LEQUATOE L'HORLOGE





L'HORLOGE





Dear Friends of Breguet

39 Quai de l'Horloge. It is here that Abraham-Louis
Breguet opened his workshop on Paris' Ile de la Cité in
1775. From these doors came not only the timepieces for
Napoleon, Marie-Antoinette, the Queen of Naples, Czar
Alexander, King George IV and other nobles of the world,
but as well technical and aesthetic watchmaking innovations such as the tourbillon, the Breguet overcoil, the parachute antishock, guilloche dials, pomme hands, Breguet
numerals and many others, that 200 years later, remain core
to the art. We honor our history and legacy by appending
this revered address to our publication as its title.

Our credo for Quai de mix of articles that, on the times of A. L. Breguet and achievements and, on the plains how modern Bregue advancing the art of fine was offer both historical and mour past and to the future.

This first issue of Quai my late grandfather, Nicola sions of his business career

Our link to the richest history in all of watchmaking inspires, as it should, what we do today at Breguet. But tradition and heritage must be seen in context. Abraham-Louis Breguet was the greatest watchmaker who ever lived, but what made him tower over not only his peers during his lifetime but those following was his overpowering drive to invent and create. So our inspiration from the past is not simply modern recreation of Breguet's inventions and designs, but the passion to devote ourselves just as tirelessly as our founder to invention and innovation. That really is the true legacy of Breguet, an endless quest to expand the frontiers of watchmaking.

Our credo for Quai de l'Horloge is to bring to you a mix of articles that, on the one hand, recounts the life and times of A. L. Breguet and, of course, highlights his many achievements and, on the other hand, illustrates and explains how modern Breguet is asserting its leadership in advancing the art of fine watchmaking. Each issue then will offer both historical and modern adventures as we look at our past and to the future.

This first issue of Quai de l'Horloge features a tribute to my late grandfather, Nicolas G. Hayek. The broad dimensions of his business career have been widely reported in the media. What is less well-known is his personal devotion to Breguet and how he guided us to where we are today. The force of his re-ignition of innovation at Breguet is shown in three articles highlighting new Breguet timepieces, the Hora Mundi, the 10 hertz Type XXII and the Réveil Musical, each of which manifests important watchmaking breakthroughs. Not to forget our history, I hope you enjoy being transported back 200 years with the portrayal of Caroline Murat (the Queen of Naples), a devoted Breguet customer who received the first wristwatch ever made and a glimpse of Marie-Antoinette's life in her private domain, the Petit Trianon.

Yours sincerely,

A. Haye le

Marc A. Hayek, President and CEO Montres Breguet SA

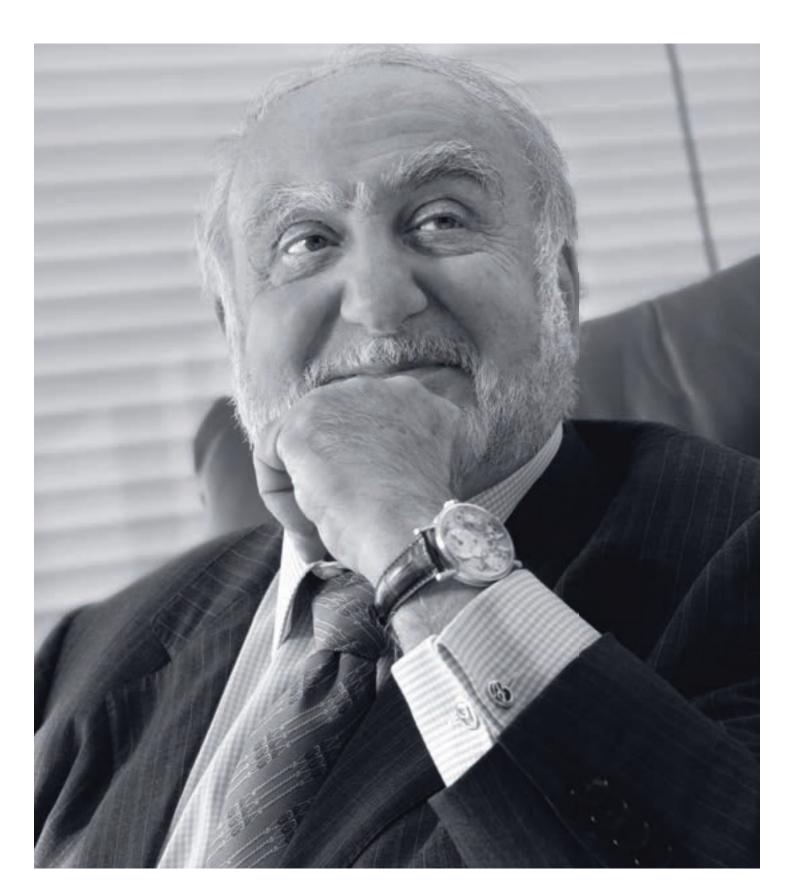


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Nicolas G. Hayek The "Exceptional Adventure"

By Jeffrey S. Kingston



isionaries are a rare breed. Consider what it means truly to be a visionary. First creative genius. That is the ability to advance human pursuits not just incrementally, but by orders of magnitude. But as lofty as creative genius may be, visionaries operate on an even higher plain. For a visionary not only possesses creative genius, but an understanding that the rest of us lack on how best to apply that genius to construct an enterprise where none has been before or to resurrect or elevate an institution or an entire industry which has lost its way.

* * *

Few businesses can lay claim to having ever been blessed with even one visionary in its history. By contrast, the two hundred year history of Breguet has witnessed not just one visionary in its ranks, but two: its founder, Abraham-Louis Breguet and its savior, Nicolas G. Hayek.

Of course, today, none of the employees of Breguet have personally interacted with the founder Abraham-Louis Breguet, but almost all have worked with Nicolas G. Hayek. To an outsider, if you are ever privileged to walk the halls of Breguet, what is striking now, many months after the death of Nicolas G. Hayek, is the omnipresence of his photograph in offices, cubicles, work spaces, watchmaker benches.... seemingly everywhere in the Breguet manufacture and administrative offices. Affectionately spoken of as "Senior" (to distinguish him from his son, Nick Hayek, Junior and his grandson, Marc A. Hayek), it is as if he were still alive guiding the enterprise. But his omnipresence is not by decree, design, or corporate edict; rather it is the product of a combination of individuals at Breguet so touched by Senior's life that they have chosen to memorialize him every day when they come to work by placing his image in their individual working places.

The world press, both general news and business news, rightly lionized Senior at the time of his tragic passing. Founding a highly successful engineering company, Senior was brought in by Swiss bankers to liquidate the two watch conglomerates known as SSIH and ASUAG, which at the time were suffering severe financial distress in common with the entirety of the Swiss watch sector. Instead of following what appeared to be the obvious liquidation path, Senior formulated a plan to restructure and merge the companies in a way that allowed the businesses within them to survive. Following that reorganization, Senior, together with a group of investors, acquired the merged companies and SMH was born. SMH, now known as the Swatch Group, not only gave birth to the iconic Swatch, but became home to a cavalcade of legendary watch houses, Breguet, Blancpain, Omega, Jaquet Droz, Longines, Glashütte Original, to name a few. All were nurtured, but Breguet occupied a special place for Senior. Although the press lauded Senior's inspired work to save SSIH and ASUAG illuminating a path that saved the entirety of the Swiss watch industry and chronicled his spectacular subsequent financial successes, omitted from their accounts is how he touched the lives of the people within Breguet, inspired and guided them to a resurgence of the marque.

№ FEW BUSINESS CAREERS ARE AS CELEBRATED As well known as his achievements are, few know the details of Hayek's devotion to Breguet.

> So if the financial press, despite its detailed reporting of business triumphs offers no account of Senior's invigoration of Breguet, where is the story to be found? In print nowhere. Only by meeting and talking to those who worked with him at Breguet will the real portrait emerge. Banish all thoughts of the common business narrative of the distant, aloof captain of industry never straying from a penthouse office suite, guarded at all times by fanged administrative assistants, who like Kerberos dogs, zealously patrol doors and phones insuring privileged access to only a rarified few. Senior was fully hands on at Breguet engaged with his teams throughout the entire organization.

The story of the birth of the Tradition series gives a glimpse, not only of his devotion to the detail of every Breguet watch, but his way of inspiring the team to do more. It's no secret that vintage-styled watches, industry wide, are à la Breguet. To prop up those around him, he calmly exmode; it seems that development teams are prowling archives and museums in their quest to copy timepieces from

aware of others joining the bandwagon. But when Senior gathered his team together his advice was "forget the past", don't make the Tradition watch a copy. He wanted the bigger challenge-something that captured the spirit of the past that was not a slavish duplicate. Over time the excitement built over what was being created—a new watch, with a modern movement sporting a titanium balance, no less, yet one that was imbued with the DNA of two hundred years ago. The defining moment came when Senior saw the beauty of the new Tradition movement. The team remembers Senior rubbing his hands together enjoying the pleasure of the moment gazing at the newly designed movement and remarking "What an exceptional and unique adventure we are having!" Then it struck him. A movement this lovely simply could not be concealed behind a conventional dial. So Senior steered the team to creating a small dial opening up the front of the watch to place the heart of the movement into full view.

It's one thing to have boundless enthusiasm flush in the success of an undertaking, it's another thing altogether to maintain that optimism in the thick of the gloom of the global financial crisis. Senior not only led Breguet and others in his group during the darkest days of the panic, he led the whole industry when he, confident in the fact of rebound which had to come, announced that he was refusing even to consider laying off any personnel. Others, household names in the watch industry, lacking both his constant optimism and fortitude, quailed in the face of the storm and imposed massive staff cuts, some as large as 50% of the watchmakers. But it was more than his positive outlook and foresight that he brought to the team at plained how Breguet survived through the turbulent times of the French Revolution. Not only did Abraham-Louis the past. Of course the Tradition development team was Breguet keep the business operating—even during the





MARIE-ANTOINETTE,
A PROJECT WITHOUT PARALLEL
Never in the history of horology has there
been a project the equal of Breguet's
recreation of the Marie-Antoinette watch.
Four years devoted to the crafting of a
watch never destined to be sold!

short period when he fled France for safe haven in Switzer-land—he invented the tourbillon during the darkest days. Imagine: his most famous creation, one that today still occupies a privileged place at the pinnacle of watchmaking, a mechanism that industry-wide is cited as confirming in any brand that can make one that it has succeeded in demonstrating the highest form of the art, was conceived when society was turned upside down and when the attachment of one's neck to one's torso was often open to doubt. From that history Senior drew guidance for the 2008 crisis. He made sure that everyone knew that the same courage that drove Abraham-Louis Breguet to imagine the tourbillon in the aftermath of a climatic revolution would be honored today by maintaining the pace of innovation during a banking crisis.

Senior also was quick to recognize the towering importance of the tourbillon complication to Breguet. Not only did Breguet invent the tourbillon, the very name "tourbillon" that today is the universal descriptor in the lingua franca of watchmaking for this honored complication, was Breguet's chosen label for his creation. As Senior reflected on this heritage, he determined that tourbillons should always be an area of emphasis in the Breguet collections. Not only did he point his team of watchmakers to create new variants of Breguet's existing tourbillons, Senior propelled them to create the even more sophisticated designs of the Tradition Tourbillon (which features a multitude of innovations such as a titanium cage, silicium spiral and escapement and an elaborate fusée chain transmission) and the Twin Tourbillon (which offers two tourbillons joined via a differential and rotating with the hour hand of the watch).

The Marie-Antoinette project is another illustration of how Senior's keen sense of the history of Breguet propelled him to imagine new challenges today. The Marie-Antoinette

watch was Abraham-Louis Breguet's most ambitious project. Acting on a commission in 1783 from an officer of the Queen's guard, obviously an ardent admirer, Abraham-Louis Breguet undertook to construct the most complicated watch ever built, one incorporating "every possible complication". More than 44 years were devoted to creation, not only of the most complicated watch of its time, but one of the most complicated ever built, even from the perspective of today. In all, the watch, No. 160, but today universally named the "Marie-Antoinette", offered a minute repeater, perpetual calendar, equation of time, power reserve indicator, metallic thermometer, large independent seconds hand, small sweep seconds hand, lever escapement, gold Breguet overcoil, double parachute, and automatic winding. Moreover, showing an almost unfathomable degree of prescience, Breguet designed the watch with a transparent rock crystal dial allowing a full view of the movement. Clear dials exposing the upper surface of the movement is a design idea that just came into its own within the last five years; Breguet was two centuries ahead of his time! This priceless timepiece passed through various hands before it was bequeathed to Mayer Museum in Israel, from which, astonishingly, it was stolen and assumed to be missing forever. With the original missing, Senior vowed to recreate it, down to the finest detail.

In every respect the construction of a new Marie-Antoinette watch fulfilled Senior's lust for an "exceptional adventure". The ambition of the project was staggering in its scale. Fashioning *any* ultra complicated timepiece demands Herculean effort and rare skills. But to build a new Marie-Antoinette watch required far more. The watch had to be 100% faithful down to the smallest detail to the mythical original. As his grandson Marc Hayek recalls, it was Senior's unique insight which illuminated



• Nicolas G. Hayek and grandson, Marc A. Hayek.

the path for the Breguet team. As he saw it, modern Breguet, thanks to today's technology was capable of creating watches which Abraham-Louis Breguet could never have imagined and modern Breguet, respecting the spirit of innovation from its original founder must be dedicated to advancing watchmaking art using that technology. But at the same time, modern Breguet was equally obligated to demonstrate that it had mastered the art and possessed the savoir faire to do what its founder had done. It was that syllogism which launched the watchmakers at Breguet to pore over photographs and available records to divine every detail of the historical design. Each and every one of its hundreds of components had to be crafted by hand. Each function and complication of the watch had to oper-



• Nicolas G. Hayek and grandson, Marc A. Hayek.

ate in an identical manner as the original. A team of watchmakers was dedicated for four years to bring the new watch to fruition.

Yet, putting the exclamation point on where Senior saw Breguet and its obligation as the industry leader to undertake projects too demanding, too daunting, too ambitious for the rest of the watch industry, was the fact that when he launched the development project, Senior had not determined whether or not the timepiece would be for sale! Savor that thought. He directed one of the most difficult and costly watch projects in history to go forward without any evident commercial purpose! Later when the watch began taking form, Senior came to his decision. Under no circumstances would it be the offered for sale. As news leaked out, pleas for purchase at any price poured in. That only strengthened Senior's resolve. This watch was far too important to reside, out of public view, in a private safe. The legend of the Marie-Antoinette, a pivotal part of watchmaking history for the entire industry, was to be kept alive for watchmakers, collectors, historians and the public at large by retaining ownership of the watch so that Breguet could put it on display in museums and special showings.

