this planetarium, one realizes that the error of the earth on its axis is not only perfectly acceptable, is far better than any other existing example.

Another unique aspect of the Richard Mille Planetarium-Tellurium is the addition of a perpetual calendar to the astronomic representations.

This represents an additional complication to the already complex movement.

"The perpetual calendar, as well as the rest of the astronomic mechanism, is designed to be able to move backwards or forwards at will, to any date in the Gregorian calendar. This sounds very simple, but the true collectors out there will know that it was really hellish to accomplish and it took the watchmaking engineers a long time to create."

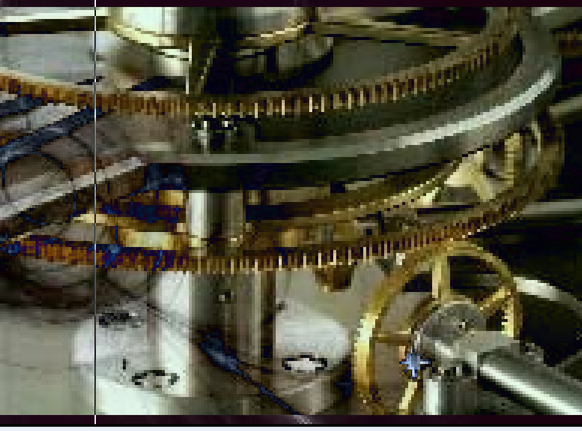
It only takes a push of the corrector button to change the settings, and such a simple solution is absolutely unknown for this kind of device. Mille says he wants the device to be used, not just looked at, in part because typically existing planetariums require an expert watchmaker's hand in order to reset or correct them after they have stopped for a longer period or are put in different time zones.

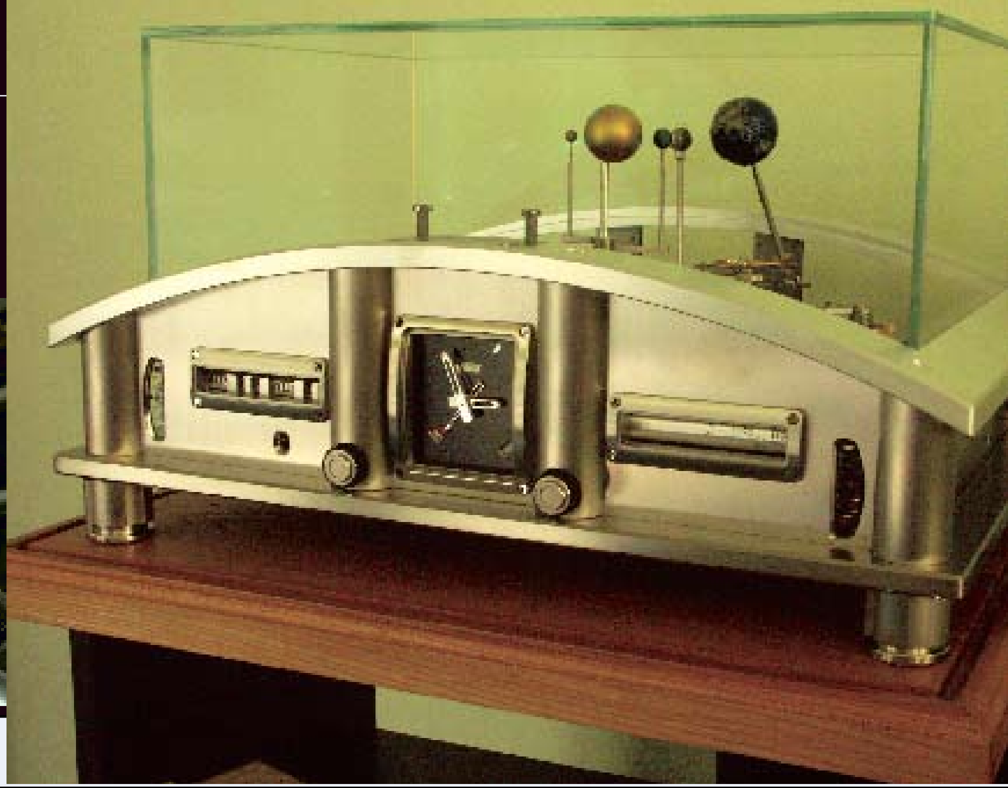
With this concentration on accuracy, the only choice could be a détente chronometer escapement. For the Richard Mille Planetarium-Tellurium, it has been fitted with a stop-restart balance that allows it to restart from a stationary position after stopping. To provide stable torque for long periods, the winding spring is a Tensator type, which provides a more consistent torque, a vital element to accurate performance of the basic movement.