But for Senior, the exceptional adventure of the Marie-Antoinette watch did not stop with the timepiece itself. The watch deserved a box. A watch never to be sold, never to be ceremonially presented to a buyer or prospective buyer, needed a box! Even the exquisite presentation boxes for the Breguet collection would not do. Senior settled on a grand plan. As it evolved, it became, beyond contest, the grandest plan ever to involve a watch box.

The initial stirrings were rather low key. A ferocious wind storm struck France, concentrating particular fury on Versailles. Among the victims was a grand 300-year-old



oak growing in the Park Trianon. The news reported that the combination of the age of the tree and the wind damage necessitated cutting it down. But this was no ordinary oak; it was an oak particularly favored by Marie-Antoinette who reports filtered out of France and reached Switzerland, the resonance between the fate of the now fallen Marie-Antoinette oak and the Marie-Antoinette watch project became immediately apparent and a plan began to jell. Why not contact the gardeners in Versailles to see what could be done to obtain some of this special wood? Dispatched to Paris, the Breguet representatives initially sought to negotiate a purchase. Unusual for our times, the response from

Breguet should simply help itself for free! At this juncture, somewhat of a divide between Swiss and French sensibilities emerged. To the Breguet team—their Swiss nature on display—taking wood for free was unthinkable; Breguet must was given to hours of leisure reading in its shade. As these pay for it. But it was not for sale! The "for free" "not for sale" deadlock soon was broken, however, when Breguet proposed to "make a donation to a Versailles restoration project". Impasse solved the team returned to Switzerland with a list of projects—statue restorations and the like all bearing modest costs—for which donations would be welcomed. Laid out before Senior, the list was not a success. As the team describes it, his eyes sparkling, Senior decided that Breguet must do much more. A small 10,000 Euro the head gardener was that the oak wood was not for sale; statue restoration was not interesting or important enough,

WHAYEK DID NOT WORK; HE AMUSED HIMSELF EIGHT TO FOURTEEN HOURS A DAY Nicolas G. Hayek brought optimism, enthusiasm and confidence to everything he did and inspired those around him to do the same.

Marie-Antoinette's private palace). Footnoted in all of this, as Breguet has not made it a point of emphasis, the resulting box can rightly be seen as the most expensive watch box in history!

However notable these grand events may be, Senior's legacy grows equally from the small things he did at Breguet. What Senior valued was inspiration and creativity from his people. For him organization charts, reporting rules, hierarchy all conspired against what he sought. He built an atmosphere of not only free interchange among people, but liberal running room to pursue ideas and create. He could be cleverly subtle in building an organization according to his principles. An example of his subtle side was his plan for the layout of the manufacture in L'Orient in the Vallée de Joux. Instead of creating islands, grouping similar functions in places separated from others, Senior saw to it that all of the myriad activities of the manufacture were interspersed. How better to encourage movement designers and watchmakers to talk to each other than to place them mixed in with one another?

Without an organization chart, Senior was able to make

a broad swath of the Breguet employees feel that each had a special relationship with him. Of course the closeness that each of his Breguet colleagues felt came at a price. He expected the same dedication from them that he brought to the organization. There was no worse response to one of his requests than "I don't have time". Inevitably he would reinforce the old axiom that if you want something done, give it to a busy man. Whenever met by a claim from someone that the person had no time, Senior's response would be "Ok, I'll do it". Indeed, his standing edict was to get things done rapidly and in that lay the key to success. Not that he always put it severely. As he urged on the Marie-Antoinette team, he was met by the watchmakers' estimate that it



would take three years (it took four). Senior, then approachmeans to me? For you it's ok, but I am almost 80".

Frequently there was yin and yang in his relations with his team. One minute calling on a Saturday to demand a report for how things were faring in a market. The next sending flowers in thanks for the excellent report. He presided at important meetings with his managers at Breguet, flyswatter in hand. The flyswatter had a dual purpose. Of course bringing an end to the annoyance of a pest flying around the Vallée de Joux was one of them. The other was as a gavel. His instrument for conducting the meeting and, hammering, if you will, his points home.

Perhaps what matters most, was that Senior was happy ing 80 rejoined "Look at me. Do you know what three years in his work. More than that. When asked about his work, Senior's reply was always "I don't work.....I amuse myself eight to fourteen hours a day!" Leading by example, that's what he inspired in those around him. Joy in the creation of a splendid new watch. Satisfaction in achievement. And above all else, confidence and optimism. Maybe that's why still today his spirit is omnipresent in both L'Abbaye (where Breguet's administrative offices are found) and L'Orient (5 minutes down the road, where the manufacture is located). His "exceptional adventure" continues.

Nicolas George Hayek (* 19. February 1928 in Beirut, Libanon; † 28. June 2010 in Biel)

tended owner of the original watch, must replicate the pattern of the wooden floors of the Petit Trianon (which was

visit the site once a week for three years.

but perhaps underwriting the complete restoration of the

entire Petit Trianon palace......THAT! would fit Breguet.

Moreover, as Senior saw it, always close to his roots as an

engineer, Hayek Engineering would, gratis, lend its exper-

tise by consulting on the project, dedicating an engineer to

And as part of this now ambitious plan, Breguet would

get the wood from the oak thrown in! The Marie-Antoi-

nette watch could now have its box. There was one more

embellishment to come. The box for the watch never to be

sold, constructed from wood historically linked to the in-





t is a given, universally accepted by all, that precision imbues every particle of the nucleus of fine watchmaking. Indeed, to many it is the nucleus. Hand in hand with the precision that marks the performance of the world's finest timepieces, is precision in the fashioning and finishing of every component of the watch. But there is a third dimension as well. More than two centuries of evolution of haute horlogerie has brought precision in the use of terminology to describe the designs, components and features of watches. For example, when a watchmaker describes a watch as a perpetual calendar, every other watchmaker and connoisseur knows what he means. The rules of what constitutes a proper perpetual calendar are well known and carefully defined. The language is, in a word, "precise".

* * *

However comforting it may be to know that the language of watchmaking has matured in this orderly way, there is one particular corner where it stumbles badly. GMT or time zone watches. The imprecision, if you will, in the terminology arises from the fact that until now there have been two distinct types of GMT or time zone watches, both described identically as "GMT" or "time zone". The first species is a watch conceived for travelers. The GMT or time zone complication of this type records the owner's home time with a subsidiary display and allows for the easy advance or retard of local time (presuming that the owner has traveled to a different time zone) with the principal hour and minute hands of the watch. This arrangement of the complication is entirely logical. If the owner has traveled to a different time zone from the one in which he customarily lives, as for example a New York resident traveling on a trip from New York to London, the watch retains New York time on a secondary display (most customarily incorporating or paired with a 24 hour indication) and displays more prominently what is now local time for

the globe trotting owner, namely London time. What is the most important function of the watch? Of course to show local London time and, by using the principal hands, that time can be seen at a glance. Home time is only a reference so that the display can be diminished in importance and consulted whenever the owner wants to learn the time back home in New York.

Yet there is a second very different species of GMT or time zone watch from the one just described. This type of watch allows the owner to select a city on the globe (presumably different from where he currently is) and note the time in that location. Since the owner is simply referencing time in a different location, the display of local time (where the owner currently is) is shown by the principal hands of the watch and the time in the selected location is displayed in a subsidiary manner (either on a small subdial or if the watch employs a system developed by Louis Cottier in the 1930's, via a rotating ring synched to cities shown on the bezel). Thus, if the owner is in New York and wants to

know the time in London, the watch offers an easy method to leave the principal time hands showing New York time and, via a subsidiary method, display London time. This second genre is better adapted as a "telephone watch"—indicating the time elsewhere as if the owner were going to place a call, hopefully not at an impolite time, to that selected location. It is vastly less well adapted to travel since, either the time in a place different from the home city will have to be read from subsidiary displays, or the watch will have to be completely "reset" to place the new local time on the principal display.

Unfortunately, watchmaking language confuses these two entirely different conceptions of GMT or time zone watches. *Imprecision* has infected the vocabulary as *both* types are called "GMT" or "time zone". A purchaser cannot rely on the terms to know which type of function a particular GMT or time zone watch offers.

The solution to this dilemma of discerning whether a particular watch is of the "travel" variety or the "telephone" variety lies not in the publishing of a revised dictionary of watchmaking terms, nor in the penning of paragraph long descriptions of two time zone display watches. Rather the solution comes in the form of the new Breguet Classique Hora Mundi. By equipping the watch with a form of mechanical "memory" the Breguet Classique Hora Mundi can either display local time on the principal hands, with home time seen when needed—the perfect persona of a true travel watch— or it can display the time of a distant city on command and immediately switch back the principal time display to home time—the persona of a telephone watch.

At first glance, the Breguet Classique Hora Mundi does not appear to be a GMT or time zone watch at all. The reason: it only offers a single hour and minute hand. There



SET ANY TWO OF
THE EARTH'S 24 TIME ZONES
Once the time zones are set, with
a simple push of a button,
the watch switches back and forth
between the two.

is no subsidiary second time display anywhere to be found on the dial. The outward appearance is largely that of a simple time only wristwatch. The single set of hands, however, is connected to a mechanical memory underneath the dial. This mechanical memory is simultaneously keeping track of two time zones. The simple push of a crown located at 8 o'clock switches the hands from displaying the time in one of the memories to the time in the other. The confusion of two separate time displays which, until now all conventional GMT or time zone watches have relied upon, has been completely eliminated. No longer is there a question as to whether the watch facilitates changing the main display or whether it has been conceived to offer rapid changing of a subsidiary display. The Breguet Classique Hora Mundi facilitates setting of both home and another time and, on command, displays whichever one the owner desires.

Usage could not be more straightforward. For the first time zone (which would be home time), the owner simply sets a city from his home time zone in the window located at 6 o'clock, then sets the correct time via the principal crown located at 3 o'clock. Thereafter, the owner can select, via the crown at 8 o'clock, any other of the globe's 24 time zones into the window. Therefollowing, with a push of the

crown at 8 o'clock, the watch will, from that point, display the time in the selected location. If the owner has traveled to that city, the now switched time display will be an ideal reading of local time. To see home time, a simple push of the crown at 8 will, thanks to the memory, switch the display back to home time. This is the classic functional description of a travel watch. On the other hand, if the owner has not traveled at all and simply wants to know the time in another locale, turning the crown to that distant time zone and pushing the crown at 8 will show that time; another push of the crown will return to home time. The ideal functioning of a telephone watch. Never before has a dual time watch offered such perfect adaptation to both paradigms.

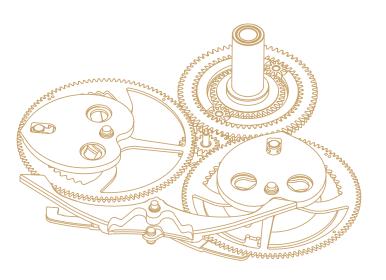
The mechanical memory that achieves this breakthrough, owes a lot to chronograph construction. One of the central components of a classic chronograph is a component called a "heart shaped cam". When an arm, which in watchmaking parlance is called a "hammer" is pressed against a heart shaped cam, owing to its logarithmic form, the cam will always rotate to the same position, centering the hammer at the "top" of the heart. In a chronograph, the heart shaped cam and a hammer are used to reset hands to zero. No matter what the position of the heart cam, when the hammer strikes, it will rotate back to the preprogrammed zero position.

The Breguet Classique Hora Mundi uses two separate heart shaped cams, each attached to its own separate wheel powered by the running train of the watch. When a time zone is set in the window at 6 o'clock, the position of one of the heart shaped cams is changed. The switching of time zones causes a hammer to hit one of the heart shaped cams, rotating the cam's wheel to center the hammer at the top of the heart. If the button is pushed again, the other end of the hammer hits the other heart shaped cam and

rotates that wheel until the hammer is at the top of that heart. Successive pushes, in turn, go back and forth between the positions of the two hearts—i.e. between the two programmed time zones.

Of course, things are slightly more complicated than that simple description might suggest as the hands must be both driven by the running train of the watch and by whatever positions the heart shaped cams command. This means that there must be a differential powering the hands, which is able to accept and combine two different inputs, one from the running train of the watch and the other from the two heart shaped cams. Further sophistication to the switching mechanism is achieved by use of a spring. When the button at 8 o'clock is pushed a spring is charged with the energy from the push. As soon as the button is released, the energy in the spring is applied to one of the hammers to effectuate the change in the time display. Why go to all this bother with a spring? This is because a charged spring will always deliver the same amount of energy to the hammers. If the push were directly applied to the hammers, the force could vary greatly depending upon how vigorously the owner pushed the button. Thus, the spring mechanism insulates the movement from possible damage from over eager pushes.

The mechanical memory system for the indication of two different time zones in the Breguet Classique Hora Mundi, taken alone, represents a significant advance in time zone watch design, but that only takes us to the half-way point in the functionality which it offers. There are two other vital indications which need to be considered—date and 24 hour or day/night displays. To be truly useful, a time zone watch should show the local date (isn't that what the owner wants to know, the date where he currently is?) and offer an indication of whether it is day or night in



THE HORA MUNDI'S SECRET:

A MECHANICAL MEMORY

Shown above are the principal components of the mechanical memory: heart shaped cams, the switchable hammer, and the differential engaged with the hour hand.

the home time zone (big difference between calling home when it is three in the afternoon vs. three in the morning).

The Breguet Classique Hora Mundi is up to both of these challenges. When the watch is switched between the two stored times, both the date and the day/night indications switch. As a result, the date shown in the date window will always correspond to the date for which the hands have been set and the day/night indicator, displaying a sun for daytime and a moon for nighttime, will likewise correctly reflect the setting. As connoisseurs of travel watches know, keeping the correspondence between the date and local time always presents a unique set of problems. This is because when a new local time is set, the date may in fact be the previous day. Said another way, in order for the date always to be correct, its mechanism must allow for changes both forwards and backwards. As many date constructions permit only changes in a forward direction those designs would not lend themselves to what the Classique Hora Mundi offers. Breguet, therefore, had to develop a design which would allow for both forward and backward changes.

All of this functionality while offering everything that travel watch or telephone watch aficionados may desire appears somewhat complicated when described in words, but is fabulously simple to use when the watch is in the hand. Initially the owner will want to set the home time and date. Pulling the crown at 8 o'clock and turning it allows for setting of the home time city; this crown can be turned in either direction to place the home city in the window. This, then sets the first time zone. Setting of the time and date for this home time zone is then accomplished as it would be for any other watch. The crown at the traditional 3 o'clock position winds the watch when fully pushed in, sets the date at the first pulled position and sets the time at the second pulled position. Once the time and date are set, all the





THREE DIAL VARIATIONS ARE OFFERED

The elaborately constructed dial of the Hora

Mundi is available depicting Asia (shown at left),

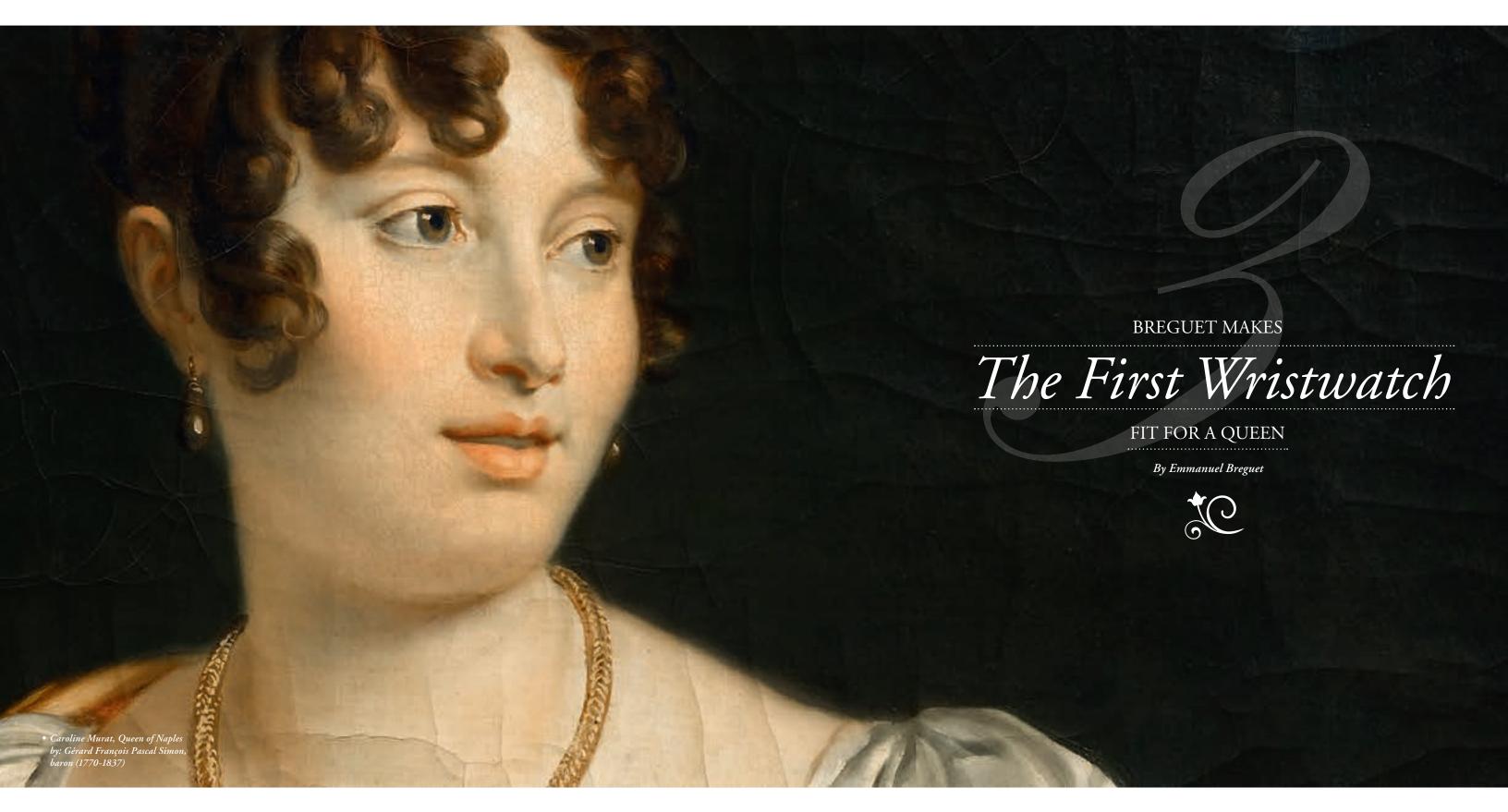
Europe and the Americas.

indications are in order for what most would consider "home time". Whenever the owner wants to know the time in any other of the 24 time zones, all that is required is to pull the crown at 8 o'clock and turn until the desired city appears in the city window. The date and the day/night indication will automatically change as the cities change in the window. Once the second city is selected, changing back and forth between the two, now memorized cities and their time zones, is trivially simple. A push on the crown at 8 charges a spring which effectuates the switch between the two cities. All three indications are synchronized—time, date and day/night—and change as required.

Beyond its ground-breaking time zone features, the Classique Hora Mundi offers a sophistication in aesthetics fitting with Breguet tradition. The dial is constructed in four parts, all but one of which are in gold—a large center section showing a section of the world, an outside chapter ring, and two elements for the day/night display, hand-engraved clouds and, the only non-gold component, a lapis lazuli background. The center section is the most complex to construct. It begins with a gold disk which is first polished, then formed into a convex, bombé form. After the window is cut for the date, and the disk repolished, lasers are used to cut the outline of the displayed continents. Three different continental designs will be offered, the Americas, Europe and Asia. A sand finish is then applied to the continental area, followed by hand application of a guilloche wave pattern for the oceans. Finally multiple coats of lacquer are applied to produce the colors. Painstaking hand work also is required for the cloud portion of the day/night display, which has a cloud design and the number of the watch carved into its surface.

The Breguet Classique Hora Mundi will be offered in both red gold and platinum.





f all the Bonaparte family, Caroline Murat (1782-1839) was Breguet's most loyal patron. The youngest sister of Napoleon I, she bought her first Breguet timepiece in 1805, at the age of 23, and would continue her purchases at an impressive rate until 1814. Indeed, the company sold no fewer than 34 watches and clocks to her who, in 1800, married Joachim Murat, then a commander of the consular guard. They ruled as King and Queen of Naples from 1808 to 1815. Throughout her turbulent reign, Caroline Murat fostered the arts, oversaw the decoration of the royal palaces, took a personal interest in the archaeological excavations at Pompeii and Herculaneum, and encouraged manufacturing. She introduced Naples to French painters, among them Ingres, and craftsmen of Parisian fashion, theatre, and... watchmaking.



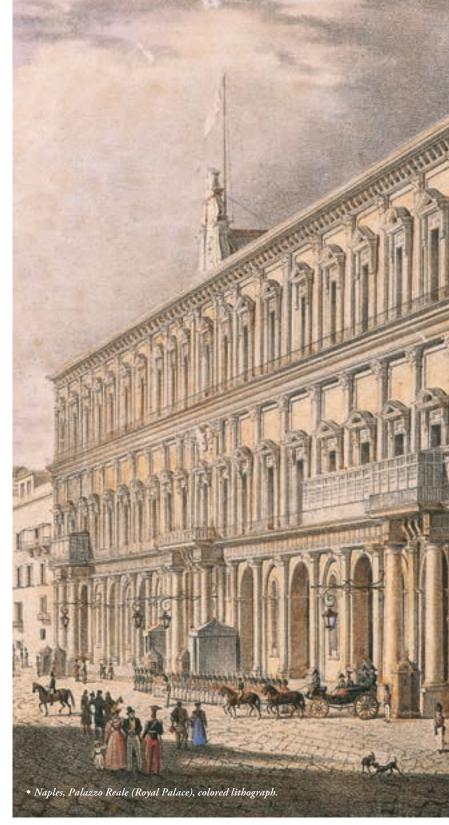
Evidently, Caroline was enamored of fine watches, and a particular admirer of those which left Breguet's workshops on Quai de l'Horloge. This was something of a family trait, as Breguet's archives for the Napoleonic period are replete with the names and titles of her siblings: Napoleon himself, who acquired three timepieces prior to embarking on his Egyptian campaign in 1798, and his consorts Joséphine from 1797 and then Marie-Louise from 1811; Joseph, King of Naples and later Spain; Louis, King of Holland; Lucien, Prince of Canino; Jérôme, King of Westphalia; Pauline and her husband Prince Borghese; Elisa, Grand Duchess of Tuscany... not to mention their relations and high-ranking dignitaries. The imperial family's purchases warrant a study in their own right!

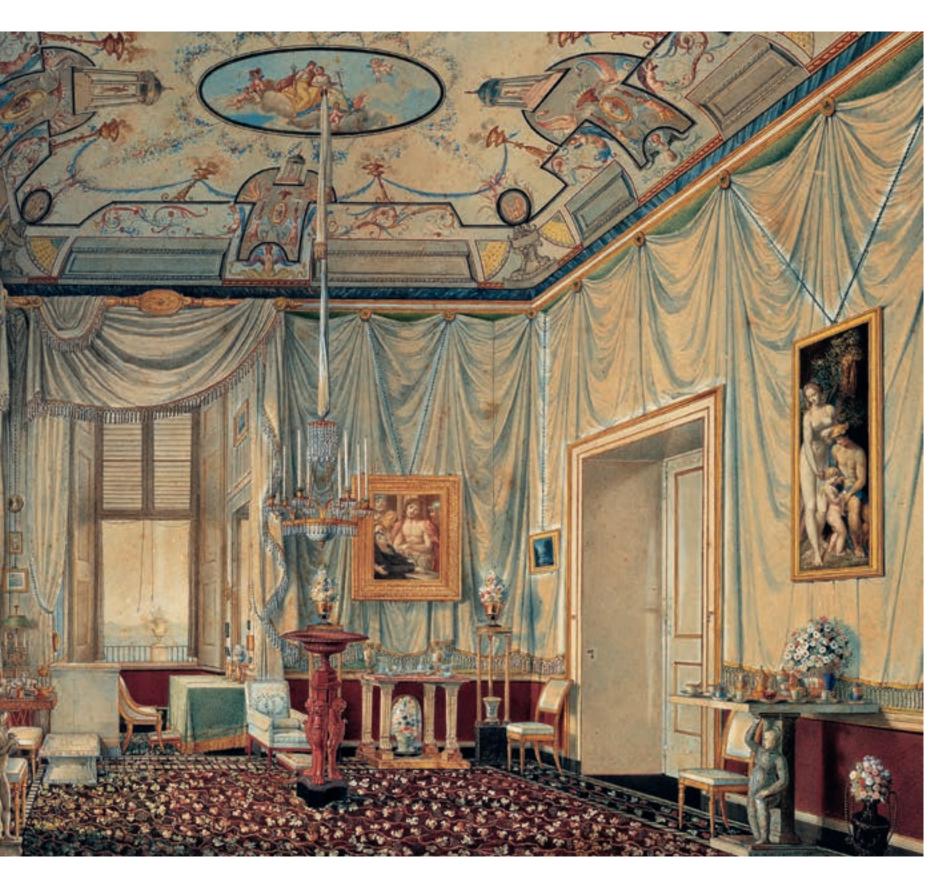
Indeed, closer analysis of these various purchases reveals a curious incident spanning the years 1810 to 1812, involving our very own Caroline Murat and... a wristwatch.

A wristwatch in this era? Impossible, say some. Much too soon, say others! Indeed, the wristwatch made its timid debut around 1880, first for ladies then a little later for men as, circa 1910, cyclists, horse-riders, and pioneers of aviation and automobiles took to the wristwatches that now featured, in one or more versions, in every watchmaker's catalogue. All of which is a long way from our story! But as with any invention, there are always antecedents, prior occurrences which have been forgotten or are known only to specialists.

Leaving aside records of watches which were later worn as charms on bracelets, or mounted in or hung from wide bracelets, we shall concern ourselves only with watches that were, from the outset, intended to be worn on the wrist. For a long time, Patek Philippe of Geneva claimed an important first in this domain with "the request, in 1868, by the Hungarian Countess Kocewicz for the first veritable bracelet-watch."

Breguet's watch for Caroline Murat, Queen of Naples, came some 60 years earlier. But what do we know of this improbable story? What do the archives tell us? Let's travel to Paris where the historic archives of Maison Breguet are preciously conserved at Place Vendôme. The register of commissions, as they were already known, lists the special orders placed by customers who had failed to find their heart's desire among the timepieces proposed. This fascinating book is filled with all manner of complications and fantasies which Abraham-Louis Breguet agreed to make for his patrons, among them many powerful and famous figures. On page 29, we learn that the Queen of Naples placed an order on June 8th 1810 for two unusual timepieces: a grande complication carriage watch for the sum of 100 Louis, "in addition to a repeater watch for bracelet for which we shall charge 5,000 Francs." This astonishing order reappears in the manufacturing register, which presents each watch's detailed identity and a complete summary of every stage in the making of the piece.





The Queen of Naple's commission becomes watch N° 2639, with the unprecedented description, "oblong repeater for bracelet." It went into production on August 11th 1810, just two months after the Queen had placed her order, and was completed on December 21st 1812. Thus it took almost two and a half years to make. We learn that this was a repeater watch, specifically a quarter-repeater which is common for a Breguet timepiece. Far less common is its oblong, that is oval, shape. The manufacturing register informs us that the watch incorporated a lever escapement and a thermometer. Seventeen people, all named, were involved in its manufacture which required 34 separate operations. By early December 1811, it seemed the watch was ready. On December 5th, an invoice was drawn up for 4,800 Francs. Not only did Breguet keep to his original quote of 5,000 Francs, he even took 200 Francs off the price!