This combination of a highly accurate escapement, going-train and winding barrel of the planetarium-tellurium make this the most accurate clockwork planetarium-tellurium of its kind created.

Astronomic representations/ indications

The Richard Mille Planetarium-Tellurium has the following astronomic information: the orbits of Mercury (87.9 days) and Venus (224.7 days); the rotation of the earth on its axis (one rotation on its axis in 24 hours, error: +1° in 7.7 years) and its rotation around the sun (one rotation in one year, with an error of -1° in two million years); the obliquity of the earth (exact rotation, the tilt of the





earth's axis between the two poles 23.5°); the rotation of the moon on its axis and the rotation of the moon around the earth (The calculation of the rotation is based on an average synodic month of 29.53058912 days, however the actual time between lunations may range from about 29.27 to about 29.83 days. the time interval between two new moons, error: +1° in 168 years), the phases of the moon, the equation of time and solar time.

Equation of Time and Solar Time

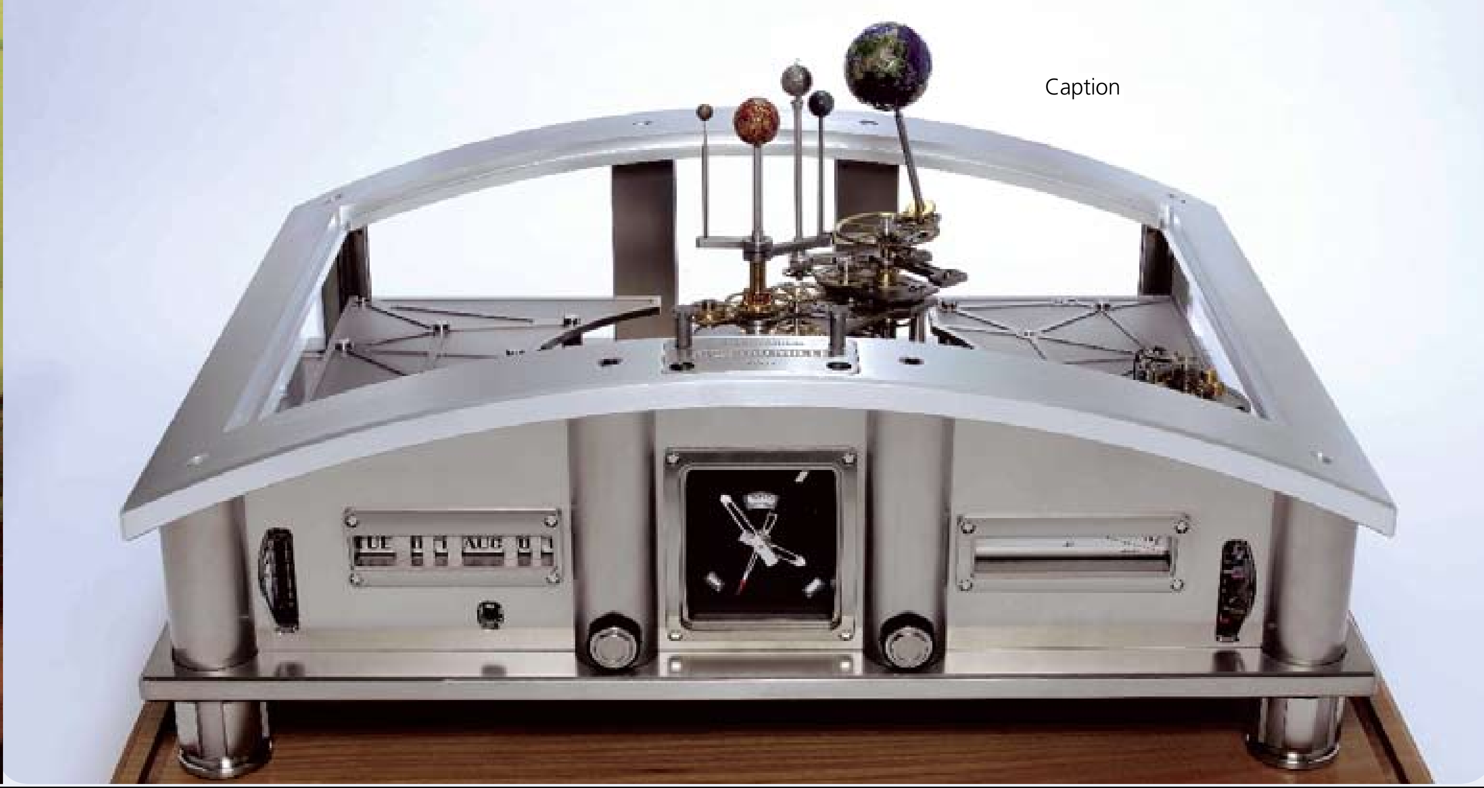
These two terms are closely interrelated. Solar time is based upon the length of a solar day; the time taken between the sun's visible highest point in the sky to the following highest point when observed from an identical location. Although our watches calculate a mean day of 24 hours, in reality the day's length based on solar time is always changing in a cyclical fashion due to two sources: the elliptical orbit the earth takes around the sun, and the earth's inclination on its axis relative to the sun.