And yet it was a further year before the watch left Breguet's workshops. Apparently, Abraham-Louis Breguet had decided to postpone delivery. For a watch to be presented to its owner, each detail had to be perfect. That was the rule. First the motion-work system was replaced; either it wasn't entirely satisfactory or had broken. Then, no doubt at the Queen's request, the guilloché gold dial was replaced by a guilloché silver dial. The register notes the dial had Arabic numerals, which were common on an enamel dial but extremely rare on a gold or silver dial. The watch was finally ready on December 21st 1812. No doubt it was sent to Naples where Caroline had taken the throne in place of Murat, who was fighting alongside Emperor Napoleon in Russia. There are no sketches in the archives to indicate its exterior. Fortunately for us, the watch appears in 1849 in a register of repairs carried out on Breguet watches; what we now call after-sales service. An entry dated March 8th 1849 notes that Countess Rasponi,

During the course of her reign in Naples,
Caroline Murat supported all forms of art,
making celebrities of both French and
Italian artists.



The Room of Caroline Murat in the Palazzo Reale in Naples, by Montagny Elie-Honore, 1811, 19th Century, watercolor.

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"residing in Paris at 63, Rue d'Anjou," had sent watch N° 2639 for repair. The countess was none other than Louise Murat, born 1805, the fourth and last child of Joachim and Caroline Murat, who in 1825 married Count Giulio Rasponi. The watch is described in detail: "Very thin repeater watch N° 2639, silver dial, Arabic numerals, thermometer and fast/slow indicator off the dial, the said watch is mounted on a wristlet of hair woven with gold thread, simple gold key, a second wristlet, also woven with gold, in a red leather case. For repair." We can thank the author of this text, no doubt amazed by such a rare object, for providing such precise details. The watch was returned to its owner on March 27th 1849. The repairs, which cost 80 Francs, were as follows: "We polished the pivots, reset the thermometer, restored the repeater to working order, overhauled the dial, cleaned each of the parts and adjusted the watch." It was again brought in for repair in 1855, which is the last trace Breguet has of it.

Today, the Queen of Naple's watch is nowhere to be found. No public or private collection lists it on its inventory. Does it still exist? Will it one day reappear? Investigations are under way!

Archive descriptions give a fair idea of the watch and, despite missing information (size, exact configuration of the dial, shape of the bracelet, attachment and fastening), such a work of art, such a feat of achievement, leaves us in awe.

Based on what we do know of this watch, we can only pay homage to Abraham-Louis Breguet who, in response to a request made by the Queen of Naples on June 8th 1810, imagined specifically for that purpose the world's first known wristwatch; a timepiece of unprecedented construction and extraordinary refinement, namely an exceptionally thin, oval repeater watch with complications, mounted on a wristlet of hair and gold thread. We can also pay tribute to Caroline Murat, a true admirer of timepieces without whom Breguet would perhaps never have created such an object. Few people are aware that, had Caroline accepted the Principality of Neuchâtel proposed to her by her brother in 1806, she would have reigned over a country of watchmakers. She declined, on the grounds it was too small. But we can't rewrite history.

[•] From the archives of Breguet—a fabrication register—which permits one to follow the detail of different steps of the fabrication of watch no. 2639 which is identified as "Rept. de forme oblongue pour bracelet" ("Repeater of oblong form for bracelet").



rogress, we have come to accept, comes only incrementally. Even Moore's law, named after Intel co-founder Gordon Moore, that has successfully predicted the towering advances in microprocessor power, hews to this axiom in the electronic milieu where doubling constitutes normal gradualism. Elsewhere, rarely, if at all, does one witness an order of magnitude jump. With the new Type XXII Chronograph Breguet has accomplished just that.

In the 200+ years of evolution of the Swiss lever escapement that lies at the heart of essentially all high quality Swiss watches, the running frequencies have increased either not at all or only gradually. The norms for the past half century have been between 18,000 and 28,800 beats per hour, with a very small number pushing up to 36,000. Recently one Vallée de Joux brand loudly announced that it had upped the ante to 43,200 beats per hour (and that watch did so with another form of escapement). This is precisely the sort of slow step-by-step evolution that one would expect in the milieu of mechanical designs that have matured for over two centuries.

Imagine then not an increase of around 7,000 beats, which some felt justified shouts to the rafters, but to more than *double* the standard frequency—72,000 beats per hour or 10 hertz. This is the advance which Breguet has achieved for the Type XXII Chronograph. Savor this for a moment. This is an increase more than *five times* larger than the last industry milestone.

But there is much more here than just numbers.

There are visibly obvious improvements in the running of the chronograph thanks to the increase in frequency. Completely transformed is the motion of the chronograph seconds hand. As the frequency is increased within the customary range—before the revolution ushered in by the Type XXII—for example from 18,000 beats per hour up to 21,600, only a trained eye will notice the difference in the movement of the chronograph seconds hand. That increase changes the small jumps of the seconds hand from every fifth of a second to every sixth. Finer jumps to be sure, but not really visibly different. Not so when the beat springs all the way to 72,000. The effect is transformative.

*№ LEAPFROGGING*THE EVOLUTION OF WATCH

FREQUENCY

Increases in watch frequency have come slowly. An advance of 7000 beats per hour was recently heralded as revolutionary.

The Type XXII offers an increase more than five times as large.

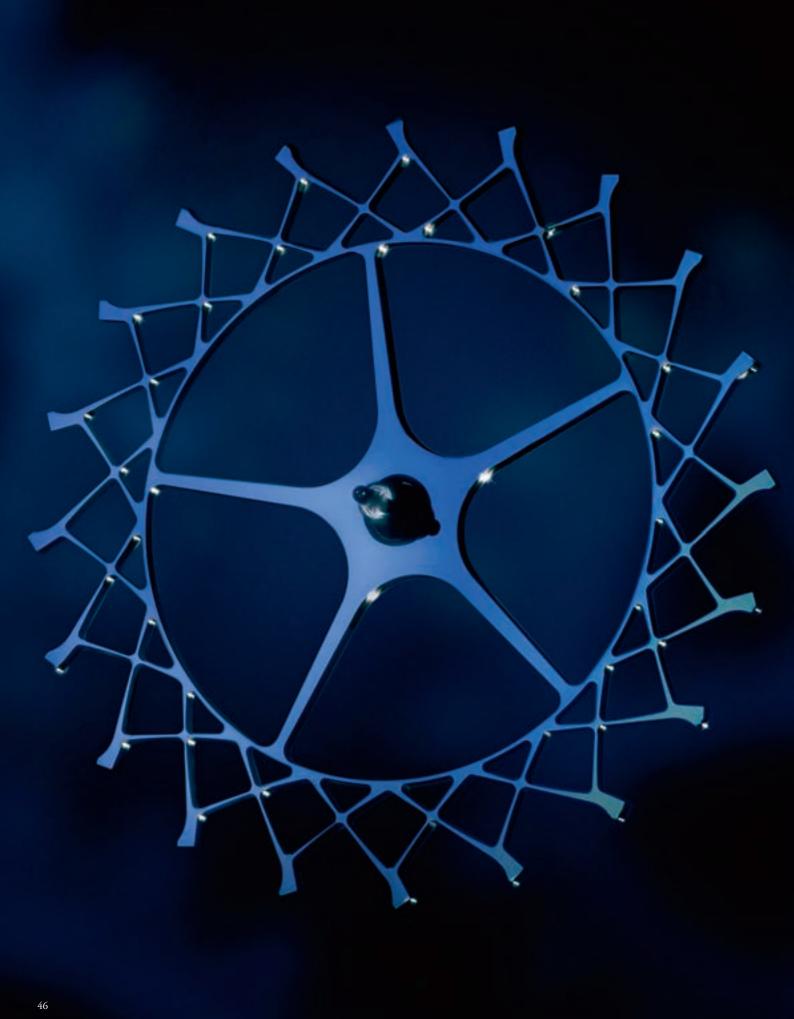
Instead of small jumps every fifth or sixth of a second, the hand moves every $20^{\rm th}$ of a second. To the eye, the motion no longer consists of small jumps; the chronograph seconds hand now glides smoothly along its path.

With the creaminess of this new motion comes greater resolution and accuracy. With each second now divided into twenty small sub-parts, it becomes possible to measure time in those same increments—i.e. a 20th of a second.

These are the benefits that are directly visible to the owner. But there are other important advantages which, perhaps not as readily seen at a glance, are equally significant. The ground breaking high frequency yields major improvements in the stability and accuracy of the watch's time keeping. Watch makers evaluate the quality of a balance combination by measuring the rate at which a running balance wheel will lose amplitude (the number of degrees in its oscillation back and forth) after it is given an initial energy burst and released to oscillate freely. The slower the rate of amplitude loss, the higher the quality factor of the balance design and the better the rate keeping performance. In addition, when the frequency of the balance is increased the amount of energy in this, what can be thought of as an oscillator system increases at the same time. The laws of physics teach that a higher energy oscillator is less sensitive to shocks and perturbations than one of lower energy. Thus, increasing the frequency produces improvements in several key measures of balance performance. To the owner what this all means is better more stable rate keeping of the watch.

This order of magnitude jump in movement performance was achieved by cutting edge materials and designs. The Type XXII chronograph features a balance spiral, escapement anchor and escapement wheel fashioned out of silicium. These uses of silicium in the Type XXII, are an outgrowth of more than six years of research by Breguet to adapt silicium for use in wristwatches. The first watches to debut with silicium components were the 5197 and 5177 which were featured at the 2006 Basel fair. Both the 5197 and 5177 offered escapements running at conventional frequencies. The Type XXII represents a further step forward as it takes advantage of silicium's lightness to run at its record breaking frequency.





The use of silicium itself places Breguet in the forefront of modern horological design, but Breguet has carried its development leadership even further. For two hundred years, watch makers have struggled to minimize the effect of temperature changes on the running of watches. The balance spiral is one of the critical components subject to temperature changes. Alloys such as Nivarox, used by most watches today, have been an excellent answer to this watchmaking quest to conquer the effects of temperature changes. With the change to silicium for the spiral, new temperature effect studies were called for. Breguet's answer, protected by a patent, is a special thermal oxidation process for the silicium.

More is involved, however, than mere replacement of components which are customarily constructed using Nivarox (for the spiral) and steel (for the anchor and escapement wheel) with new material. New innovations were developed in the shapes of the escape wheel and anchor to lower their mass (and consequently, inertia). A conventional steel anchor, for example, weights 7.5 gm; the Type XXII's silicium anchor weighs but a third of that, only 2.6 gm; more importantly with this change the inertia is reduced to but 10% of that of a steel anchor. The lowering of the mass of these central components of the watch was a critical stepping stone to raising the frequency to the revolutionary plateau of 72,000 beats per hour.

The use of silicium confers yet another advantage. Ordinary escapement wheels require lubrication to prevent wear. Silicium's natural wear resistance eliminates the need for lubrication of the outer surface of the wheel, which is particularly important at this high frequency.

A second stepping stone is the design of the balance wheel itself. Breguet has pioneered and patented the use of titanium for balance wheels. The lightness of titanium, coupled with gold regulation screws to set the running rate of the watch, ideal at customary watch frequencies, is particularly well suited to the Type XXII's industry leading frequency where minimizing inertia is essential.

It is fitting that this game changing advance in chronograph design, occurs close in time to the celebration of a half century anniversary. Breguet's original Type XX Chronograph debuted in the 1950's to fulfill a commission from the French military seeking a chronograph for use by air force and naval aviators.

™ BREGUET IS A PIONEER IN THE USE OF SILICIUM Shown at left, the filigree of the Type XXII's silicium escape wheel.



Of course the Type XXII offers the full functionality of a two button, flyback chronograph, but, in addition it also features a second time zone GMT complication.

The designation Type XX (although some have referred to the early versions of the model as the "Type 20") brings with it a degree of historical symmetry as the last airplane produced by A. L. Breguet's grandson, Louis Breguet, one of aviation's pioneers, was the Type XIX. Each watch, which was purchased and owned by the French military and issued to pilots as part of their standard flight gear, was one of the first in watchmaking history to feature a flyback feature. One of a chronograph's most useful complications, the flyback, is extremely valuable for pilots, who historically depended upon making consecutive time/distance calculations in the air. As a pilot passes a navigation point (or in aviation parlance a "fix"), the chronograph is stopped by pushing the start/stop button, time is noted and then another timing event for the next fix is customarily started. This requires that the chronograph be reset to zero and started once again. With a classic two button chronograph, three button pushes are called for: one to stop, a second to reset to zero and a third for the re-start. The flyback complication of the Type XX greatly reduced the pilot's work load as a single push of the reset button effectuated a stopping of the chronograph, its resetting and restart for another new time/distance calculation. Three button pushes reduced to one.

Of course, apart from its ground breaking high frequency, the Type XXII takes its place in the Type XX family lineage by offering the flyback complication which so distinguished the original Type XX model. So, too, the aesthetics of the Type XXII are faithful to its heritage. Its generous diameter of 44mm to allow easy reading at a glance, rotating bezel, stainless steel case, black military style dial with white Arabic numerals all recall the designs of the first Type XX chronograph.

Faithfulness to the aesthetics of the original has not, however, precluded changes to take advantage of the greater precision produced by the high frequency movement. Instead of offering a chronograph seconds hand that makes one revolution of the dial per minute, the Type XXII rotates the seconds hand twice as fast, one revolution every thirty seconds. As a result, the seconds markings are twice as far apart as they would be with a conventional chronograph hand, making the reading of fractions of a second vastly easier. Of course, with the revolution of the chronograph seconds hand occurring twice a minute, it became necessary to display whether a reading was in the first thirty seconds of a minute or the second. This has been accomplished with markings on the dial.

In common with its predecessor Type XXI, the Type XXII is fitted with a large minute counter hand that reads on an outer minute chapter ring, whose markings, easily distinguish between the first thirty seconds or second thirty seconds being recorded by the chronograph seconds hand. In addition there is a twelve hour counter located in a subdial at 6 o'clock.

New to the Type XX line is a GMT function. The main hour hand can be advanced in one hour increments via the screw down crown to show local time as the owner crosses time zones, while home time remains recorded on a 24 hour subdial located at 3 o'clock.

Rounding out the dial displays is a date window at 6 o'clock.

Traditionally, all of the timepieces in the Type XX lineage have featured closed case backs—appropriate for a military instrument. The Type XXII deviates from this imperative only slightly. The oscillation of its high speed balance and escapement is so captivating that it would have been a tragedy to have totally sealed them away from observation. Accordingly, the otherwise solid stainless steel case back has been fitted with a porthole over the balance to allow view of motion equaled by no other wrist watch. And since the winding rotor for the automatic winding mechanism may from time to time pass in front of the port hole, it has been specially decorated.

Thus, the Type XXII can be seen resolutely bridging two eras—that of more than half a century ago as the timepiece for the French military and that of the present day pioneer with cutting edge technology which has produced the world's first wristwatch running at a 10 hertz frequency.



A TRADITION CARRIED FORWARD

The Type XXII draws on a rich history
of sixty years of Breguet watches
for aviation, dating from the original

Type XX for the French Air Force.

51





eft brain. Right brain. Sensible and functional or artistic and emotional? How often do objects or designs fall into one box or the other? Almost always. This is why absolutely nobody waxes poetic on the subject of minivans or plans flower arrangements for a Navy Seals training exercise.

But if there is to be an exception that proves the rule, guilloche decoration is the perfect example.

If a watch dial is a tableau upon which the watchmaker paints, is there a more radiant, refined, elegant expression of watchmaking art than a guilloche design? Scant historical probing is required to arrive at the firm conclusion that when Abraham-Louis Breguet introduced guilloche design to the dials of his watches more than two centuries ago, the first watchmaker to bring this art form to timepieces, aesthetics were certainly in the forefront of his thinking.

♦ No. 7337

Patterns shown at left:
Grain d'orge (main dial);
panier alterné (interior
chapter ring); soleil radiant
(small seconds); liseré
(border chapter ring);
panier (moon phase);
filet (border number).



No. 5707

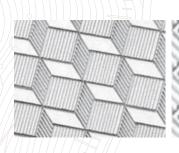
Patterns shown at right:
clou de Paris (main dial);
pavé de Paris (subdial 3 o'clock);
vieux panier (upper subdial
9 o'clock); flammé (lower subdial
9 o'clock); grain d'orge (subdial
6 o'clock); liseré (border chapter
ring); filet (border number).





However, terminating the inquiry at this point is to perceive only a fraction of Breguet's motivations in his adoption of the motif. Scholarly examination of his career plainly shows that Breguet never departed from his convictions of function in every element of watch design. Left brain. Right brain. For Breguet guilloche decoration was both beautiful and functional.

Decorative engraving as an art form dates back centuries before Breguet's lifetime to ancient Greece. There is some uncertainty as to precisely when mechanical techniques to produce it were introduced. According to one school of thought it was a French engineer, Guillot, who invented the engine turning machine to engrave patterns on metal. An alternate account gives credit to a German, Hans Schwanhardt. Regardless of the origin of the machines to produce the designs, it seems that Breguet encountered guilloche engraving on a trip to London where this form of decoration was widely adopted to adorn wooden furniture.





vague (main dial).

◆ No. 5827

Pattern shown opposite below: flinqué alterné (main dial).

◆ No. 5967

Pattern shown above left: art deco "cube"

♦ No. 5177

Pattern shown above right: damier croisé.



No. 5157

Patterns shown at right:
clou de Paris (main dial);
liseré (border chapter ring);
filet (border number).



Inspired by what he observed in London, Breguet returned to Paris and began experimenting with the technique for watch dials. What is clear, however, is that he perceived important functional benefits that could be achieved with this fine form of engraving. First, placing the fine guilloche pattern behind the hands greatly improved visibility of the hands and, thus, the readability of the watch. At the time, baroque was the prevalent aesthetic for hand design. Large and ornate, baroque hands, of course, would stand out against any background. Guilloche opened up the way for a far more refined hand aesthetic. With a fine contrasting texture beneath them, the now classic blued steel "pomme" hands—or in what is now universally accepted watch parlance, "Breguet hands"—became a possibility.

A second functional purpose emerged from Breguet's early experiments. By varying the pattern of the fine engraving on the surface of the dial, Breguet found that he could delineate, highlight and define different zones on the dial within which to locate individual complications and



No. 5347

Patterns shown at left:

panier circulaire (main dial);

liseré (border chapter ring).

♦ No. 5317

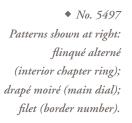
Patterns shown above:
clou de Paris (main dial);
vague circulaire (power reserve subdial);
liseré (border chapter ring);
filet (border number).







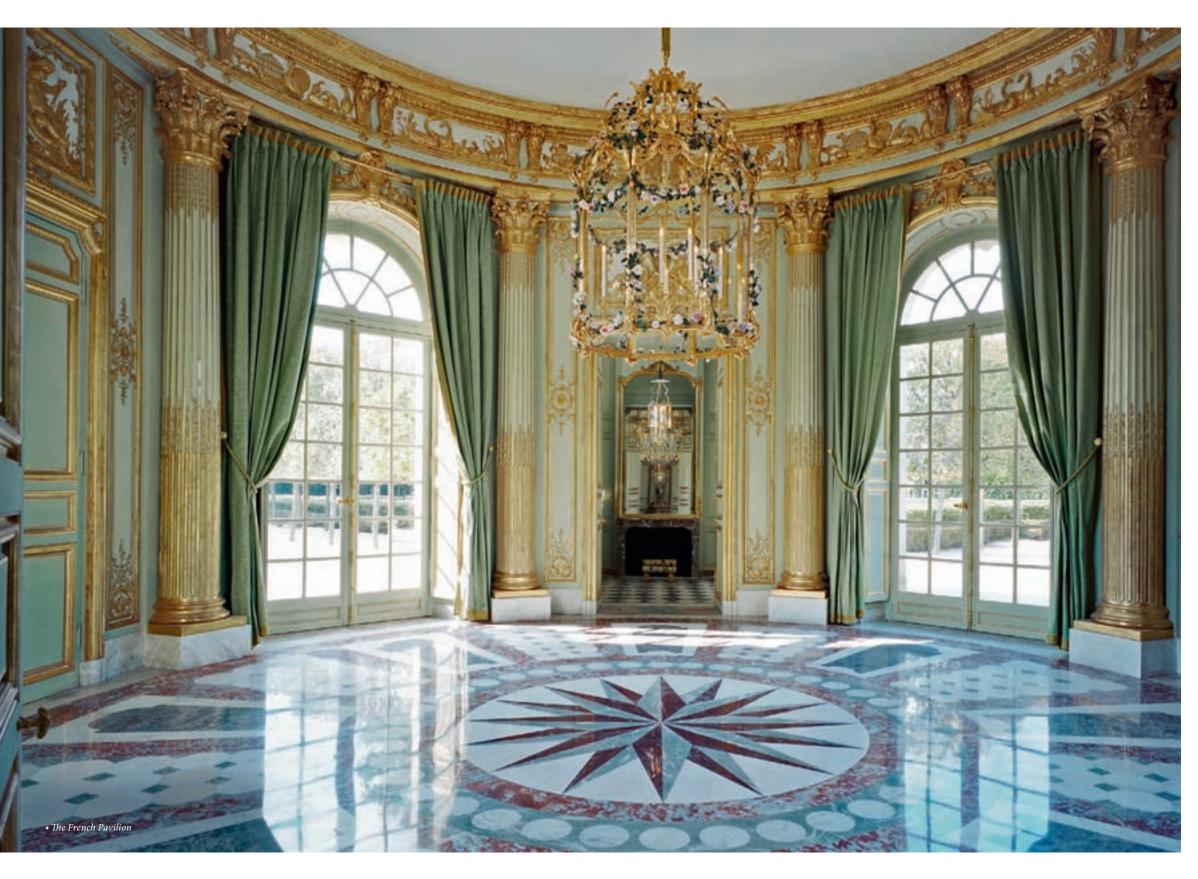
respects in which the designs have evolved in the intervening two centuries. First, Breguet himself did not plate his guilloche dials. Fashioned out of either gold or silver—Breguet used both—the dials would bear the color of the material unaltered. Today, modern Breguet metal dials are either fashioned out of solid gold or, for some of the women's collection, out of mother of pearl. The gold dials are now given a subtle plating of silver, not done in Breguet's



time, to confer an even greater visual depth. Second, still engraved using the same general type of rose engine tool—completely hand powered and controlled as it was in the past—new patterns have been added to the repertoire offering an ever richer visual diversity than ever before.

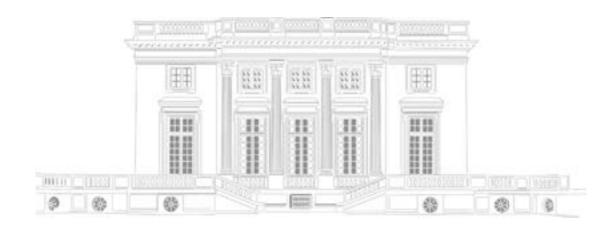
Think of the photos in this story as paintings in an art exhibition. Each turn of the page will take you into a new display room in the Breguet guilloche gallery.





THE PETIT TRIANON

Professor Marie-Hélène Huet



rance is dotted with castles enlivened by the memories of gracious hostesses from the past. Two stand out among them: Chenonceau, the elegant structure, built across the Cher river and forever associated with the enchanting Diane de Poitiers, mistress of King Henry II; and the Petit Trianon, the charming palace that housed the happiest summers of Queen Marie-Antoinette before the French Revolution.

*** * ***

The Petit Trianon was first conceived as a royal gift from Louis XV to his mistress, Madame de Pompadour. Madame de Pompadour, a commoner, had won the king's heart through her beauty and intelligence and, from her first encounter with the King in 1745 until her death in 1764, she had encouraged and protected the development of the arts. The Petit Trianon project was entrusted to Jacques-Ange Gabriel, one of the foremost architects of the time, and construction began in 1763. But Madame de Pompadour died before its completion and the small castle was inaugurated in 1768 by the King and the notorious Madame du Barry, the lively but far less sophisticated woman who followed Madame de Pompadour in Louis XV's affections.

Nothing could be further removed from the majestic magnificence of Versailles than the Petit Trianon: only a few miles away from the royal castle, it seems magically remote, a lovely palace surrounded by a graceful landscape of curving alleys, copses and summer pavilions. Contrasting with the rigorous symmetry of the Versailles gardens, the landscape of the Petit Trianon surprises visitors, leading them to unexpected vistas along a river or toward a small lake. The small "jardin à la française," the only area left from the original gardens, provides a perfect counterpoint to the picturesque designs known as "jardins à l'anglaise" that give the appearance of uncontrived and gentle nature. No doubt there is art and a carefully devised master plan behind the park. But, like the happy summers Marie-Antoinette spent





◆ Marie-Antoinette's theater.

at the Petit Trianon, far from the pomp and ceremony of Versailles, the lovely gardens commissioned by the Queen and the small palace she made her own exude a sense of imperial children for the marriage of their elder brother, the leisure and undisturbed harmony.

in 1774 for her sole enjoyment and pleasure. No gift could have been more appreciated by the 19-year old Queen, who had grown impatient with Versailles' rigid etiquette and to a young Queen and celebrates all the pleasures associated monotonous schedules. The Queen hired the best architects with the playful tyranny of Cupid. and artists of the time to complete the interior decor and transform the landscape. She made the Petit Trianon her exclusive domain, throwing herself into the redecoration of try belies both the actual size and complexity of the Petit the main apartments, ordering exquisite furniture, sacrificing the botanical gardens for a delightful park with a river, a new vista, each floor is connected to the others through a small lake, and a grotto. She was well-served in her project complex series of staircases—some carefully hidden from by Richard Mique, official architect of the King. He per-view—each room, it seems, hides a secret. The splendid fectly understood the need to soften the severe lines of neo- apartment of the Queen occupies the main floor, along with classical architecture with the free designs that characterized the English gardens. Small summer pavilions punctuate the

sic, or the Temple of Love, erected on a small artificial island in the middle of the lake, remind the visitor that this seemingly uncontrived nature was the object of thoughtful planning. The renovation of the grounds took several years. The graceful pavilions were carefully placed to offer perfectly harmonious views of the gardens from each of the windows of the Petit Trianon.

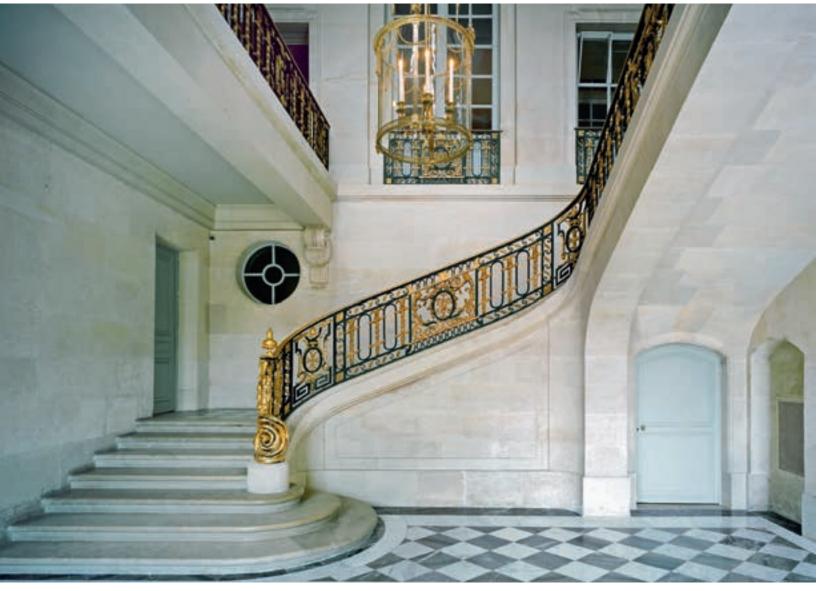
If Marie-Antoinette had to submit to antiquated protocols at Versailles, she reigned freely at the Petit Trianon. No one was allowed to come without a personal invitation. She replaced some of the large paintings that decorated the vast downstairs apartments with works that recalled her youth in Vienna. In the vestibule hang two large canvases by Johann Georg Weikert, an Austrian painter Marie-Antoinette commissioned to reproduce paintings he had made on the occasion of a play written and performed in Vienna by the Archduke Joseph. One of the paintings is entitled "The Triumph of Love" and shows the young Marie-Antoinette, Louis XVI gave the Petit Trianon to Marie-Antoinette dressed as a bride and gracefully dancing with the groom under the eyes of Cupid. The importance and symbolism of the painting are not lost on the visitor: this domain belongs

The exterior of the palace with its neo-classical symme-Trianon. Each façade is different, each window frames a public rooms and the mysterious Cabinet des glaces mouvantes (Moving mirror cabinet) where an elaborate system of curving lines of the park. The Belvedere, dedicated to mu- pulleys allowed mirrored panels hidden into the walls to



THE PETIT TRIANON WAS A GIFT

No gift could have been more appreciated by the 19 year-old Queen than the Petit Trianon intended for her sole enjoyment and pleasure.