On the dates of the furthermost point of the earth's elliptical orbit, the aphelion (July 1st), to the nearest point of the earth's movement around the sun, the perihelion (December 31st), the sun will travel faster in relation to our mean time. However, while travelling in the other direction, from perihelion towards aphelion, the sun will travel more slowly.

The second problem mentioned above, the earth's obliquity, its inclination on its axis relative to the sun, means the apparent motion of the sun on and around the equator is also always changing from season to season. (Don't forget, we are discussing the measurement of two points, highest point to highest point of the sun's travels across the sky when we discuss solar time- so the earth's tilt will have definite effects on our observations). Those of you who have a sundial in the garden will be aware of this variation, which amounts roughly to some +16 minutes to -14 minutes variation depending on the month or season.

The equation of time shows this variation quite exactly, with the differences either plus or minus relative to the mean solar time of our timekeepers and daily life rhythms. It is visible on the Richard Mille Planetarium-Tellurium by a hand and a dial divided into sectors on the front part of the planetarium. The hand represents in + or – the number of minutes that must be added or subtracted from mean time in order to obtain true solar time.

However, rest assured your clocks and watches are in tune with our solar system at least four times a year, as you won't need to look at the equation of time on April 16, June 15, September 1 or the December 25. The difference



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with any watch or clock on these dates with the sun's passage across the sky will be zero!

Time indications

As would be expected, hours, minutes, time zones, and for the perpetual calendar: day, date month year and leap year. The seasons, and the signs of the Zodiac as well as the equinoxes and solstices are all shown and indicated on a slowly moving, hand-engraved cylinder behind a window, located to the right. For practical purposes the power reserve (fifteen days) is also indicated.

Finishing and exterior

The mechanical parts of the Planetarium-Tellurium are constructed from titanium, steel, brass, gold, silver, and red corundum. Visually one of the first things you notice is the well-known Richard Mille spline screws and the ribbed plates seen on different levels of the mechanism, similar to the base plates of the RM 005, 007, 010 and 011.

Indeed, all the parts of the Planetarium-Tellurium share the same attention to detail as the watches, so if you see some similarities there, you are correct. The numbers and letters used are also all in the well-established style of the watches as well.

The exterior has undergone several changes in the course of time, and Richard is still not finished with that aspect.

"When it returns to Switzerland, we will be changing a number of visual details. But I am very happy that the piece has been tested and fully functional as we expected, and therefore not needing changes in that area."

At the moment, no price has been settled for this creation, which has definitely taken the role of one-of-a-kind, 'pièce extraordinaire' within the Richard Mille hierarchy. One thing is clear however: this is going to be the most exclusive, most expensive Richard Mille creation for many years to come.

"This is a piece that only a few collectors in the entire world will be able to afford, and which only one person shall own. It is also entirely outside the mainstream of the wristwatch–so you see this is truly horology for horology's sake, another affirmation of my goals and dreams about watchmaking, Mille explains.

"It was time that modern horology gave some new impulses to such a traditional and complex, philosophical and mathematical machine, which the greatest watchmakers that lived through the ages helped to design and improve, as well as the modern watchmakers and engineers who helped create this particular one," he continues.

"The whole project just made sense to me within the context of my passion for watchmaking. That's why it had to be created."