The Grand staircase

descend and cover the windows. The system provided Marie-Antoinette with a perfectly private room, hermetically sealed from the exterior world; it was a small private space to be sure, but a space where all fantasies could be played out, away from the public censors that had plagued the Queen's life at Versailles. One can't help seeing the Cabinet des glaces mouvantes as an ironic response to the majestic Galerie des Glaces Louis XIV had built at Versailles as a reflection of his very public glory. Marie-Antoinette's private room still holds the secrets of her happiest days as Queen of cast aside by a young and free-spirited Queen.

France. With whom did she share the gracious intimacy of a Cabinet so well-protected from exterior curiosity? Wild rumors circulated, of course, suggesting that the small circle of friends regularly allowed in the Petit Trianon-among them Louis XVI's younger brother, Count of Artois, the Count of Vaudreuil, or the beautiful Duchess of Polignac participated in far-from-innocent enjoyments. Some of these libels no doubt stemmed from, or were encouraged by, the old Court's resentment at having been deliberately

Marie-Antoinette moved to the Petit Trianon every summer for several months of freedom, mistress of her time and pleasures. The King himself, it is said, only came by invitation and never spent a single night in the apartment that was prepared for him. The young Queen organized games, outings, and staged a number of plays performed in a little theater of perfect proportions, also built by Mique who had become her favorite architect. Marie-Antoinette loved the theater and, on several occasions, she had slipped away from Versailles in the company of the King's younger brother and some of his friends, to attend performances in Paris. Though in disguise, the Queen had been promptly recognized, and more libels immediately circulated denouncing yet another of her imprudent escapades. The theater of the Petit Trianon no doubt served to redirect the Queen's interest for the stage in a manner more suitable to her rank: she could attend plays without scandal, and she herself took part in several productions. Initially, only her small circle of friends was allowed to applaud her, but gradually, invitations were extended to include other privileged members of the aristocracy and some of the King's officers. Marie-Antoinette last performed as Rosine in Beaumarchais' The Barber of Seville in 1785.

After the French Revolution, the Petit Trianon briefly served as an inn before being reclaimed by Napoleon, who gave it to his favorite sister, the beautiful and slightly scandalous Pauline Borghese. Certainly, Pauline's adventurous life did not allow her to spend much time in this peaceful retreat. After the death of her first husband, Charles Leclerc, she married Prince Camillo Borghese and moved to Italy where she would be immortalized by Antonio Canova as Venus Victrix, a splendid semi-nude sculpture now housed in Rome's Galleria Borghese. The Duchess of Angoulême, Marie-Antoinette's own daughter, spent a few days there, during the July Monarchy. The small palace was later



• Console designed by Jean-Ferdinand Schwerdfeger in 1788 for Marie-Antoinette's bedroom.

VISITORS TO THE PETIT TRIANON CAME BY INVITATION

Summers in the Trianon brought freedom for the Queen. Those surrounding her there came by invitation, even the King, who came only once.



Marie-Antoinette's bedroom.

WEACH APARTMENT HAS A
UNIQUE MOTIF AND COLOR
The rooms of the Petit Trianon carry
the memories of the delights of
the Queen and who would have dared
check her amusements?

the object of Empress Eugenie's devoted care. The Empress revered the memory of Queen Marie-Antoinette and bought back part of the furniture that had been sold during the French Revolution. Marie-Antoinette's summer residence finally became a museum in 1867. Though never completely abandoned, the Petit Trianon remained in a state of passive conservation, gradually fading in the shadow of Versailles, until the great storm of 1999 unexpectedly led to renewed interest in the Queen and her private domain.

It all started with the death of a 300-year-old oak tree, said to have shaded Marie-Antoinette at Versailles. Weakened by the storm, the oak died in the heat wave of 2003 and the historical tree had to be cut down. Montres Breguet—whose founder, Abraham-Louis Breguet, had enjoyed a long association with both Louis XVI and Marie-Antoinette—became interested in the fate of the old tree and gradually considered a partial restoration of the magic garden and its enchanted palace. A meeting took place in the Valley of the Joux "in a wintry décor worthy of a postcard," as Nicolas Hayek recalled. By the end of the meeting, Montres Breguet had decided to assume full responsibility for the entire renovation of the Petit Trianon.

It was on another very cold and snowy day that we had the privilege to visit the Petit Trianon in the company of two young historians and one of the small palace's curators. A north wind swept across the large esplanade that leads into Versailles courtyard, and we were grateful to be driven by car through the immense park to the door of Marie-Antoinette's private domain. Few visitors had braved the cold, and we felt particularly welcome in the intimate warmth of the palace. The decision to restore the Petit Trianon as it was in the days before the Revolution took the royal family away from Versailles forever, enables the visitor to have a vivid sense of Marie-Antoinette's taste and love of the arts. Going



• The music room.

past the public rooms now open to the public, we were taken for a tour of the "entresol" and the "attique," the second floor where a complicated series of apartments, corridors, hidden stairs and molded panels gave us the feeling of entering a magic space.

Sumptuous and vividly-colored brocade panels frame the windows; tapestries and wallpapers carefully reproduce the initial designs chosen by the queen. Here a charming bouldoir invites intimate conversation; there a delicately ornamented bedroom suggests the most gracious form of hospitality. A small chair adorned with a garland of roses with its matching footrest has been delicately re-upholstered; carefully lifting its protective dust cover, the curator's hand revealed the initial upholstering, absolutely identical to the new one, only faded. This brief glimpse at the original fabric made suddenly palpable the lapse of time that had occurred, one that put a tragic end to the Petit Trianon's dream of happiness. But it also showed how the restoration had recaptured with exquisite details the fragile charms of the past.



• The Temple of Love in the English Garden of the Petit Trianon.

Each apartment has a different motif and slightly different colors, variations and harmony on the soft grey and the light green characteristic of the period. Friezes break the severe lines of neo-classical furniture; curves everywhere soften the interior paneling: the doors of corner cabinets are rounded, as are the locks that close them, suggesting well-kept secrets in a cocoon-like existence. One tends to whisper, afraid of breaking the spell of bygone years. Unsuspected doors open into the wood-panels; hidden corridors and staircases take you to yet another part of

a building you first thought was a simple cube, but turns out to be a labyrinth.

Exploration of darker corners reveals a different side of the charmed life that once animated the Petit Trianon: in between private apartments, small rooms without windows and furnished with a simple table and chair, indicate the places where invisible servants waited to be called. The dining room itself became famous for an ingenious design meant to mechanically raise and lower fully-set tables through the floor

so that meals would appear and be served by an invisible staff. The mechanism was never installed but it can be seen both as the symbol of a palace where everything would work as if by magic, and a sign of the deep divisions between social orders that would soon contribute to a revolution.

But the Petit Trianon still carries the memory of the delightful times that preceded the storm: "Who would have dared to check the amusements of a young, lively, and handsome Queen?" wrote Madame Campan, Marie-Antoinette's first lady-in-waiting. In her Memoirs, Campan described one of the evenings that contributed to the Petit Trianon's fairy-tale reputation:

"A fete of a novel description was given at Petit Trianon. The English garden was not illuminated, but lighted, producing a charming effect. Earthen lamps, concealed by boards painted green, threw light upon the beds of shrubs and flowers, and brought out their various tints. Several hundred burning fagots in the moat behind the Temple of Love made a blaze of light which rendered that spot the most brilliant in the garden." Music and dances, brilliant nights, endless games, these were the perfect summers that preceded 1789. "I hold no court there, "declared Marie-Antoinette, "I live like a private person, and M. Campan shall always be employed to execute orders for the private fetes I choose to give there." ³

- Madame Campan, Mémoires sur la vie privée de Marie-Antoinette, chapitre IX.
- ² Madame Campan, Id., chapitre VIII.
- ³ Madame Campan, Id., chapitre IX.



 At the dedication ceremony of the restored palace, Nicolas G. Hayek presents the Breguet Marie-Antoinette watch nestled in its box fashioned of oak from the Queen's fallen tree.

BROUGHT TOGETHER BY A STORM

The death of a 300-year-old oak, whose shade was favored by Marie-Antoinette, set in motion a chain of events which led to Breguet's financing of the restoration of the Petit Trianon.

A GHOST STORY 2

On 10 August 1901, two English women, Charlotte-Ann Moberly and Eleanor Jourdain, visited Versailles and walked through the park in search of the Petit Trianon. The weather was oppressively hot, and the two women became lost after taking a wrong turn.

As they wandered through unmarked lanes green or gold near the edge of the handkerchief, and among trees that looked strangely "flat and which showed that it was over, not tucked into, lifeless," they reached the edge of a wood close to her bodice, which was cut low. . . . I looked the small round Temple of Love. One of them straight at her; but some indescribable feeling observed a semi-abandoned farmhouse and gar- made me turn away from her being there."4 deners dressed in old-fashioned garb, the other saw a man seated near a kiosk with a face marked surprising scenes but did not confide in each by smallpox and a malevolent look. After cross- other until a few days after their strange experiing a bridge, and meeting several other characters ence. They were extremely surprised when they curiously dressed, they finally reached the Petit realized that where one had seen a woman with a Trianon, where Moberly observed a scene that girl, the other had not noticed anything, or that made her uneasy: "[A] lady was sitting, holding the malevolent gentleman had only appeared to out a paper as though to look at it at arm's length. one of them. I supposed her to be sketching, and to have she must be making a study of the trees, for they the Petit Trianon under the pseudonyms of Elizachief fashion, and there was a little line of either the hope of identifying the strange characters

Moberly and Jourdain each saw different and

Ten years later, Moberly and Jourdain finally brought her own camp stool. It seemed as though published an account of their disturbing visit to grew close in front of her, and there seemed to be beth Morison and Frances Lamont. Troubled by nothing else to sketch. She saw us when we the fact that, although they had both experienced passed close by; she turned and looked full at us. a sense of oppressive uneasiness, they had not It was not a young face, and (though rather pret- seen the same characters, they wrote two separate ty) it did not attract me. She had on a shady accounts of their wandering in search of Mariewhite hat perched on a good deal of fair hair that Antoinette's domain. An Adventure recounted fluffed round her forehead. Her light summer their experience and detailed all the research they dress was arranged on her shoulders in handker- had done subsequently in the French archives in



intimate friends and a habitué of the Petit Tri- disquieting journey into the past. anon. The woman seated and sketching in a light green dress, and only seen by Moberly, was tit Trianon, the last visitors had departed. As we clearly similar to Wertmuller's portrait of were walking through the handsome rooms that Marie-Antoinette described by Madame Cam- make up the Queen's apartment, a high-pitched pan. Moberly was sure they had never seen the sound was audible that seemed to come from a portrait before because it had been sent to the glittering chandelier. One of our guides turned Swedish Court.

than those of traditional ghost stories: "We won- and goes, no one can figure out what causes it." dered," Morison/Moberly writes, "whether we Impulsively, I turned to the curator and suggesthad inadvertently entered within an act of the ed: "The Ghosts, perhaps?" Shocked, she quick-Queen's memory when alive, and whether this ly exclaimed: "You don't believe in that! Do explained our curious sensation of being com- you?" "No, of course not, I hastened to reply. I pletely shut in and oppressed. What more likely, don't believe in ghosts haunting the Petit Triwe thought, that during those hours at the Hall anon." Nonetheless, lending a careful ear to the of the Assembly, or in the Conciergerie, she had eerie sound, wasn't it just possible to hear the gone back in such vivid memory to other Au- murmur of light voices and the echo of distant gusts spent at Trianon." Interestingly, they music? This exquisite little castle, so perfectly could find no signs on any modern map of the and lovingly restored, throws a spell on visitors, landmarks they had observed on their way to the and nowhere is the memory of pre-revolutionary Petit Trianon. But they identified the kiosk and pleasures more profoundly felt than within Mathe bridge on earlier maps and in the description rie-Antoinette's private domain. If you visit the of projects for the renovation of the gardens.

comments among parasychological societies. It lier: you may hear in a high-pitched murmur the Eleanor Jourdain, that the two authors were out from Weikert's "Triumph of Love." women of highly respectable background. Moberly had served as Principal of St Hugh's College at Oxford from 1886 to 1905, and was the daughter of a headmaster who later became bishop of Salisbury. Jourdain, also an academic,

• Johann Georg Weikert, The Triumph of Love.

they had encountered. Moberly and Jourdain and the daughter of a Vicar, succeeded Moberly came to the conclusion that the man with a dark as St Hugh College's Principal. A carefully face and somber look was none other than the orchestrated hoax? A summer delusion? An Comte de Vaudreuil, one of Marie-Antoinette's Adventure reads like a marvelous and slightly

By the time we concluded our tour of the Peto the others and remarked: "The sound has re-Their conclusions were rather more complex turned." "Yes, responded the curator, it comes Petit Trianon, lend an ear and listen carefully as Needless to say, the book elicited passionate you walk below the magnificent crystal chandewas reedited several times and received renewed last measures of a minuet and perhaps even catch attention when it was revealed, after the death of a glimpse of a young Queen graciously stepping

An Adventure, London, MacMillan and Co, 1911,



e live in an age of musical ubiquity. To put a fine point on it, it is practically impossible to escape its presence. The tsunami of tunes comes at us from all directions—CDs, radios, iPods, mobile phones, data streams, downloads. In the same way that it seems that one is never more than 50 meters away from the nearest cappuccino, music's proximity, thanks to digitization, at times overwhelms.

Centuries ago this most decidedly was not the case. Each encounter with music was magical, doubly so if the music emanated from a music box which mechanically could produce sound without the presence of a musician. If the path to musician-less music is traced back far enough, one arrives in 9th century Mesopotamia, when the Persians produced a hydro powered organ that utilized a rotating drum equipped with small pins to formulate the tunes. Although, owing to its flowing water source of energy, this Persian design was hardly destined for prominent mantle pieces, much less a vest pocket, the design was remarkable in one respect: its use of a rotating drum with attached small pins to "record" or "program" the music. The principle of the drum and pins was destined to persist for centuries in ever more advanced music boxes.

The marriage of a clockwork and a pinned drum arrived around the end of the sixteenth century and propelled the genre to prominence as a symbol of wealth. Two advances, both Swiss, coming within a few years of each other allowed, for the first time, the production of musical pocket watches. The first in 1796 by a Geneva clockmaker, replaced the bells that were the usual sonnerie with a comb. The comb was composed of a number of bars or, later, small teeth each sounding a particular note. The second, arriving four years later, introduced a rotating pinned disk to replace the rotating barrel, which for a thousand years had been the standard programming element.

The zenith of the musical pocket watch genre arrived in early 1800's as a variety of timepieces were produced, some using rotating drums, others, rotating disks but both types playing the melody on fine comb teeth. The difficulty in constructing these elaborate timepieces was the location of the pins on the drum

MECHANICAL MUSIC BOXES

Despite a history spanning centuries
and frequent incorporation in
pocket watches, mechanical music
boxes have remained distant from
the world of wristwatches.





or disk. Great precision in the placement was required. Eventually a form of "typewriter" was developed. A musician, at the proper tempo, would strike keys for each individual note which would, in turn, place properly spaced and located marks on a rotating drum or disk which had been inserted into the "typewriter". Thereafter, the watchmaker would insert pins in the position of each of the marks so that the melody would play on the watch as the musician had played it on the "typewriter". The demands of this difficult and technical construction guaranteed the position of musical watches at the top of the pyramid of complications and, of course, price. In accord with their lofty station and price, these rare and special watches were generally outfitted with the finest cases of the day and, often, with the most expensive hand-crafted dial or case decoration, such as enamel painting. It is even reported that both Mozart and Haydn wrote special compositions for the "relatives" of musical watches: wall and table clocks known as Flötenuhren in German.

Although essentially all pocket watch complications have made the jump to wristwatches, it seems as if the musical complication has been overlooked, at least until now. With its introduction of the Réveil Musical, Breguet has fully revived the grand tradition and lore of this rare and romantic genre and achieved no less than a world premier—the first mechanical musical sonnerie paired with a réveil (sounding alarm) in a wristwatch.

Moving a complication from the generous dimensions of a pocket watch into the confines of a wristwatch has always been a watchmaking challenge. The fact that no one before Breguet has succeeded in offering a full musical sonnerie in a wristwatch is a vivid testament to the enormity of the task in miniaturizing this complication. It can be said that essentially all of the other classic pocket watch

complications have been translated into wristwatch dimensions simply by making the components smaller. Perpetual calendars, tourbillons, chronographs (both regular and split second), minute repeaters, two time zones, world time, equation of time, all of these have found their way into wristwatches through the process of miniaturization, leaving the basic design of the complications intact from the ways in which they were originally conceived and implemented in pocket watches. That truism does not apply in the same way when it comes to a musical sonnerie. Much more was involved than shrinking the size of the components.

Of course, all of the challenges of a traditional pocket watch musical sonnerie were present when Breguet undertook to develop the Réveil Musical. Breguet had to settle on a method for programming the melody and a method for sounding the notes. Here classical design ideas could be applied—a rotating disk with pins for programming the melody and a comb for sounding each of the notes. As we saw, both of these concepts were born around 1800.

But these elements, daunting as they are to miniaturize for a wristwatch, represent only a fraction of the issues which confronted Breguet when work began on the Réveil Musical. Generating sufficient volume of sound, regulating the rhythm of the notes, and having sufficient power reserve for the sonnerie represented enormous challenges. Without full solutions for each one of these obstacles, the watch could not have been developed.

With generous dimensions, watchmakers of two hundred years ago could pack the interior of the musical sonneries with large powerful winding barrels and large scale musical teeth to produce satisfactory sound volume. As well, the large surfaces of pocket watches facilitate the radia-

*▶ BRINGING THE MUSIC BOX*TO THE WRIST

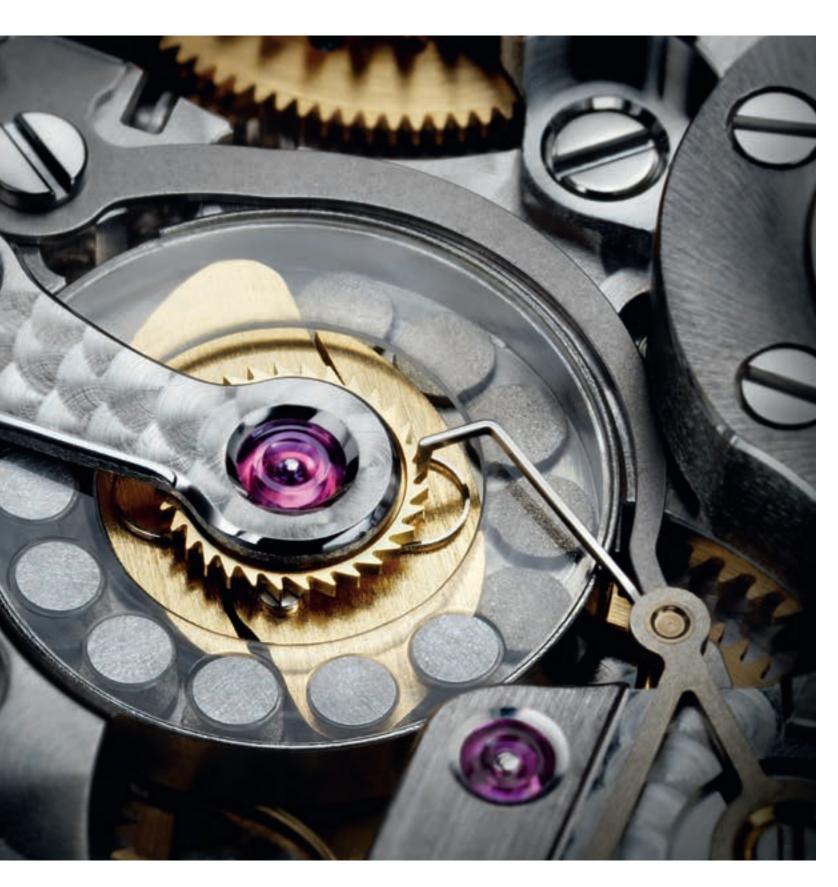
Breguet confronted daunting challenges to create a music box within the limited confines of a wristwatch.

tion of sound from the interior. It stands to reason that when the amount of energy is reduced with a smaller winding barrel, the size of the musical teeth is likewise shrunk, and the size of surfaces is diminished, the decibel level of the sound will inevitably drop. Thus, although miniaturization of the components could be achieved, boosting the level of the sound that would be heard by the owner, which is the say the number of decibels transmitted from the movement to the outside of the case, required new methods beyond those implemented historically.

The secret was finding a design that would improve the passage of sound from the movement to the outside of the case. The answer was both obvious and at the same time the evident solution introduced yet another problem. The "obvious solution" and one which another brand had used for a minute repeater watch was to open holes in the back of the case to allow the sound to flow freely from the movement to the exterior with only minimal blockage from the gold case back. Those schooled in watchmaking will quickly recognize the substitution of one problem for another; the openings in the case back may serve well to let the sound escape but they also serve to let moisture and dust, both enemies of fine movements, pass to the interior of the watch (and this other brand's repeater was absolutely water vulnerable).

Breguet approached the problem differently. Instead of thinking of holes first and sealing second, it began searching for a material that would resonate with the sonnerie, vibrating itself, in order for there to be strong sonic radiation. Traditional case back materials such as sapphire or precious metals do not naturally vibrate in the frequency range of melodies which the sonnerie would produce. The answer that Breguet found relies on a technology that only recently became available, a liquid metal membrane. The physical properties of the liquid metal membrane are like that of a drum that sounds in the proper frequency range-that of the melodies. Breguet did extensive work to develop the geometry of the liquid metal membrane so that it would have several resonance peaks falling into the range of the musical notes. The purpose of the gold case back is, thus, transformed. It serves to protect the liquid metal interior case back from damage and shocks. In addition, the cavity or air space between the liquid metal membrane and the metal case back became a subject of attention because it forms what is known to sound engineers as a "Helmholtz Cavity". Although the name is somewhat forbidding, this acoustic phenomenon is really part of our common experiences as, musical instruments such as the violin, audio equipment such as subwoofers, and even the air boxes of automobile fuel systems, exploit it. This air space has its own resonant frequencies which Breguet also tuned, by the creation of the holes, to fall into the range of music. Of course, Breguet did not settle simply with the fitting of an undecorated membrane. Even though it is hidden from sight, Breguet developed a never before attempted process to produce the proper geometry for the membrane and to decorate the membrane with a guilloché pattern. Owners may be contented to know that watchmakers who remove the case back of the Réveil Musical in order to service the watch will be greeted by the sight, sadly denied to non-watchmakers, of the world's first guilloché engraved liquid metal membrane!





The second profound problem to be surmounted was regulation of musical tempo. In common with all mechanical sonneries, the mechanism is powered by a spring barrel. Inevitably, the force of the spring is greater when the barrel is fully wound than when it is nearly fully unwound. If such a barrel were to be simply connected to a sonnerie, the effect of diminishing spring force would be a slowing in the pace of the musical sounding as the barrel is discharged. The common method for combating this phenomenon is to construct a regulator which is inserted in the train powering the sonnerie. As the name suggests, the regulator serves to insure that the tempo remains constant while the sonnerie is in operation. Typically, however, a regulator which is constructed with spinning components emits sound of its own which would intrude on the melody of the sonnerie. Once again a "solution" solves one problem while at the same time introducing another.

For a second time in the development of the Réveil Musical Breguet turned to technology. No less than a silent regulator was invented, indeed one that used a technology never before brought to production mechanical wristwatches, magnets. Normally magnets or, more generally, magnetic fields are a form of poison for watches. Traditional movement materials used in the rate keeping components of a watch are magnetic. If subjected to a strong enough magnetic field, these components can become magnetized themselves, utterly changing the finely made rate adjustments accomplished by the watchmaker when the watch was assembled. The usual solution is to demagnetize the watch, returning things to their original state. Although demagnetization is trivial to accomplish, more than one watch owner has fretted when a prized timepiece no longer was running as it had when purchased because, unbeknownst to the owner, it had become magnetized. So in looking to construct a silent magnetic regulator, Breguet

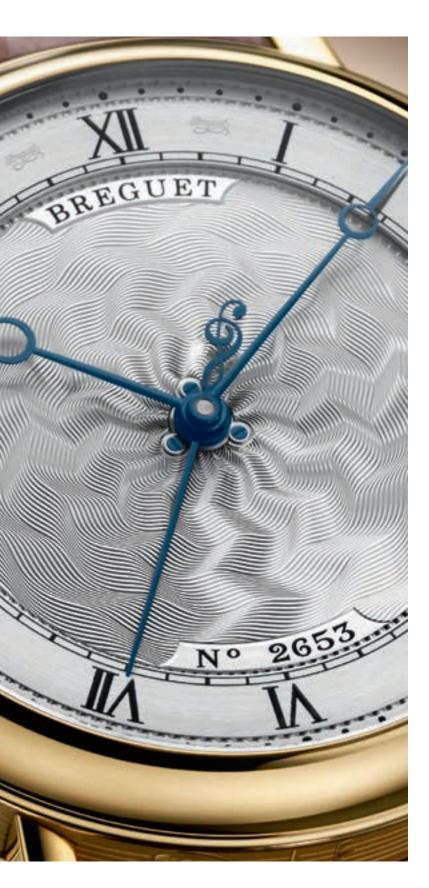




™ BREGUET'S WORLD FIRST MAGNETIC REGULATOR

Above, centrifugal force moves the silver disks of the regulator outward and more directly under the magnets, tending to slow down the rotation; below at a slower speed, the springs pull the disks inward, tending to allow rotation to speed up.

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confronted two issues: how to fashion the regulator itself and, secondly, how to insure that the magnetic materials would not alter the running of the watch.

The operating principles of the regulator which emerged from this design effort are ingenious and represent a construction never before seen in a mechanical wristwatch. In many ways the mechanism resembles an electrical generator. The rotating arms of the regulator are made of metal and are surrounded by static magnets in the exterior circumference of the regulator. As the metallic arms rotate in this magnetic environment, they produce an electrical field, which as it builds, is resisted by the magnetic field from the magnets. The faster the rotation, the greater the resistance and, correspondingly, the slower the rotation the lower the resistance. The result of all of this is a device that produces constant rotation, since both speeding up and slowing down are met with an alteration of the resistance to rotation opposite that of the change.

Not only is this utterly new system silent, but it avoids a problem associated with traditional regulator designs. The ordinary method for achieving regulation with a mechanical sonnerie relies upon friction. Generally, rotating arms inside a cylinder press against cylinder walls to regulate the rotating speed. The faster the speed of rotation, owing to centrifugal force, the harder rotating arms press against the walls, increasing friction. This rubbing of surfaces, of course, requires lubrication. Contact between two components with this traditional construction not only produces a "whirring" noise, but wear as well (which only gets worse as the lubrication deteriorates). By avoiding such contact between spinning components and an interior wall, Breguet succeed in eliminating both noise and wear. There is yet one more advantage, particularly important to movement designers; unlike friction-based regulators where

the friction characteristics are difficult to calculate in advance and which, even then, are prone to change over time, the magnetic regulator's characteristics can be precisely calculated and will remain highly stable over time.

This perfect solution, of course, necessitated dealing with the presence of magnets inside the movement. Here rather conventional methods presented themselves. In the same way that many military watches have been made "antimagnetic" by surrounding the movement with iron shielding, Breguet surrounded the regulator with an iron case. The magnetic fields of the regulator remain confined inside the iron case, thus, protecting the remainder of the movement. Two further design decisions insure that the magnets of the regulator will not affect the running of the watch. First the escapement and spiral are fashioned out of silicium which is a non-magnetic material. Second, the architecture of the movement evolved in a way that placed the regulator far away from the balance and escapement of the watch.

The last problem to be confronted was developing a sufficient store of energy to allow the melody to play long enough to be enjoyed and long enough to serve as an effective alarm. Here the solution was to find a way to fit two mainspring barrels into the movement just for the sonnerie. Remember that there must be yet an additional mainspring barrel for the running of the watch itself, bringing the total to three.

Truly to be enjoyed, a musical sonnerie should do more than sound an alarm at the appointed time. Of course the alarm function is important (and introduces complications of its own in the form of developing a method for setting the alarm time), but owners will want to be able to play the music on demand. The Réveil Musical allows for both

A MELODY THAT PLAYS ON THE WRIST

The playing of a melody requires not only perfect

regulation of the pace of the notes but a long

power reserve as well.

functions. By actuating a pusher located on the side of the case at 8 o'clock, the Musical Réveil will play its melody for 20 seconds. But there is more enjoyment than merely hearing the musical composition. Breguet located the "program" pins for the melody on a plate fastened to the underside of the guilloche dial. When the sonnerie is commanded the dial rotates for 20 seconds, which is one full turn, as the melody plays.

If the watch is sounding in the alarm or réveil mode, the music will sound for an extraordinarily long 80 second period, or four turns of the dial. Compare this with the normal sounding time for an alarm watch which is 15 seconds! Shrewd watch connoisseurs may ask what happens if the alarm is turned off in the middle of sounding. Because the program pins are rotating with the dial, the music will continue until the dial has completed its rotation and returns to its regular stationary position. Breguet's movement designers considered one other issue in their conception of the movement; what happens if there is insufficient power reserve for the sonnerie to complete one full turn? Of course there is a power reserve indicator on the dial, but what if the owner ignores it? The answer is found in a blocking system.



• Gioacchino Rossini.

When there is insufficient power reserve for the completion of one dial rotation, the sonnerie is blocked. Thus, the movement is protected from a circumstance that would leave the dial out of its proper alignment. The alarm on/off control is effectuated by a pusher located on the side of the case at 10 o'clock. When the alarm is in the on position a musical note appears in a window on the dial.

The alarm time is read on the face of the dial by a large hand bearing a treble clef on its end. One clever design feature from Breguet's Réveil du Tsar is carried over into the Réveil Musical. Traditional watch alarm mechanisms have one annoying characteristic. Because there must be a connection between the alarm mechanism and the regular time indications of the watch, resetting the hour and minute indications generally changes the time set on the alarm. Said another way, once an alarm time has been set, if the watch time is reset, then the alarm time will move requiring that it be reset as well. Breguet solved this chronic alarm problem when it developed the Réveil du Tsar. It inserted a clutch into the time-setting components of the alarm. Thus, when the crown is pulled to reset the time on the watch, this clutch disengages the alarm mechanism. As a result, the change in the watch time has no effect on the preset alarm time. This same clutch design has been incorporated into the Réveil Musical.

The initial tune for the Réveil Musical is Rossini's "La Pie Voleuse" ("La Gazza Ladra" or "The Thieving Magpie"). It is fitting that a Rossini melody was chosen for the debut of the watch as Rossini was a Breguet owner.

The base movement that powers the watch is Breguet's in-house caliber 777 which features a silicium escapement, a Breguet overcoil on the free sprung balance wheel spiral (also in silicium), and gold regulation screws. This caliber offers a 60 hour power reserve.

The Réveil Musical will be offered in both yellow gold and white gold.







f one picks up bits of history here and there, it is easy to glide one's way to the conclusion that Abraham-Louis Breguet was a French watchmaker. After all, except for two years, he lived in France from 1762 until his death in 1823 and was a French citizen. His longest lasting commercial address was 39 Quai de l'Horloge on the Ile de la Cité in Paris. His roster of clients abounds with French notables: Napoleon, Marie-Antoinette, Louis XVIII, Charles-Maurice de Talleyrand, and General Charles-Victor-Emmanuel Leclerc. He was admitted to the French Académie des Sciences. His wife was French. His son and grandson successfully maintained his watch business in France for decades after his death. His great-great grandson, Louis Breguet was a French aviation pioneer.

But, in fact, Breguet was Swiss.



 Le Château de Prangins, the Swiss National Museum in the Suisse Romande. Left, Zürich's Landesmuseum.

Recognizing Breguet's Swiss heritage, the Swiss National Museum honors his lifetime of unmatched watchmaking achievements with two special exhibitions, one in Western Switzerland at the Château de Prangins and one in Eastern Switzerland in Zürich.

first 15 years were spent in Switzerland, sadly many of them as an orphan. Although he moved to Paris in 1762 to ap- Neuchâtel and Le Locle. prentice and take up the profession of a watchmaker, Breguet developed and maintained strong ties to other Swiss artisans working in Paris. Among the circles of Swiss in Paris thoud, one of the early pioneers of marine chronometry; Jean-Antoine Lépine, a renowned clockmaker originally from a small town near Geneva; and Jean-Pierre Droz, from La Chauds-de-Fonds, a medallion and coin maker. But Breguet's Swiss ties went well beyond those living in Paris. He cultivated contacts with Abraham-Louis Perrelet, also from Neuchâtel and a watchmaker, and a wide network of Swiss suppliers of components for his watches.

In the post French Revolution turmoil, Breguet, even though an early supporter of the revolution (paradoxically, as his clients were most decidedly on the other side of that political divide), sensed that his association with somewhat rather moderate factions had placed him under the shadow of suspicion. His response was to flee with his family to the Abraham-Louis Breguet was born in Neuchâtel. His relative safety of his native Switzerland. He was to stay two years, part of the time in Geneva and the remainder in

This two year interlude in Switzerland was far from a lost time. He spent two and a half months in Geneva which in which he traveled were Neuchâtel native, Ferdinand Ber- allowed him to cement further relationships with suppliers of wheels, spirals and other components with whom he had dealt from his Paris workshops. Even more ambitiously, he undertook the relaunch of an old watch movement facility, originally created by Voltaire, in Ferney, a small village near the present day site of the Geneva airport. This was truly a bit of a dare-devil undertaking. At the time the French were imposing a series of economic blockades on the city of Geneva as part of a plan to seize control. This had the effect of



making development of facilities within Geneva prohibi- period of extraordinary brilliance. In addition to his workwhen he was admitted to the Société des Arts de Genève.

assembly to supply his Paris facility. Associated with the in synch with the clock). assembly operation was a development laboratory where Breguet concentrated on movement experiments.

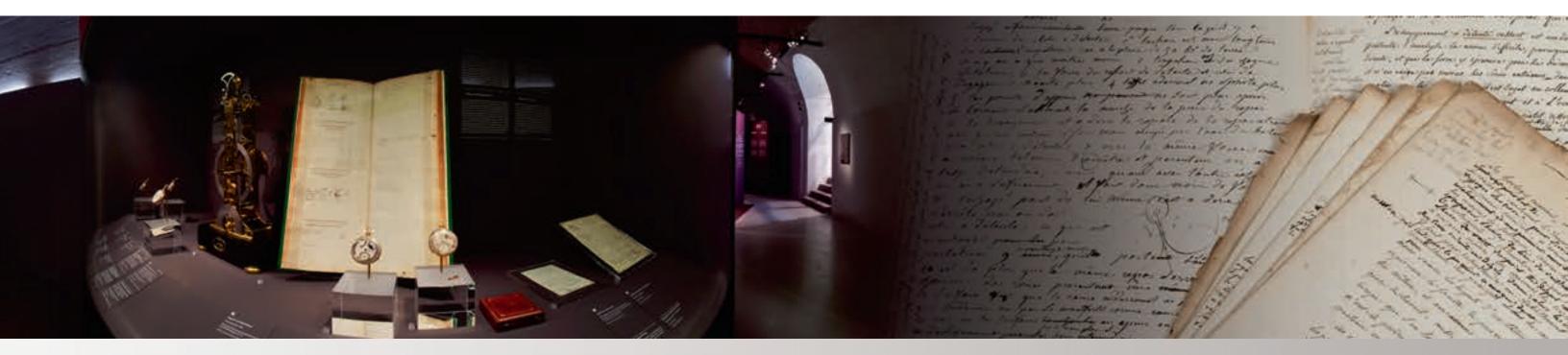
are consumed by mere survival. Invention, creativity, in- as he conceived an entirely new way of selling watches, by spiration are pushed to one side with the disruption. But souscription. Breguet's notions for his souscription timefor Breguet his two year interlude in Switzerland was a pieces were both revolutionary and pointed the way to mod-

tively expensive. Ferney, as today lay, on the French side of shop projects in Geneva and Neuchâtel, Breguet laid the the border, which although presenting political risk to Breggroundwork for a host of innovations that burst forth on uet, offered fewer economic obstacles. Regrettably, the his return to Paris. First among them was the conception combination of these circumstances proved too forbidding of the tourbillon. Savor, if you will, this thought for a moand Breguet was ultimately unable to re-open the Voltaire ment. One of the most important inventions in the entire workshops. Not all was for naught during these months in history of watchmaking was begun while Breguet was a Geneva for a type of recognition that would only come to refugee. The tourbillon was not the only invention hatched him later after his return to France was bestowed upon him during this Swiss period. As well, he conceived the montre à tact (a watch with a single exterior hand which allowed the time to be "read" by feeling the position) and the sym-His months in Neuchâtel and Le Locle proved more pathetic clock (a clock with a companion pocket watch productive. There he established a workshop for movement that could be placed in a holder and automatically be reset

The fertility of his imagination during these two years was not confined to new conceptions of watches. His atten-Ordinarily, those uprooted from home and business tion extended broadly to the business side of his enterprise

ern watch serial production. In his time, watches were essentially bespoke pieces, each watch being unique. Breguet's souscription watches were imagined instead as being both uniform and simple, featuring enamel dials and a single hand for telling time. By adopting a standardized design Breguet had anticipated the way watches would be made by others in the decades to come, and for that matter today, as his new ideas were no less than the first steps toward serial production. Not only did Breguet achieve lower prices for these simpler standardized watches, thereby expanding his client base to a broader class of people, but he conceived a new business model for selling with that same democratic goal in mind. Under his new business model, the client paid a portion of the purchase price of the watch (usually one third) at the time the order was placed and made additional payments during production and at delivery. This stood in bold contrast to the common business practice at the time of demanding full payment when the order was placed.

The tapestry of Breguet's life and career is easily seen as both a Swiss and French composition, with neither able to **EXHIBITIONS WITHOUT PRECEDENT** Breguet is the only single watchmaker to be honored by several of the world's premier museums.



plans were laid down for an exhibition paying homage to Not only did the exhibit draw more than 110,000 visitors his works, it was evident from the start that it must be over its short two and half month's stay at the Louvre, but shown both in France and Switzerland.

The debut of the French/Swiss exhibit took place in the Louvre from June through September 2009. It was an exhibition without precedent. This was the first time that the or of a dedicated major exhibit in one of the world's prestige the world. museums is unique to Breguet and has never been conferred upon any other single watchmaker. Prior to the current French/Swiss exhibit which debuted in the in Louvre, in St. Petersburg in 2004.

be isolated or extricated from the other. So it was that when rette; and the Ambassador of Switzerland, Ulrich Lehner. the catalog created for the event became the number one seller in the Louvre's museum book shop during the period!

The Swiss National Museum in two of its locations is home to Swiss portion of the exhibit: from June-September Louvre had devoted one of its prime exhibit rooms, in this 2011 at the Chateau de Prangins in Western Switzerland and case the Salle de la Chapelle located adjacent to the entry from October 2011-January 2012 in Zürich's Landesmusepyramid, to a single watchmaker's works. Indeed, the hon- um. Thereafter, the exhibit is destined for showings around

There are slight variations in the composition of the watches on display, depending on the location, but approxi-Breguet's works were celebrated in the Hermitage Museum mately 120 watches and clocks have been brought together for the first time. The exhibit is much more than an assembly of watches in display cases. For many of the most impor-The importance of the French/Swiss exhibit was undertant pieces, Breguet's historian has paired the time piece with scored at the Louvre opening. In attendance were the late copies of Breguet's meticulously hand written records docu-Nicolas G. Hayek; the President of the Louvre, Henri Loy- menting its creation from the original order, through the

steps of its construction, ending with the final delivery to Breguet's client. Reading these documents from the archives is to be transported 200 years back in time and to become a witness in Breguet's legendary Paris workshops on 39 Quai de l'Horloge to the birth of a now priceless masterpiece.

HIGHLIGHTS
FROM THE EXHIBITION

Sold 1814 to the future King of England George TV Today owned by H.M.

Queen Elizabeth
and H.R.H. Prince Philip of England.



♦ *No. 666/721*SYMPATHETIC CLOCK AND WATCH:

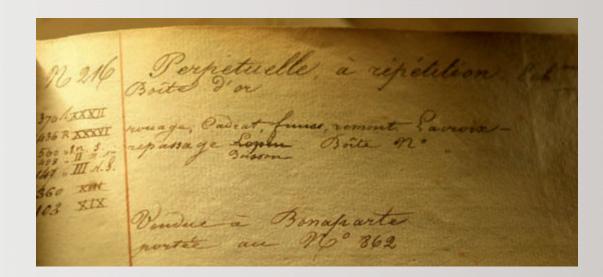
AND WATCH: clock with silver dial rimmed in gold, mahogany case with four windows; watch with enamel dial and gold case. Sold August 1814 to the future King George IV of England; on loan for the exhibition from H.M. Queen Elizabeth and H.R.H. Prince Philip of England.

HIGHLIGHTS FROM THE EXHIBITION

Purchased in 1798 by Mapoleon Bonaparte

◆ No. 178 QUARTER-REPEATING TRAVEL CLOCK WITH ALMANAC:

gilded bronze case with Doric columns, three glass sides, silver dial with large window for the phases of the moon, imitation plaque of gilded metal with engraved scrollwork and three windows for date, month and day of the week. Eight-day movement with straight line lever escapement. This travel clock was purchased by Napoleon Bonaparte in 1798 a month before he began his Egyptian campaign. This was included in a purchase of three timepieces by the General Bonaparte all of which were to be part of his equipment for the war.





HIGHLIGHTS FROM THE EXHIBITION

Constructed for Marie - Antoinette

MINUTE REPEATING PERPETUAL
WATCH "MARIE-ANTOINETTE":
gold case, rock crystal dial, gold and
steel hands, complete perpetual calendar,
equation of time, power reserve
indicator, metallic thermometer, large
independent seconds hands and seconds
subdial. This is a faithful recreation of
the original Marie-Antoinette constructed by Montres Breguet, 2004-2008.







Sold in 1800 to Empress Joséphine Bonaparte

◆ No. 611

SMALL "TACT" MEDALLION WATCH: blue enameled gold case, diamond set pointer, tact studs of large round diamonds, silver dial, ruby cylinder escapement. Sold to Empress Joséphine Bonaparte in February 1800. The watch was later given by Joséphine to her daughter, Hortense de Beauharnais, Queen of Holland, at which point it was adorned with diamonds in the form of a crowned letter "H" and reset with diamonds larger than those originally set into the watch. A "tact" watch is one offering a large exterior hand, the position of which could be felt to tell time in the dark.







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